



Number 5, September 1995

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RECENT TRENDS IN IRRIGATION MANAGEMENT CHANGING DIRECTIONS FOR THE PUBLIC SECTOR

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This paper discusses responses to the under-performance of irrigated agriculture, highlighting the changing relationships between the state and users in the operation and maintenance of publicly-funded irrigation schemes. It begins with a summary of the reasons for and responses to under-performance in the sector and then outlines the institutional and economic background that favours local cooperation and coordination in irrigation management. The focus of the paper is on management transfer and privatisation of irrigation, with reference to the broader problem of inter-sectoral water allocation and the accompanying transformation of the role of state agencies from implementation to service provision and thence to enablement and regulation.

Declining investment in irrigation

Rapid irrigation development has taken place throughout the 20th century, with increasing levels of public finance through the post-war period, aimed at the full spectrum of gravity-supplied irrigation and groundwater exploitation. Despite the success of irrigation in supporting the Green Revolution in Asia, irrigation schemes have often under-performed in economic terms, and field research has highlighted substantial shortcomings in management (operation and maintenance), equity, cost-recovery and agricultural productivity. Reasons for this include:

- unrealistic productivity projections at appraisal;
- capital cost over-runs;
- substandard construction or design;
- poor system management and service provision;
- poor understanding of farmer priorities and inadequate markets for produce.

Public investment in irrigation development tailed off from the 1980s as fiscal constraints set in and external funders became disillusioned with the economic performance of previous investments. This period has also seen a significant decline in the international prices of major irrigated crops such as rice and wheat, and diminishing marginal returns to farmers input use in intensively cultivated areas. This has contributed to reduced profitability and to the decline in external and domestic financing. Further, growing environmental concerns over the impacts and costs of large water development projects have stimulated more interest in the careful use of water than in simply increasing its supply.

Policy options in response to poor economic performance are summarised by Rosegrant and Binswanger (1994):

- Technological solutions, including rehabilitation, modernisation and water conservation technologies.
- Reform of public management of irrigation systems.
- Communal water management through improved farmer participation.
- Establishment of tradeable property rights in water and the development of markets in water rights.

Given that management initiatives to achieve improved economic and technical performance form the focus of this paper, some initial consideration is needed of what contributes to effective management and why public agencies have failed to deliver satisfactory service.

Improving management

Five essential elements underwriting effective irrigation management have been identified by Vermillion (1994), that:

- 1) clear and sustainable water rights are accorded to users, at an individual or group level;
- 2) the irrigation infrastructure should be compatible with the water rights allocated and with local management capacity;
- 3) clear and recognised responsibilities and authority are vested in the managing organisations;
- 4) adequate financial and human resources exist to operate and maintain the infrastructure and the managing organisations; and
- 5) there is transparent accountability of, and supporting incentives for, the managing entities.

The culture of service provision is, to a large extent, missing from public agencies involved in irrigation: construction has long dominated the agenda, driven by the prevailing professional identity of the engineer as designer and, on some occasions, by the possibilities of illicit diversion of funds which construction contracts offer. This void has allowed local elites to capture disproportionate shares of water. Stronger participation by the bulk of farmers in water management through Water Users Associations (WUAs) has been widely promoted both to enhance efficiency and to counter such inequities.

Communal water management and farmer participation

In a number of Idcs over the last 15 years WUAs have been primarily concerned with the management of either entire small-scale gravity or groundwater irrigation projects, or local sub-systems within large and complex gravity schemes. Considerable insights, which have helped in the design of WUAs, have been obtained from research into traditional small-scale farmer-managed irrigation schemes (FMIS) through the 1980s and, in the last decade, from rapid development of private groundwater irrigation, notably in Bangladesh, India and Pakistan. Thorough analysis of institutional arrangements in FMIS has prompted Ostrom (1990) to propose institutions for common property resource management as a viable alternative to privatisation.

Attempts to improve service delivery by public agencies have been closely bound to the development of more user autonomy and there is now a wide consensus that irrigation system performance is determined by 3 groups of factors: physical/technical; social/economic; policy/agency. However, in practice it is difficult to divorce technological from institutional change; existing arrangements reflect both the initial design and construction of irrigation systems, as well as their subsequent evolution.

Although WUAs have been shown to improve irrigation system performance, they do not operate in a vacuum and are themselves affected by the factors mentioned above. A recent review (Meinzen-Dick et al., 1994) concludes that there is a need for an integrated approach between WUAs, technology, the state and the market in realising high performance:

- Although water is increasingly attributed **economic characteristics**, there is a need to complement or substitute for the organising and coordinating principles of the market due to the numerous sources of market failure inherent in the nature of water resources management.
- There is a need for institutions to minimise transaction costs involved in coordination of individual and group activities in irrigation management.
- Technical 'fixes' without corresponding consultation and user participation have failed.

Broader and more direct farmer representation in WUAs generates stronger incentives to distribute water equitably and supplies better local information on irrigation needs which may improve flexibility in operation. A greater sense of ownership by the WUA and its members stimulates improved monitoring and system maintenance. The resulting rewards to WUA membership include improved income arising from the expansion of the net irrigated area and rising agricultural productivity.

New approaches to financing and delivery

The full recovery of construction, operation and maintenance costs of publicly-managed irrigation has been rare in both developed and developing countries. The importance of restricting continued government subsidy has prompted more than 20 countries to promote programmes of '*irrigation management transfer*' (IMT) to users, sometimes bolstered by an over-optimistic view of what WUAs can achieve. The form taken by IMT varies by context: cultural; climatic; topographic; macro-economic; and depends on the scale and type of irrigation system involved.

Approaches include **decentralisation** (for a review of these concepts see NR Perspectives No.4) within public service agencies and **devolution** of rights and responsibilities for local management to formally established WUAs. Various forms of **privatisation** have also been tried, ranging from franchising sub-systems (contracted management under farmer ownership) to full ownership of the entire infra-structure, involving some form of capital repayment to the state. Privatisation includes ownership and management by not-for-profit organisations such as cooperatives and NGOs. Decentralisation may in practice be little more than cosmetic **deconcentration**, where responsibilities are assigned to WUAs without concomitant rights, such that they become little more than an extension of the existing public administration. Where [water rights](#), rights of association and financial autonomy are specified for WUAs, but government retains a degree of ownership and operational responsibility for the water supply infrastructure, the term used for devolution is joint management.

Devolution and privatisation of management and ownership are promoted, in part, to increase local control over resources and management decisions, in the hope of improving responsiveness, efficiency, cost-recovery (in return for voice) and ultimately productivity. In equity terms, some revised management and ownership arrangements are likely to improve the spatial and temporal distribution of water, and so benefit low income tail-enders. By contrast, land consolidation is likely to occur with negative medium- and long-term impacts on rural equity as a consequence of stimulating water markets.

Schemes larger than 10,000 ha have rarely been privatised except in Chile and Mexico, although privatisation of smaller enterprises is found more widely in the Philippines, Indonesia, much of Latin America and parts of India. Privatisation of small-scale projects may simply involve returning coopted FMIS to farmer ownership, but there is also a tendency to nominal privatisation, where financial responsibility and ownership are not supported by adjustments to legal and institutional frameworks: this has led to charges of dumping financial obligations on users (Cernea, 1994) or virtual abandonment (Vermillion on Sudan, 1994). The debate on the effectiveness and performance of new arrangements for service provision in irrigation has as much to do with the process and mechanics of implementation as with the macro-economic setting, market incentives in agriculture, and the policy context.

Competing demands for water

Growing concern over food security is stimulating a search for more productive and environmentally sustainable use of water. Simultaneously, rapidly rising urban and industrial demands require new ways of allocating water rationally among competing users. Many of these concerns provide a rationale for IMT: water markets address the problem of inter-sectoral water allocation by allowing [water to be traded](#) to its highest value use. Water markets are dependent on clear individual or group rights to water. Allocation of such rights is simpler in privatised irrigation systems, especially if property rights are to replace usufructory ones that are the present norm.

The policy environment post-UNCED is beginning to stress the importance of rational water resources management, especially among sectoral interests, including sanitation and environment. Simultaneously, financial requirements for urban water supply and

treatment in the coming 25 years have no previous historical precedent (Serageldin, 1994), and have prompted calls for a much greater role for the private sector. Whether the private sector has the capacity and willingness to respond, depends not only on incentives and risks in the market place, but also on how effectively public agencies master their changing roles. In this new environment, public agencies are tending to be transformed further from system management into facilitators of management and development. They are increasingly involved with functions such as registration of water rights; collection, analysis and provision of hydro-logical and water quality data; regulation; and enforcement of environmental codes. This process is more advanced in some countries than others. An increasingly common feature of changing public sector roles is the introduction of [management and performance contracts](#) .

Performance of IMT

IMT s performance can be considered against criteria of:

1. Reduced public expenditure; improved cost recovery.
2. Productivity of individual schemes: improvements or changes in various linked indicators of performance, from before to after transfer situations.
3. Impact on externalities: for instance, the extent of water- logging and salinity problems.

It is too early to be conclusive about the performance of new arrangements in irrigation service provision. However some evidence is reviewed by Turrall (1995). In Colombia there has been variable performance in cost recovery and agricultural productivity, and managers tend to set low water charges under private management, resulting in neglect of maintenance. This trend has also been observed in Australia and in parts of western USA. The technical performance of certain projects declined in the early years following transfer to private irrigation associations in the Columbia Basin (USA) in the 1960s, but then improved as the new managers accumulated experience. There is a significant problem in evaluation at the moment, in that most experience comes from countries such as the US, Australia and Chile where functional systems are handed over to relatively small numbers of well-capitalised and market-oriented farmers, operating within a well-established legal framework. Mexico has followed this model, and much has been claimed for the rapid and comprehensive reform that has ensued, although little hard evidence has yet emerged to substantiate these claims and allow meaningful inferences for other developing countries, especially ones with relatively much larger numbers of small subsistence farmers.

Considerable work is required to evaluate the performance of the myriad different arrangements for irrigation management that are emerging across the developing world. Performance measurement should concentrate on the economic efficiency of turnover programmes; the efficiency of cost-recovery within turned over or privatised systems; the extent of maintenance and improvement activities; the distribution and productivity of water, and changes in the size and distribution of farm incomes. Similar substantive investigation is required to establish the soundness of developing water markets and transferable property entitlements to water in developing countries. Capacity needs to be built to allow this at a national scale and local research is needed on case studies to illuminate detailed impacts of IMT on equity, availability and cost of services, and agricultural productivity. Donors may have a role in supporting some of these initiatives.

Implications for donor programmes and policies

The crucial issue to address is the lack of an effective supporting and coordinating set of institutional arrangements for rational water management in many developing countries.

There is a clear need for improved technical, regulatory and administrative capacity in both private and public irrigation service agencies and for the development of an appropriate institutional framework to support rational allocation and management of water resources registration of water rights (supported by clear understanding of the resource base and all existing formal and informal uses); laws and codes of practice; information systems; public consultation; credit, banking and audit arrangements. Contracts are required between users and suppliers of irrigation water and transparent, accessible forms of arbitration must be instituted to support their enforcement.

As far as gravity irrigation is concerned, re-orientation of construction-minded Irrigation Departments, to becoming service agencies, needs promotion and long-term support and will partly be achieved by setting them within a more rational framework for water resources management. Where private ownership and management become dominant, it may be reasonable for irrigation agencies to become water resources managers and planners on a broader scale. Where joint management is the norm, it is preferable that there should be a new oversight body responsible for water resources management, plus additional arrangements for arbitration between state service providers and users. Such transformations provide considerable opportunity for improving public participation and accountability.

With regard to groundwater extraction for irrigation, it is clear that public agencies should restrict themselves to facilitating and regulatory roles; this is a prime instance of where the private sector has performed adequately but often at the cost of sustainable use of the groundwater resource (Shah, 1994). However, sustainable groundwater development is unlikely in many countries where regulatory capacity remains weak and energy for agricultural water extraction is subsidised, as in India and, until recently, in Mexico.

Groundwater interaction with surface hydrology, over-use and degradation highlight the need to integrate irrigation management and development within a rational framework for water resources management. The twin problems of water allocation and environmental management may prove to be the driving forces in transforming the narrow construction perspective of irrigation agencies into wider regulatory and facilitating roles.

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