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9. ABSTRACT

The water laws of Pakistan do not encourage cooperative efforts among water users at the farm level, and Pakistan has no formalized pattern of local associations designed to promote the effective distribution and use of water. Such local associations should be developed, for they would support improved irrigation, increased employment, and greater agricultural productivity. Such organizations could involve farmers in local decision-making, resolve disputes, and constitute a legal contact point between the government and water users. The organizations would need to be simply structured and tailored to the religious, social, political, economic, and legal systems of Pakistan. Such organizations function well in other countries studied. The Tribunal of Waters, in Valencia, Spain, is a good model of the type or organization that would be effective in Pakistan. The authors offer 28 recommendations concerning the proposed functions of water user associations in the Indus Basin and means of developing it. These deal with a charter, bylaws, objectives, functions, formulation of rules and regulations, assessments, sanctions, jurisdictions, separation from politics, member representation, member obligations and rights, cost sharing, water course maintenance, extension and training activities, interfaces with government, and other aspects of such organizations.

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Applicability to Pakistan**

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Prepared by

George E. Radosevich



**Water Management Research Project
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WATER USER ORGANIZATIONS FOR IMPROVING IRRIGATED AGRICULTURE:
Applicability to Pakistan

by

George E. Radosevich¹

ZAMINDAR SHOT DEAD

A young Zamindar was yesterday shot dead in Nemon Goth, Madir, by a rival group over the theft of irrigation water.

*Morning Star
Karachi, 4 July 1975*

Importance of Water Laws and Institutions

Water is a basic natural resource. Without its presence and proper control over the distribution and use, progressive civilization is not possible. Indeed, there is evidence that, where regulatory controls have been efficient, civilization has grown; but where these controls have been ineffective, civilizations have declined and often disappeared.²

Water laws are the expression of basic policy and substantive provisions dealing with the use of water and the development of water resources; they are the basis for establishing the administrative rules and regulations. The underlying philosophy of each particular system of water law has a direct connection to the surrounding physical factors of its origin. Where water is plentiful, regulation is aimed at ameliorating the harmful effects of water (floods, desalinization, etc.), but, where water is scarce, regulation is aimed at ensuring an adequate supply, for example, by providing that water is not owned by one individual but, rather, collectively so that all may use what is available.³

¹Water Law Specialist and Asst. Prof. of Environmental Law and Economics, Dept. of Economics, Colorado State Univ., Fort Collins, Colo. This report is a summary of Organizational Alternatives to Improve On-Farm Water Management in Pakistan, by George E. Radosevich and Craig Kirkwood, Water Management Technical Report No. 36.

²Caponera, Dante A., "Evolution and Concepts of Water Legislation," Annales Juris Aquarum, Proceedings of the International Association for Water Law (September 2, 1968). See for an excellent discussion on the history of water law.

³A converse situation exists in a few highly developed countries where the underlying philosophy was oriented toward private enterprise rather than social welfare. For example, in the arid Western U.S.A., a system of private water rights developed which gave a priority of use to the first users and subsequently transformed most unappropriated water to private use at the exclusion of the public, except for personal and domestic needs.

The Near East is an arid region. This general condition, coupled with the vexation of having a general shortage of water or a shortage in one area while there is a surplus in some areas within the region, indicates a need for governmental regulation.⁴ Since water must be managed to ensure the most beneficial use, any governmental program must be flexible and able to plan for present and future needs.

Control and management go beyond the bounds of law, and with the evolution of the law is machinery which carried it out. The governmental and nongovernmental organizations and associations play a companion role in water development. A sound law without implementing machinery is good theory only. An examination of countries with progressive water policies and integrated resources programs, such as England, Taiwan, Germany, Australia, and the U.S.A., finds a synthesis of the laws and institutions at various levels of government on down to the individual water user.

But, the system of water law and organizational structure in any society did not just happen. It has evolved. And anyone who undertakes to suggest reform must be aware of the roles of custom and tradition in a nation, since these commonly are accorded a greater significance by the general population than a governmental edict. Revision of the laws in Pakistan may be desirable, but local rules and customs must be observed; for it is better to have no law than a law which is not obeyed, a condition leading to disrespect for government.

Water law in Pakistan has a rich and interesting history. Hosting one of the oldest hydraulic civilizations and currently one of the largest irrigated areas in the world, this nation can trace its sources of water laws to the ancient customs and practices of the Indus civilization that surrounded Mohenjo-Garo and Harrapa through the contributions of the Aryans and Greeks and more influentially to the Arabs, who spread Islam into the subcontinent during the eighth century with the Umayyad invasions.⁵ Modern water management at the governmental levels was markedly influenced by the British.

The exact origins of water resource development on this subcontinent are lost in legend. Large scale cultivation was carried on by the early Indus civilization (2200-1300 BC), and it appears that the rulers of ancient Bengal had evolved sophisticated techniques of overflow irrigation in the lower Ganges Valley more than 3000 years ago. These techniques have found their way into southern India, where water is diverted from the main river or stream and where long delivery canals may be observed.⁶ Too, there is some evidence that sizable irrigation reservoirs

⁴Policy Aspects of Irrigation, An Organizational-Economic Report to the Land and Water Use Seminar of the Near East, September 25-30, 1967, FAO Report 1 (1967).

⁵See Radosevich, G. E., Water Laws and Institutions in Pakistan, Colorado State University, 1975.

⁶Willocks, "Lectures on the Ancient System of Irrigation in Bengal and its Application to Modern Problems" (1930).

existed in northern and western India as early as two hundred years before the coming of Christ.⁷ Buddha is said to have settled a conflict between two city states over their rights to use the waters of a river.⁸

Islamic water law purports to ensure to all members of the Moslem community the availability of water. All waters are deemed to be the common entitlement of all the community and are subject to public administration.⁹ Severe penalties were prescribed for unauthorized use or for causing harm to reservoirs.¹⁰ The law also provided for collective enterprise in the construction and maintenance of canals.¹¹ This all derives from a religious grounding which linked water with the very creation of man.¹²

The modern role of government in water use in India appears in the latter half of the nineteenth century with the direct involvement of the British in canal construction and water administration.¹³ Without any experience in the field of irrigation engineering, the British quickly examined the situation in the subcontinent and sent missions to Italy, France and Spain to examine practices that might be adaptable in India. Their contributions to irrigation water conveyance includes a vast network of canals, barrages and weirs and a system of law and administration.¹⁴ The basic legal and organizational framework as well as delivery systems, however, was molded to combat the ever present threat of famine in the subcontinent.¹⁵

⁷Adhya, *Early Indian Economics: Studies in the Economic Life of Northern and Western India*, 200 B.C.-A.D. 300, 39 (1966).

⁸Wittfogel, C., *Oriental Despotism* (1963), citing Jatakam, V:219, as supportive.

⁹Caponera, *Supra*, footnote, p. 10.

¹⁰Teclaff, L., *Abstraction and Use of Water: A Comparison of Legal Regimes* (1972).

¹¹Daumas, M., ed., *A History of Technological Invention*, Crown Publishing, Inc.; N.Y., 1969, pp. 336+.

¹²Caponera, D., *Water Laws in Moslem Countries*, (1954). He states that Prophet Mohammad declared the gift of water entailed a religious obligation deriving out of the very nature of water out of which "every living creature was created." No one can refuse the surplus water without sinning against Allah and against man.

¹³For an excellent account of canal development and management, see Buckley, R.S., *The Irrigation Works of India*, E. and F. N. Spon., London 1905, and Michael, A. A., *The Indus Rivers*, Yale University Press, New Haven: 1967.

¹⁴It has not been determined to what extent the British consciously incorporated Islamic principles of equitable apportionment and common property status of water into the Canal and Drainage Act and design of delivery and administration systems. Their observations in Europe as related by C. C. F. Moncrieff, *Irrigation in Southern Europe*, London, 1961, indicate possibly a revitalization of early irrigation practices introduced into Spain by the Moors in the 9th century.

¹⁵Bhatia, B. M., *Famines in India*, 2nd Ed., Bombay Press, 1967.

Beginning with the Northern India Canal and Drainage Act of 1873 and the Bombay Act of 1879, public ownership of surface waters and governmental control of their use, development and distribution were established. Many of the provisions on water use were codifications of existing practices. The Northern India Canal and Drainage Act, which, with amendments, still applies to the original area of jurisdiction, both in India and Pakistan, states:

The State Government is entitled to use and control of public purposes the waters of all rivers and streams flowing in natural channels, and of all lakes and other collections of stream water.¹⁶

Modernizing Water Legislation and Organizational Structures

Many governments are now faced with the problem of a plurality of laws dealing with water allocation, utilization, delivery and removal, and control of water quality. These laws are scattered in a variety of sources and texts, often conflict with each other, and are known only to the administrators of a particular sector. This situation calls for a continuous review of existing water legislation in order to update it at regular intervals. This implies a basic water code with broad principles, which do not change continuously, and regulations interpreting and applying these broad principles which can deal with changing circumstances.

Of equal importance is the matter of how the laws are implemented, by whom and who is affected. Again, many countries face a proliferation of agencies at the national and subnational government levels, charged with carrying out specific functions of water development or control or oriented to a particular sector of the economy. The problems associated with macro-structure organization have been and will continue to be the focus of attention of developed and developing nations alike.

However, a situation that exists in most every agricultural country, that is ignored or considered insignificant to the major efforts of improved water management, is the micro-structure organization or water user association. Normally, technical solutions are offered to solve the problems of water users. Often, they do result in immediate and substantial benefits to him, provided he can afford the capital investment or is subsidized. But he must continually depend upon technical solutions, and as an individual has not really achieved the benefits of social interaction and cooperation in the utilization of his scarce resources, whether they are natural or acquired.

An alternative to a purely technical solution, and one which has attained substantial success and sophistication in many countries,¹⁷ is the formation of water users associations. The terms water user associations or water user organization are used here to refer to any of the patterns of farmer to farmer or farmer to governmental agency entities designed to facilitate water delivery, application and removal. Where the term

¹⁶Northern India Canal and Drainage Act, Act No. VIII of 1973, Preamble.
¹⁷e.g., U.S.A., Taiwan, Spain and Argentina.

"water user association" as applied in a country refers to a specific organization distinct from others it will be noted. These entities of various forms have enabled the farmer to optimize his efficiencies of water use by adding flexibility to his application scheduling, sharing costs of an improved delivery system, and preventing unnecessary water removal problems. As with the water law, though, not just any structural pattern should be adopted. There are a wide variety of associations with varying degrees of success. It is important that the organization be structured from within the existing legal, social, economic and cultural framework, and not be a simple adoption of an association that has been successful elsewhere.

The impetus and guidance for local water user associations may be either part of the water law or special legislation. The rule of innovation applies to drafting the law as well as to the organizational structure of the association, for as Montesquieu, the 18th Century French scholar said, "Civil and Political laws must be so fitted to the country for which they were enacted that it is a real coincidence if those of one nation apply to another."¹⁸

Rationale for Local Water Organizations

Pakistan has been working on the technical and economic problems of irrigated agriculture almost from its birth in 1947. Many bilateral agencies' studies and country assistance programs have centered attention upon the pressing problems of salinity, waterlogging, groundwater development, and improved agricultural practices. Storage for agriculture and power production has been implemented with several large dams and barrages.

Agriculture remains the cornerstone of Pakistan's economy even though the country has experienced a phenomenal growth in industry and has become diversified in other sectors.¹⁹ Although its share in the gross national product decreased from 60 percent in 1949-50 to 48.2 percent in 1964-65²⁰ and 46 percent in 1967-68, agriculture is still the livelihood for 90 percent of the people living in rural areas.²¹

Yet, in spite of this importance, agriculture is one of the most tenuous components of the economy primarily due to the many unpredictable forces acting upon the individual farmer and his productive capacity. Climatic variations, uncertainty and unpredictability of water supply, soil conditions and seed and fertilizer availability are among a few of the preharvest elements which the farmer must contend with. In addition, population

¹⁸Quoted by Dante Caponera in "Evolution and Concepts of Water Legislation," *Supra*, p. 12.

¹⁹Sabzwari, M.A., "Food Production and Population Growth in West Pakistan--Problems and Effects," Food Production Increase in West Pakistan by C. M. Sharif, PARD, Peshawar, 1971, p. 11-29. There has been a 160 percent increase in industrial output from 1960-68 according to the Area Handbook for Pakistan, USGPO., Washington, D.C. 1971, p. 413.

²⁰Agriculture in Pakistan: Resources, Progress and Prospects, Agriculture Division, USAID, Karachi, 1966, p. 6.

²¹Sabzwari, p. 11.

pressures, smallness of individual holdings, lack of knowledge of improved farming methods and capital makes it difficult for the agriculturist to improve his condition. It is, therefore, necessary to develop a feasible and acceptable program that will reduce the risk associated with his profession.

Many of these contingencies and constraints to increased benefits from resources use can be alleviated if the farmer can take advantage of economies of scale and be induced to internalize certain externalities that are now being passed onto others. To successfully accomplish this task, some common denominator must be identified. In the case of irrigated agriculture, that common denominator is distributed water, and characteristic of irrigation is the necessity to cooperate and coordinate activities.

In most irrigation systems, the cooperation that has developed among farmers needs only to be formalized to give stability and reliance to the arrangement. It is recognized that among the farmers in many villages throughout Pakistan there is a high degree of cooperation in water use, aside from the theory of the warabundi, and in some cases, even amount to a well structured and semipermanent arrangement. Without a fixed and definite purpose, however, the ad hoc arrangement may unexpectedly be dissolved, consequently adding to the host of uncertain factors facing the farmer.

Pakistan has no institutionalized system of water user associations by which her farmers can jointly pursue optimizing a mutual task. Many of the problems faced by the irrigator, and in particular the small farmer, can be partially solved by providing him an opportunity to formally organize with his neighbors to increase agricultural production by improving water management. The water user association can become the nucleus of mutual on-farm water activities pursuing objectives of equitable distribution of water, resolving disputes, watercourse rehabilitation, irrigation scheduling, assistance in land leveling, augmenting water supplies through tube-wells and conservation practices, integrating water quality control through conjunctive use of ground and surface water and proper drainage and collection of fees and assessments.

Labor intensive programs can be adopted to involve Pakistan's increasing population in the agricultural sector. It is acknowledged that machinery is far more productive than human power, but there is an attendant danger of labor displacement if machinery is introduced too quickly.²² While machinery is desirable to aid in increasing production, the use of good seed, fertilizer, and improved implements and the combination of small holdings into larger blocks, proper alignment of irrigation channels, and crop rotation are at least equally important in increasing productivity. Water user associations can be extremely helpful in achieving all these improvements.

Every new program has both positive and negative aspects, and instituting water user associations is not without exception. The benefits are

²²Khan, Jameel, Economics of Farm Mechanization and Water Development Policies in Pakistan: A Case Study, Ph.D. Thesis, Department of Economics, Colorado State University, December, 1974.

easily seen, particularly when observing the schemes evolved in many other highly productive agricultural societies. Often the "costs" are subtle. Financial and technical assistance is a cost, but one which will hopefully be offset by future benefits. The most critical negative effect will be upon those individuals and officials who will have to change their mode of operation to accommodate the water associations. The willingness to accept and internalize change may be the most difficult step in the entire process. Many functions singularly carried out in the past, will have to be jointly pursued or at least the decision making process will have to be shared. Certain traditional positions, i.e. the potwari, could most easily be displaced and these functions granted to the association. Other negative effects may occur and must be evaluated.

Utilizing Exogenous Experiences

There is a particular advantage in working with on-farm water management institutions in Pakistan in that only a few patterns of organizations have been tried. This enables a more objective review of exogenous alternative systems of administration.

Local water administrations of five countries were examined and their various attributes analyzed. Each system is somewhat unique in itself. Each system had to go through the painful process of evolving, of having the input from within the social structure such that the participants of the system could identify with it. Hall noted that what is good about the irrigation system of Valencia was dearly paid for by several centuries of wrangling and discord.²³ But, the characteristics and experiences of the system can serve as a guide.

At the local level there are three distinct private organizational entities in the United States of America designed to accomplish water resources development and management within a system. They are the mutual irrigation company, operated by users for their express benefit; the voluntary association with objectives similar to mutual companies but having their foundation less on legislative enactments and more on custom; and the commercial irrigation company, organized by entrepreneurs for profitable conveyance of right holders' water or rented water. All have potential in countries such as Pakistan where economies of development and irrigation requirements prohibit individual landowners from operating efficiently as independent units. However, because of slow returns from farms, sensitivity of agricultural production to unforeseen disasters-- such as floods, drought, salinization, etc.--it is recommended that the mutual irrigation company and voluntary associations' model be considered. Profits for a commercial company are too speculative to draw much interest, especially in a developing area such as Pakistan. The voluntary associations have the advantage of tradition and history going back to basic Moslem/Spanish origin. Their simplicity in structure and operation is highly desirable.

²³Hall, Wm. Ham, Irrigation Development, Supt. of State Printing, Sacramento, Calif., 1886, Vol. 1 p. 384, footnote 1.

The irrigation company and irrigation district formed in the Western U.S.A. illustrate the structure and functions of private and public organizations. Internally, both types of entities are very similar, consisting of a board of directors who may also serve as managers. The distinct feature between the two types being that a private organization has greater flexibility in operation, i.e. voting rights, multi-purpose objectives, and obtains its finances from assessments made against the voluntary membership. A public entity usually has more rigid statutory guidelines to follow and is subject to greater governmental control. Membership may be compulsory and the organization can levy taxes under various formulas to acquire financing.

The voluntary associations and mutual irrigation company are the most relevant because they do originate at the water use level. The simplicity of structure is desirable. (See Figures 1 and 2.)

Water administration in Spain takes place at two distinct organizational levels. At the government agency level, the Ministries of Public Works, Agriculture and Industry have various delegated functions in development construction and management, create projects and programs and infrastructure activities. Another category of organizations are the autonomous agencies or entities, principally the Area Water Authorities (Confederaciones Hidrograficas), river federations and the irrigation associations (Comunidades de Regantes). (See Figure 3.) At the regional level of water administration, two distinct but similar entities exist, both organized around hydrologic boundaries of the watershed. They are the Area Catchment Offices (Comisarias de Aguas) and Area Water Authorities (Confederaciones Hidrograficas). The former is an organ of the Ministry of Public Works, the latter an autonomous entity. The comisarias, thus, are part of the governmental framework directly concerned with water allocation, distribution and utilization.

The Area Water Authorities functions are primarily oriented toward planning, executing and operating water projects, collecting hydrologic data, collecting project assessments, and promoting the creation of irrigation communities.

Their internal structure consists of water users and representatives of the government. The membership of the organization is made up of water users to give them a direct avenue of input into water resources planning and project selection and construction.

This is the basic reason for creating an institutional body parallel to the comisarias. There are as many confederaciones as comisarias with the major organizational distinction being that water users form the former while the comisarias are bureaucratic institutions without user participation. There has, however, been a definite trend toward a lessening of power and support of the confederacion in favor of the comisarias.

At the local level, there exists a logical and simple hierarchy of autonomous entities consisting of water users of public waters. This hierarchy is placed in a category called Comunidades de Regantes (irrigation

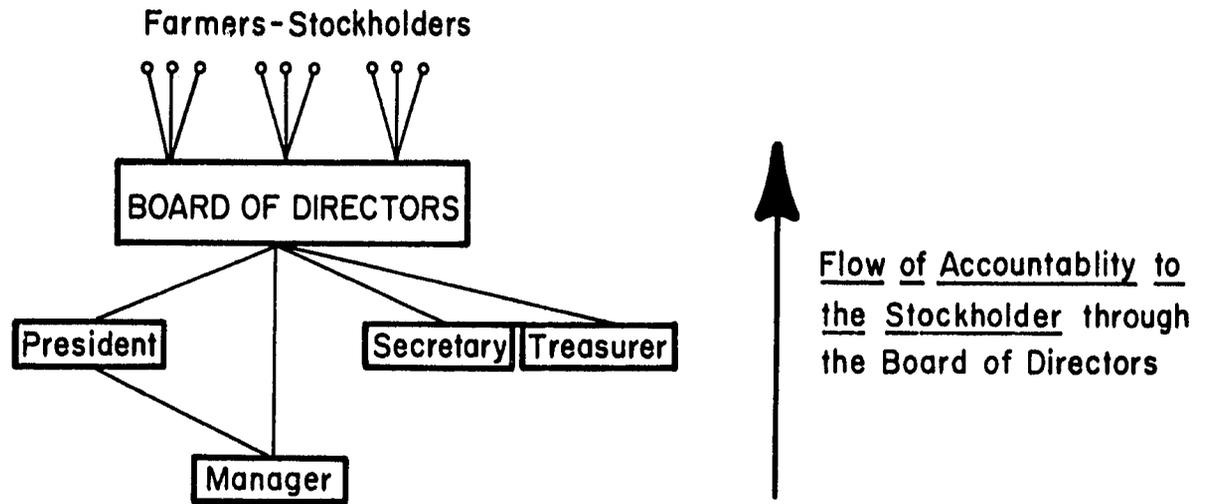


Figure 1. Voting control of Mutual Company emanating from stockholders.

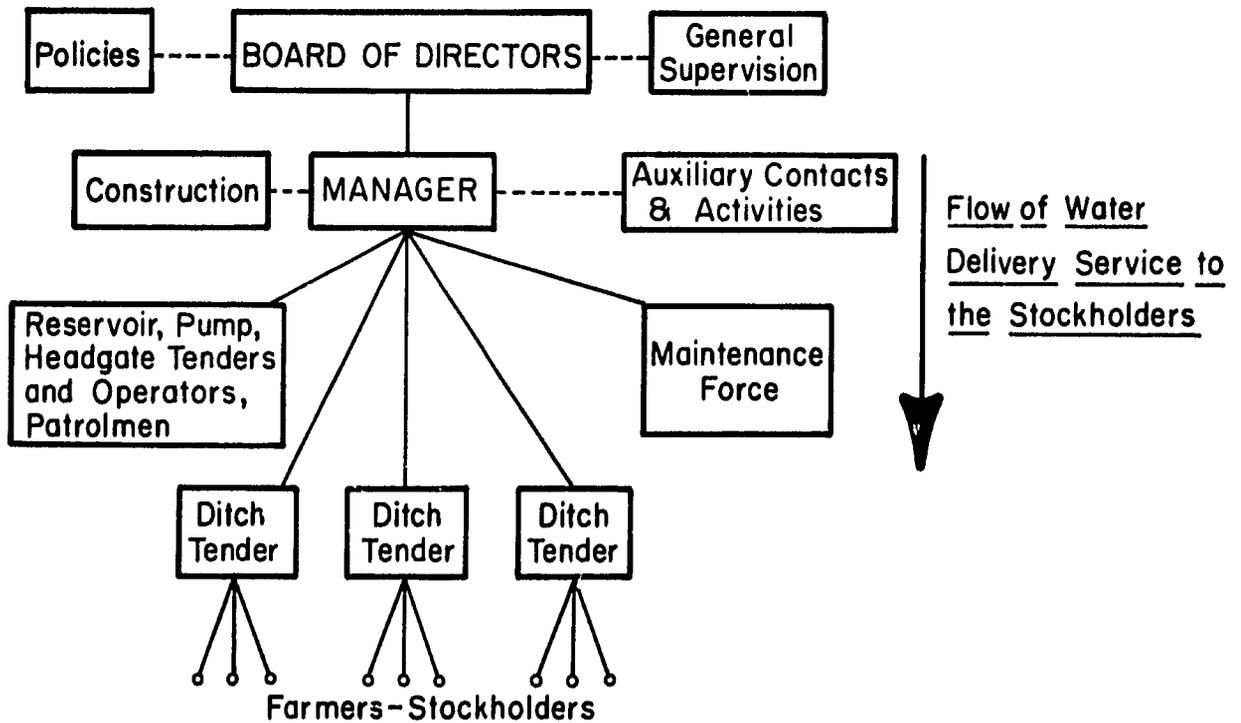


Figure 2. Control of water service to stockholders of Mutual Company emanating from Board of Directors.

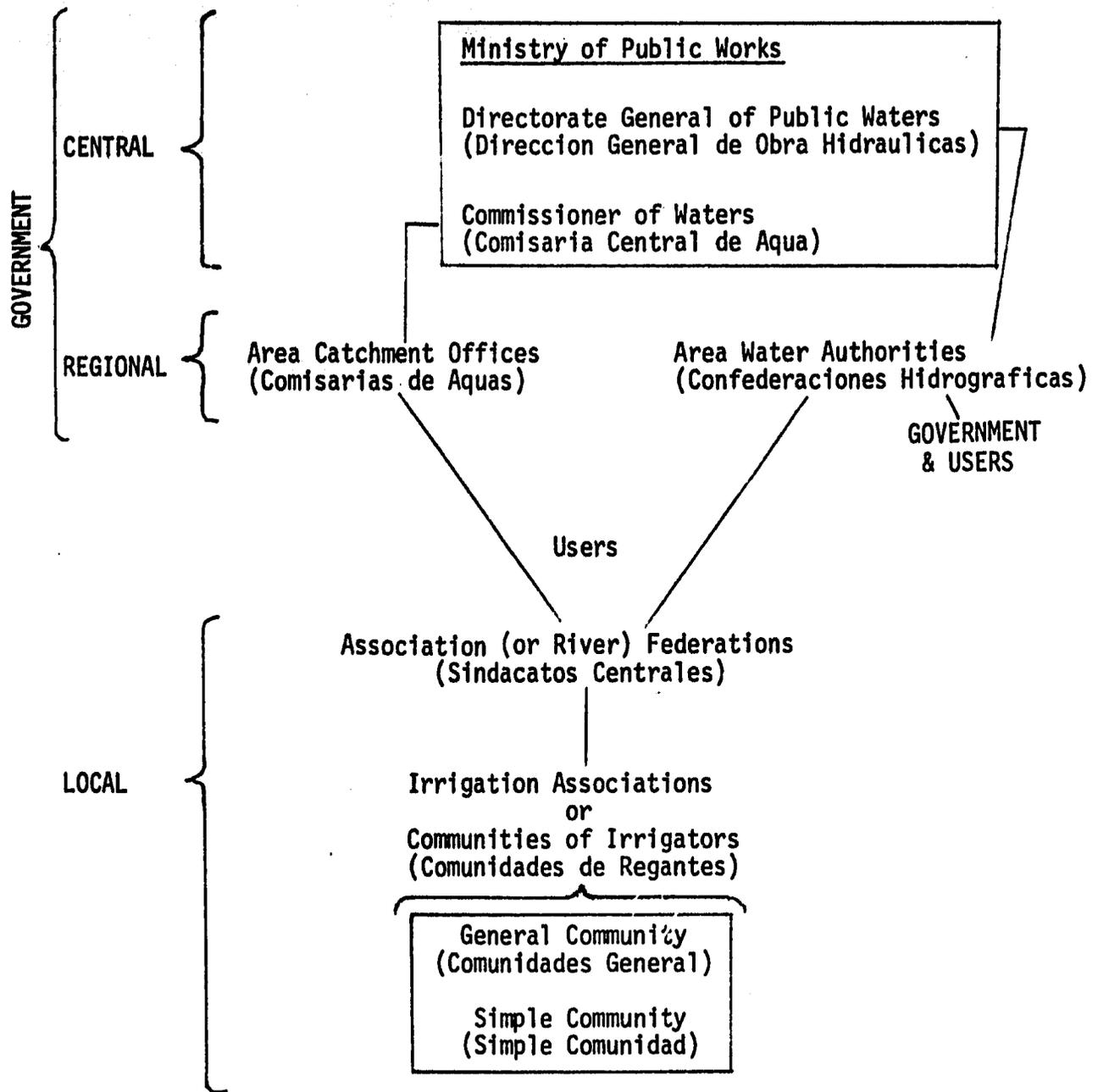


Figure 3. Organization of Water Entities in Spain.

associations or communities of irrigators)²⁴ and is a strong traditional feature of the Spanish water administrative system, making up the backbone of water resources control and management for national food production. Their success in Spanish agriculture is an example of decentralized administration of public property. Argentina has basically the same local administrative structure.

The communities may be organized voluntarily by action of water users of a common canal or watercourse, or by direction of the Comisario de Aguas in the basin.

As a legal entity, the irrigation association has several unique and important features--features that should be strongly considered among the organizational needs of the Pakistani water uses. These features are:

1. Corporate entity
2. Judicial personality
3. Element of reality

When the waters are granted to a community it is charged with the control of the distribution of the water among its members. It administers the waters. If a person leaves the community he loses his right because he is leaving the lands. The right to use the waters is on the members of the community. The community, even when granted the water, performs only a distributive function.

The hierarchy of the irrigation associations begins with a very simple entity serving a small area from a lateral or sub-watercourse to a federation of irrigation associations on the river. At the base of the hierarchy is the simple community (simple comunidad). The next level is the general community (comunidad general) which takes on very formal organizational characteristics and consists of simple communities and users served from a public canal and diversion works. The general community must defend the interests of the simple communities within their water delivery area. They are also responsible for the control and distribution of the community waters.

²⁴In addition to the fine works of Dr. Martin-Retontillio, from which much of this discussion is based, the senior author has also sought counsel in the following excellent expositions on irrigation communities through the interpretation and consulting of Dr. Miguel Solanes, lawyer and water law specialist from Mendoza, Argentina, and Research Associate to the Conference Committee for the International Conference on Global Water Law Systems, 1974-1975: Comunidades de Regantes: Concepto, Naturaleza Juridica y Regulacion Positiva, by Sr. Julio Maestre Rosa, Bosch, Casa Editorial, Barcelona, 1969; Tratado de la Legislacion de Aguas: Publicas y Privadas, by Srs. R. Gay de Montella y Cristobal Masso Escofet, Bosch, Casa Editorial, Barcelona, 1956, Vol. II-Legislacion Complementaria, de Las Comunidades de Regantes y sus Sindicatos y de los Jurados de Riego, p. 248-279; Regimen Juridico de las Comunidades de Regantes by Juan Antonio Bolea Foradada, Escuela Nacional de Administracion Publica, Madrid, 1969; Manual de Aguas by Angel Carmona Hernandez, Editorial Boyer Hnos. Barcelona, 1966.

The highest level is the federation of communities (or associations) (sindicato central), lacking many of the internal features of the comunidad general, and formed to pursue the mutual interest of communities on a reach of a natural watercourse getting water from different diversion works. (See Figure 3.)

The organic structure of the community of irrigators illustrates a logical functional diversion of activities particularly relevant to water control and management. It consists of three organs:

1. Junta general (general assembly)
2. Sindicato de Riego (board of directors)
3. Jurado de Riego (jury of water users)

Each member of the community must pay the assessments allocated him according to the quantity of water delivered. Although the water is not metered, a "duty of water" for various types of crops is established by the sindicato. That quantity is distributed through canal outlets calculated to deliver a certain flow for a certain period of time. The junta approves the budget and fees charged to the members.

Water user associations at the local level have greatly contributed to the development and effective utilization of available sources of water in Spain and Argentina. The particular system of administration in Valencia has many attributes common to the rest of Spain, but an equal number of features unique to that fertile valley. The present system, although changed very little over time, has had the opportunity of centuries of experience of local control. It is this experience that is most useful to a country like Pakistan, where local administration of water is highly desirable to accommodate an extensive canal delivery network.

The author does not suggest an implantation of the Spanish or Valencian local water administration practices, but does contend that the following points are relevant to the design and evolution of a system of water users associations in Pakistan.

1. The Spanish organizational system from the central government down to local organizations functions partly because of the accepted and ingrained philosophy of levels of administration. Conceptually, both the needs of the irrigators in decentralized management and the government in at least monitoring the activities of local water use, can be met with the organizational base of the Spanish system. The hierarchy from communities to federations to confederations, in some form followed in many countries, has merit in Pakistan if the water development and management of the country is to be dynamic.
2. Focusing directly upon the water users association (community of irrigators), it is recommended that a social consciousness in the use of a public or state resource be generated.

3. The Moorish infusion of many Moslem principles into the structure of the "community of irrigators" in Valencia and the Al-Andalus provides a link or basis of association for the Pakistani farmer.
4. In order to develop and maintain an enthusiastic attitude of the farmer to participate in the water user association activities, every farmer, regardless of size of holdings, wealth, location on the watercourse, landlord or tenant, or membership in caste group or baradri, must be able to participate. Several features of the community of irrigators enables this.

FIRST, the four basic concepts of the association enable local control and self-imposed management.

- a. An association's existence is justified by a need to deliver water to a specific parcel of land in a more efficient and effective way.
- b. Concept of proportional distribution, practiced in Pakistan under the warabundi, theoretically favors no man, but rather provides to each irrigator a portion of water according to the size of the holding.
- c. Concept of individual responsibility to community for maintenance of his part of the watercourse and duty not to waste water makes each irrigator unique and significant. Infractions may result in fine or nondelivery of water.
- d. Concept of collective responsibility through internal organs of the association placed the capability and success of effective control and management upon the irrigators themselves.

SECOND, decision making is functional, divided into three organs of the association (assembly, board and water court) for check and balance by the members of the association activities and resolving disputes.

THIRD, the composition of community is confined to landowners and tenants in the command area and only members who are actively involved in irrigation may hold office.

FOURTH, an equitable representation on the board of directors (sindicato) from throughout the watercourse is fundamental to the protection of interests and rights in water of those irrigators located at the tail of the watercourse.

5. Voting privileges is one item of extreme importance in order to encourage participation in the decision-making process and protect the interests and rights of all water users. The system varies among the water users associations in Spain, from number of votes per person directly proportionate to size of irrigated landholding in the community, to one person/one vote for the working landowner or tenant. It is not suggested that either of these approaches be applied because of the obvious favoritism to either large holding landowners or multitude of small holding farmers. The graduated voting rights system in Argentina is a more ideal and equitable approach.

6. One of the most unique features of the Valencian irrigation system is the Tribunal of Waters. This body, originating from the Moorish influence, is similar functionally to the jurga in the tribal areas of Pakistan. It is an institution in Valencia and throughout Europe, highly regarded for its equity and swiftness in revolving water problems. Its applicability to the needs of Pakistan would occur if water user associations are formed for each watercourse and federations created at the village and minor canal levels. Situated at the mosque, a "tribunal" consisting of the presidents of the common associations could resolve water disputes and problems in an oral, public, rapid and inexpensive proceeding.²⁵

Turkey and Spain illustrate the infusion of micro and macro levels into water management, the former under a cooperative approach, the latter under autonomous water entities with parallel user and bureaucratic liaison or middle organizations. This line of communication is approached differently in Taiwan by placing greater emphasis upon the private sector with liaison only at the top of a coordinated private hierarchy. Turkey's proposed law prohibiting political involvement by the cooperatives is also recommended.

Each system illustrates the need for a hierarchy or organization. Taiwan has a complete hierarchy within the private sector. The American system is to have distinct public and private entities, while the other three systems are variations of blending quasi-public and public responsibility together ranging from the local autonomous irrigation associations in Spain and Argentina to the purely public nature of the cooperative in Turkey. The hierarchy in the case of U.S.A., Spain and Taiwan occurs both at the macro and micro level, a feature considered highly desirable in Pakistan.

In Taiwan, the association is a self-governing corporate body organized by farmers to administer the irrigation facilities, construct irrigation works, distribute water, assist in planning new water projects and serve as the direct mechanism for operation of a repayment program.²⁶ They may be created at the determination of the provincial agency in charge when economic benefits and water use efficiency require the mandatory action, or action to organize can be initiated by 50 or more qualified potential members. Specific rules governing the organization of the associations were enacted by presidential decree.

The association consists of two major bodies, the policy making body and executive body (see Figure 4). The former is the representative assembly

²⁵Procedural details of the Tribunal are excellently explicated by Victor Fairress Guillen in El Proceso, Ante de Tribunal de las Aguas de Valencia, Valencia, 1974.

²⁶Much of the discussion on the irrigation associations is taken from two papers by L. T. Chin, Land and Water Development Division, FAO, entitled, "Irrigation Associations" and "Management, Operation and Maintenance of a Completed Project," presented at the FAO/UNDP Regional Seminar on Measures to Accelerate Benefits From Water Development Projects By Improving Irrigation, Drainage and Water Use at the Farm Level, held in Manila, Philippines, 7-16 Oct. 1970.

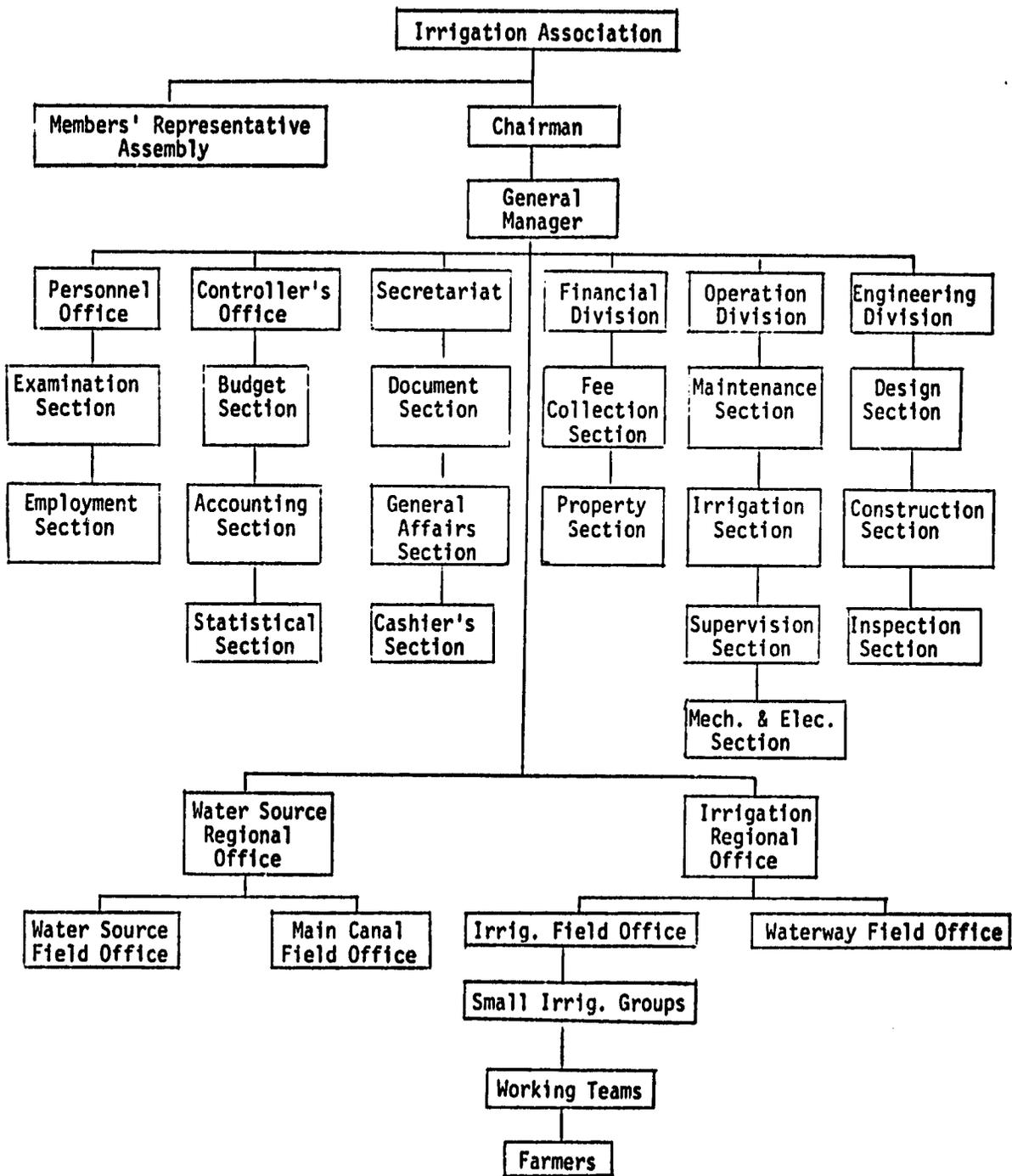


Figure 4. Organizational Chart of an Irrigation Association (Taiwan, Republic of China).

whose size varies according to command area of the association. The association members elect the representative for a four year term. Two-thirds of the representatives must be farmers from the area. The assembly meets twice a year to decide issues relevant to the entity's functions.

Operation of the association is carried out by the executive body which consists of three levels of administration: head office, regional offices, and field offices. The head office is the nucleus of the organization, made up of a chairman, general manager and staff offices.

The entire hierarchy of the irrigation is made up of water users, with the exception of technicians and other specialists. Officials and representatives of the association are elected by the members according to the level of activity in which they participate.

The membership is a key feature of the association since the basic philosophy for their creation is to stimulate farmer involvement in the decision-making process of national water use. Any person living in the jurisdictional limits of the entity who is either: a) an owner of private land; b) leasee or tenant of public or private land; or c) managing public land; is a member of the association.

Both Taiwan and Spain encourage labor intensive involvement in the managing and operation of the entities.

Regarding the rights in the water resources, all five systems recognize state or public ownership in water; however, the Argentinian and Spanish (and in a few western states in the U.S.A.) systems link the right to use water with the right to the land. This insures the allocation of water to agriculture and, in particular, preserves the efforts and productive capability of the reclaimed soils. One drawback to this system is now being felt in both Spain and the U.S.A. This alienation of transfer of water use is a major constraint when national priorities change due to energy crises, new industries, etc.

Another feature of the Spanish and American systems is the effort to administratively integrate water quantity and quality control. Irrigation associations undertake this task where the problem exists along with their other functions of efficient water distribution and maintenance of the conveyance system.

Designing Water User Organizations

1. Watercourse and Village Level

Water user associations in Pakistan can be a tremendous boost to national and provincial efforts toward optimization of available water supplies. The association itself will do little, but in conjunction with a conscious effort by irrigation department officials and others in the agricultural production sector, the association can serve as the most useful tool or catalyst in pursuit of improved resources use. The Government's Integrated Rural Development Program and the watercourse lining programs will be greatly strengthened by creating an institution that is the water users own.

In designing a system of local water user organizations in Pakistan, there are several fundamental principles that should be taken into account:

1. A policy of decentralized, self-management at the watercourse level should be adopted. This principle will go a long way to inducing participation by water users, developing a sense of pride in operation, and stimulating a progressive agricultural economy.
2. The format of the association should be structured similar to existing institutions to present only a limited amount of social disruption. An interesting situation occurred in Ceylon (Sri Lanka) during the last half of the 19th century.²⁷ Two changes were introduced by the British that modified local practices in the use and maintenance of irrigation systems. The custom of forced services was abolished and the British system of minor courts was introduced. Local leaders couldn't get assistance to repair watercourses and the new method of resolving disputes was not understood. This combination of adverse affects from the two changes was extremely detrimental.
3. To be most effective, much flexibility should be allowed to give the agriculturalists in local areas the opportunity to adopt the types of organizations most acceptable to them.
4. Not only the positive aspects of forming associations should be discussed, but also a clear understanding of sanctions and enforcement against infractions of association rules must be made.
5. The purpose to be served by the organization should justify its existence. In the converse, no association should be formed simply to create an entity. Further, the organization should be publicly responsible for use of public waters.
6. Goals of the associations should not only include improving water delivery and scheduling but include the minimization of risk while maximizing production for association members.

It will be necessary to design several water user organizations that will operate within the recognized customs of Islamic irrigation practices. However, a general scheme is proposed that will utilize the principles forementioned and the key features from the exogenous systems described.

The scheme is a modification of the Spanish and American mutual irrigation companies and the Taiwanese system. The Spanish system is effective because of its Islamic roots and practical, long-range features. The concepts of equity and proportionality (each Moslem entitled to a share of water), water appurtenant to land (water cannot be sold; there is only the right to use it on designated land), and the right and burden of local

²⁷Coward, Walter, Jr., "Water Runs Down Hill and Evaporates: Human Organization and the Management of Water Environments," presented at Mekong Development Seminar, Pattaya, Thailand, Aug. 20-23, 1974, p. 5.

control being placed upon the users of the system (speaking now of those farmers under the watercourse) are inherent in Moslem law.

The other particular features should be included. First, the organization should consist of members representing various areas within the watercourse. Second, this body should be multi-functional--acting as jury and judge on matters solely within the watercourse; conducting administrative functions of operating and maintaining the system, hiring ditch walkers, etc.; serving as a planning board for exploring ways of improving distribution and utilization of water within the system; planning cooperative efforts between systems to facilitate delivery of water on demand without upsetting the canal conveyance system; and being responsible for ensuring that penalties are carried out, water is properly delivered according to predetermined schemes, etc.

Like the American Mutual Ditch Company, the organization needs legal status, temporarily organizing under existing legislation, not under customary law. Strongly recommended is an addition to the national and provincial water laws setting forth the substantive and procedural issues relative to formation of water user associations and the role of government agencies toward them.

The water user associations in Taiwan provide for the necessity of creating levels of organization. This system, in conjunction with the Spanish community of irrigators, Sindicato Central and Tribunal de las Aguas, illustrates the management, control, development, equitable infraction determination, and enforcement factors essential for short and long run success. The Spanish have not materially altered their Islamic-based water administration and dispute resolving system since the 10th century when it was first documented.

The association would be organized on each watercourse (Figures 5 and 6). As previously stated the governing body (assembly) would be made up of all members, membership being working landowners and tenants.

The managing body could consist of a five man board (or some number depending upon the size of the watercourse), and representing different areas of the watercourse (e.g., one from the head of the watercourse, two from the middle, and two from the tail end). A rotating presidency or chairmanship is suggested with the president selecting a treasurer and secretary, all from within the five representatives. Three year terms of office may be best suited, with terms expiring in staggered manner. No officer would have any power greater than each other.

A dispute resolving body would be formed consisting of the president and secretary of the board and three members of the association, one each from the head, middle and tail of the watercourse. This body would meet at the village mosque to resolve issues related to the functions and purposes of the association.

Voting rights of the membership should be graduated. There would be a minimum and maximum number of votes to protect the interests of both

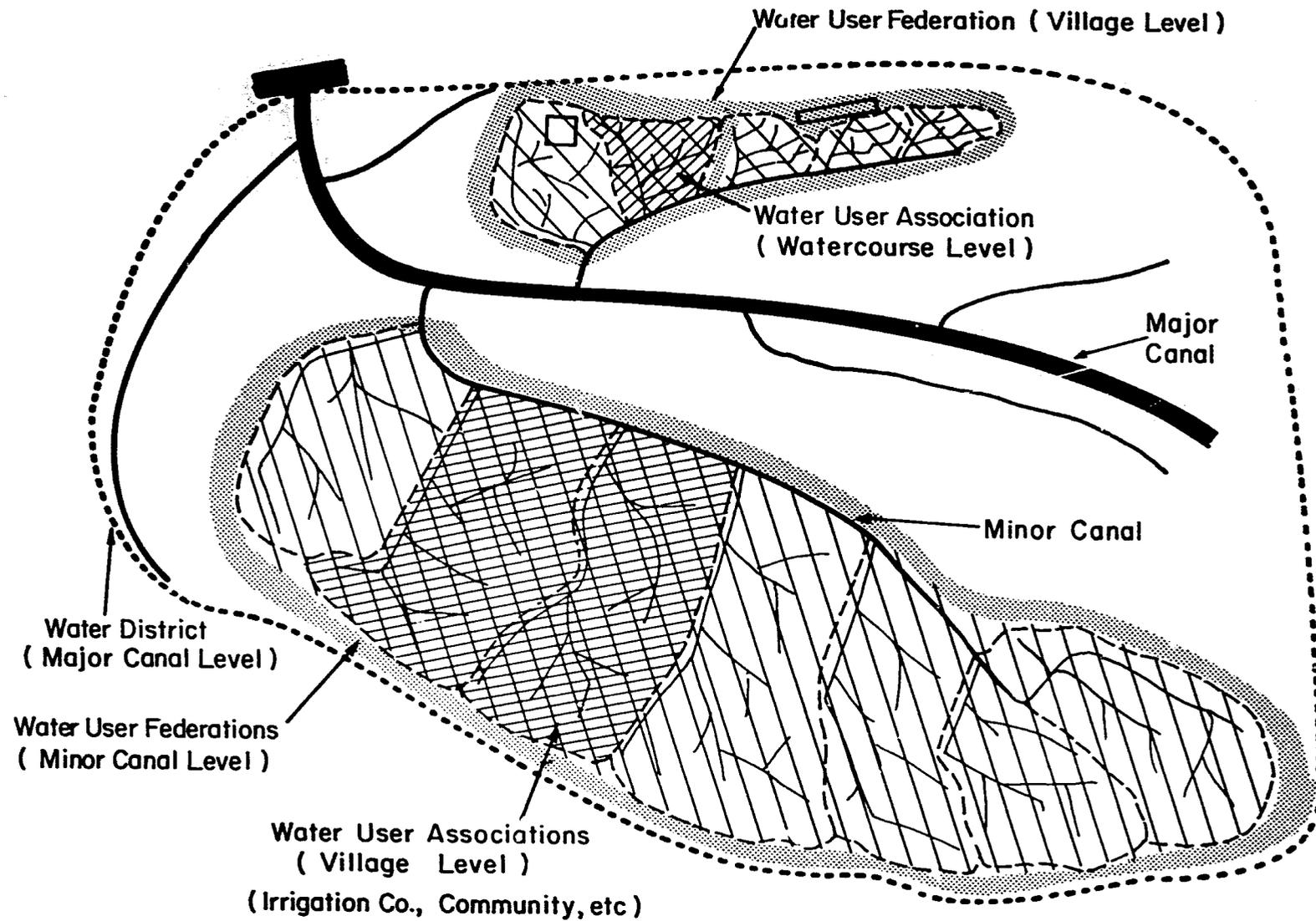
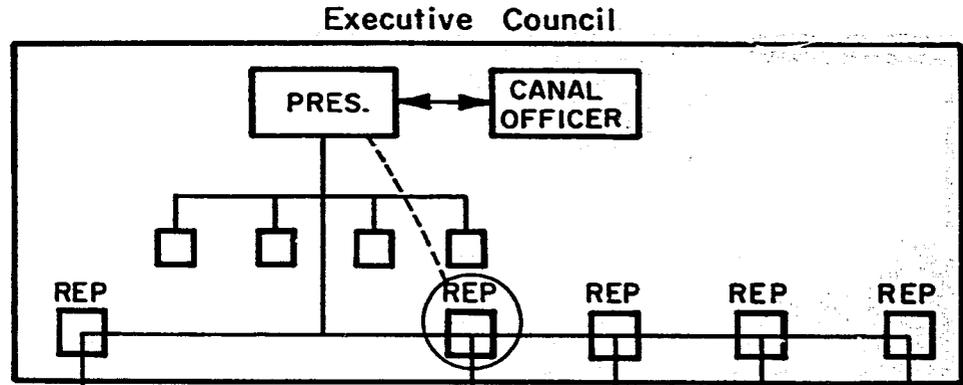


Figure 5. Water User Organizations for Pakistan: Development Scheme

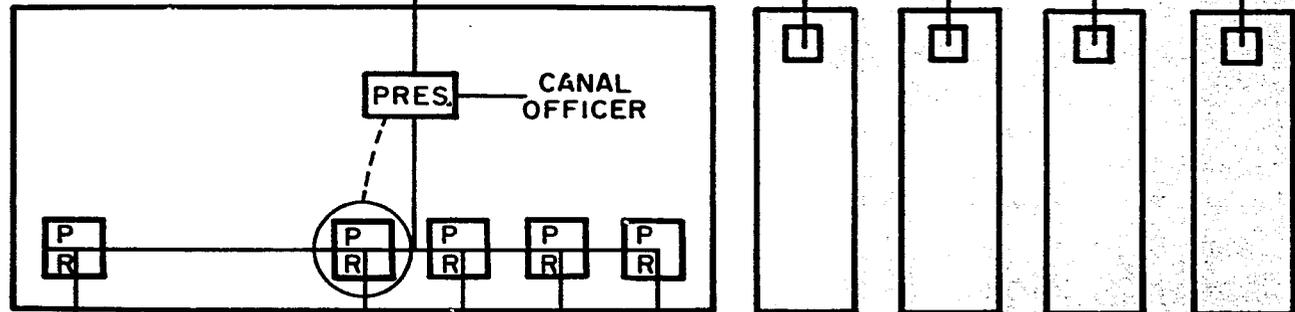
Water District – Executive Council

All Canals Under
Major Canal



Water Users Federation

Minor Canal Level



Water Users Associations

Watercourse or Village Level
(From the Mogha)

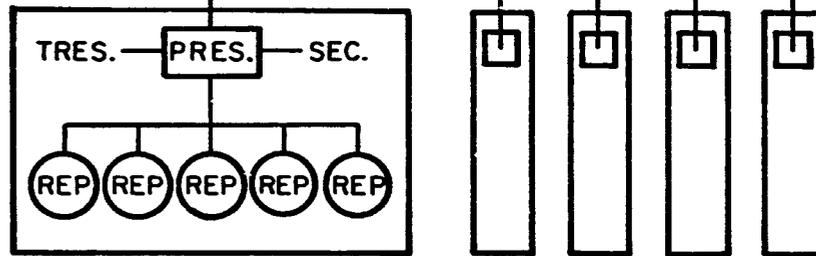


Figure 6. Water User Organization for Pakistan: Organization Scheme

large and small farmers. For example, in Mendoza, Argentina, votes/irrigated land area is as follows:

<u>Irrigated Area</u>	<u>Vote</u>
0.1 ha to 5 ha (hectares)	1
5.1 " to 10 "	2
10.1 " to 15 "	3
15.1 " to 20 "	4
20.1 " to 25 "	5
25.1 " to 30 "	6
.	
.	
.	
70.1 " to 75 "	15
above 75 ha	15

This level of organization is considered the most essential to improved water management. However, several upward extensions of the association are recommended to place the irrigators in a better position to implement irrigation scheduling, dissemination of information on canal rotation and closures, participating in delivery decisions made by the Irrigation Department, and working with WAPDA, Land and Water Development Board, etc. The organizations at the watercourse or village could be created under special legislation giving associations legal status, or formed as voluntary associations under the company or cooperative laws of the provinces.

2. Minor Canal or Village Level

The next level of organization would be a federation of water user associations at the minor canal and/or village level. In the case where two or more watercourses serve one village, the commonality of interest could be the basis of forming a federation to better manage the waters for irrigation and other rural needs. The composition of this entity would consist of the presidents (or chairmen) from the associations represented. One from among the representatives would be selected as president of the federation. He, like the president of the associations, would have no greater power than other federation officers, requiring a majority approval for all actions.

In addition to this formal board, the canal officer could be made a technical advisor without voting privileges.

3. Major Canal Level

Carrying the hierarchy one level further, a water district can be formed at the major canal level primarily to disseminate information on water supplies, deliveries, etc., and enabling the Irrigation Department to acquire water users' input into the decision-making process. An executive council consisting of presidents or chairmen from federations (or elected representatives from unfederated minor canals) would be formed. The Irrigation Department would maintain an official position in the district, without voting privileges.

Voting rights for the federation and district would likewise be graduated according to area served. This would prevent a small water-course or canal command area from over influencing the activities of large command areas.

The structures suggested are perceived to be implemented over a considerable period of time. This would enable the users, themselves, to make the necessary modifications that will personalize the system for Pakistan. However, the purpose for setting out a rather detailed and sophisticated program is an attempt at the very outset to prevent constraints to creating a hierarchy from developing.

Legal Foundation for Associations

At the outset, it is to be noted that no serious impediments exist in Pakistan regarding the formation of water users' associations. On the other hand, little exists which explicitly encourages such associations. The major encouragement exists in the customs and religion of the country. This is fortunate in that custom and religion still play a direct role in determining behavior of the common citizen in Pakistan more so than does the legislation. Further, Pakistan is an "administrative" oriented nation and the water users are familiar with the basic concepts or at least the need for effective administration. This familiarity should, however, be used to assist the farmer in developing and improving his own administrative capability as a member or officer of an association and not become a government type program imposed and controlled by bureaucratic forces.

There exists many formal provisions which can be used to form water users associations in Pakistan. The most important are the Companies Act of 1913 and Cooperatives Societies Act of 1925.²⁸ Other significant acts include the Soil and Reclamation Act of 1952, the Water and Power Development Act of 1958 and the Easements Act of 1883.

1. The Companies Act of 1913 and Relevant Decisions²⁹

A "company" is defined by its common usage as "an association of a number of individuals formed for some common purpose."³⁰ Section 4 (2) of the Companies Act provides that no company, association, or partnership consisting of more than twenty persons shall be formed for the purpose of carrying on any function (except banking) that has as its object the

²⁸The author examined the Societies Registration Act of 1860 as a legal basis for water user associations and has concluded this Act could not be used for a functional organization at the watercourse or village level. However, the Act may be used in the formation of educational, extension or other purposes selected to dissemination of information on agricultural activities. See M. Z. Khan, Commentary on the Societies Registration Act, 1860, Lahore Law Rib. House, Lahore, 1973.

²⁹Company Law in Pakistan, for a detailed analysis of the Company Act of 1913, see A. G. Chaudhary, 2nd edition, Pakistan Publishers Ltd., 1970.

³⁰Id., 1.

acquisition of gain unless it is registered³¹ as a company under the Companies Act or other act or charter. This provision does enable the voluntary formation of water user associations, since such entities are not created for gain or profit, but rather to help the users in optimizing their total resource capabilities.

The effort of failing to incorporate is to become an illegal company or a nonentity which cannot contract or sue to enforce a contract already entered into.

An association which has incorporated may issue shares representing partial ownership. These shares are transferable³² and so become, in effect, "movable property."³³ Capital represented by shares may be consolidated and divided into shares of a larger amount than the existing shares and reconverted into paid-up shares of any denomination.³⁴ Such provisions clearly encourage incorporation and facilitate management of capital.

Under this act, a form of water users association similar to the mutual irrigation company in the U.S.A. or the community of irrigators of Spain could be organized. Although a system of water rights or concessions per se do not exist in Pakistan, the right to receive water from the mogha could be termed an equivalent for the association. Membership can be described as working landowners and tenants. Shares in the association can be appurtenant to the land, i.e. transfer from present owner to purchaser upon sale of land or from landlord to tenant or tenant to tenant upon change of working parties.

Provisions to register are highly recommended (as a practice in many countries) not only to provide statistical data but more importantly for dissemination of information to individual associations. Powers of the association can be broad enough to permit assumption of water rate and other assessment collection with failure to pay empowering the association officers to deny water delivery.

The flexibility in structure also permits forming various operational organs in the association for planning, management and dispute resolution. Most important, organizing under the Company Act (in the absence of specific legislation on the topic) enables a high degree of self-management and operation by the water users.

³¹The steps of registration of a company are: (1) preparation of a Memorandum of Association defining the scope of activities and setting forth the constitution of the company and its name (see §§ 5,6,7,8, and 11 of the Companies Act); (2) preparation of the Articles of Association which set forth rules for internal management of the company (see §§ 17 and 18 of the Companies Act); (3) registration of the company (see § 24(2) of the Companies Act); and (4) issuance of the prospectus or statement in lieu of a prospectus (see § 2(14) of the Companies Act). The latter is not required of private companies.

³²The Companies Act, § 28 (1913).

³³Id.

³⁴Id., § 50(1) (a) and (c).

Depending upon the objectives of a federation of companies, a hierarchy could be formed with or without registering. If the federation is simply to improve water management through better timing of delivery or some other function not requiring contracting or assuming other legal responsibilities or liabilities, this may be done through informal unregistered association of registered entities.

There are advantages and disadvantages of incorporating. When dealing with companies, the property of the company belongs to the company. This loss of control of ownership is offensive to a people who do not have much to begin with.³⁵ However, creditors can proceed against only the company and not the individuals.³⁶ Therefore, in organizing, the farmers will want to be informed of the implications so a conscious decision can be made on what properties, if any, will become company properties.

2. The Cooperative Societies Act, 1925

This Act was passed to facilitate the formation and working of cooperative societies for the promotion of thrift, self-help, and mutual aid among agriculturists and other persons with common economic needs so as to bring about better living, better business, and better methods of production.³⁷ It was made applicable to the whole of Pakistan, except in Tribal Areas, by the Sind Cooperative Societies (West Pakistan Amendment) Ordinance, 1965.

The Act applies to "producers societies," which are groups formed with the object of producing and disposing of goods as the collective property of their members, and "consumers societies," which are societies formed with the object of obtaining and distributing goods to or of performing services for their members and customers and of dividing among their members the profits accruing from such supply and distribution.³⁸

Only societies registered as cooperatives may use the word "cooperative" in their titles.³⁹ The Provincial Government may, by special order, exempt any society from registration requirements in an effort to save time and trouble.⁴⁰ Provisions of the Companies Act do not apply to societies registered under the Cooperatives Societies Act,⁴¹ and this simplifies administration.

Cooperatives are the method of water user involvement in Turkey, but their success to date is not known to the authors. The provisions of the

³⁵In re George Newman Company (1895), Chapter 685.

³⁶Harikar Prosad v. Bansi Missir, A.I.R. 1931, Pak. 321 (F.B.) § 25, Partnership Act, 1932.

³⁷The Co-Operative Societies Act, Preamble (1925), for detailed analysis see The Cooperative Societies Act, 1925, with Rules, by M. H. Jahanfa, The Monsoon Boon House, Lahore, 1967.

³⁸Id., Chapter 1, §§ 2 and 3.

³⁹Id., Chapter 9, § 62.

⁴⁰Id., Chapter 11, § 66.

⁴¹Id., Chapter 11, § 68

Cooperatives Societies Act are very similar to those acts in U.S.A. and other countries, particularly regarding the registering and monitoring of cooperative affairs. This latter point is one which has caused concern in many countries, among farmers, who as a group are individuals. Cooperatives have a definite attribute in traditional agricultural cooperative activities such as product marketing and credit acquisition. But, in reality any water users association formed as a cooperative must be cognizant of the jurisdictional limitations of the hydraulic unit served, thus a multitude of "cooperatives" would need to be formed along water-course or village levels for on-farm water use improvement purposes in order to insure that those who are to benefit from the cooperative will not be dominated by "outsiders."

3. Related Legislation

The formation of water user associations is facilitated by three acts which provide a legal foundation to carry local water management activities. These three acts are the Soil Reclamation Act of 1952, WAPDA Act of 1955 and the Easements Act of 1883.

Regarding the possibility of implementing any water users' association or other organizational arrangement leading to user management of water within designated agricultural areas, the Soil Reclamation Act of 1952 as amended in 1964-65 and 1972 provides the authority to cause a department or other agency of the government to frame a scheme considering such matters as, and notwithstanding any provisions contained in the Canal and Drainage Act, the improvement, alteration, extension, or curtailment of any watercourse; the amalgamation or separation of any irrigation chak; the transfer by any area of one source of irrigation to another; the temporary increase or decrease of water allowance to any area or total curtailment of water supply; the alteration, amendment or cancellation of any order already in force regarding the distribution of water on any watercourse or the mutual rights or liabilities in respect of the use; the construction or maintenance of a watercourse or the issuance of a fresh order superceding any existing order or mutual agreement; the construction of any field drains or drainage works; the implementation of lining of channels in consultation with the irrigation department where the board considers such a measure desirable. The installation, management and maintenance of tubewells and the doing of all acts intended to promote the health, well-being and prosperity of local residents including soil conservation and preservation from injury or pollution of rivers and other sources and means of water supply.⁴² Prior to January, 1973, the Act was implemented through the Land and Water Development Board. However, in the Punjab, effective 31 January 1973, these duties and powers were transferred to the Irrigation and Power Department.⁴³

Section 18 contains the procedural aspects giving notice of such a scheme and the handling of responses by individuals.

⁴²Id., Chapter 4, § 17.

⁴³Notification No. SOV (O & M) 2-15/72.

Under Section 22 of the Act, if the government sanctions any scheme after proper notice and response by concerned persons and agencies, then "it shall announce the fact by notification and the board shall forthwith proceed to execute the scheme."

A notification under Subsection I, in respect of any scheme, shall be exclusive evidence that the scheme has been duly framed and sanctioned and shall not be called into question by or before any court; therefore, this provision eliminates the right to judicial review by anyone adversely affected. Section 26 of the Act states that, as soon as the scheme for a local area or part thereof is sanctioned and notified under Subsection I of Section 22, the use of underground water in that area, except the water used for domestic purposes or for watering livestock, shall come under control of the agency. The agency shall frame rules to define for different areas from time to time the uses which are to be included in the term "domestic purposes" for watering livestock.

Although the Act was adopted to resolve problems of waterlogging and reclaim saline lands for maximum agriculture production, the purpose and powers of the Act are broad enough to enable the designated agency or board authority to work with local water users on programs to improve water and related resources use.

Less related to implementation of water users associations is the WAPDA Act. Under the Act, WAPDA can designate critical areas of salinity control and pursue a reclamation program in the area. It would be advantageous if WAPDA could contract with local water users through some representative entity specifically created to improve water management.

The last act, the Easements Act of 1883, is very important to a new association undertaking watercourse realignment and rehabilitation. Easements for constructing and maintaining the distribution structures can be obtained with consent or through legal action under the act.

Changes in the Law to Accommodate Improved Water Management

From an examination of the Cooperatives Act, Companies Act, WAPDA Act, Soil and Reclamation Act, Canal and Drainage Act and Minor Canals Act, it is concluded that water users associations as suggested in the preceding section can be formed. However, a major reorientation of the laws will be necessary to permit the most rapid and extensive development of all water resources and land capabilities.

Most notable is the absence of a national water policy which, in addition to government agency action, encourages beneficial use of water by users and user associations. A policy statement is considered essential to set the tone and priorities for development and conservation of resources.

The program of initiating water users associations and potentially a hierarchy to establish an effective line of communication between the government and the water users can best be undertaken with special legislation setting out the purposes and requirements of these local entities.

This, however, should not be done until sufficient experience has been gained to determine the nature and scope of an acceptable form of entity.

Legislation on specific ministry programs should be developed providing incentives to formation and operation of water user associations.

Perhaps the most significant changes or enactments needed are with the water laws. Suggested is a fundamental change in principle from the 1873 Canal and Drainage Act, but considered to be essential to the optimum benefit from water user associations. This change is to explicitly permit trading and renting of water turns within the watercourse or federation of associations where this can be accomplished.

Other major changes are: recodification of the laws to give recognition to the hydrologic unit of water supply systems, and interprovincial allocations of water, integration of quantity and quality control of water resources and conjunctive use of ground and surface waters.

Existing water law should be amended making the system of rotation more flexible and the farmers' ability to influence the timing of water delivery through the mogha. Water application based on crop demand can lead to increased crop production, reduction of water waste and improved standards of living for the rural population. Of importance also, would be the improved image and standing of government irrigation officials. Water user associations can accomplish a great deal in improving timing and on-farm water management.

In addition, serving as a trial to implement improved technologies, the water users association can be most effective in a procedure we shall call the "reverse turn." This is a practice which has met with success in the very arid northeastern part of Mexico.⁴⁴ It was introduced simultaneously with creation of irrigation districts. Prior to the "reverse turn," farmers in this area practiced a similar "nakka to nakka warabundi."

The reverse turn operates in the following manner. Water is diverted into the watercourse to the very end user and instead of the traditional approach of working down the watercourse it starts at the tail and ascends in reverse to the users at the head of the watercourse. The difference in operation, aside from the reverse nature, however, is that the turns commence as soon as water reaches the last outlet. Turns are not tied to a specific length of time and fixed time of day, nor is the rotation fixed on a 7 or 14 day basis. Where the rotation may have been a 7 day warabundi previously, under the "reverse turn" it may be that water users would get their water every 6, 5 or 4 days depending upon how quickly the water could be conveyed to the tail and the turns commence.

The theory upon which this system is recommended for Pakistan is that the time in conveyance is now spread equally among all the users

⁴⁴This point is based upon an explanation of the operation of irrigation districts made to the author by a water law specialist from Mexico City, Mexico, at Fort Collins in June, 1975.

on the watercourse, since the turns do not begin until the water reaches the end farmer.

This is in stark contrast to how conveyance time is presently spread among the water users. Under the head to tail rotation, a full head of water reaches the first field outlet. This farmer is thus concerned about the state of repair for only this length of watercourse, and once his turn is over unless he also owns or operates lands in other parts of the watercourse, he really has no reason nor incentive to care about watercourse maintenance.⁴⁵ Sequentially, as water moves down the watercourse, the head is diminished, due to seepage, overflow and leakage. Water takes a little longer each time to go from outlet to outlet.

The losses, in addition to the physical need to build up the head at each outlet, exponentially increases the time between turns. Consequently, the users further down the watercourse either lose precious minutes of a turn or some standard formula is applied to lengthen their turn. In either case, no incentive exists to keep in repair the entire watercourse, except that the desire is increased as one goes beyond some point toward the middle to the end. The result is well known in Pakistan. Production at the tail of the watercourse is less than at the head, with corresponding affects upon the landowners or operators.

Improving and maintaining the watercourse under the traditional head to tail system does definitely improve water delivery efficiency and reduce losses and is strongly recommended for this reason. Likewise, organizing users to carry out operation and maintenance will insure the continuation of the operation and maintenance. However, instituting the "reverse turn" simultaneously with formation of water users associations has a three-fold advantage. It provides an incentive for all users to improve the watercourse to the optimum. A structural mechanism exists to enable self government of collective responsibility cum benefit. And finally, it is making at least some (if not nearly all) users better off without adversely affecting others (in terms of crop output).

The benefits are both physical and social. The physical benefits and the incentive to improve the watercourse leads to reduction of transmission losses, provides a "maintained" head immediately at the outlet and enables users to shorten the time between periods of their next turn. Socially, the water users have an opportunity to work together for mutual benefit without relinquishing any rights or privileges.

The cornerstones of the "reverse turn" to be successful are: 1) agreement and organization of farmers; 2) commencing the turn only when water reaches tail user; 3) willingness of water users to improve the watercourse; 4) a change in the Canal and Drainage Act or regulations of the Provincial Irrigation and Power Departments to permit and encourage the reverse warabundi.

⁴⁵The authors recognize that in the vast majority of watercourses in Pakistan, whether sanctioned or not, the strict nakka to nakka rotation is not followed, rather the rosewari or free movement systems are practices.

It is further recommended that a licensing system be established, commensurate with the institution of water user associations, that will provide the security necessary to the agriculturalist for the capital investment. The license would be for the volume entitled to the water-course and granted to the irrigation association. This would be an incentive for formation and a realistic gesture approving self-management and collective responsibility.

Although the development of groundwater has moved forward rapidly since the 1930's, there is a noticeable lack of sufficient legislation controlling the spacing of wells, withdrawal rates, and installment of wells. It is recommended that such legislation be drafted simultaneously with the re-codification of water laws.

Land Tenure and Land Reform

There is one area of legal involvement and control not previously discussed that is very important to developing a program of water user associations; this is the law and regulations regarding land tenure and land reform. Prior to 1950, the Punjab NWFP Tenancy Acts of 1887 provided the only statutory foundation governing relationship between landowners and tenants. Then in 1950, the Punjab, Sind and NWFP enacted laws which granted tenants certain rights and recognized certain duties of the landlords. Major changes occurred in 1959 with the adoption of Martial Law Regulation 64. It attempted land reforms among which the most important were the limits placed on size of holdings, restrictions in fragmentation of holdings, encouraging the consolidation of holdings and providing security of tenure for tenants.

Pakistan has seen many changes in land reform since its creation in 1947, but the most sweeping and immediately important are the Land Reform Regulations of 1972. An effort was made to bring the field of land reform into conformity with the Islamic principles of equitable distribution of wealth and economic power by redistributing wealth and reducing income disparities, increasing productions, and decreasing unemployment and improving relations between landlord and tenant. The 1972 Regulations shifted from limiting family size holdings of 500 acres under 1959 regulations to individual holdings of 150 acres (or equivalent in produce index units) and special provisions for government servants. Transfers of excess land after December 1971, unless qualifying under an exemption, were declared void. Important to tenants are the provisions which give the present tillers of the land a preference in the distribution of excess acreages.⁴⁶

These are a few key changes under the 1972 regulations and subsequent amendments. This is an area of law that is changing very rapidly and as

⁴⁶For detailed discussions and analyses of the 1972 Land Reform Regulations see Mian Abdul Hamid, The Land Reform Regulations of 1972, Khyker Law Publishers, Lahore, 1974, and Ronald Herring and M. Ghaffar Chaudry, "The 1972 Land Reforms in Pakistan and Their Economic Implications: A Preliminary Analysis," The Pakistan Development Review, Vol. XIII, No. 3, Autumn 1974, p. 245-279.

a consequence of the dynamic nature, a more detailed discussion is not in order. However, it is a topic of great importance to any long range program directed to improving on-farm water management and the contemporary state should be assessed at the time changes affecting landlords' and tenants' water use are being formulated. Regardless of the form of water user association, the membership will undoubtedly consist of cultivating landowners, absentee landowners, tenants and/or cultivating owners who also lease additional lands and, thus, are owners cum tenants. The interdependence of land reform regulations and organizing successful water user associations is in the complexity of the entity and establishing a method by which all irrigators can be represented in the decision making affecting their water supply. Fragmented holdings complicate irrigator involvement as well as generating economic inefficiency in the farmer work hours during water distribution, in a fast network of laterals to service parcels, and in evapotranspiration and seepage of water. Yet, this is a condition that must be taken into account in formulating the scope and operation of the local irrigation organizations.

Training and Extension Needs

The creation of water users associations presumes the agreement of farmers on a watercourse to voluntarily proceed with a water management program and realize the benefits in the short and long run, not only of the technical and financial components of the program, but also of organizing. To insure this latter component is clearly understood and that farmers are not merely responding to preconditions for assistance, extension personnel must meet with the water users and discuss the attributes, manner of creation and operation and importance to the individual, community, province and nation. Continuous extension assistance will have to be offered on matters of internal operation of the association, i.e. voting, accounting, obtaining financial assistance, etc., simultaneously with technical assistance. Workshops should be held to discuss matters of importance to the water users.

The training and extension activities do not cease at the farm level. In fact, they must permeate both the micro and macro levels. Irrigation Department and Revenue officers need to be made aware of their role in a program of improved water management. Department manuals need to be revised to explicate the interrelationship that exists between the purveyor of water and the user in terms of optimizing total available resources and technologies for increased food production and living standards.

Conclusions and Recommendations

In summary, the water laws of Pakistan have remained in a static state for a number of years. Law, like the society for which it is adopted to guide social conduct, should be dynamic and unconstraining. Unfortunately, there is no process in Pakistan nor in most other nations for a systematic review on the adequacy of the law. This report is an attempt to take one particular aspect of the law and examine it against the existing conditions and changing times.

The legal analyses of the status of local water user organizations in Pakistan and selected countries has led the authors to the following conclusions.

1. Pakistan has no formalized pattern of local association or organization concentrating upon water use and conservation.
2. The laws and regulations for water use as well as the design and operation of the water delivery system do not encourage creation of cooperative efforts among water users at the farm level. Three major reasons exist that compel the majority of water users to merely function in the system: a) the rigidity in rotation of canal water delivery, yet unpredictability in water delivery to the farmer; b) noninvolvement of the farmer in the decision-making process of canal delivery, subsequently leading to an inability to influence control over one of the most vital elements in agricultural production, or to adopt a planting and harvesting schedule in which the plant water requirements are timed to coincide with predicted water availability; and c) legal sanctions against water trading and selling inhibit the users from freely maximizing the supply within the watercourse area.
3. The Government of Pakistan has accorded high priority to the development of some structural type of local water user organization.
4. No insurmountable constraints are detectable in either legislative or customary water laws of Pakistan. In fact, research into old irrigation systems of other Islamic nations, and in particular the Moslem influence upon the irrigation communities of the once Moorish controlled portions of Spain, clearly indicate an established pattern of water user collaboration to control and manage the resource.
5. Several general laws of Pakistan can serve as the legal foundation for implementing the concept of water user associations; however, it is recommended that specific legislation be adopted to sanction their formation and provide adequate legal authority.
6. The formation of local water users associations would provide the institutional framework for improving irrigation efficiency and increasing agricultural production by:
 - a) getting farmers directly involved in the local decision-making process;
 - b) managing water delivered to the watercourse, thus improving timing and conveyance throughout the chak;
 - c) solving some problems of small farmers and resolving disputes between users;
 - d) serving as a vehicle and forum for disseminating information and assistance on improved water use and agricultural practices and technologies;
 - e) constituting a legal contact point between the government and water users; and
 - f) offering opportunities for increasing labor intensive agriculture.

7. A range of organizational schemes exist that serve to illustrate users involvement and programs in local water control and management and from which basic models can be developed acceptable to the needs of the Pakistani farmers and consistent with the policies and programs of the government.
8. The scheme of water user associations:
 - a) must be an endogenous entity structured and tailored to coincide with the religious, social, political, economic and legal systems of Pakistan;
 - b) should commence with a simple, nonsophisticated organizational arrangement having the attributes of flexibility and completeness to allow evolution and maturation as intra-watercourse demands and development take place; and
 - c) can be designed for hierarchical evolution to achieve inter-watercourse collaboration in water management, and undertake development on improvement programs of a greater magnitude or complexity than the "first level" entities.
9. Based upon an examination of local water organizations in five countries, it is concluded that effective water control and management is facilitated by having an expeditious institution for equitably resolving disputes (e.g. the Tribunal of Waters, Valencia, Spain).
10. The success of any agrarian program with objectives of enhancing the quality of rural life and meeting national food production requirements depends upon a strong water policy to increase delivery and application efficiency, encourage conjunctive use of surface and groundwaters and activate structured collaboration of local water users in improved water management. Such objectives and policies require an awareness of policy-makers and government officials of the conditions and constraints to change of the water users. Conversely, the image of government officials and personnel in relation to the water users must be improved by their demonstrating an appreciation and understanding of the problem.

Reexamining the basic proposition of improving on-farm water management in the Indus Basin, the following recommendations are offered to develop and institutionalize the concept of water users associations in Pakistan:

1. The institutionalization of water users associations requires a simultaneous effort at both the macro and micro levels. It is recommended that a government agency be established or designated at the macro level with responsibility for developing and administering programs designed to assist the farmers, such as watercourse rehabilitation, land leveling, insuring dissemination of vital information on water availability and delivery schedules, improved practices and technologies and with authority to negotiate and contract with water users associations for implementation of such programs. The entity, in addition, should be the liaison between the micro level efforts of the associations and other provincial and national agencies with responsibilities and programs in water and related resources.

2. Induce the establishment of associations through governmental incentive programs, as opposed to penalty or enforcement techniques.
3. Permit a wide degree of variations in organizational scope of authority so as not to restrict or constrain future development (i.e., allow the organization to start from an embryo and mature as the needs arise).
4. Draft a charter stating policy and purpose of organization.
5. Include in the objectives the goal of improving efficiency in water delivery and use from ground and surface waters and prevention of excessive return flow.
6. Formulate rules and regulations for operation and maintenance of association works.
7. Allow the association to levy assessments for the operation and maintenance of the system as well as providing a portion of these assessments for a capital improvement fund, and empower the association to collect water charges such that individual and collective (community) responsibility can materialize, and perhaps even eliminate the propensity for corrupt practices.
8. Failure to pay assessments or for other material infractions should result in the loss or suspension of the right to receive water and voting privileges.
9. Draft bylaws for administrative functioning of the association.
10. Provide the association with jurisdiction over main and minor watercourses within the command area.
11. Prohibit associations from becoming involved in politics.
12. Establish internal organs of the association to permit greatest amount of farmer participation in decision making (an assembly of users), a managing body (executive organ) and body to resolve disputes quasi-judicial in nature. Ensure equitable representation of all members through graduated voting rights, rights which would extend not only to the operating landowners but also tenants.
13. Provide for obligations, rights, and liabilities of association members.
14. Create the recognition of the right of each member to a share of his water and provide for the enforcement of such right consistent with the Islamic concept of equitable apportionment.
15. Provide means of enforcing charter provisions and rotating directorship.
16. Technically assist the association in delivering water to the shareholders in due time, place, and amount when water is needed by the plants.

17. Keep use of water by the association consistent with the ability of the Irrigation Department to deliver water, although it may be necessary to modify the customary practices of water use within the watercourse, i.e., shifting within the types of warabundi = pakkī, kutchā, rosewārī, nakka by nakka, or reverse warabundī.
18. Defray or minimize, through cost sharing, the initial and subsequent costs of improving the delivery and use system.
19. Induce and/or assist cultivators in the installation of turnouts or gates at the nakka in place of the present practice of removing the dirt. The organization should provide a ditch rider who is the only employee (or his organizationally designated assistant) who can open and close the nakkas.
20. Consider, and where possible, induce the conjunctive use of ground and surface waters (e.g. give the association the authority to realign major and minor watercourses but within the constraint of water delivery through the mogha and tubewells where they exist).
21. Assist the members through financial and educational means (which in turn requires a training program for extension-type personnel) to learn of, provide for, and implement improved farming and irrigation practices.
22. Extension and training efforts must be directed not only to water users, but also the water purveyors.
23. Provide for an integrated hierarchical organization among user associations to accomplish various magnitudes of development.
24. Establish at the federation level, an independent juridical body, consisting of association presidents, to resolve water disputes within the federation command area.
25. Develop a line of communication to the provincial and national governments either through a hierarchy of associations or a new or existing governmental agency particularly concerned with rural affairs.
26. Permit the divisional canal officer and other nonirrigator types as impartial technical advisors to the association with no voting power.
27. Strengthen the authority in the Canal and Drainage Acts that presently exist regarding the rights and responsibilities of divisional canal officers to inspect delivery systems at the farm levels, i.e., from the mogha onward.
28. Examine the impact of land tenure practices and regulations upon proposed program of improved water management.