MANAGING MAIN SYSTEM WATER DISTRIBUTION

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MAIN SYSTEM

The term "main system" refers to a canal system. From the headworks of a storage reservoir or diversion structure, water is conveyed and distributed from main canals to branch (secondary) canals, and then down the line of supply to minors (tertiary canals) and outlets, where it is delivered to the fields. Canal system operations are governed by a set of rules for allocating and distributing water. Normally, the irrigation bureaucracy is responsible for properly maintaining and operating the system, and for delivering water to a group of farmers at the outlets.

In South and Southeast Asia, policy makers, planners, and administrators are concerned over poorly performing irrigation systems. Problems include delays in using irrigation potential, relatively low average crop yields, waterlogging, salinity, and alkalinity; and poorly organized and managed systems.

Although, initially people thought that the best way to improve the performance of irrigation systems was to develop the farms below the outlet, it soon became clear that better and more equitable systems was to develop the farms below the outlet, and for delivering water to a group of farmers at the outlets.

In the area served and the type of crops grown. The system works smoothly as long as the command areas. The systems are designed on the concept of "duty," which is the area that can be irrigated by a unit discharge flowing continuously for the duration of the crop (the base period). In all continuous-flow systems, it is difficult to ensure that water distribution will be equitable, both at the head and tail-ends.

Canal systems run continuously for the time that the crop is in the field and serve individual command areas. The systems are designed on the concept of "duty," which is the area that can be irrigated by a unit discharge flowing continuously for the duration of the crop (the base period). In all continuous-flow systems, it is difficult to ensure that water distribution will be equitable, both at the head and tail-ends.

METHODS OF DISTRIBUTING WATER

Several types of distribution systems have evolved through practical experience or have been designed to meet specific physical and social requirements.

The rotational water distribution system, or "warabandi" of northwest India and Pakistan, is used when water supply is insufficient to provide irrigation to all the land served by the system, and rationing is necessary. It ensures a high degree of equity in distributing water, and increased efficiency, by imposing scarcity on every user. Each farmer gets his share of the available water based on how much land he holds and according to a roster that specifies the day, time, and duration of his turn. He is free to decide how best to use the water for his crops.

In the intermittent flow or "shepali" system in western India, a schedule that specifies the day, time, and duration of his turn. He is free to decide how best to use the water for his crops. The objective of the water distribution system should be to encourage efficient use of scarce water and to deliver fair, reliable, and predictable supplies at the outlet. Supplying adequate water to meet the optimal crop-water requirements for each farmer below the outlet may appear desirable, but it is not always feasible.

Managing water distribution from the main system is very difficult. Typically, systems are large and made up of many structures, controls, and people. There are complex and dynamic interactions among the physical nature of the resource and the elements of the system, and between these and the environment. These interactions are further influenced by the personnel of the irrigation bureaucracy and the farmers, who make both formal and informal decisions at various levels. People are often uncertain about how much water is available, which generates competition in sharing it. This can lead to conflicts and, sometimes, to corruption.

ASSESSING PROBLEMS

Conflict in objectives. The objectives of a public irrigation system often conflict with the wishes of the farmers who are to receive its water. For example, irrigation system managers try to maximize the yield per unit of water because water is normally a scarce resource. However, farmers try to maximize the net benefit for a unit of land because, for them, land is the scarce resource. Water may not be a scarce resource unless it is rationed.

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Deficiencies in planning and design. Systems are seldom tested to determine if they are functioning as designed. For example, although designers often assume that the government can enforce cropping patterns, such control has rarely been demonstrated. Other design deficiencies are: assuming that irrigation continues day and night, providing larger outlets than are needed, not locating outlets properly, providing direct sluices or outlets from the distributary instead of from a minor, assuming that "duties" are the same at the heads of all distributaries irrespective of their lengths, assuming that seepage and operational losses are much less than in reality, and not providing for drainage even where it is obviously necessary.

Timing phases in construction. When reservoirs are completed too early during system construction, excessive water is often delivered to the head reaches of finished canals, causing over-irrigation and consequent adjustments to cropping strategies. When the entire canal system is completed, these cropping strategies remain, causing a shortage of water for the tail-enders.

Communication in operation and maintenance. There are often no operating or maintenance manuals for the systems. Flow measurements and communications are often inadequate for effective monitoring and management. Maintenance grants are insufficient. The operating personnel are often subject to considerable pressure from local influences.

**PRIORITIES**

Priorities for research and development are:

1. Generating awareness and commitment among governments to improve system performance.

2. Preparing clear objectives in collaboration with system operators and putting into practice operational plans for specific projects. This procedure will also enable managers to determine if the system is performing as designed and indicate the improvements needed.

3. Monitoring performance, with emphasis on effective measurements in the field, especially water budgeting. Performance monitoring requires a good communication system which, in turn, leads to the development of a good information system for management.

4. Evaluating system performance, with emphasis on developing criteria and indicators of performance, and on maintenance standards.

5. Training both irrigation department personnel and farmers, and developing institutional structures that lead to effective coordination within irrigation departments and between them and farmers.

**REFERENCES**


