Institutional Framework for Irrigation: Some Salient Features of the South Asian Situation

D. J. Bandaragoda[4]

INTRODUCTION

Definitions

THE WORD "INSTITUTION" can be given **a** wider meaning than is normally understood. Defining it widely, I have used the following interpretation elsewhere:

> The term "institutions" in its popular usage is usually given **a** restricted meaning, to refer only to "organizations" but **as** it is applied in this paper, the term **also** covers "rules" (laws, regulations, procedures, norms and conventions) which in fact underlie the organizations and determine the "work roles" of individuals and groups. In this sense, the term "institutions" mean both "rules" and "roles."
>
> Organizational behavior cannot be assessed or changed without reference to its institutional environment. However, the emphasis of most evaluations and attempted remedial action **is** often on organizations or role structures, to the relative neglect of their underlying rules. The outcome is invariably not very successful. A broader definition of the term "institutions" draws attention to this neglected area of irrigation-related rules which are critically important in assessing the institutional impact on overall irrigation management performance (Bandaragoda and Firdousi 1992 chap. 2).

In this sense, the term "institutional framework for irrigation" covers the organizations, norms and practices relating to irrigation; and also the rules, procedures, and laws that underlie or govern them.

Main Characteristics of the South Asian Situation

The institutional scene relating to irrigation in South **Asia** seems to he characterized by two main factors : (i) ***the existence*** of ***a deep-rooted "irrigation culture;"*** and (ii) ***the effect*** of ***recent development initiatives on rhe institution building process.*** Interestingly, the continuing interaction between these two factors, though not so constructive at times, is another characteristic of the South Asian situation. It is this interaction between the two intluences that largely determines the quality of institutional performance.

---

4 **Management Specialist of** the International Irrigation Management **Institute.** Colombo, Sri Lanka

SOUTH ASIAN "IRRIGATION CULTURE"

The idea that there is a distinct irrigation-related culture, which characterizes the institutional framework in South Asia, relates to the region's long history of irrigation development and practice. This culture[5] in my view, has tended to determine the quality and shape of institutions in this instance, and is seen to he based on the following:

- Tradition of the ruler's responsibility for social welfare, (supply-oriented administration)
- Influence of colonial administration, (regimented and formalistic)
- Dominant public sector involvement, (management by proxy through center's agents)
- Preference for legalistic/centralist administrative approach, (as against aparticipatory mode of management)

King and the Subjects

Some of these elements are interrelated. The dominant role of the public sector in irrigation, at a glance, appears to be a product of the colonial administrative influence, but in fact, it has its roots in the interest shown by the ancient rulers in many aspects of irrigation development. In the region, this tradition covers a period of more than two thousand years.[6]

Although the water users played an important role in operating and maintaining the irrigation systems at that time, they were guided by the rules of the state for their required participation (this was known as *rajakariya* or "service to the king"). Also, regarding equitable distribution of water, there was state guidance, and the water users acted on the decisions of the ruler's representative in the area. The tradition of compliance in South Asia comes from over two thousand years of subordination and structured life under the Emperors, Kings, Princes, Nizams and Sultans, and the various warlords and chieftains. Compliance was not a total subservience; it was partly a reflection of the work the leaders did in using their power and resources to provide common goods, like irrigation, for the benefit of the people. The despotic character of these benevolent monarchies in managing these common goods is considered to have been necessitated by a social need to control large systems (Wittfogel 1957).

The fall of what is popularly referred to as the ancient "hydraulic civilization" in this region is attributable to the decline of this structured institutional framework for irrigation. The irrigation systems collapsed when there was no leadership or arrangement to build, maintain and operate them.

---

5 My colleague Douglas J. Merrey has explained that *culture* is a concept which can be differentiated from the concept of "social system" or "organization." He refers to *culture* as the set of values, beliefs, rules, perceptions, knowledge, etc., shared by an interacting group (Merrey 1992).

6 The history of irrigation in Sri Lanka spanning over 2,000 years refers to irrigation structures dating back to the first century BC (reign of King Kalantissa) and of such technical innovation and skill as portrayed by the Maduru Oya brick terra-cotta sluice of the same period. Irrigation was of such importance in this era, that administrative areas were identified on the basis of irrigation; the ancient district of Nuwara Kalaviya, as named, comprised the command areas of the three large tanks (reservoirs) of Nuwarawewa, Kalawewa and Padaviya.

Colonial Period

After some centuries of neglect and decay, the abandoned infrastructure formed the basis for renewed interest in an "irrigation renaissance" during the colonial period. The largest ever reconstruction and rehabilitation program in Sri Lanka started with the renovation of its extensive network of irrigation "tanks" (reservoirs) under the British colonial administration. Following the old inundation canals, a massive canal system was built in the northern part of the subcontinent.

The vigor with which the physical system was built was matched by the enthusiasm shown in developing the needed irrigation institutions. In designing new structures and rules for the colonial administration, the British retained most of the old institutional elements found in the subcontinent. Yet, they improved substantially upon the existing supervision and compliance relationships. Understandably, the centralism in administration was strengthened. Hierarchies were established. Village leadership was formally appointed, and rules and procedures were formalized. The institutional framework for irrigation that was finally put in place in South Asia during this period was basically an innovative adaptation to suit the local conditions and values.

Despite being centralized, this institutional framework was considerably service-oriented. Many rules were aimed at providing distributive justice or equity, grievance mechanisms for dispute resolution, and accountability in operation and maintenance of the systems. There were mechanisms for the central administration to outreach for serving the people.

Until the late 1960s, the British-revived old concept of *Vel Vidane* (irrigation headman) was an effective institution in Sri Lanka; to date, the Patwar plays a similar role in Pakistan. The present legal system for irrigation management in this region is still based on Acts promulgated by the British in the 1870s. and manuals of procedure developed soon after that period (a sample from Pakistan is listed in Annex III).

I am tempted to comment that the institutional framework which the British evolved for irrigation in the subcontinent at that time can be rated as one of the best institution building attempts anywhere in the world. It served the needs of the day extremely well; in its core, it has not been fully superseded by any revision or reform to date.

After Independence

When part of the South Asian region that was under colonial administration became independent late in the 1940s, the new nation states embarked on yet another period of concern and attention on irrigation. This was on the basis of their often expressed desire to provide food for the growing populations To promote food production, incentives had to be built into the administration of irrigated agriculture. Support prices and subsidies paved the way for liberalization of existing rules or of their application. With increased government expenditure on irrigation development, operation and maintenance became a state responsibility. The effect of some of these development initiatives will be further discussed under Recent *Development Initiatives*.

While taking these steps towards enhanced domestic food production and accelerated social development, the new national governments that came to power jealously guarded their authority and status so that they could have close identity with these administrative measures.

Almost reflecting the colonial style, these governments preferred to maintain central authority. They liked to claim responsibility for whatever development that could be achieved. The higher the levels of government investment on irrigation development, the greater was their desire to retain irrigation management as a social responsibility. The public sector became the dominant actor in the development process; consequently, the irrigation institutional framework also became more centralized and law-enforcement oriented.

All these traditional influences (ancient, colonial and post-colonial) combine to form the present "irrigation culture" in South Asia. There is a natural tendency for the rural people in this region to follow these cultural footprints, even when they are in pursuit of the benefits of modem technology. Illustrating this, the irrigation officials tend to behave like feudal lords, and the farmers in their rather rare attempts at organizing themselves tend to select office bearers from elitist families. Irrespective of today's democratic ethics, big landlords in the subcontinent frequently interfere with formally laid down irrigation rules. Defying the modern day economic impulses, the farmers in Sri Lanka practice sharing both water and land during water shortage; they sacrifice their individual rights and cooperate among themselves and with officials to reduce their risks during drought (this practice is called *bethma*).

RECENT DEVELOPMENT INITIATIVES

The effect of recent development initiatives on the present institutions for irrigation in South Asia can be seen in the following issues :

Overlapping agency responsibilities,
Emphasis on technical processes,
"Soft state" effect on application of rules,
Excessive political intervention,
Popular notion of "good officials and bad farmers," and
Recent attempts at institutional change.

Proliferation of Organizations

South Asia can be described as a region which has attempted fast development in political processes. Immediately after independence, and in some cases even before independence, the countries were quick to adopt the Westminster mode of democratic institutions. India, Pakistan and Sri Lanka embarked on parliamentary democracy, almost together, immediately with the declaration of independence. Universal franchise was introduced to Sri Lanka as early as in 1932.

In sum, political development in this region has proceeded ahead of economic development. As a result, there has been a proliferation of political and administrative organizational structures (ministries, departments, divisions, bureaus, corporations, centers, institutes, etc.) beyond the economic needs of these countries. For political reasons, a large number of elected members have to be given ministerial positions, and the result is adilution of functions into numerous portfolios. Each ministry then has a tendency to build its own administrative empires. The irrigated agriculture sector, because of its social and economic importance, attracted more than its due share from this institutional extravaganza.

Thus, the presence of too many agencies with diffused or overlapping responsibilities is the result of a rapid political modernization process and the associated development strategies which were based on sectoral (and even sectarian) policies. This is a feature common to most of the countries in the region. Sri Lanka has been described as having more "irrigation institutions per hectare" than most countries. India and Pakistan, being relatively large countries with central and provincial political arrangements, possess a very extensive institutional landscape. Its uncoordinated nature and related inefficiency have become the subjects of many evaluations.

Technical Emphasis

Post-independence enthusiasm on project-based infrastructure development, which was substantially supported by international development assistance, saw a definitive tilt in administration toward construction and technology transfer aspects. The massive Indus Basin Project in Pakistan, Udawalawe and Mahaweli irrigation projects in Sri Lanka, a host of similar construction and rehabilitation projects elsewhere in South Asia, all brought with them this emphasis on the technical process.

In most instances, the Irrigation Departments which had evolved from the colonial period were partially dismantled to form larger, more powerful and resourceful parastatal bodies, mandated with infrastructure development objectives (Water and Power Development Authority or WAPDA in Pakistan, Mahaweli Authority of Sri Lanka or **MASL).** Their emphasis on the technical processes has polarized adecline in attentionon the social side ofirrigation management. This has also led to a gradual decline in the technical competence of those individuals remaining in or joining the operating agencies.

While the construction emphasis has shifted to the new, and more pampered (by the government), organizations like WAPDA and MASL, the rest of the institutional framework failed to capture the opportunity to develop other useful emphases. For instance, in Pakistan there **is** no organization with a mandate for farmer organization or coordinated irrigated agriculture. With an engineering emphasis given to the newly created On-Farm Water Management (OFWM). wings of the provincial Departments of Agriculture, they grew fast ahead of the other wings of the Department, and in the process of this growth, reduced the visibility and the effectiveness of Agricultural Extension.

Laxed Rule Application and Excessive Political Intervention

Another major difference between pre- and post-colonial administrative styles in this sector was the relative neglect by the latter of the "rules" side of institutions. This is largely caused by the "softstate" attitudeof overly politicized administration of new governments. Field studies in these countries clearly show that there has been a definite decline in institutional performance in the irrigation sector, which has worsened gradually since independence. Both farmers and agency staff recall the more disciplined irrigation behavior and the greater attention and supervision of officials at every level during that earlier period. A common feature of the present field situation is what they refer to as "political interference" on most aspects of management responsibilities. Performance evaluation of any type is virtually nonexistent in this context. The culture-bound orientation towards law-enforcement directly conflicts with this new development, and the outcome seems to he variable in different parts of the region.

Good Officials and Bad Farmers

For individuals in position of authority, to place the blame of collective responsibility on the weaker group may he a universal phenomenon; farmers are a particularly vulnerable group vis-a-vis the irrigation officials. In South Asia, this **is** a very prominent feature of agency-farmer relationships,

Recent Attempts at Institutional Changes

In almost **all** the South Asian countries, recent attempts at change are a special characteristic of the institutional framework. Most of these changes have been promoted by the development process itself, some by way of introducing democratic institutions, others by way of bringing about greater coordination, or management support. Following project-based development aid, donor interest in promoting improved institutions and more efficient management for project implementation, has been a conspicuous feature of these recent changes.

The creation of new structures such as WAPDA in Pakistan, MASL in Sri Lanka, and Central Water Commission (CWC) in India are examples of major attempts at structural change. Pakistan has been experimenting with Command Water Management Projects (CWMP) at a pilot level in selected canal commands in all of the four provinces; Sri Lanka is still evaluating its introduction **of** the Irrigation Management Division (IMD) to the traditional Irrigation Department and of the Project Management concept in system management; and India has proceeded a long distance with a number of Command Area Development Authorities (CADAs). Similar structural changes are being developed in Nepal (Pradhan 1989) and Bangladesh.

New laws, procedures and mechanisms for recovery of the costs of operation and maintenance are another attempt at institutional change in the region, This is basically a donor-driven initiative which is now being increasingly appreciated **as** an essential change to meet increased operation and maintenance costs.

Recent political imperatives of devolution of power also have led to some decentralization of responsibilities to the provinces. In the subcontinent, irrigation has become a state or provincial responsibility, and the states or provincial governments have established their own irrigation institutions. With this change, the original tilt towards centralism has **also** undergone change, although repercussions exist.

Despite these changes, however, the irrigation institutions in many of the South Asian countries appear to remain conspicuously static. Within the irrigation sector, the changes in institutions **lag** behind those that have taken place in the resource base and technology over the years; these changes also **lag** behind the changes that have taken place in other sectors. For this reason alone, the level of adequacy of the institutional framework for irrigation in South Asia is perceived as corresponding more to their original purposes, which were based on feudal and colonial requirements, than to present needs of social development.

INTERACTION BETWEEN CULTURE AND NEW DEVELOPMENT INITIATIVES

The continuing interaction between deep-rooted irrigation culture and the effect of development initiatives can be seen in **all** the South Asian countries. Generally, where the interaction between these two factors has proceeded with less conflict, the role of the irrigation-related institutional framework appears to have been more supportive to irrigation management performance.

For instance, in Pakistan (and **also,** perhaps in North India) where forms of feudalism still stubbornly persist in influencing the socioeconomic aspects of rural life, the role of big landlords in irrigation conduct seems to be disruptive to achieving most of the performance objectives. Heavy investment in upgrading the physical system and increasing water availability has not been able to receive its due return, **as** the institutional framework remained basically static.

Another classic case of this interaction between culture and development inputs is the practice **of warabandi** (water distribution by fixed turns **of** fixed time duration) in northern parts of the subcontinent. The practice **is** dictated by deep-rooted cultural influences such **as** group

water rights, tolerance for power and authority, subservience to traditional leadership, etc., although more recent official interventions have tried to make it rigid and officious, but more equitable. Recent attempts to explore radical changes to the practice were readily turned down by the water users as well **as** the agency staff.

Relatively, this conflict between tradition and new development inputs has been less damaging in Sri Lanka (and also in South India) than in the northern subcontinent, because new development initiatives such **as** agrarian reforms, land settlement schemes, and attempts at farmer organization have proceeded without much hindrance, and with some degree of success. Concurrently, the culture variable here may also not have been as strong as in other contexts.

INSTITUTIONAL FRAMEWORK

Organizations

The South Asian model of the structural arrangements for irrigation management typically consists of three main components:

1. Traditional Irrigation Department (ID) for managing large systems
2. An offspring of the traditional ID, which was established for construction of large infrastructure development projects
3. An organization for developing and managing small schemes

The IDs are predominantly staffed **by** civil engineers and their support service groups. Generally, the preference of this staff is still towards construction activities, including rehabilitation, as against operational activities, or maintenance.

In Pakistan, the national planning documents have repeatedly pointed oot the deficiency created by this preference in that the irrigation systems are not viewed or operated **as** production systems, and have recommended that ID staff should he given a special training in agriculture and brought closer to irrigated agriculture. Some coordination between these traditionally dichotomous agencies of irrigation and agriculture was attempted with the pilot CWMPs, but their evaluations do not present much of a success story. Recent World Bank proposals speak of the need to try more radical changes in the structures, where coordination is to he achieved more intensely on a canal command basis, and greater responsibility for water distribution be given to farmers.

In Sri **Lanka,** the ID functions were bifurcated into construction and "irrigation management" responsibilities: an IMD has been created within the ID itself and charged with the responsibility of coordinating all irrigated agriculture activities at the project or system level, thus trying to dilute the civil engineering flavor in the ID. The creation of MASL was basically for implementing the Accelerated Mahaweli Development Project of which the major effort was in constructing new regulatory reservoirs and irrigation canal systems. However, since relocating and settling of a large number of farmer families were also an important part of the project, MASL establishment included two sub-units of equal size and significance: Mahaweli Engineering and Construction Agency (MECA) and Mahaweli Economic Agency (MEA). The MEA in its structure saw a major departure from the traditional ID structure and also from the usual dichotomy between irrigation and agriculture, and evolved an integrated project management mode having the functions of water management, agriculture, community development, marketing **and** land administration, **all** under one management structure (Raby and Merrey 1989). In the "declared Mahaweli areas," **MEA** has tried to develop collaborative relationships with line

agencies such as the Irrigation Department and the Department of Agriculture, while maintaining its legally provided autonomous character.

In India, CADAs have also attempted a coordination between irrigation and agriculture involving different line agencies. In structure and performance, in terms of coordinating irrigated agriculture, CADAs appear to he more effective than Pakistan's CWMPs, but less effective than Sri Lanka's MEA.

Apart from this type of special attempts for coordinated irrigated agriculture, the typical organizational structure for irrigation in South Asia is one depicting unnecessary confusion and competition as described under *Recent Development Initiatives*. A sample of this wide distribution of responsibilities can be seen in Annex I and Annex II.

Governance

Some steps towards greater autonomy from government involvement in managing irrigation systems have been taken in most South Asian countries. As mentioned in previous sections of the paper, these steps resulted only in creating semiautonomous parastatal bodies like WAPDA and MASL, and also in experimenting with structures for coordinating irrigated agriculture, as in the cases of CWMPs, MASL and CADAs. Most of these steps appear to have stopped short of developing into a clear trend. I see this as a result of the conflict between the "culture" and new development initiatives. Conventional wisdom and preference towards the trodden path have won over critical thinking and the desire to try new ideas. Lack of creativity and initiative is a strong characteristic of the static bureaucracy which the average South Asian institutional framework seems to represent.

Mainly as a consequence of the "soft state" phenomenon, the general law and order situation is refusing to show any improvement. This is aggravated by the skewed nature of distribution of wealth, income and political power. In this climate, it is not reasonable to expect a public opinion that is readily sympathetic towards privatization moves. In some of our field interviews, farmers clearly indicated a preference towards government-sponsored water distribution methods. So far, only pilot-scale attempts have been made in privatizing irrigation management, and that too in selected areas of groundwater use and small surface water systems. Effective farmer organization attempts also lag behind the successes achieved in other regions.

Legal Framework

The history of irrigation rules in South Asia can be traced back to water regulation during the period of the Indus civilization and the later developments during the periods of Aryan, Greek and Arab influences (Radosevich 1975; Caponera 1978). However, the origin of written irrigation rules in the region does not go beyond the British colonial period.

As has been discussed in previous sections, the colonial period had left behind a fairly strong legal framework for irrigation in the subcontinent. These laws (most of which were enacted in the 1970s), manuals of procedure, and irrigation rules form the formal-rules component of the irrigation institutions. Using this strong base for most administrative purposes, subsequent governments have added a new set of laws as minor amendments and a few new laws and procedures. In some instances (e.g., amendments to the land laws and the Irrigation Ordinance in Sri Lanka), these changes have tended to dilute the old framework. Notwithstanding this, the present legal framework for irrigation seems to he impressive (see an example in Annex III). While the laws and procedures (or the formal rules) are adequate for most practical purposes, the real problem lies with their application.

In some countries, attempts have been made to introduce legal support to new development initiatives such as participatory management (Alwis 1990), tenancy laws, land reform and user association laws (Sri Lanka and Pakistan). Pakistan is one country which has established specific laws promoting farmer organizations (see Annex III), but has also demonstrated the futility of having legislation without a popular will to apply them, or to implement the reforms.

Informal Rules

Irrigation behavior is determined not only by formal **rules** like written laws, regulations and procedures, but also by a number of informal rules such as traditional practices and values (elitism, caste system, landlordism, property inheritance and tenancy). In South Asia, where these practices have been sustained over a very long period of time, their effect forms part of the deep-rooted "irrigation culture." After years of tradition, they become a stable set of "rules" in their own right. Formal rules have a tendency to be subordinated by these informal rules, particularly when the countries have "soft **stale**" conditions. The overriding influence of informal rules over formal rules is seen as one of the dominant factors causing irrigation performance to be stagnant in Pakistan (Bandaragoda and Firdousi 1992).

Agency-Farmer Relationships

This is one of the weakest elements in the institutional framework in most countries, although some have tried more earnestly than others. In large irrigation systems, where a joint-management mode will continue to be operative for some more time, the farmer-bureaucracy interface should be the focal point for institutional development. The present situation in South Asia varies widely from almost an abrupt end in agency involvement at the distributary outlet level in Pakistan, to federated farmer organizations managing the distributary itself in Sri Lanka, to totally farmer-managed command area systems in some parts of India, and many parts of Nepal.[7]

Another important feature is the varying mechanisms that the different countries have for dispute resolution and other interactions between farmers and agency staff. In Sri Lanka, a preseasonal planning meeting (cultivation meeting) has been in existence for a long time, Additionally. a system of "Open Kutcheri" days (dialogues between farmers and administrators) is also used for the agency staff and relevant politicalleaders to meet farmers in their own villages. The latter method has been practiced in the subcontinent widely, even during the colonial period, Overall, the quality of this interaction can be described as poor, and its general character as basically agency-dominated and patronizing.

CONCLUSION

South Asia has an extensive institutional framework for irrigation built on a strong base which has been inherited from both the precolonial monarchical rule and the British colonial administration. The influences from these two periods, and the enthusiastic nationalism that followed the colonial period, have all combined to form an "irrigation culture" which seems to be continually impacting on the subsequent development initiatives. Consequently, the dynamism, that the more recent efforts could have generated by now, is missing in the present institutional

---

7 For details regarding the limited functions of the government and the tradition of nonintervention in irrigation water management at the community level in Nepal, see Pradhan 1989.

framework. What one can find today is an unhealthy mixture of tradition and modernity in which the formal institutions play a passive role, as though trapped between these two opposing forces.

Bibliography

Alwis, Joe. 1990. Legal support required for effective resource mobilization under the new participatory management policies, in Resource Mobilization for Sustainable Management, proceedings of a workshop held at Kandy, Sri Lanka. Colombo: IIMI.

Bandaragoda, D. J. and Firdousi. G. R. 1992. Institutional factors affecting irrigation performance in Pakistan : research and policy priorities. IIMI Country Paper - Pakistan No. 4.

Caponera, D. A. 1978. Water laws in Muslim countries. Rome, Italy: FAO, 2 vols. vi, 223p; iii, 311p. Microfiches (FAO irrigation and drainage papers nos. 20/1 and 20/2).

Caponera, Dante A. 1968. Evolution and concepts of water legislation, Annals Juris Aquarium. Proceedings of the International Association for Water Law, September 1968.

Chambers, Robert. 1988. Managing canal irrigation: Practical analysis and lessons from Asia. New Delhi, India: Oxford and IBH Publishing Co.

Lusk, M. W. and Parlin. B. W. 1988. Bureaucratic and farmer participation in irrigation development, WMS Report 89, Logan, USA: Utah State University.

Merrey, Douglas J. 1992. Overcoming artificial institutional barriers: linking farming systems with irrigation management research. Paper prepared for presentation at the Asian Farming Systems Symposium, 2–5 November 1992, BMICH, Colombo, Sri Lanka.

Malbotra, S.P. 1982. The Warabandi system and its infrastructure. Publication No. 157. New Delhi: Central Board of Irrigation and Power.

Nasir, A.D. 1981. A practical treatise on analytical study of Canal and Drainage Act (VII of 1873). Lahore, Pakistan: Mansoor Book House.

National Commission on Agriculture. 1988. The report of the national commission on agriculture. Islamabad, Pakistan: Ministry of Food and Agriculture.

Nayman, Oguz B. 1988. Information-seeking habits of farmers: an exploratory survey. Punjah-Pakistan (unpublished report).

Pradhan, P. 1989. Patterns of irrigation organization in Nepal : a comparative study of 21 farmer-managed irrigation systems. IIMI Country Paper - Nepal No. 1.

Raby, N. and Merrey. D.J. 1989. Professional management in irrigation systems : a case study of performance control in Mahaweli System H, Sri Lanka. IIMI Country Paper - Sri Lanka No. 1.

Radosevich, George E. 1975. Water user organizations for improving irrigated agriculture: application to Pakistan, Water Management Technical Report No. 44. Fort Collins, USA Colorado State University.

Wittfogel, Karl. 1957. Oriental despotism: a comparative study of total power. New Haven: Yale University Press.

The Institutional Framework for Irrigation in Pakistan

Pakistan has inherited a strong institutional base for irrigation, the origin of which can be traced to the mid-19th century. With the Irrigation and Drainage Act promulgated in 1873, the state intervention on irrigation issues started to be effected through a government bureau, and was thus the beginning of the present Irrigation and Power Department in the Punjab Province. Provincial Irrigation Departments (PIDs) in other provinces are the offshoots of their older Public Works Departments, but for both legal procedure and departmental traditions their parentage can be traced to the original state irrigation agency created by the British with the Act of 1873. The organizational culture of all these PIDs is strongly linked with the rigid hierarchical administrative setup of the colonial period.

However, the application of rigid formal rules formulated over a century ago has been severely eroded by the informal social practices which have evolved with the rapid social change since independence. The rigid formal rules that served the earlier period well are now no longer functional in view of the social dynamics of the present-day irrigation sector. To this extent, PIDs continue to be strong organizational structures, but less effective in meeting the present social demand relating to irrigation operations.

Provincial Agricultural Departments (PADs), though of slightly more recent origin, are also related to preindependence institutional creations. PADs were originally entrusted with agriculture extension and adaptive research as their main functions, and their technical importance increased significantly during the green revolution days of the 1960s. More recently, irrigation-related construction work was also given to PADs through the donor-assisted watercourse improvement activities, popularly known as the On-Farm Water Management (OFWM) program. The newly added responsibilities, and substantial budgetary allocations associated with them, tended to provide high visibility to the OFWM wings of the PADs. Consequently, there has been a tendency for the PADs' focus of attention to shift away from their main role of agriculture extension work.

Traditionally, except for the resolution of water-related disputes among the farmers, the Irrigation Departments have restricted their jurisdiction, and more importantly their interest, to the main and distributary canal systems, leaving the area below the *mogha* (distributary outlet) to the Departments of Agriculture. To date, this sharp separation of responsibilities, above and below the mogha, characterizes the institutional framework for irrigated agriculture in Pakistan, and tends to affect the operation and maintenance of the system as a whole. It also serves as a symbol of a "great divide" between irrigation and agriculture, which runs through the framework from field-level operators to provincial-level departments, and to federal-level ministries.

Building on the strong institutional base left behind by the colonial administration, Pakistani authorities have added some very important and useful elements to form a fairly complex institutional framework for irrigated agriculture. With the federation of provinces, which was established in Pakistan early in the 1970s, irrigation remained a provincial responsibility, while, for accomplishing its major responsibility of planning for national development in which irrigated agriculture continued to play a very significant role, the Federal Government created its own Ministries of Water and Power (MWP), and Food, Agriculture and Cooperatives (MFAC). The Planning Commission (PC) with administrative support from the Planning and Development

Division, and the Ministry of Finance (MF) were to perform their assigned supervisory functions in overall planning and resource allocation.

In the preparation of five-year plans and the annual development plans, the Planning Commission plays a pivotal role and tries to bring about a planning discipline among the various ministries and departments by requiring them to follow a specific process. For major projects, five specific PC forms and instructions are to he followed: PC-1 for construction or any other developmental activity, PC-II for investigation, PC-III for quarterly progress reports, PC-IV for completion reports, and PC-V for monitoring of benefits. Out of these, PC-I is used as the basis for project choice decisions,-and is to he prepared similar to a normal project feasibility report with all relevant technical and financial details, and economic and other decision criteria.

Consideration of various project policy aspects and decisions thereon takes place at different levels.[8] For instance, for a project costing more than Rs. 60 million, the process starts with the preparation of a concept paper by the sponsoring department. Concept clearance is given by the Executive Committee of the National Economic Council (ECNEC) which is the highest administrative body for project choice decisions. A PC-I!I is then prepared by the department detailing the investigation requirements and work plan, and once this work is completed a PC-I is prepared with details of project implementation. The PC-I proceeds through several approval levels: the Departmental Development Working Party (DDWP) or the Provincial Development Working Party (PDWP), and then the Central Development Working Party (CDWP) at the Federal Government level, involving all agencies and the ministries concerned including Provincial Planning and Development Departments (PP&DDs). Finally, the PC-I is considered by the ECNEC, and the‘approvals of the provincial and the national assemblies are sought depending on the nature of policy and resource-allocation needed.

Research relating to irrigated agriculture is initiated by specific wings of line ministries at both federal and provincial level, while their activities are supplemented by the Ministry of Science and Technology (MST) and the universities under the aegis of the Ministry of Education (ME). Specifically deployed for this purpose are the Pakistan Agriculture Research Council (PARC) and the National Agriculture Research Centre (NARC) of the MFAC, Pakistan Council for Research on Water Resources (PCRWR), Drainage Research Institute of Pakistan (DRIP) and the National Documentation and Library Information Center on Water Resources (NADLIN) of MST, and the Center of Excellence for Research in Water Resources (CEWRE) of the University of Engineering and Technology in Punjah. Research wings of the Provincial Irrigation Departments such as the Imgation Research Institutes (IRI) in Punjah and Sind, and the Directorate of Land Reclamation (DLR) in Punjah, and those of the Provincial Agriculture Departments such as the Agriculture Research Institute (ARI) and the Rice Research Institutes (RRI) in Punjab and Sind add to this overall research institutional setup.

The Water and Power Development Authority (WAPDA), a semiautonomous or parastatal body created in February 1958, can he recognized as a major postindependence contribution in institutional development for Pakistan’s irrigation sector. When it was established in 1958, WAPDA became an agency of West Pakistan, and remained so until 1970 when the West Pakistan’s One-Unit arrangement returned to the pre-1958 system of separate provinces. With this change, WAPDA became a federal agency and was given much greater prominence than it had during its formative period as a West Pakistan agency. The prominence corresponded to the new responsibility given to WAPDA for assisting the Federal Government in its role in resource allocation for irrigation and power development and, for planning and executing all major development projects in the sector. With the advantage of this prominent place in the institutional

---

8 The revised procedure for approval of development schemes and powers of various authorities to sanction development schemes are given in Circular No. 20 (1)DA/PC/87, dated 15 November 1987, issued by the Planning and Development Division of the Federal Government.

framework, WAPDA is able to play, and has demonstrably played, an important role not only in irrigation-related policy, but also in research, assisting the federal authorities in many policy initiatives. The International Waterlogging and Salinity Research Institute (IWASRI), Mona Research Station. SCARP Monitoring Organization (SMO), the Lower Indus Water Management and Reclamation Research Institute (LIM), and Watercourse Monitoring and Evaluation Directorate (WMED) are WAPDA's subsidiary organizations or units established for specific research, monitoring and evaluation functions.

Annex II provides a functional and hierarchical distribution of the various units of the institutional framework in Pakistan's irrigated-agriculturt: sector.

Annex II

Institutional Framework for Pakistan's Irrigated Agriculture

Irrigation-slat4 intervention	Policy/Planning	Design and construction	Operation and maintenance	Research
Wafer Acquisition				
River Diversion Reservoir Small Dams	ECNEC. CDWP, DDWP. MWP, MAFC, PC, MF PDWP, WAPDA	WAPDA, PID	WAPDA, PID	MWP (WAPDA) MAFC
Wafer *Distribution*				
Main Canal Distributary Minor	PP&DD, PID, PAD	WAPDA, PID	WAPDA, PID	
Water *Use*				
Watercourse Field				

Notes:

CDWP	=	Central Development Working Party
CEWRE	=	Centre of Excellence in Water Resources
DDWP	=	Departmental Development Working Party
DLR	=	Directorate of Land Reclamation
DRIP	=	Drainage and Reclamation Institute of Pakistan
ECNEC	=	Executive Committee of the National Economic Council
IRI	=	Irrigation Research Institute
IWASRI	=	International Waterlogging and Salinity Research Institute
LIM	=	Lower Indus Water Management and Reclamation Research Institute
MAFC	=	Ministry of Agriculture, Food and Cooperatives
ME	=	Ministry of Education
MF	=	Ministry of Finance
Mona	=	Mona Reclamation Research Project
MST	=	Ministry of Science and Technology
MWP	=	Ministry of Water and Power
NADLIN	=	National Documentation Centre
NARC	=	National Agriculture Research Centre
NESPAK	=	National Engineering Servicesof Pakistan
OFWM	=	On-Farm Water Management
PAD	=	Provincial Agriculture Department
PARC	=	Pakistan Agriculture Research Council
PC	=	Planning Commission
PCRWR	=	Pakistan Council for Research on Water Resources
PDWP	=	Provincial Development Working Party
PID	=	Provincial Irrigation Department
PP&DD	=	Provincial Planning and Development Department
RRI	=	Rice Research Institute
SMO	=	SCARP Monitoring Organization
WAPDA		Water and Power Development Authority
WMED	=	Watercourse Monitoring and Evaluation Directorate

Some Irrigation-Related Laws in Pakistan

1 Canal and Drainage Act (VIII of 1873) as amended by
Canal and Drainage (Amendment) Act (XIV of 1952),
Canal and Drainage Extension Act (XXIV of 1964),
Canal and Drainage (West Pakistan Amendment) Ordinance (XXIII of 1965) and Act (Vii to 1968),
Canal and Drainage Extension to III Lora Canal of Bannu District Ordinance (XIII of 1969),
Canal and Drainage (West Pakistan Amendment) Ordinance (I of 1970) and (West Pakistan 2nd Amendment) Ordinance (IV of 1970).
Canal and Drainage Extension to Rohri Canal Area Ordinance (XVII of 1970),
Canal and Drainage (Punjab Amendment) Ordinance (XVIII of 1971), and
Canal and Drainage (Punjab Amendment) Act (XXXII of 1975).

2. The Punjab Minor Canals Act (III of 1905).

3. Rules and Rates under the Punjab Minor Canals Act (1906).

4. Sind Irrigation Act (VII of 1879).
Bund Manual, P.W.D. Government of Sind (1954).

5 Punjab Soil Reclamation Act (XXI of 1952), as amended by:
The Punjab Soil Reclamation (West Pakistan Amendment) Ordinance (V of 1964),
The Soil Reclamation (Punjab Amendment) Ordinance (VI of 1970), and
The Punjab Soil Reclamation Board (Reclamation Fee) Rules (1965).

6. The West Pakistan Land and Water Development Board (Reclamation Fee) rules (1965).

7. Hand-Book of Professional Orders for the Guidance of Officers of the Irrigation Department, Punjab and North West Frontier Provinces (1914), 2nd Edition 1925.

8. Irrigation Manual of Orders (1912), 2nd Edition 1929, 3rd Edition 1940, 5th Reprint 1964.

9. Manual of Irrigation Practice (1943, Reprint 1963).

10. Schedule of Rates (1963 1964), Vol.I, Part I (Specifications for Material Construction), Vol.I, Part II (Specifications for Execution of Works), Vol.II, Part I (Analysis of Material Quantities), Vol.II, Part II (Analysis of Labour), Vol. III, Part III (Schedule of Composite Rates).

11. Public Works Department (Irrigation Branch) Revenue Manual, 4th Edition 1955, 6th Reprint 1987.

12. Water Users' Association Ordinances (Provinces), 1981