WATER USERS´ ASSOCIATIONS IN PAKISTAN:
Institutional, organizational and participatory aspects

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Abstract

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The study, based on empirical data collected in Pakistan´s Punjab, deals intensively with the prevailing contingencies which may support or hinder farmer´s participation in Water Users´ Associations for the management of irrigation water. The changes in the management of irrigation water at the watercourse level through the active participation of the water users were examined on the basis of an empirical survey conducted at farm level in a village of the district Sargodha in central Punjab. The study area can be distinguished as the very first location in Pakistan where the concept of Water Users´ Association was experimented, and the watercourse studied was selected as the ´pilot watercourse´ for the full-scale improvement by the Water Users´ Association.

The main aim of the study was to identify prevailing formal and informal methods for the management of irrigation water at farm level through the active participation of the water users. During empirical research, several influencing as well as determining factors captured central attention due to their vital importance in shaping water users´ attitude and behavior towards Water Users´ Association and its respective activities. In this connection, the institutional, socio-political and cultural factors are considered to be the basic influences within the context of irrigation water management which determine the structure and efficiency of Water Users´ Associations, the organizational entity being used to organize the water users´ participatory activities. The socio-economic regulatory patterns such as family, caste and *´biraderi´*, as primary social units, are playing a dominant role in determining the direction and extent of activities of the Water Users´ Association. In addition, the physical as well as the social environment surrounding the water users have a great impact in shaping the collective actions for the management of irrigation water.

The empirical results underline the importance of Water Users´ Associations for the efficient management and application of scarce water resources which, in comparison to other production resources, have greater potential to increase agricultural production. The importance of such organizational arrangements is equally valid for the better management of non-water inputs. Moreover, irrigation water management, being a socio-technical matter, demands a better coordination between the social and technical worlds which can be well realized through the establishment of the Water Users´ Associations.

As the regulatory patterns of the rural Punjab usually do not coincide with the proposed model of Water Users´ Association, some structural as well as functional changes are necessary to make this arrangement more effective and efficient. In the light of empirical findings, proper planning is recommended to integrate and incorporate the end beneficiaries in the management and operation of the irrigation system.

Abstrakt

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Die Studie, die auf empirische, in Pakistans Punjab erhobene Daten basiert, befaßt sich intensiv mit den vorherrschenden Bedingungen, die die Beteiligung der Bauern in Wassernutzer- Assoziationen zur Bewässerungswirtschaft unterstützen oder behindern können. Änderungen in der Bewässerungswasserwirtschaft am Kanal, die durch die aktive Beteiligung der Wassernutzer verursacht wurden, werden auf der Grundlage einer empirischen Untersuchung analysiert, die auf Betriebsebene in einem Dorf des Sargodha-Distrikts im Zentralpunjab durchgeführt wurde.

Hauptziel dieser Studie war es, die vorherrschenden formalen und informellen Methoden des Bewässerungsmanagements auf Betriebsebene durch die aktive Mitwirkung der Wassernutzer festzustellen. Während der empirischen Forschung war das Augenmerk auf mehrere Einfluß- sowie Bestimmungsfaktoren gerichtet, weil sie von grundlegender Bedeutung bei der Gestaltung der Stellung und des Verhaltens der Wassernutzer gegenüber der Wassernutzer-Assoziation und deren entsprechenden Aktivitäten sind. In diesem Zusammenhang werden die institutionellen, soziopolitischen und kulturellen Faktoren als die grundlegenden Einflüsse im Rahmen der Bewässerungswirtschaft angesehen, die die Struktur und die Leistungsfähigkeit der Wassernutzer-Assoziationen bestimmen, da der Verwaltungsapparat zur Gestaltung von Teilnahmeaktivitäten der Wassernutzer gebraucht wird. Die sozioökonomischen Regulierungsstrukturen wie Familie, Kaste und *'biraderi'* als wichtigste Sozialeinheiten spielen eine entscheidende Rolle bei der Bestimmung der Richtung und des Umfangs der von den Wassernutzer-Assoziationen durchgeführten Handlungen. Außerdem haben sowohl die physische als auch die soziale Umwelt der Wassernutzer einen starken Einfluß auf die Gestaltung von kollektiven Aktivitäten zur Bewässerungswirtschaft.

Die empirischen Ergebnisse unterstreichen die Bedeutung der Wassernutzer-Assoziationen für die wirksame Bewirtschaftung und Verwendung knapper Wasserressourcen, die im Vergleich zu anderen Produktionsmitteln eine größere Möglichkeit haben, die landwirtschaftliche Produktion zu erhöhen. Solche organisatorischen Einrichtungen sind auch für eine bessere Bewirtschaftung der nichthydrologischen Produktionsmittel von Bedeutung. Außerdem erfordert die Bewässerungswirtschaft, da sie ein soziotechnologisches Anliegen ist, eine bessere Koordinierung zwischen den gesellschaftlichen und technologischen Welten, die durch die Einrichtung von Wassernutzer-Assoziationen wohl durchgeführt werden kann.

Da die Regulierungsstrukturen im ländlichen Punjab mit dem vorgeschlagenen Modell von Wassernutzer-Assoziationen in der Regel nicht übereinstimmen, sind einige sowohl strukturelle als auch funktionelle Änderungen erforderlich, um diese Gestaltung noch wirksamer und effizienter zu machen. Angesichts der empirischen Ergebnisse wird eine angemessene Planung empfohlen, um die Endbenutzer in die Bewirtschaftung des Bewässerungssystems einzubeziehen und aufzunehmen.

Foreword

In the heap of contemporary literature on irrigation, one finds relatively less studies focusing on micro analysis of the water users´ organizations. To subside this lack, the

present study concentrates on the efforts to establish, organize and operate a Water Users´ Association in the Pakistan´s Punjab. Although, the basic aim of the promotion of Water Users´ Associations was to increase water users´ role in irrigation system management, but it remained an illusion than a reality.

The research and analysis presented here is an outcome of years long scientific efforts conducted mainly at the Institute of Rural Development, Georg-August-University Goettingen, which, in the course of its preparation, benefitted from active participation of many individuals. All those who cooperated in a spirit of scientific inquiry should be thanked by name, but prudence says otherwise. However, the excellent cooperation of the all, mentioned by name or otherwise, is greatly acknowledged.

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Glossary

Authorized Supply	The quantity of water allotted to a command area.
Biraderi	An endogamous kinship group based on blood or marriage relations.
Chai pani	Literally means tea and water, a common well known term used for bribe. The small amount paid to officials for entertainment.
Chaj doab	Land between the Chenab and Jehlum rivers.
Chak	Block of land identified as the smallest administration unit with reference to irrigation.
Chakbandi	The gross area commanded by an outlet for irrigation.
Chowkidar	Watchman.
Command Area	The area served by a watercourse, a distributary or a canal.
Dara	A place of men´s gatherings for discussions, guests entertainment, etc.
Dera	A multi-purpose buiding built on the farm to keep animals, agricultural equipment and dry fodder.
Distributary	A relatively small sized canal which supplies water to the watercourse outlets. The hierarchy of water supplying channels in terms of size, in descending order, are as follows: Main canal, branch canal, distributary, minor and watercourse.
Doab	Land between two rivers.
Faslana	Bribe paid in the form of agricultural produce at harvest.
Imam masjid	Religious leader; leads the prayers and takes care of the mosque.
Izzat	An expression of power and esteem whose English synonyms are: honour, reputation, status, face, or esteem.
Kammee* or *moeen	Members of non-agricultural castes providing skilled services to the farming community in return for annual contractual payments.
Katcha	Informal, unofficial or unregulated.
Khal	Watercourse; a water channel jointly owned and managed by the water users of an outlet command area that transports water to the field outlets.
Kharif	Summer cropping season; from April to October.
Mogha	An outlet in a canal or distributary to supply water to a watercourse.

Musalli	A member of the *kammee* class, usually landless laborers.
Nakka	An outlet from the watercourse to deliver water to the farmers´ fields.
Nazrana	The jargon used for the amounts paid as bribe.
Numbardar	Headman of the village basically responsible for collecting land revenues and irrigation fee and forwarding them to the government alongwith mediating social and political affairs of the village.
Panchayat	An assembly of village elders to settle disputes and regulate the traditional codex of village.
Pansal nawees	Gauge reader and record keeper of the water supply at the lower level in the main system; regulates water supply to a number of distributaries or minors.
Patwari	Lower level revenue official at the field level for a particular area, surveyer of crops to assess the revenue fee for every farm, keeper of revenue and *warabandi* schedules.
Pukka	Formal, official or regulated.
Rabi	Winter cropping season; from October to April.
Sarkari Khal	Main section of the watercourse transporting water to the water users´ field oulet (*nakkas*).
Tube well	An irrigation well to lift the underground water with electric or diesel motor engine connected to a sizeable metallic tube bored in the earth.
Ushar	An annual Islamic tax on agricultural produce which amounts to 1/10th of the yield for irrigated land and 1/20th for non-irrigated land.
Warabandi	The rotatory system for the distribution of irrigation water.
Water User(s)	The actual water manager(s) at the watercourse and fields level.
Zakat	An annual Islamic tax leviable on assets possessed by an individual for the continuous period of one year and which can yield a capital that can be set aside for the production of further wealth. It is not leviable on wealth which has no capacity for growth. In general terms, it amounts to 1/40th of the value of the taxable property.
Zamindar	Landowner.
Zilladar	Junior member of the supervisory staff of the revenue division of

the Irrigation Department, supervising a number of patwaris.

Abbreviations

ADB	Asian Development Bank
AKRSP	Agha Khan Rural Support Program
BA	Bachelor of Arts
BRAC	Bangladesh Rural Advancement Committee
CE	Chief Engineer
CSU	Colorado State University
CWMP	Command Water Management Project
EAN	Economic Analysis Network
EIU	Economic Intelligence Unit
GDP	Gross Domestic Product
GNP	Gross National Product
H, M & T	Head, Middle and Tail of the Watercourse
ha.	Hectare
ID	Irrigation Deparment
IDA	International Development Agency
IIMI	International Irrigation Management Institute
km.	Kilometer
m.	Meter
MAF	Million Acre Feet
MREP	Mona Reclamation Experimental Project
NESPAK	National Engineering Services Pakistan
NIA	National Irrigation Administration
NWFP	Nort West Frontier Province
O&M	Operation and Maintenance
OFWMP	On-farm Water Management Project
PCI	Pakistan Consultants International

PID	Provincial Irrigation Department
PWD	Public Works Department
SCARP	Salinity Control and Reclamation Project
SDO	Sub Divisional Officer
SE	Superintending Engineer
SFDP	Small Farmer Development Program
SO	Section Officer
sq.	Square
UNDP	United Nations Development Program
UPRIIS	Upper Pampanga River Integrated Irrigation System
USAID	United States Agency for International Development
WAPDA	Water and Power Development Authority
WMT(s)	Water Management Technician(s)
WU(s)	Water User(s)
WUA(s)	Water Users´ Association(s)
WUO(s)	Water Users´ Organization(s)
XEN	Executive Engineer

Measures and their Conversion

Acre	Anglo saxon measure; 1 acre = 100 decimal = 0.4047 ha.
Acre foot	The volume of irrigation water that would cover one acre to a depth of one foot and equals to 43,560 cubic feet = 1,233 m^3
Cusecs	Cubic feet per second = 28.317 liter per second
Murabah	A block of demarcated land, with an area of 25 to 27.7 acres. A commonly used unit of area for agricultural land.
Maund	Weight measurement unit; 37.32 Kilogram
Karam	A local unit of length measurement; 5.5 feet.
Marla	1 *marla* is equal to 0.0025 ha.

1. Introduction

The present study, based primarily on empirical data collected in the district of Sargodha in Pakistan´s Punjab, deals intensively with the prevailing **socio-economic contingencies** which may support or hinder farmers´ participation through some formal arrangements for the management of irrigation water. The changes in the management of irrigation water at watercourse level, especially through the active participation of water users, were examined on the basis of an empirical survey conducted at farm level. The findings of the study support the importance and validity of the local level organizations for the management of production resources benefiting from the wealth of indigenous knowledge and experiences of the target group(s). In this regard, the **institutional, socio-political and cultural factors** are considered to be the basic influences within the context of irrigation water management which may determine the structure and efficiency of **Water Users´ Associations**, the organizational entity being used to organize the participatory activities of water users. Furthermore, the prevailing socio-economic system consisting mainly of traditional **regulatory patterns** such as caste, *´biraderi´*, power and influence is affecting the willingness of water users to participate in irrigation management activities. The analysis of the case study presented here is specific to collectively owned and operated watercourse in Pakistan. Nevertheless, it is hoped that this may yield general insights, particularly with regard to the way in which the participation of water users can lead to a better management of the system and, ultimately, of irrigation water.

The Water Users´ Association studied has been taken as an example of the agrarian community of the Punjab, where **the efforts to establish, organize and operate these associations** have been directed towards improving agricultural production through an efficient management of irrigation water. The study examines the impact of these **organizational efforts** on the development of agriculture generally and on the efficient use of water input particularly. In so doing, the research makes a contribution to studies on the socio-economic dynamics of the local level organizations with a view to understanding the realities faced by water users in the agricultural production process.

Problems of water management generally and of agricultural production particularly can be, if not exaggerated, counted in the list of **burning issues** for the whole world and for Asia specifically. The heaps of contemporary literature on the issue of irrigation water can logically verify the relevance of the present study in the light of the present level of knowledge and research needs. As the majority of the studies has focused on the observation of irrigation system or structure at macro level, therefore, the need is felt for research work which can present **a micro analysis of individual situations and, hence, of individual organizations such as Water Users´ Associations, in a specific span of time and place**.

Without a glance at the historical evolutionary process of irrigation development, the present debate on prevailing contingencies would be incomplete. In the next section, the background of irrigation development is dealt with.

1.1 Evolution of Irrigation

While searching for **the origin of irrigated agriculture**, the historical evidence is not accurate regarding time and place, as it is lost in the haze of unrecorded history of antiquity (FRAMJI et al. 1981:vii). Later investigations suggest that the very first use of irrigation started when human beings changed their nomadic way of life for a comparatively settled form. As other historical processes, the search for the origin of irrigated agriculture begins with the **hunting and gathering society**, which occupies the first place in the history of mankind and, hence, provides the base for further investigations. The society which can be traced back to the Paleolithic and Mesolithic eras, did not practice agriculture. The insufficient data about this era is the main hurdle in depicting this period in an elaborate way (STEWARD 1953:190). This era came to an end when **incipient farmers** living in small villages succeeded the hunters and gatherers.

The **incipient agriculture** began with the first cultivation of domesticated plants to supplement hunting and gathering (STEWARD 1955-a:200) and ended with the production of cereal and meat to feed mankind. The simplest form of cultivation during this period was the **slash and burn agriculture** (FARMER et al. 1986:6). Where the moisture of the land allowed this, **horticulture** was also practiced, but hunting and gathering remained the main source of securing food (COLLIER 1955:19). Incipient agriculture was practiced without artificial irrigation[1] and was started in the river basins where rainfall was sufficient for farming. Moreover, the moisture of the ground compensated for rainfall deficiencies, not causing irrigation to be a need of the day (STEWARD 1955-b:59). The shift from hunting and gathering to agriculture brought with it a vast differentiation of occupations which stratified the societies into different groups (FARMER et al. 1986:62). This era was followed by the **formative era** (STEWARD 1953:323) which provided a base for irrigated agriculture.

The most conspicuous characteristic of this era was the formation of **community-culture**. In irrigation civilizations, this term refers to the formation of a ´supra community sociocultural system´ integrated through cooperation in irrigation works under the control of the theocratic class (STEWARD 1955-b:61). This was the time when a local community, folk or peasant culture came into existence (STEWARD 1955-a:200). Almost all the principal crops were cultivated and nearly all the principal animals were domesticated. For the first time, **artificial irrigation** was practiced, but only on a small local scale. For the erection and operation of irrigation infrastructure people cooperated with each other, and irrigation activities were performed in a participative way[2]. Although the pattern of participation is not defined in literature, these participative activities were organized under the supervision of the ruling class and as a compensation for their services, a share of produce was handed over to them. It must be made clear that the food production was still at the subsistence level. **The invention of the animal-drawn plow** made farming more efficient and productive and also released a certain part of the

[1]Keeping this fact in view, STEWARD (1955:59) stresses the omission of incipient farming from the particular hypothesis explaining the development of irrigation civilizations.
[2]For details, see STEWARD 1955-b:61f.

population for the performance of other specific tasks, thus leading the community to a more specialized division of labor. The innovated technologies were used for satisfying biological needs, on the one hand, and for the social and cultural needs on the other hand.

The simple **village communities multiplied and spread** (ADAMS 1955:6). These settled communities appeared, towards the end of this era as multi-community states. The political authority was based on the control over land and water which afterwards contributed to the growth of states (FARMER et al. 1986:51). Social organization was more clearly defined and elaborated, although the lineage or kinship group was still **the basic social unit**. In the emergence process of civilization, however, the transition from rank society to stratified society is inseparable (ibid. 1986:8). There existed **inter- and intra village alliances based on cooperation and participation for the management of irrigation** activities. Most of the irrigation activities were performed on a self-help-basis, while the community members actively participated at all levels of the irrigation system development. The irrigation methods being practiced were not altogether similar in all regions of the world, as they were seriously affected by the climate, topography and technology. For example, in Peru, small-scale local irrigation was practiced, while in China the well-and-ditch system was used to irrigate the land (STEWARD 1955-a:192-193).

The **enlargement and expansion** of irrigation systems took place during the **florescent era.** This task was most probably performed through people's participation because the use of paid or coercive labor is not reported. The theocratic class, along with feudals and lords (especially in Asia) (FUKUDA 1976:14), was mostly responsible for the organization of such activities (ADAMS 1955:6). In this era, the communities were welded into small states, under the feudals, lords and theocratic class. Out of the village people substratum, a distinctively civilized pattern of living emerged (ibid. 1955:7). According to CHILDE, this was **a period of revolution** (1942:23f).

The period presents a mixed picture of peace and warfare as some of the states like Meso-America were reported to be free of warfare, while China, Mesopotamia and Egypt indulged in it. Warfare, therefore, has been instrumental in expanding states. The relation of irrigation expansion to warfare and state expansion, however, is not clear. This era presents a variety of irrigation methods ranging from inter-valley (Peru) to local and terracing (Meso-America), and from large-scale irrigation (Mesopotamia) to public works such as dikes (China) (STEWARD 1955-a:194-195).

The **social structure** underwent a lot of changes during this era. The immediate family or lineage was the pivot of all the social, cultural and economic activities. Social stratification into rural and urban dwellers became more obvious (ADAMS 1955:6). Warfare generated a new class of war prisoners and an economic stratification of the slaves; the former were used mostly to build and improve the state infrastructure, public works, new land colonies, etc. (FARMER et al. 1986:148) and the latter served in the houses. This **coercive labor**, probably for the first time, took over the activities (of irrigation as well) which were usually performed by the native people.

Succeeding the Florescent era, the emergence of large-scale militarism, strong tendency of urbanization, expansion of political and economic domination over large areas or empires and construction of forts can be identified as the main features of the subsequent era: the **initial empire**. In all centers of hydraulic societies, as a response to internal population pressures, competition for the acquisition of resources and from the pressure of external nomads, warfare provided the real base for the early empires and dynasties. For the organization and management of these empires laws were codified, learning was systematized, astronomy, theology, medicine, writing and mathematics were established as independent sectors of knowledge. The process of social change may have been set into motion with the shift to agriculture and husbandry which laid the foundations of the village societies at first and then led to **the formation of stratified societies**, the urban centers and eventually the formation of states (ibid. 1986:6).

The social structure transformed into a new **class and hierarchy**. Social classes were sharply defined and identified as nobles, priests, warriors, commoners, slaves, etc. Moreover, differentiation on the basis of occupation was also observed (STEWARD 1955-a:196-198). The concept of private property, especially of land and consequently of water, replaced the existing concept of communal, lineage and tribal property. This privatization affected adversely the communal and cooperative activities of irrigation system construction, operation and maintenance.

The above discussion indicates that there has been **a close connection between the social and economic development and stability of society and water**. From this connection, according to some authors, originated the first social groups as ´**hydraulic civilizations**´ (CAPONERA 1978:93), for example. The classical economists termed these civilizations as „Oriental or Asiatic" societies (WITTFOGEL 1957:1), whereas KARL A. WITTFOGEL denotes them as „**hydraulic societies**" (ibid. 1957:3). These societies are claimed to be the longest existing societies of the world (WITTFOGEL, 1955:43). The last 6,000 years of progressive development ascertain that no civilization could be preserved in any region of the world for more than 30-70 generations except in the Nile Valley, Mesopotamia, the Yellow River Valley and the Indus Valley (DALE & CARTER 1957:28); the civilizations evolved, developed and flourished around the hydraulic resources.

Different hydraulic societies emerged and flourished in different natural settings which definitely affected and shaped their respective **institutional patterns**[3] (WHITE 1949:368).

[3]On the basis of institutional variations, WITTFOGEL (1957:165ff) has divided the core areas of hydraulic world into two main categories, namely compact and loose hydraulic societies. „A hydraulic society may be considered compact when its hydraulic agriculture occupies a position of absolute or relative economic hegemony", whereas a society may be considered loose when „its hydraulic agriculture, while lacking economic superiority, is sufficient to assure its leaders absolute organizational and political hegemony" (ibid. 1957:166). These two main categories are further subdivded into secondary divisions. Compact 1 includes those societies whose hydraulic agriculture is economically dominant and spatiously continuous. Compact 2 subdivision of compact hydraulic society represents those societies whose hydraulic agriculture is economically dominant but whose hydraulic system is discontinuous. Some loose hydraulic societies, on the other side, may include some large areas which are compact within their immediate area or which may prolong beyond the areas of a single region. The inclusion of territorial and relatively less dense hydraulic systems formulated the patterns of these hydraulic societies which are termed as ´loose 1.´ Loose 2 are those

They cannot, therefore, be explained only in their economic, geographical and technological terms. The physical setting, under some specific cultural conditions, definitely directed the formation and structure of the hydraulic society accordingly. The regulatory patterns, therefore, influence not only the organization and management of irrigation systems but also help in determining the extent of involvement and participation of various related actors. The understanding of prevailing institutions with regard to farmers´ organization and participation in the management of irrigation water merits attention, if one is to have a comprehensive view of the subject matter. Therefore, a detailed discussion on the importance of institutions follows in Chapter 2.

1.2 Aspects of Agricultural Development

The importance of agriculture in developing countries is being realized more and more, not only because of its absorbing capacity for **manpower** but also as the main source of **food and livelihood**. The rapid increase in the world´s population generally, and in the developing countries particularly, demands an efficient use of agricultural resources, especially for the poorer countries where the greatest potential for increasing food production and rural income is always found in the agricultural sector.

In the past, most of the growth in worldwide food production was associated with the **expansion of cultivated areas**. In developing countries, since 1955, about 375 million acres of land have been brought under cultivation; they cover an area which is larger than the total area on which cereals are grown in the USA, Canada, Western Europe and Japan combined[4]. As land itself is a limited resource, food production through expanded acreage will be relatively limited in future.

In the years 1965-66, the high yield varieties (HYV) of rice and wheat brought a revolution in the world´s food production, where fertilizer and irrigation played a vital role for the success of these varieties. During this period, generally known as the **Green Revolution**, the production of „miracle rice and wheat“ occurred on irrigated land (FAIRCHILD & NOBE 1986:357). The importance of irrigation for world food production can be realized from the fact that, during the ten years between 1976-86, about 40 percent of all increase in food production in developing countries was contributed by **expanded irrigation**. Moreover, in the last fifty years, the land under irrigated agriculture has increased threefold[5]. Despite its vital importance, water in the agricultural sector is being treated as a free good, both in its application and prices, causing a huge loss of this precious input and an ultimate loss of food production potential.

The amount of water, on the other hand, is limited, whereas its demand is increasing day by day. This situation calls for an adoption of urgent means for the more **effective and economic utilization** of this resource. The fact that agriculture requires the largest amount of available water, compared with other requirements, underlines the importance of

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hydraulic societies whose hydraulic units are not strong enough to provide economic superiority both in the sense of leadership and authority. For more details, see WITTFOGEL 1957:166ff , 1955:46ff.

[4]Cf. FAIRCHILD & NOBE 1986:357.

[5]Cf. FAIRCHILD & NOBE 1986:356.

irrigated agriculture and, therefore, the need to organize and manage the irrigation systems more efficiently.

In many developing countries, agriculture no longer holds a leading position in the economy; it has become a supportive element. In the past, everything was linked with and focused on agriculture, now it has become **an integrated and depending part of the economy** (KUHNEN 1988:10). The agricultural production is decreasing, due mainly to high migration out of agriculture, and has decreased to less than 50 % in many countries. This situation demands some farmers´ institutions to represent their interests in the changing world. The agricultural community has become a playball in the hands of strong economic and political circles. The constantly increasing need for agricultural products, on the other hand, demands a **change in agricultural policies** which must favor and protect the farmers´ interests. This would not happen automatically. The farmers have to unite themselves in organizations, associations or unions so that their needs can be voiced effectively and their interests represented in economic and political discussions[6].

The failure of approaches applied for the **development of the agricultural sector** in Pakistan is partly attributed to institutional barriers, both at the macro and micro levels. At the macro level, the system is facing a centralized bureaucratic system supported by a century-old rigid and insensitive package of irrigation acts and practices. At the micro level, on the other hand, the irrigated agriculture is confronted with a set of rural norms, traditions, social stratifications based on social regulatory patterns such as caste, *´biraderi´*, faction, sect, etc., outdated agricultural and irrigation practices and so on. The prevailing socio-cultural, ecological, political, technological and economic environment is hardly favorable for the development and promotion of agriculture. These factors, to the extent of their relevance for the present study, are dealt with in detail in the following chapters of the dissertation.

The **agricultural production** can, theoretically, be increased by adopting either of the three following possibilities, or a combination of these:

1. expanding the area under cultivation,
2. increasing the yield per unit of cultivated area, and
3. increasing the land use intensity (SCHREVEL 1989:50, CHAUDHRY 1985:2).

In the case of Pakistan particularly and for other developing nations generally, the opening up of new fertile land is becoming increasingly difficult, due partly to the unavailability of favorable land for flora, and partly due to the scarcity of required means and inputs. The land which is not under irrigated agriculture until now is either infertile or entails very high costs to be made arable. Moreover, the danger of strong soil erosion also acts as a hindering factor. **The second possibility** mentioned above shows some potential for its practice. Although the yields of several crops cultivated in Pakistan are below those of other countries with similar conditions, considering the level of agricultural methods and inputs used, most crop varieties in use seem to have reached their production ceiling. A

[6]Cf. KUHNEN 1988:10-11.

major part of the cultivated area is sown with old varieties, as new high yielding varieties (HYV) are either unavailable in required amounts or the farmers are skeptical whether to cultivate them. Moreover, the necessary inputs required for the HYV are very often not available at the right time in the required amounts or are too costly for the small landholders. Therefore, the old traditional methods of land tillage are still widely practiced. The first two possibilities, however, do not seem promising in terms of the desired increase in the national production.

In this situation, the third possibility, which stresses on **increment in land use intensities** through an efficient and effective management of the available natural and human resources is likely to contribute to an increase in national production figures. The prevailing conditions are characterized by the non-availability or insufficient provision of high yielding seeds, chemical fertilizers, insecticides and pesticides. Moreover, their unequal provision to farmers belonging to different socioeconomic strata and production regions is making the case more complicated. The other agriculture-oriented services provided by national agencies (of agriculture, irrigation, banks, etc.) are substandard and of low performance. In comparison to other inputs, irrigation water possesses a **substantially greater potential** to increase agricultural production; much better than regarded. The irrigation system, both at main and field levels, is fraught with **efficiency and equity problems**. The potential of 176.02 million acre-foot (GOVT. OF PAKISTAN 1991:166, Table 4.18) of annually supplied water is not being optimally utilized. The **huge losses of water** are causing a great percentage of agricultural land to become infertile through **water logging and salinity**[7], on one hand, and scarcity of water due to losses is not allowing more land to be included in irrigated agriculture, on the other hand. It is believed that the improvement of agricultural and irrigation services can substantially contribute to increase the yields. The **actual potential** of the agricultural sector is not being adequately exploited and the result is a lower level of agricultural production. This level of production can, however, be raised merely by properly utilizing the currently available natural and human resources (CHAUDHRY 1985:2). In short, of the three possibilities of increasing agricultural production, intensification of land and water use can promise the greatest chance of success.

Almost all the agricultural inputs in the country are either explicitly or implicitly subsidized (CHAUDHRY 1985:25). Such a **subsidy policy** is affecting crop prices and private investments unequally, causing a difference in the distribution of benefits for different farm sizes and, hence, for the farmers. As a result the major part of subsidies and other resulting benefits are collected by large farmers; this further widens the gap of social and economic benefits among different groups within the agricultural sector. The low prices of crops in comparison to those of the international market are also acting as a disincentive for agricultural development. In how far these factors have been playing a positive or negative role for the development of rural sector in Pakistan remains an open question which cannot be adequately dealt with within the limits of this study.

[7]About two million acres are reported underlain varying from 0-10 feet depth (GOVT. OF PAKISTAN 1991:165, Table 4.15).

The **operation of the irrigation system** substantially below the expected or optimal performance levels has put the farmers as well as the system planners under an enormous pressure (WADE 1982-b:287). This pressure sometimes seem to lead to depression when one sees that the gulf between food produced and its demand is becoming larger and larger. The developments in other supportive fields of food production such as gene technology, fertilizer, implements, etc., in spite of their remarkable contributions did not succeed in bridging the gap. For a possible solution, when the available resources are analyzed on the basis of their potential, only water can be singled out wherever the existing potential of this precious input has not been adequately dealt with. In many parts of the world, irrigation water has not been properly exploited so as to contribute its share to increase grain production. The causes of **water under-utilization** are multiple, including technical as well as social.

The efficient and effective application of water available in developing countries can definitely cause a multiple increase in agricultural production which may prove an important means of initiating **rural development**[8]. Ever since, agriculture has been an essential subject matter of rural development and in the course of time, its importance has acquired higher momentum as a necessary element of development strategies. The importance and relevance of benefits that irrigation can contribute to a rural development program aiming at **eliminating poverty** through an increase in agricultural production hardly need spelling out. The **local organizations** whose operating orientation concentrated on a **participatory approach** have substantially contributed to rural development programs. The organizations which operate in an indifferent or adverse normative **environment** have produced less benefits than the average, unless they adopted some participatory and egalitarian procedures. The effective local leadership and sophisticated provision of outside support are highly desirous to cause voluntary groups to function effectively, especially when the prevailing conditions are indifferent or negative (ESMAN & UPHOFF 1984:159-160).

The effective and efficient management of irrigation needs a high collaboration among farmers, especially when the holdings are small and fragmented. The **effective management of irrigation water** becomes necessary as the use of other agricultural inputs such as fertilizer, high-yield-varieties (HYVs), insecticides and pesticides heavily depend on it (WADE 1982-a:103). To achieve this target, two approaches are usually used, i.e., organization initiated by government organs and through self-initiative. The former approach, also known as implied paternalism, will undermine rather than to promote a subsequent capacity for more **autonomous initiatives** by the water users, particularly when the government´s tutelage is withdrawn (HART 1978:23f).

GROENEVELD, while understanding rural development as a subsystem of the holistic development, defines it as a fundamental improvement of the economic, social and political living conditions of all the people living in the **rural areas** as well as their mobilization and activation (1978:22-23). While differentiating rural areas from urban areas „ ... the qualitative characteristics regarding production and social system, that is, the

[8]A similar approach has been recommended by HERBON (1990:75) for Bangladesh.

functions and structures of the rural area“ (STRUTZ 1994:8) must be paid due attention. Thus, a rural area includes regions with a single settlement, village settlement as well as small-town settlement with a village environment and intensive exchange relations with that environment: agricultural activities, or more significantly, the activities based on agricultural predominance in life in the rural area[9].

The importance of farmers´ participation in rural development projects for realizing their objective of yield maximization is a need of the day. The significance of their participation becomes more vital for the management of irrigation projects because the involvement of different actors such as hydrologists, engineers, politicians, etc., makes it necessary to secure benefits for themselves by playing an active role. In an era of increased concern for the participation of various beneficiaries in the projects planned for them, the importance of water users, the main beneficiaries, in the irrigation projects holds a central place. This aspect is being more and more emphasized as „the success of an irrigation project depends largely on the active participation and cooperation of individual farmers. Therefore, a group such as a farmers´ association should be organized, preferably at the farmers´ initiative or if necessary, with initial government assistance, to help in attaining the objectives of the irrigation project. „Irrigation technicians alone cannot satisfactorily operate and maintain the system“ (ASIAN DEVELOPMENT BANK 1973:50).

1.3 Statement of the Problem

Considering the present situation in Pakistan, where the continuously increasing **population rate is higher than the increase in agricultural production**, the question as to how to overcome this mismatch needs a satisfactory answer. The analysis of the conventional methods of increasing agricultural production leaves us with limited alternatives. Therefore, for an intensive use of arable land, the importance of a better management of irrigation water and the relevant technologies and institutions do not need to be spelled out.

In the last few decades, the importance of efficient management of human resources to optimally profit from the natural resources has caught a special attention. In irrigation water management not only it is important to overcome the physical and technical constraints, but it is also essential to **focus on human-resource development**. Indeed, human resource rich countries have demonstrated that they can develop even if they are poor in natural resources. The establishment of Water Users´ Associations provide the most suitable mechanism for the human resource development. The development of Water Users´ Associations must be emphasized because the indigenous knowledge of the water users is the basis for achieving an increase in the agricultural production through efficient management of irrigation water.

While characterising the **economic problem as being man over nature**, MARSHALL decleared, „although nature is subject to diminishing returns, man is subject to increasing returns“[10]. The famous agricultural economist and Nobel Prize winner, THEODORE

[9]Cf. WORLD BANK 1978:13-15.
[10] Cited by MEIER 1995:265.

SCHULTZ, in contrast to emphasizing on the accumulation of physical capital, has called attention to the need for **investment in human capital to develop the agriculture**. He is of the opinion that the decisive factors of production to develop the poor people are not space, energy and crop land but the decisive factor is the improvement of human resources[11]. In this connection, it is important to improve abilities and skills of people and to modify their motivation and values so as to make them more suitable for the management of natural resources. In order to improve the human infrastructure, it is necessary to mention that alongwith organizational and institutional efforts, the economic, sociological, psychological and political atmosphere surrounding the human beings must be carefully studied and analyzed.

The cooperative education and training to the water users about the effective management of production resources are either paid no consideration or are **considered consumption goods instead of investment goods**. The human-resources as human-capital is not being conceptualized by the policy makers and administrators, and hence, undervaluing in their acknowledgement. Consequently, the failure of conventional measures and approaches to manage the natural resources demand to emphasize on human-resource promotion and development. Now, even though the construction of infrastructure and hydraulic technology have dominated irrigation water management discussions, it has now become evident that a high priority must also be assigned to develop the human capital.

The **non-consideration and under-estimation of the farmers´ role** in the management of irrigation water through their active participation can be singled out as the major cause of inefficiency of the irrigation system in Pakistan. The huge irrigation system of the country is, in fact, unmanageable for the Irrigation Department (ID) alone. The **organizational gap** between the irrigation managers and the farmers leads to an inefficient use of water. This gap is causing an adverse effect on the production potential. The actual production level of major crops is estimated to be half of that of other developing nations like Mexico and Egypt. Following KHAN (1985), FREEMAN states that a four-fold increase in production is possible if strategic improvements were to be made in the agricultural sector where improvements in the organization of water management occupy a central place (1984:64-65). This varifies the fact that the effective use of physical capital is dependant on human capital. The mainstay of organizational changes, therefore, revolves around the establishment of farmers´ organizations at the local level for the management of water, or more precisely, of Water Users´ Associations.

[11] Cited by MEIER 1995:265

1.4 Rationale of the Study

In many cities and villages throughout South Asia, people are organizing themselves to restore order in their lives. There is a **spontaneous movement** for the restoration of society. This movement is leading towards the organization of the communities by involving indigenous inhabitants. The approach of community participation for the success of development projects is becoming more and more attractive.

The study defines an example of how water users participated in the improvement and rehabilitation of their pre-existing field level irrigation infrastructure and in its operation and maintenance. It shows the form of organization structure through which the participation of the water users was mobilized and organized to provide them a better supply and control of water. It also depicts the extent of technical, financial and management support by the state.

It is a pity that despite the favorable climate, fertile land, hard working farmers, improved infrastructure and possession of the world´s largest integrated irrigation system, **the per unit agricultural yield in Pakistan** lags far behind that of other countries with almost similar conditions. In this situation, one may pose the question why such a set of supportive factors did not provide enough incentive for a better management of water. The factor which is missing in this set of arrangements is definitely the **participation of farmers**, as, without active involvement of the real managers, the farmers, the effective and efficient management of such a huge system to secure the desired results seems an illusion. It should, therefore, be acknowledged that a better management of irrigation water through farmers´ participation is the most effective and promising way to secure high yields at sustainable grounds. Therefore, to achieve higher agricultural production to satisfy the increasing food needs in Pakistan, the active involvement of farmers in all matters regarding agricultural development is highly desired.

In no other part of the world, one may find such times where **scarcity and surplus** are so near to each other as in South Asia (FIEGE 1995:13). Such an **inequality in distribution** of the resources is not limited to macro levels only, one may find some drastic differences even in micro social units like villages. By searching deeper in socio-economic system of Pakistan´s rural people, such differences are identifiable even within caste groups, among close relatives, families, etc. A typical example of such an unequal distribution of economic resources is presented by **the watercourse studied**. The watercourse shows conspicuous differences in terms of land holdings, tenure patterns, cropping intensity and patterns as well as in terms of accessibility to water, control over supply and quantity of water, availability of necessary irrigation infrastructure, etc. One must realize that the roots of such differences can be found in the natural environment, but there exists no doubt that such differences have been extended and intensified by the man-made distributive and allocative regularities, too. Such **regulatory patterns** are definitely controlled by the basic and primary institutions existing in every community. One may not, however, assume that this watercourse is a unique case; rather, the distributive patterns of other watercourses in Pakistan are almost similar, definitely with some specific differences shaped by the

particular patterns of society, culture, economy, politics, geography and, last but not least, topography.

The main emphasis of the study is laid on **analysing the impact of farmers´ organization for the management of irrigation systems through their active participation**. Moreover, a diagnosis of the process of development that is supported by and enhanced through the participation of farmers, especially in irrigation water management, will be made. The study also examines the factors which motivate the farmers to involve themselves actively in the management of irrigation system or hinders them from doing so. The study analyses the role of farmers´ participation and involvement in the management and operation of irrigation practices in a Punjabi village of Pakistan, as **the participatory approach** has introduced some new dimensions to the irrigation management. The effective participation of farmers can, indeed, guarantee the effective development of the irrigation system. The success of the system, however, needs to be capitalized into institution building at the community level. In other words, farmers´ participation in management is the first step in social organization for development. Without an accurate management of irrigation system, the production potential achieved with the help of high investments may be a social misinvestment.

1.5 Main Objectives of the Study

In the past few decades, voluminous literature on irrigation and related institutions has been produced. The problem of water acquisition, storage, transportation and distribution, infrastructure development, project management, bureaucratic vs communal models of irrigation water management and the emergence of new institutions have all appeared as major issues. However, a rigorous element, that has not captured adequate attention in the past, and even at present, relates to **the role of water users for irrigation water management through their active participation** at all possible levels of the irrigation system. A lot has been said in favor of this approach, but one seldom finds a scientific analysis of the actual applicability in the real world. Most of the time, the participation of the water users remained a symbolic illusion rather than a reality.

The object of the study is to depict, with the help of empirical findings at micro level in rural Pakistan, the **specific environment of irrigation practices** and the efforts to develop them, especially at the watercourse level. The contribution of some institution building efforts has been analyzed to explore their impact on the rural population and their irrigation related socio-economic activities.

The **main objectives** of the study are:

a) to explore the **existing formal/informal water users´ organizations** concerning irrigation,

b) to examine the **level and extent of farmers´ participation** in such organizations to improve their water, particularly, and non-water inputs management, generally,

c) to observe the **impact of these organizational activities** on the irrigation management practices at the local level,

d) to observe the **impact of natural and socio-economic conditions** surrounding the water users in their participatory activities regarding irrigation water management at the watercourse level,

e) to analyze the **role of water users participation** in the management and operation of irrigation practices, and

f) to examine the extent of water users´ **involvement in decision making** and, hence, **implementation** of decisions for their own development.

The basic aim of this study was not to propose a developmental policy but it is hoped that this effort can serve this purpose, too. The primary object of the research was to train oneself (the author) to qualify for future scientific undertakings in the field of rural development and to be able to apply scientific knowledge and personal grass-root experiences at the level of policy, project and program implementation[12]. The study can, however, be useful to national level policy makers, planners and irrigation system administrators as well as to international funding agencies. The document not only highlights some achievements resulting water users´ participation, but also **indicates shortfalls in design and implementation** of the participatory approach. Moreover, an effort has been made to sketch a structural as well as functional model to improve the applicability and efficiency of the WUAs in Pakistan´s Punjab.

1.6 Research Theses

On the basis of theoretical knowledge and self experience of the irrigation practices in the country, the following hypotheses were set forth for the test:

1. One of the major working hypotheses is that socioeconomic regulatory patterns affect the water users´ ability to participate in water management activities significantly. The prevailing sociocultural institution have a great impact on the participatory cooperative activities of the water users. It is hypothesized that a **general validity and functionality of rural institutions** will regulate the behavioral patterns of the water users regarding water management. The basic rural institutions such as family, caste and *´biraderi´* provide the basis for collective actions and may affect these activities the other way round.

2. The irrigation system, being a socio-technical entity, is equally affected by the specific contigencies of the water users´ social organization as well as by the physical and technical features of the system. A relatively **homogeneous atmosphere in terms of technical, social, cultural, economic and political aspects** may facilitate the organiztion of participatory activities for the management of irrigation water.

3. Due to the lack of proper guidance, the farmers are unorganised for the management of production resources, generally, and the irrigation water, particularly. The farmers are

[12]Cf. HERBON 1988-a:34.

not provided sustained incentives to organize themselves. It is supposed that, if farmers are offered **a variety of socio-economic incentives**, they can be organized in a much more effective way.

4. The participation of the water users in the management of irrigation water can **increase the efficiency of the system.** Their organized involvement can help to solve the problems of water management at local and main levels, which for the state alone are difficult , if not impossible, to accomplish.
5. The Water Users´ Associations are not functioning well due to **organizational and sociopolitical problems.**
6. The **socio-economic status of a water user** is of central importance in determining his role in participatory activities and in determining his share in the benefits as a result of such activities.

1.7 The Structure of the Study

The division of the study into chapters is in terms of a desire to discuss the important issues per se as well as in an overall coordinated way and to keep the analysis manageable in the light of the underlying principles and themes. All relevant aspects will be discussed at varying levels of detail, with a logical priority to main issues about Water Users´ Associations´ organization, operation and effectivity. The remainder of the dissertation will follow the plan as below.

In the following chapter, **Chapter 2**, - Conceptual and Theoretical Framework - the basic concepts for presenting and interpreting the farmers´ organized participation in water management are discussed. The meanings of the relevant basic concepts such as institution, organization, management, and participation have been defined and delimited to be followed throughout the study. The concentration is on the relevance of the basic ideas and themes which should guide research and analysis along with providing an exhaustive documentation of what has been theoretically and practically done in the field of irrigation water management. Towards the end of the chapter, the concept of Water Users´ Association is discussed in detail. The concept of Water Users´ Association occupies a central position in the dissertation, as most of the empirical section revolves around it.

The **third chapter** deals exclusively with the institutional and socio-political conditions developing, operating and controlling irrigation water in Pakistan. While discussing the general environment of irrigation management, special attention has been paid to social, political, legal and normative aspects, both at the main and the tertiary levels. These details are described as scene setters and serve as the main stage for the drama of irrigation water management in the country.

Against the background of the determinants dicussed in Chapter 3, the patterns of local level water management at the watercourse level are the focus of the following chapter, **Chapter 4**. The prevailing contingencies, determined by several factors discussed in depth, are analysed and critically discussed to observe their impact on the informally and formally

organized collective actions. The empirical results obtained from the field work mainly constitute this chapter.

In **Chapter 5**, the conclusion of the study will be presented. The conclusion is arrived at by discussing and analysing the theoretical and empirical statements made in the last chapters. For future water management plans in Pakistan, based on participatory approach, a few basic insights and recommendations for theoretical as well as practical measures are presented. Special consideration being paid to the prevailing contingencies in the country, a model for the Water Users´ Associations is suggested.

In the last chapter, **Chapter 6**, the study will be encapsulated to summarize the discussion.

2. Conceptual and Theoretical Framework

2.1 The Institutions

2.1.1 Definition of the Concept

The importance of institutions in **development economics** has always been emphasized. It is so frequently discussed in the literature that one finds it in the writings of the early 20th century institutionalists as well as in the works of the modern development economists[13]. Although there exists a consensus over the importance of understanding the local institutions for the proper arrangement of development programs, it has not helped to arrive at a unanimous definition of the term. Different authors have defined institutions quite differently by emphasizing different aspects[14]. To some (e.g., UPHOFF 1986:9), **behavioral perspective** is more important, whereas others (e.g., RUTTAN & HAYAMI 1984:204) evaluate **the rules perspective** as being more crucial. While pleading for the behavioral aspect, UPHOFF defines institutions as „complexes of norms of behavior that persist over time, by serving collectively valued purposes" (1986-a:9). RUTTAN & HAYAMI, on the other hand, stress that „institutions are the rules of a society or of organizations that facilitate coordination among people by helping them from expectations which each person can reasonably hold in dealing with others" (1986:230). DOUGLAS C. NORTH (1986:230) observes institutions as „.....regularities in repetitive interactions among individuals ..... (which) not only limit the range of choice in individual interaction, but they dampen the consequences of relative price changes". Within the same context, in his other publication, he writes „ ..... institutions consist of a set of **constraints on behavior** in the form of rules and regulations; a set of procedures to detect deviations from the rules and regulations; and finally, a set of moral, ethical behavioral norms which define the contours that constrain the way in which the rules and regulations are specified and enforcement is carried out" (1984:8).

Amidst a great variety of definitions, MANIG arrived at a more cohesive and comprehensive one. To him „institutions .... are those **stable regulatory and organizational principles and rules** which govern interaction process between the people themselves and, in this relation, the environment and which are recognized and sanctioned by the societies in which they are found" (1991:17).

Whichever definition one follows, there appear three main characteristics which may be considered as the basis of the concept of institution (NABLI & NUGENT, 1989:1335). The **rules and constraints nature of institutions** can be identified as the *first* characteristic. According to OSTROM, these rules and constraints are „perceptions commonly known and used by a set of participants to order repetitive, interdependent relationships. Perceptions refer to which actions are required, prohibited or permitted" (1986:5). It is

[13]For further details see NABLI & NUGENT 1989:1334.
[14]See NORTH 1984:8, 1986:231ff, BROMLEY 1982:839, NABLI & NUGENT 1989:1334ff, MANIG 1991:17-18, 1993:11ff, LÖFFLER 1992:37ff, RIEKEN 1994:29, HAYAMI & KIKUCHI 1981:5 and the references cited there.

important, however, to note that such rules and constraints are considered collectively instead of individually. The *second* characteristic distinguished here is the **ability of institutions to govern the interactions among individuals and groups**. Sometimes, these rules and constraints are practiced voluntarily by the participants, whereas, on other occasions, they are enforced and policed, and sometimes coercive incentives help in enacting them. The **predictability** can be singled out as a *third* characteristic of institutions. The applicability of the rules and constraints in a repeated way shape the institutional character, bestowing on them some degree of stability and validity for future situations. This enables one to anticipate the future interactions.

Institutions, being **collective conventions and rules** (BROMLEY 1982:839), provide a surety for the continuous flow of social interactions and, therefore, guarantee the stability of the system (MANIG 1991:18). They also provide a base for the standardization of social interactions as they limit the possible alternatives for interactions for the achievement of social goals, especially when resources are limited. In this situation, the prevailing norms and values prove to be the ´**first filter**´, that limits the alternatives. When institutions function in the form of regulatory and organization principles, they further limit the behavioral and activity alternatives and are, therefore, regarded as ´**second filter**´. On the basis of institutionalized interactions and behavior pattern, the possible alternatives are reduced once again to constitute the ´**third filter**´(ibid. 1991:18).

NORTH & THOMAS (1971:777) have classified the institutions into ´**basic institutional environment**´ and ´**secondary institutional arrangements**´. The former classification deals, along with others, with the set of decision rules and property rights, whereas the latter covers the specific forms and distinctions of the arrangements (MANIG 1993:12). Within the same context, FICHTER (1968:155ff) denotes these classifications as ´main´ (Haupt) and ´by´ (Neben) institutions whereas GÄFGEN (1983)[15] labels them as primary and secondary institutions.

Following FICHTER (1968:150f) and WASCHKUHN (1987:87f), LÖFFLER (1992:39) has listed the following **characteristics** of an institution.

Institutions are:

- goal oriented,
- coordinated,
- regulated,
- allocated to the values, and
- marked by a certain inertia.

The values and norms practiced by a society are reflected by the prevailing institutions, and a deviation from such regulatory mechanisms is rewarded with positive and negative **consequences**. Institutions are an important component of the culture which do not always flourish organically, but can also be introduced by the state to realize some plans, i.e., to regulate some (new) relations (LÖFFLER 1992:41).

[15]Cited by LÖFFLER 1992:39

The institutions in agrarian communities are customary rules and moral principles instead of formal rules and regulations. HAYAMI & KIKUCHI (1981:218) consider that the basic institutional environment of village communities consists mainly of **traditional customs and moral principles**. For the implementation of these institutions, no formal arrangements are required; rather they are enforced through social interactions. Social interactions are more frequent in agrarian communities, especially because of the face-to-face relations, locational affinity and kinship ties.

From the above description of the institutions, it may not, however, be assumed that **New Institutional Economics** (NIE) is a homogeneous and monolithic discipline of knowledge; rather, it includes a variety of approaches to deal with the institutions. Even in the absence of a consensus about the scope of the new institutional economics, **two broad and general approaches** have been a focal point of a series of discussions about NIE. These approaches are generally known as the transaction costs and collective action theories (NABLI & NUGENT 1989:1336).

2.1.2 Transaction Costs Theory

A unanimous agreement has not been found among institutional economists about the definition of transaction costs (KIRK 1994:42). Research on transaction costs covers different situations by emphasizing different aspects. In general, **three approaches** have retained considerable attention, namely:

- transaction costs and information costs approach,
- property rights approach, and
- incomplete and asymmetric information approach (NABLI & NUGENT 1989:1336).

In the discussion on „The Nature of the Firm," the primary concept of the transaction costs was developed by COASE (1937) and furthered by DEMSETZ (1967:547ff), ALCHAIN (ALCHAIN & DEMSETZ 1972:777ff; 1973:16ff), WILLIAMSON (1985-a, 1985-b:187ff) and NORTH (1981, 1984:7ff, 1986:230ff). This group of institutional economists has been denoted by BARDHAN (1989:4) as the **´CDAWN school´**. An addition to the theory of transaction costs was made by AKERLOF-STIGLITZ by promoting the concept of information costs which is better known as the **theory of imperfect information** (STIGLITZ 1985:21ff).

The concept of transaction costs, although developed for **economic institutions** specifically, has a general application too, and thus provided room to be defined differently by the following different approaches (BÖSSMANN 1982: 664, SCHÜLLER 1983:IX, SCHMITT 1985:442ff, NORTH 1984:7, NABLI & NUGENT 1989:1336f and the literature evaluated there). Generally, transaction costs are considered to be the **costs of coordinating** the economic activities of the markets or other costs related to the competitive coordination mechanisms (SCHMITT 1985:449). According to RICHTER, these are the costs of establishing or changing an institution (or organization) along with the costs associated with the use of the institution (RICHTER 1990:577). The definition presented by MANIG, however, covers the costs in a more elaborate way. After discussing

the transaction costs in the perspective of institutional economics, he concludes that transaction costs cover **all the costs of social interactions** concerning resource-use; they cover the costs of collecting information, establishing contact, negotiations, agreements, controls, mutual and reciprocal coordination, protection against risks and insecurities, maturity of contracts, settlement and implementation of contracts rights/rules as well as the regulation of conflicts and adjustments to changing conditions (1993:15).

While emphasizing the importance of coordination in economic activities, BÖSSMANN uses **coordination costs** as the main term and limits the transaction costs as the coordinating costs of the market (1982:665). While promoting her point of view, she argues that the organization costs of a firm are costs which result from the economic coordination. Therefore, transaction costs can entail.

- costs for the collection of information as well as information on other exchange conditions,
- costs for the preparation and completion of contracts, e.g., negotiation costs,
- costs for the maturity and implementation of the contracts, e.g., control measures, furnishing costs and persuasion costs (ibid. 1982:664).

For the purpose of the present study, transaction costs will be dealt with as **the costs of information as well as of coordination**.

Substantial transaction costs always arise during economic activities (NIEHAUS 1987:676), however, they are difficult to **measure** (POLLAK 1985:606). Although STIGLITZ has tried to measure them by quantifying and fitting them to formal economic models, even then, this remains a tedious job (1985:21ff). To have an idea of the transaction costs of a developed country at national level, it is assumed that it may comprise as much as 50 percent of the GNP (NORTH 1984:7). For the coordination of agricultural production activities, many transaction costs arise in the form of farm implements, inputs, execution, planning and control of the produced goods (SCHMITT 1991:49f). Just as the transaction costs have an influence on the production process of agricultural goods, so have they on the organization and management of irrigation water. These costs are relatively lower in the agrarian communities because of the small size of these communities, face-to-face relations and traditional customs and moral values which facilitate the **enforcement** of contracts. In the large-scale complex urban communities, on the other hand, the costs of transacting can be higher due to impersonal exchange relations, which, in turn, increase the probability of opportunistic behavior as shirking, cheating, moral hazard, etc. (BARDHAN 1989:5). Therefore, in visibly closed agrarian societies based on personal relations, there exist **hierarchical relations** which tax production and distribution, instead of **decentralized exchange acts** (BARDHAN 1989:5, HAYAMI & KIKUCHI 1981:14ff, LÖFFLER 1992:52 and NORTH 1989:1320). On the basis of such observations, one may assume a „trade-off between economies of scale and specialization on the one hand and transaction costs on the other“ (BARDHAN 1989:5).

The **identification of partners, altruism and continuity of contracts** play a decisive role in determining the transaction costs. In village communities, especially, a strong tendency

prevails to transact with the identifiable partners instead of strangers. While transacting, the identification of partners provides a sense of **security and mutual confidence** which, on the one hand, can save transaction costs and on the other, can stimulate future economic interactions (BEN-PORATH 1980:1). The transactions between known partners can also cover the allocation mechanism of the market. Caste, family, ethnicity and locational affinity also play an important role in reducing transaction costs by providing a basis for personal and intimate relations (NABLI & NUGENT 1989:1339). The degree and extent of identification shapes the mode of transaction or contract (BEN-PORATH 1980:1). The village community is characterized by multi-stranded personalized relationships of the **patron-client**[16] type, which, over time, proved to be the most frequent transacting channel. Within the framework of biological production process, it is difficult to standardize the production activities of agricultural goods and due to the high uncertainty aspect, the patron-client relationship is preferred, as it reduces risks and saves transaction costs (HAYAMI & KIKUCHI 1981:217).

In an atmosphere of **incomplete/asymmetric information**, the relevance of multi-stranded personalized relationships becomes more important. The frequent and continuous transactions demand a faithful and trustworthy relation which reduces the danger of **cheating/shirking** in dealings. With reference to this, PLATTNER discusses the closed and open-ended personal modes of exchange and considers the continuity of exchange relations as a dominant goal (PLATTNER 1980:6). ARROW also supported this thesis: „In the absence of trust it would become very costly to arrange for alternative sanctions and guarantees and many opportunities for mutually beneficial cooperation would have to be forgone“ (1969:62).

The problems of **moral hazard, adverse selection and opportunistic behavior** are closely related to the asymmetry of information (NABLI & NUGENT 1989:1337). The availability and equality of information supplied to contracting parties are important, especially when they are not identical. This may lead to opportunistic behavior on the part of the party that is equipped with relatively better information. Such an atmosphere facilitates the entry of the middlemen who maximize their profit, since they have a relative better knowledge of and access to the market than the farmers.

Undoubtedly, the village communities have reduced transaction costs by establishing some moral, ethical, traditional and customary institutions, i.e., through the **internalization of externalities** (MANIG 1993:16), but, for the practice of norms and values of these institutions, they have to bear some costs. Thus, **some costs occur even to reduce transaction costs**. For this, some implicit contracts are made which, being basically based on family loyalty and altruism (POLLAK 1985:605), facilitate their transactions within the traditional confines.

[16]The patron-client relationship has been defined by SCOTT as „a special case of dyadic (two-person) ties involving a largely instrumental friendship in which an individual of higher socio-economic status (patron) uses his own influence and resources to provide protection and/or benefits for a person of lower status (client), who, for his part, reciprocates by offering general support and assistance, including personal services to the patron“ (1972:8).

In agricultural communities, according to BROMLEY & CHAVAS (1989:727), the transaction costs fall in **three possible arenas**. The simplest arena for exchange and transactions is provided by the family. They refer to the second arena as a network, i.e., a circle of friends/acquaintances where transactions are reasonably frequent. The third arena for the transaction of agricultural goods arises from trading. In this circle, occasional transactions are made with strangers. The first two levels of transactions (family and network) are derived from previous transactions. Some new transactions will also be undertaken in consideration of some specific future expectations. Trading transactions, in contrast, are mostly impersonal and one-shot affairs which do not leave any charge in the form of obligations or expectations to facilitate repetition. Such trading activities are labeled as unconditional[17] transactions (ibid. 1989:728).

Like the other biological production processes, the concept of transaction costs is equally valid for the management of irrigation water by the farmers at farm level. For the on-farm water management through the **organization and participation** of farmers, there occur some specific transaction costs. These comprise the formation of Water Users´ Associations, securing some familiar relationships and contacts with irrigation officials as well as becoming aware of co-farmers and of their personal characteristics. All these activities are connected with costs which can be considered as investments to facilitate future relations (BEN-PORATH 1980:6).

With regard to the organizational as well as the infra-structure improvements of the watercourse studied, the prevailing social and traditional institutions (such as family, *biraderi*, caste affiliations, etc.) along with already paid transaction costs played an important role. Within the context of mutual trust and personalized relationships, **two aspects** which lead to a **contract** between the farmers (water users) and the project officials for the watercourse infrastructure improvements need due consideration.

a) The **already established atmosphere of trust** between the project staff and some of the farmers (some maliks particularly and some gujars generally) provided a base for the other farmers to agree to an informal contract. For this contract most of the transaction costs in the form of information costs, transport costs, awareness costs, costs of establishing contact and entertainment costs had already been paid by the said farmers. The overwhelming majority of the co-farmers was motivated basically by their trust in the so-called patrons who were a **guarantee** at both ends: for the farmers and the project officials. A majority of the co-farmers had not paid the initial transaction costs, so that for them, it was a free swing.

b) The watercourse as a **collective good** by nature facilitated this contract by lowering the information, contracting and enforcement transaction costs. The mutual benefit, on the one hand, and almost no risk involvement, on the other, facilitated the implementation

[17]BROMLEY & CHAVAS distinguish between conditional and unconditional transactions „not as bipolar opposition but, rather, at possible extreme points of a continuum“. According to them, a transaction is unconditional „if the nature and terms of exchange are completely determined at the time of transaction and carry no condition for repeat transactions between the parties involved. Alternatively, a transaction is said to be conditional (or contingent) if the nature and terms of exchange depend on some states of the world that are unknown at the time the transaction is agreed on“ (1989:727-728).

and maturation of the contract. The inter- as well as the intra-*biraderi* ties, with varying intensities, also helped to enforce the contract, mainly through collective action.

2.1.3 Collective Action

Although HARDIN (1968) is considered to be the pioneer in discussing collective action in his famous article „The Tragedy of the Commons", this perception, however, is not valid (OSTROM 1990:2). Collective action, being an important feature of human life, has, long ago, been observed by ARISTOTLE, when he mentioned that „what is common to the greatest number has the least care bestowed upon it. Everyone thinks chiefly of his own, hardly at all of the common interest."[18] GORDON stated the same problem as: „There appears, then, to be some truth in the conservative dictum that everybody's property is nobody's property. Wealth that is free for all is valued by no one because he who is foolhardy enough to wait for its proper time of use will only find that it has been taken by another.... The fish in the sea are valueless to the fisherman, because there is no assurance that they will be there for him tomorrow if they are left behind today" (1954:124).

The theory of collective action or **tragedy of the commons** has such a vast application that it has been used to describe a variety of problems. A wide range of its applicability extends from labor unions through development projects, agricultural policies, etc. to the formation and survival of the institutions as well as organizations (NABLI & NUGENT 1989:1341-1342). In whatever perspective the theory has been used, there exists a consensus that **collective action is organized to internalize those production externalities which for an individual are difficult to undertake**[19]. Moreover, for the creation, maintenance and modification of the institutions, collective action is a prerequisite (HAYAMI & KIKUCHI 1981:34). The main concern of collective action is the elimination of the **free-rider** problem (NABLI & NUGENT 1989:1338). HARDIN is of the opinion that the key issue the collective action deals with is the explanation of collective outcomes in terms of individual motivation (1982:2). The success or failure of a collective action depends upon the actions of the self-interested or individually rational persons in understanding those activities which may benefit them collectively. As „ ... **individual rationality and collective rationality** differ and are frequently mutually opposed" (FREEMAN 1990:115), it is a difficult job to bring both rationales at some point acceptable for both. Whenever this consensus point is created or is imaginable, a collective action could be organized. Within the same context, JANVRY et al. have discussed a number of determinants of success in a collective action (1989:364). According to them, a collective action may be successful when different members have more complementary goals and are able to suppress free-riding. A small group of members living for a longer period of time together and having a homogeneous origin seems more conducive to the success of a collective action. The difficulty of ´**exit**´ as opposed to ´**voice behavior**´ may also have a positive effect (ibid. 1989:364f).

[18]POLITICS, Book II, Ch. 3 quoted by OSTROM 1990:2.

[19]It may not, however, be taken for granted that agreement on the results of collective action theory is universal because a number of authors see „solutions to rural poverty in terms of individual rather than collective action". For details, see ESMAN & UPHOFF 1984:55.

The creation, management and preservation of public or collective goods form the basis of the collective action theory. Such goods are not always of material nature but have a **non-material or abstract character** as well. Anyhow, whatever the character of a collective good is, it is always costly to organize collective actions (HAYAMI & KIKUCHI 1981:34). Therefore, the cost of organizing, on the one hand, and the public or collective nature of collective action, on the other, give rise to the problem of free-riding. As the benefit of a collective good or action cannot be denied to those who did not participate, the **self-interested rational individual** may decide not to participate because in this case his gain is larger than that of involved in the collective action. The benefits derived from the public/collective goods and also from the institutions are, thus, less than optimum, chiefly because of the free-riders problem (HAYAMI & KIKUCHI 1981:34 and OSTROM 1990:6).

To the question as to how the problem of free-riders can be solved, there did not exist any universal solution applicable to all situations of collective action. The nature of the concerned group, as well as its goals, its numerical strength, its age and shared characteristics of the members such as homogeneity in their goals and origins may, however, be helpful in overcoming the problem of free-riding (NABLI & NUGENT 1989:1338). The degree of **social interaction** of a community may also be, to some extent, helpful in solving this problem (HAYAMI & KIKUCHI 1981:34). On the basis of a relatively high degree of social interaction in village communities, it may not, however, be assumed that these communities do not have free-riders and, thus, collective actions are easy to organize and enact. The silted and poorly maintained water channels (collective good) in the village studied reflect the difficulties in organizing collective actions.

It is no exaggeration that social interactions in village communities in Pakistan have, overtime, **dropped off enacting and enforcing the mutually agreed contracts**. In the case of the watercourse studied, the switching from *katcha* to *pukka warabandi* is a strong indicator of the fact that local traditional personalized relationships, the base of the village level social interaction, failed to enforce the mutually agreed distribution of water among the water users of the same watercourse. A call for the formally regulated system of water distribution, measured by the state organs, proves to be a (partial) failure of the social interaction - at least at the level of farm water management. Graded on this basis as a relatively loose structured community, the village system did not prove successful in enforcing the implicit contracts in personalized relationships. This situation indicates that the village shows a great tendency towards **polarization**.

According to the logic of collective action, the gains from a collective effort should principally be divided evenly among the group members. In this regard, the question arises as to who will initiate and organize the collective action. Even if a collective action yields a benefit which is greater than the total costs, the share of the initiator may not be large enough to compensate for his costs and efforts. On this assumption, BARKER has analyzed this issue in a communal irrigation project as: „A major problem is that a leader who takes on both the formidable task of organizing his community for public works and convincing the government to contribute will benefit only marginally from the project if he

is a small landholder. So only a rare individual dedicated to the community good will offer to organize a community project. On the other hand, if the leader is a large landholder, he will benefit substantially, but other members of the community will see the project as a means of promoting his interests rather than contributing to the common benefit. In this case, it would be extremely difficult to persuade the community members to contribute their labor“ (BARKER 1978:149).

To understand the behavior of group members, the concepts of ´exit´ and ´voice´ provide a useful criterion to measure the grade of a participant´s satisfaction or dissatisfaction. Especially if any member is dissatisfied with the efficiency or functioning of an organization, he may opt for any of the **two choices**:

a) **Voice behavior**, i.e., while remaining in the group or organization the member will express his/her dissatisfaction by criticizing the action or will call for reformation of the whole or some part(s) of the collective action, and
b) **Exit behavior**, i.e., in case of dissatisfaction the member will quit the group or organization (NABLI & NUGENT 1989:1338).

It must be stressed here that, in a **traditional personalized atmosphere**, it is not easy to exit; only when it is relatively free of costs, it is preferred to voice behavior (ibid. 1989:1338).

During the field research for the present study, the author observed a third possibility, i.e., when feeling dissatisfied with the functioning and performance of the Water Users´ Association, some water users adopted a **passive but opportunistic behavior**. In this case, the members neither criticize through voice nor exit, but selected a soft medium between the two. Such members, while remaining in the organization and adopting a passive attitude, wait for an opportune occasion, from which they can only profit with relative ease when they successfully ´**exhibite or demonstrate**´ their group/organization affiliations. In this way, they avoid the penalties (mostly in the form of verbal punishment) which would otherwise have been their fortune.

Another issue widely discussed on the basis of collective action is the use of common pool resources. In such discussions, „the public or collective goods considered are subject to significant degree of **congestion**“ (ibid. 1989:1338). The major problem the common pool resource users face, is that of organizing it. As long as, the expected beneficiaries are unorganized, they cannot obtain an optimal gain as high as they could have earned by organizing themselves in a collective action (OSTROM 1990:39). Such organization is either initiated from within the community concerned or is introduced by an external agent such as government, entrepreneur, development project, etc. These types of efforts may only then be successful when they address a common set of problems (ibid. 1990:27). When such a set of the problems appears to be a challenge, it suffices to elicit the collective action (ESMAN & UPHOFF 1984:127). The confidence of the participants in collective efforts that they improve their situation also facilitates their organization (ibid. 1984:230).

In concluding remarks, it is important to mention that the two main branches of the NIE (transaction costs and collective action), although developed in separate contexts, can by no means be regarded as unrelated and independent. They share many of the issues and approaches discussed in the NIE. NABLI & NUGENT have summarized some of these **similarities** along with their simultaneous usage:

- The two approaches share the **same framework**, as both are analyzed on the basis of issues such as self interest, bounded rationality, opportunism, etc.
- **Institutions** like family, caste and ethnicity are of equal importance to transaction costs and collective action theories. These institutions may reduce the transaction costs, on the one hand, and may enhance the collective action, on the other.
- The **existence and promotion** of norms and values are of vital importance to minimize the transaction costs and to maximize the collective action.
- Both are complementary in the sense that collective action begins where **contractual choices** based on the principles of transaction costs leave off.
- Any problem that remained unanswered by the transaction costs theory can be adequately dealt with by the collective action approach. The gap caused by inefficiency or failure of the prevailing contracts may be bridged by the collective action.
- A simultaneous use of the two approaches can be helpful in understanding some dynamic institutional interactions.
- The evolution, formation and functioning of an organization can well be understood by applying the two approaches: the collective action may better explain the power, composition and relative position of the subgroups of an organization, whereas determinants of the structure of authority in an organization may well be analyzed by applying the transaction costs approach (1989:1339-13340).

2.1.4 Institutions vs Organizations

When the terms institution and organization are used in the day-to-day business, hardly any difference is made between the two. This causes a great confusion, or correctly phrased, leads to mistakes. It should be made clear that institution and organization are **two independent concepts**, but with an interdependent relationship. They are well interconnected in the sense that institutions provide a base for the evolution, formation and regulation of the organization. In the light of institutional economics, a firm can be regarded as the socially sanctioned organizational entity as it embodies the institutional arrangements. In other words, the organizational bodies are a set of contracts and rules defining roles and establishing their relationships, in which individuals accept or quit roles which are already defined for general purposes and permanent use (BEN-PORATH 1980:11).

In simple and plain words, institutions are the norms/values and principles which define the organization, whereas organization itself is the **operationalization** of the institutions (BROMLEY 1982:839). Institutions and organizations provide a base for the **institutional framework** of a society and, thus, are an important component of its entire structure. They are considered, here, as the organs which enforce institutional regulative principles and put

them into practice. It is important to note, here, that such executive organs by themselves, however, cannot be regarded as institutions. The internal and external interactions of the organization members are controlled and regulated by **institutionalized behavior**, interaction patterns and general regulatory principles of the society (MANIG 1991:18).

As the term organization makes important theoretical contributions to the present study, an in-depth discussion is required, which follows hereunder.

2.2 The Term Organization

To acquire an optimum agricultural yield, farmers rearrange continuously their micro-environment to fulfill best their desire. This arrangement demands a resetting of the agricultural activities which are compulsory for the production process. As these activities are performed within a limited sphere, one is always in need of cooperation, coordination and help of other potential neighbors; farm and/or residence. For achieving this goal, individuals reach agreements among themselves, which generate an organizational structure. The major factor underlying these agreements is the ability of farmers to establish **organizations** to accomplish their tasks.

2.2.1 Definition

The term organization is perhaps the most complex one. In its **generic sense**, it is a design of any kind of social arrangement between individuals or groups of individuals to achieve a goal or a set of goals (SAGARDOY et al. 1986:5). Following KIESER & KUBICEK (1977) and HAGE & FINSTERBUSCH (1987), MANIG has defined organizations as follows: „organizations constitute the **stable structural framework** within which the current functions (management) are carried out. ..... organizations are defined as institutional units, in which people interact purposefully and often on the basis of a division of labor and whose order has been established systematically and for a long period of time“ (1994:246). Another important feature of an organization is the division of labor (KAST & ROSENZWEIG 1974:214). An organization is also conceived as an institutional unit in which individuals act objectively, in a planned and established manner (HAGE & FINSTERBUSCH 1987:12). In its institutional sense, an organization can be defined as a **goal-oriented social structure** with a definable membership. The most conspicuous element of this structure is management which, as an institution in the framework of structure, performs its management function. At the other end, in its functional sense, organization itself is one of the functions of management (MANIG 1989:368).

Many other definitions of the concept have been set forth by scholars. To some, **behavior** (KAST & ROSENZWEIG 1974:5) is the fundamental factor, as it is always goal oriented. Therefore, organizational behavior is directed towards objectives which are more or less understood by members of the group. The organization makes use of **knowledge and technology** for accomplishing its tasks, i.e., organization implies structuring and integrating relationships. Moreover, organization is:

a. goal oriented; persons with a purpose,
b. a psycho-social system; persons working in groups,

c. a technological system; persons using knowledge and technology, and
d. an integration of structured activities; persons working together (ibid. 1974:6).

The literature on organization presents **three major segments** — organizational development, organizational theory and organizational design — regarding the way in which organizations should be structured and designed (HAGE & FINSTERBUSCH 1987:3). The emphasis of organizational development is mainly on group processes, job designs through training, group discussions and problem solving groups. Organizational theory stresses the reformation of organization in the direction prescribed by the contingency theory, a better model for achieving either efficiency or innovativeness. The emphasis in organizational design is on the improvement of planning strategy, structured changes for greater efficiency and the improvement of management skills (ibid. 1987:4).

Before a detailed discussion of organization is intended into, the repeated appearance of the term **management** necessitates a brief description. Although organization means integration and coordination of individuals or sub-group activities, some conflict is inevitable. It may be overt; often it is covert. „Management's task is the integration of diverse — sometimes cooperative, sometimes conflictive — elements into a total organizational endeavor" (KAST & ROSENZWEIG 1974:6). Therefore, management and organization are separable, as they formulate a society's institutional system (MANIG 1989:368). Management can be defined as the process of realizing and implementing measures within the organizational framework (ibid. 1989:367). It involves the **coordination** of human and material resources towards achieving an objective. Undoubtedly, the formulation and establishment of an organization is in fact a managerial task. Management and organization are, therefore, two sides of the same coin, one serving the functional purpose and the other the institutional one (MANIG 1989:368, HUPPERT & WALKER 1989:11). However, **four basic elements of management** can be identified:

a. toward objectives,
b. through people,
c. via techniques, and
d. in an organization (KAST & ROSENZWEIG 1974:6).

Typical definitions suggest that management is a process of **planning, organizing, controlling and implementing** activities. Management is the primary force within organizations which coordinates the activities of the subsystems and relates them to the environment (ibid. 1974:6). In other words, it is the process whereby obviously unrelated resources such as men, machines, material, money, etc. are integrated into a total system for achieving objectives.

Irrigation system in the managerial sense consists of two main elements:

- overall management function, and
- management of specialized activities.

The first one deals with the direction and coordination of the decision-making process within the system whose aim is to involve farmers, irrigation agency staff, foreign experts, etc., in the process of achieving objectives, although most of the times the involvement of farmers is only theoretical. The second element covers the management of specialized

activities such as distribution of water, system maintenance, irrigation assistance services, etc. Here, management of the irrigation system means management of information and control on people and other inputs.

2.2.2 Main Types of Organization

From the **structural point of view**, organizations have always been defined in the sense of 'formal' and 'informal' structures. Formal structure can be differentiated from informal as it has a system of roles and functions which the members follow. Moreover, **formal** organization has a planned structure and represents a deliberate attempt for the formation of interlinkages among components to meet the objectives. On the other hand, **informal** organization refers to those aspects which are not formally planned but come into existence through the individuals´ spontaneous activities and interactions. Furthermore, informal interactions are of vital importance for the effective functioning of an organization (ibid. 1974:208).

To understand the organization, the following **two approaches**, which definitely represent two different philosophies, are of basic importance:

- Segregated approach, and
- Integrated approach (SAGARDOY et al. 1986:8ff).

2.2.2.1 The Segregated Approach

According to this approach, the final goal can be reached by coordinating the interaction of the independent organizations concerned. In other words, there is a separate organization for the performance of every specific task, allowing the development of each organization according to the specific needs. Already existing dynamic social groups, capable of developing their own organization, and a precondition for this approach. Generally, this approach is known as '**bottom-to-top**'.

2.2.2.2 Integrated Approach

The integrated approach is more appropriate when dynamic social groups are absent. It necessitates the satisfaction of the needs felt by individuals through a centralized management, and the organization develops **from top to the bottom** (GEBAUER 1980:28ff). Here, the final goals are reached through the interaction of many sub-organizations or units, each answerable for a specific activity, as they are a part of the complete whole. This approach demands a certain degree of **homogeneity** in the socio-economic conditions of the target group. The integrated approach is useful, especially, to minimize the difficulties in coordination at national level; however, special care is needed as it may duplicate the functions undertaken by existing institutions (SAGARDOY et al. 1986:11).

2.2.3 Dimensions of Organization

As every organization is characterized by a certain degree of task specialization, its structure has a **horizontal** and a **vertical** dimension. The horizontal dimension is

concerned basically with the differentiation of activities, i.e., in which way various activities essential to the achievement of objectives can best be differentiated and then coordinated. This coordination is essential in order to produce the necessary unity of effort among the specialist sub-groups. In the more formal organizations, the horizontal dimension defines the basic **departmentalization** (KAST & ROSENZWEIG 1974:214) .

The vertical dimension is represented by the **organizational hierarchy** and is concerned with the way in which responsibilities are distributed among members working at different levels of the organization. The vertical differentiation defines specific roles for different positions. In the formal organization, this dimension sets the basic communications and authority structure (ibid. 1974:214). The dimensions of an organization, whether specifically defined or not, are structured by the specific situation in which the organization functions. In other words, the adequate functioning of an organization is strongly depends on the particular situation or contingency, which determines not only its dimensions but its structure as well.

2.2.4 The Environment of Organization

This environment constitutes both the **internal and external** situations of an organization. The dimensions of the internal situation are: size, technology, rules and regulations, goals and targets, age of organization, development stage of organization and type of foundation. The global environment and task specific environment collectively formulate the dimensions of the external situation (KIESER & KUBICEK 1977:191, MANIG 1994:247, MANIG 1989:370-371). On the basis of specific situations, no single organization model, whether bureaucratic or adhocratic, centralized or participatory, can be graded as the best one, as the different environments of different societies demand different organizational structures. In the organizational theory, this view is called **contingency approach** (HAGE & FINSTERBUSCH 1987:10, KAST & ROSENZWEIG 1974:507) . This theory was evolved by contrasting and developing the forms of mechanical and organic organizations[20] (HAGE & FINSTERBUSCH 1987:4-5). The most important factors from which these two **ideal types** of organization originate are **technology and market**. The technology may be simple or complex, and the market may be either small or large. The complexity, formalization and centralization of these ideal types differentiate them in their organizational structure (MANIG 1989:372). The basic premise of this theory is that different environmental situations (contingencies, derived from ‘contingent’ meaning ‘subject to’ or ‘dependent upon’) call for different organizational structures (HAGE & FINSTERBUSCH 1987:4).

During the last two decades, as literature confirms, both **organizational theory and design** have moved towards the contingency theory of structure and process[21]. As a result, in the **modern organization theory**, organizations are being dealt with as open systems,

[20]Mechanical organization is centralized, hierarchical, specialized in tasks, formalized, efficient, and large in scale, whereas, organic organization is decentralized, relatively non-hierarchical, based on team work and networks, innovative or adaptive, non-formal and small in size. For more details, see HAGE & FINSTERBUSCH 1987:63f.
[21]See HAGE & FINSTERBUSCH 1987:59ff. and the literature cited there.

since they interact with social, ecological and technological environment. According to this approach, three relevant levels can be differentiated in organizations as institutional entities. Each of these levels consists of some specific constitutive elements or influential variables. Moreover, the interactive relations between the levels and the elements within the level influence the organizations significantly. The following levels of the organization require considerable attention (MANIG 1993:23, 1989:369ff, 1994:246-247):

Members of Organization

- Membership size,
- Membership intensity,
- Behavior of the members, and
- Objectives of the members.

Structure of Formal Organization

To understand the member's attitude/behavior, knowledge of the organization´s formal structure is a prerequisite, as it describes the system of rules and regulations. Five structural dimensions are important in this regard:

- Specialization,
- Coordination,
- Configuration,
- Formalization; and,
- Competence distribution (KIESER & KUBICEK 1977:49).

HAGE & FINSTERBUSCH (1987), on the basis of their survey of developed countries, extended the model of ideal types to four. These models are based on the contingency approach of the organization theory. According to the organizational structure, the following two elements of situational dimensions were taken as **delimiting basis**:

- market demand, i.e., large or mass market vs batch or individual market, and
- sophistication grade of the technology, i.e., simple vs complex technology.

On the basis of the **mutual interaction** of the above-mentioned situational dimensions, HAGE & FINSTERBUSCH presented **four forms of ideal organizations**: mechanical, organic, craft and mechanical-organic (1987:59).

2.2.4.1 The Mechanical Form

This form is suitable for the standardized system of production or provision. Generally known as **WEBER's bureaucratic model**, it demands mostly low levels of skill for the performance of a certain activity, which categorizes it as 'not innovative'. The demand for the product or service is sizable and constant and is appropriate for production with simple technologies for large markets. It stresses mainly efficiency, productivity and capital-intensive mass production. Its structure is **centralized** as well as **hierarchical**, and the organization is of a **large scale**. This form has been identified as an important one for the economic development of LDCs (ibid. 1987:63ff). Here, the emphasis is on specialization, rationalization and routinization of work and cost cutting, so that the system is quite

efficient and productive. It has certain disadvantages as it produces only medium quality goods and services, is insensitive to local needs and individual desires and is more rigid as workers do not have any control over the work process. Its formalization and routinization make it inefficient in the long run because of the rigidity and inertia caused by these structural characteristics. From the workers point of view (especially in the developed countries), it is not a popular organizational model. Anyhow, for mass services and mass production, it is equally valid (ibid. 1987:63-65).

2.2.4.2 The Organic Form

This is an appropriate model to produce quality goods and services for small markets with the use of complex technology. These organizations are innovative, highly skilled, but nonstandardized in services. These are **decentralized, non-routinized and non-hierarchical** organizations which are coordinated more through horizontal communication. In general, the contingencies shaping this form are exactly the opposite to those of the mechanical model. This model is usually recommended for research organizations doing innovative work, which is always very expensive and has a low productivity. It is neither efficient, productive, nor fast producing. In size and structural format, it is very flexible allowing the acceptance of new modifications and changes. Because of resource limitations in LDCs, this form is usually not recommended (ibid. 1987:65-58).

2.2.4.3 The Traditional-Craft Form

When simple goods and services for simple markets are to be produced by utilizing **simple technologies**, the traditional-craft model is the appropriate one. These small organization units need neither bureaucratic staff, nor highly qualified manpower and sophisticated technology, rather, they have a decentralized structure, and the workers enjoy a considerable autonomy for the performance of their tasks. As a result of low capital requirements, lower staff skills and absence of appropriate regulations, output is considerably low. The existing socio-cultural and socio-economic conditions of the LDCs are suitable for such organizations, e.g., family units, small farms, cottage industries, etc. This form has a more adaptive tendency to prevailing as well as to changing contingencies.

2.2.4.4 The Mechanical-Organic Form

This mixed form of organization is recommended for the production of **goods and services for large markets** by using **complex technologies**. It emphasizes both efficiency and innovation, quantity and quality, and service and productivity. To achieve this, the structuring of organization is formatted partially mechanically and partially organically, i.e., the production apparatus corresponds to the mechanical type, and the research and development component follows the organic model. It involves a specialized division of labor, both centralized and decentralized organization, with communication in both directions: horizontal and vertical. Like other forms, it has certain weaknesses, as it is very expensive with regard to capital, technology and skilled manpower.

Besides these four models of the ideal type, HAGE & FINSTERBUSCH discovered **two new models** of organization. These types, namely the truncated-craft model and the truncated-organic model, did not emerge from the contingency organization theory but rather resulted through the review of the case studies from LDC´s (1987:256). These models coincide with the contingencies found in the developing countries and are rarely found in developed countries. The contingency, referred by LERNER (1985) as the problem of rising expectations which lies at the base of these forms, is a vast demand for basic commodities and services which face a considerable lack of resources in their provision[22]. In these **truncated models**, the range of skills is narrowed and many of them are not provided, as they are found in organic and traditional-craft forms.

2.2.4.5 The Truncated-craft Model

In this model of organization, a few essential activities are picked out to comply with the important concerns. To meet the objectives, a deliberate selection of activities is made, i.e., a **minimum program** (MANIG 1989:375). A **low level of skills**, resulting from the **low costs**, is met through short and specific training programs. More services are provided by using a large number of low skilled workers. This type of organization is very small in size, but has a highly formalized and centrally designed structure. Such organization models are used as outposts of the central establishments with a demarcation of activities. The central establishment organizes the standardized supply along with the training of staff members, whereas the outposts are responsible for field implementations. This situation is usually an outcome of the combination of the truncated craft model with the mechanical form. Such a model is found to be successful for the basic health care programs, T &V system of the agricultural extension, etc. The **decentralized structure** facilitates the involvement of the local community and, hence, the local resources. While relying on the local support, it allows the local community to exercise some control over the outpost organizations. There is, however, no guarantee for efficient service and desired results as a response to local control.

2.2.4.6 The Truncated-Organic Model

This organization model is designed for the execution of **complex tasks** under conditions of insufficient or scarce resources. The most relevant common examples of the exercise of this model are integrated rural development (IRD) or community development (CD) programs. As it is designed for the **low-funded programs**, every member of the organization is assigned a few activities for which he/she is trained in a few selected skills out of the complex field of activities. Thus, the level of skills remains low. The model can be regarded as a **duplicate of the organic model**, but with truncated skills. This model calls for team work to accomplish complex tasks, for which coordination among different activities becomes necessary. The small size and the regional location of the organizations entails the decentralization of the decision-making structure. To keep the costs low, this model invites the participation of the local community that provides resources and/or labor.

[22] Cited by HAGE & FINSTERBUSCH 1987:256

Like the truncated-craft model, this organization model also functions as **an outpost of national or central service organizations**, especially when it is combined with the mechanical model.

From the above discussion, it is clear that each form of organization is more effective than the other, but only under certain conditions, as there exists no single optimal model for all contingencies. The organization models of the ideal type are, mostly, not easy to find.

According to the **contingency theory**, the organization models of the ideal type can either be efficient or innovative at the same time (HAGE & FINSTERBUSCH 1987:5, MANIG 1994:248, MANIG 1989:376). In other words, efficiency and innovativeness compete in these ideal types where an increase in one commonly results in a reduction in the other. This factor along with other variables such as situational contingencies, behavior of the members, etc., demand for a so-called **organization mix** (MANIG 1994:248). The organization mix is not limited to the ideal types only but also applies to the total social structure of a community. Whatever the situation may be, „the combination of various basic types in an organization also leads to a struggle for the supremacy of the organizational principles (or rather of the organization members)“ (MANIG 1989:376-377).

In this context, **irrigation organizations**, in which for the management of water at various levels several organizations, and hence, **several organization models** are practiced, are not an exception. Independent of the model being followed, the irrigation organizations are struggling for the management of water from acquisition to supply and to distribution. The irrigation organizations present extremely heterogeneous (HUPPERT 1989:1) organization forms which, like other organizations, are influenced by the situational factors, on the one hand, and by the norms and values of the concerning community, on the other hand.

2.3 Main Aspects of Irrigation Systems

Before a detailed discussion of irrigation organizations is entered into, a brief description of the **irrigation system** is necessary to provide basic information about the environment in which irrigation organizations function. According to HUPPERT and WALKER irrigation systems may generally be defined as: „Systems in which people endeavor to use water in an organized way at a specific location so that the irrigation-specific products and services produced will help to fulfill the goals of water users and other interested groups“ (1989:12).

The definition identifies the following **characteristics** of an irrigation system:

- Socio-technical system
- Open to the environment; and
- Goal oriented (HUPPERT & WALKER 1989:12, HUPPERT 1989:27ff, KNOTH 1989:12f).

Regardless of the size, every irrigation system consists of **physical and social systems**. The physical system is composed of relevant physical environment as hydraulic infrastructure, while the social system refers to the social organization which controls the

physical system. It is also true that the organization of an irrigation system is mainly dictated by its nature, where size and the activities accomplished by the system determine its operational structure.

There exists a large variety of irrigation systems with different physical and structural aspects all around the world. It is the amount of irrigation water applied to the soil which determines the management and structure of the irrigation systems. The amounts of water applied in surface irrigation are usually greater than in sprinkler or micro irrigation systems. The basic functions of an irrigation system, irrespective of its size and structure, include **acquisition, transportation and distribution** of water. In a gravity flow system or surface irrigation, for example, these functions are performed in a more elaborate way, with an observable demarcation of physical and institutional activities[23]. The large gravity flow systems are usually composed of dams, headworks, main, medium and distributing canals. The water is diverted from a river through a network of headworks and canals to farmers´ fields. In case the diversion mechanism does not suffice to meet the needs, the water supply is increased by constructing of storage dams and by pumping under-ground water. The phenomenon of water supply from the river/dam to the fields includes conveyance, distribution and field application (HEERMANN et al. 1990:127). C**onveyance** means moving water from its source through the main and secondary canals to the tertiary canals. **Distribution** includes moving water through the tertiary canal to the farm inlets. **Field application** is the application of water to the crops (ibid. 1990:127).

Regarding the management of water in an irrigation system, two organizational levels are identified, i. e., **the main system and the farm system**. The overall performance of an irrigation system is the combined effect of both systems when the performance of the main system complements the farm system results. There exists a wide gap between the two levels in terms of organizational efforts. The main systems are usually managed by a central authority in a highly coordinated fashion, whereas, the farm systems are usually the responsibility of several organizations with their own specific objectives and points of orientation. The dams and headworks are administered by the state or para state department(s). The main canals along with medium canals and distributaries are also managed by state organs such as irrigation ministries or departments. The supply of water up to the watercourse outlet is managed by the state, whereas below the outlet the management of water is usually the farmers´ exclusive responsibility. Above the outlet, there exists a well elaborated organization for the management, operation and distribution of water, whereas, below the outlet there did not exist any local level organization. Thus, there exists an **organization gap** between the main and the farm level water management. Such a situation calls for an organizational improvement at the farm level, as the attempts to improve management in the main system will come to naught if they fail to produce the desired results in terms of higher production levels through the efficient application of water. To fill the gap, an **intermediary organization** is required „which accept(s) main system water deliveries within the constraints which the main system must impose, control

[23]The institutional aspects are not deliberately discussed here. A detailed discussion covering institutional aspects of a gravity flow system (of Pakistan, for example) follows in Chapter 3.

such water, and disaggregate water flows to fit the unique demands of individual farmers“ (FREEMAN 1989:14).

LOWDERMILK (1981) defines **irrigation water management** as „the process by which water is manipulated (controlled) and used in the production of food and fiber ... (It) is not water resources, dams or reservoirs to capture water; nor codes, laws or institution to allocate water; nor farmers´ organizations; nor soils or cropping systems. It is, however, the way these skills and physical, biological, chemical and social resources are utilized to provide water for improved food and fiber production“[24]. To get optimum results, it is essential to manage the irrigation system as a whole, not only the water, including the management of physical, social and economic factors and of other inputs besides water. There is no doubt that the management of these factors in irrigated agriculture particularly revolves around water and its management. Due to the imbalance in addressing the issues concerned, the irrigation systems are functioning far behind their actual performance and potential. The main reason is that the real managers - the farmers - are not effectively involved. It is true that without the farmers´ active participation in decision making, planning, implementation, operation and maintenance, it is difficult, if not impossible, for the main system managers to manage gravity flow systems, particularly at the field level, to make them efficient and cost effective.

It is a well accepted fact that the irrigation management below the outlet has received little attention, both in physical and social terms. As a result, the infrastructure at the watercourse level is characterized by deteriorated conditions, and the social atmosphere is pregnant with a bundle of conflicts over water. Although some efforts have been made to improve the situation, the part of the irrigation sytem below the outlet is still a **no man´s land** (SAGARDOY et al. 1986:42, CHAMBERS 1980-a:29). In the presence of a variety of solutions to bridge the gap and to improve on-farm management, the concept of establishing and propagating **Water Users´ Associations** has been universally accepted.

2.4 Irrigation Organizations

The creation and operation of organizations have always been a central concern of human beings to manage collectively what they cannot manage individually. In early civilizations, around water resources, such as the Nile, the Tigris, the Indus, the Ganges and the Yangtze, the earliest forms of complex organization emerged as people organized to deal with the control of irrigation water (FREEMAN 1989:6). Irrigated agriculture, therefore, has always been collectively organized to control water to meet crop needs in a better way. The need for irrigation organization is thus an essential factor; unlike other agricultural inputs, one cannot buy a unit of water in the market. Moreover, „the maddening nature of water itself, with its tendency to flow, seep, evaporate, condense and transpire“ (CHAMBERS 1980:29) makes its organization a necessity.

There exists **no ideal form of organization suitable for all irrigation schemes**, as the suitability of a form depends upon many factors such as size of irrigation system,

[24]Cited by REDDY 1986:106.

technology, social structure, political structure, norms, attitudes, etc. (BOTTRALL 1981:14). Therefore, the structural forms of existing irrigation organizations are extremely **heterogeneous** (MANIG 1989:377). This is mainly because of a large variety of influential factors determined by the regions and, more specifically, by the situations. However, the factors of the ideal types are arranged and rearranged to fit the situation optimally. This has resulted in a list of irrigation organizations and their classifications, but none of them proved to be satisfactory for all contingencies.

In literature[25], one comes across different criteria to categorize irrigation organizations. The **variety of typology** ranges from WITTFOGEL´s (1957-a) **eccentric polemic on oriental despotism** to THORNTON´s (1976) classification based on **physical acquisition, transportation and allocation of water**. Regarding the subject matter and orientation of observers such as engineers, hydrologists, agriculturists and social scientists, different classifications of the irrigation organizations have been presented[26]. The main classification criteria chosen here are based on the level and extent of activities performed by these organizations. The **main types** are:

- Integrated Management Organizations,
- Multipurpose Water Management Organizations; and
- Specialized Water Management Organizations (HUPPERT 1989:151).

2.4.1 Integrated Management Organizations

Such organizations are characterized by a structure, in which all developmental activities undertaken by **specialized sub-groups** are integrated, i.e., connected to a clear line of authority and command (SAGARDOY et al. 1986:23). Here, all the developmental activities are integrated in a maximum way (HUPPERT 1989:151). Being based on the degree of intervention of relevant groups (mostly irrigation agency and water-users) in the management-scheme, integrated management organizations are of several types. Where the role of water-users (WUs) is dominating, it usually takes the shape of a Farmer's Association. On the other side, maximum government intervention can be observed in State Farms and/or Irrigation Settlement Projects (SAGARDOY et al. 1986:24).

In the case of **Farmers´ Association**, which for the purpose of water management can be regarded as ´irrigation cooperatives,´ only those farmers participate who own larger pieces of land. The participation of wealthier farmers, here, is determined by the expected high costs for the construction and maintenance of the irrigation infrastructure. Large farmers, by virtue of their large holdings, are in a position to get credit, and this facilitates their participation in such cooperatives or associations. Therefore, such organization models are suitable, especially, for farmers in the developed countries (ibid. 1986:32)

In the case of State Farms, all the production activities are controlled by the **central management** in the person of Farm Manager or Executive Director, where the participation of water users in the management and operation of the irrigation system is not

[25]See SAGARDOY et al. 1986:23, MANIG 1989:377, CHAMBERS 1977:343 and the literature discussed there.
[26]For details, see CHAMBERS 1977:343.

considered. In Irrigation Settlement Projects, for example, the settlers are usually inexperienced in irrigated agriculture, so that they are mostly ´**directed**´ and ´**derived**´ by the project officials. They are given simple and straightforward tasks to carry out with their own resources. As most of the activities are managed through a single integrated organization (ibid. 1986:24f), one may conclude that integrated management organizations are **less conducive** to water users´ participation. Here, the water users are not provided with more chances of participation and are limited to a range of activities of a lower nature.

2.4.2 Multipurpose Water Management Organizations

This type of organization is held responsible for the management of activities directly related to **water and other developmental inputs**. Under specific conditions, such organizations can be used to play a central role for water management organization and perform only those relevant activities which do not fall under the responsibility of any other existing institution. Therefore, an impression of **holistic approach** (HUPPERT 1989:27) can be observed here; all is done by one organization. This organization demands a maximum governmental intervention. In most cases, it may take the structure of a Public Irrigation Scheme, to which all relevant new activities are added (SAGARDOY et al. 1986:42-43).

In some situations, both models, i.e., integrated management organization and specialized water management organization, may prove unsuccessful, while the former, due to its complexity and the danger of duplication of existing arrangements, and the latter, due to its specific limited activities, may not be able to achieve the set goals. Under these conditions, the multipurpose water management organization offers a suitable solution (ibid. 1986:43). As its name shows, this organization whose key function is water management, may include other activities related to agricultural production, such as procurement of inputs, i.e., seed, fertilizer, insecticide; marketing of agricultural produce; extension services, research, etc. The range of its activities, therefore, allows the participation of non-farmers as well. Although, the participation of water users becomes a prerequisite for the performance of a key function, the other activities, however, can be handed over to other community members. Thus, these organizations are structurally very close to Public Irrigation Schemes, but considering the scope of their functions, it would be more suitable to denominate them as Multipurpose Public Irrigation Schemes (ibid. 1986:43). LOWDERMILK´s argument also supports its **credibility** when he stresses that the mere distribution and allocation of water should not be the ultimate objective of an irrigation organization, rather „people, credits, inputs, outputs, price policy and other services for farmers ..... must be managed.“ (1985:2).

2.4.3 Specialized Water Management Organizations

This type can generally be defined as a social organization concentrating basically on an appropriate use of water for irrigation purposes (SAGARDOY et al. 1986:32). The appropriate use of water and its allocation are mainly determined by two factors: „decisions about areas to be irrigated and about timing; and actual allocation and

appropriateness“ (CHAMBERS 1977:347). In a broader sense, they can be considered for the management of water at the main system level and at farm level. The **interplay of activities** between these two spheres leads to a further classification with its own **specific objectives and functions**. Here, a timely and equitable provision of water is one of the main objectives, whereas the operation and maintenance (O&M) of the irrigation system is the basic function. A further classification results from the degree of intervention by the government and water-users to effect the water management (SAGARDOY et al. 1986:33, COWARD 1980:27):

2.4.3.1 Maximum Government Intervention

This organization is characterized by a **clear line of command** that goes from the national level to the lowest unit (SAGARDOY et al. 1986:38). The main activities such as water distribution, O&M activities, cropping pattern or plantations (THORNTON 1976:149) etc., are performed by the government. In general, they are labeled as Public Irrigation Schemes. The irrigation organizations functioning in Spain, Turkey, Bolivia, Iraq, Ecuador and Kenya are relevant examples (SAGARDOY et al. 1986:33). These schemes usually encompass large-scale activities (COWARD 1980:24) which stress management and planning by bureaucracies or governments. The degree of farmers participation is, however, determined by the government policies concerned. In some extreme cases like the Gezira scheme in Sudan, almost all the management activities are performed by the irrigation agency. The projects of northwest Mexico and of the Indian subcontinent are, however, not reported to be strictly centralized like Gezira (ibid. 1980:24). Even in the presence of different levels of centralization, **bureaucratically managed systems** are fully administered by a government organization (ibid. 1980:27).

In predominantly government managed schemes, activities like the design and construction of the irrigation infrastructure, water allocation and distribution along with the settlement of disputes are performed by the project officials, without the farmers being consulted (ibid. 1980:26). These schemes are usually designed to introduce irrigated agriculture in new areas; therefore, settlers have little or no experience of irrigation. In the initial phase, the irrigation management affairs are run by the project officials and, afterwards, are supposed to be taken over by the settlers when these have accumulated enough experience and knowledge. Thus, the farmers´ active participation in the management of irrigation water becomes a prospect for the future. With respect to its **functional structure**, this organization model is labeled as **top-down,** where formal organization and the distribution of responsibilities within the organization are used to separate categories such as private and public organizations (CHAMBERS 1980:32). This organization model is very similar to of THORNTON´S category B3 (1976:149).

2.4.3.2 No Government Intervention

Organizations in which the government does not intervene are mainly controlled by the water-users; those are **organizations of the people, for the benefit of the people**. Anyhow, for the promotion and encouragement of these organizations, government’s

participation cannot be fully excluded (SAGARDOY et al. 1986:33). Following the segregated approach, this organization always needs other services from other institutions, e.g., extension and consultancy services to be able to exist. Commonly known as Irrigation Associations, they have the following conspicuous characteristics: democratic model of participation, representative's selection, decision-making and implementation, non-political in nature, low costs, effective follow-up of rules and regulations, better communication, friendly atmosphere, etc. Being initiated, operated and maintained by the water users themselves, this type of irrigation organization is most conducive to water users´ participation. From planning and decision-making to implementation and evaluation, water users participate actively at all levels. The **democratic atmosphere** of the organization facilitates not only the farmers´ participation at all levels, but also provides better chances of communication (with irrigation authorities etc.) within and outside the organization. They function as a two-way channel of communication among the farmers and between the farmers and the administration. According to CHAMBERS, this model represents a **bottom-up** view of irrigation „... starting with the farmer and his preoccupations..."(1980:32), leading towards the fulfillment of his needs and his self determined goals and, thereafter, worked on by him. This type is also denominated as ´community systems´ which are operated and maintained by the farmers themselves, under their own leaders and representatives (COWARD 1980:27). THORNTON´S A4 classification has a great resemblance with this model (1976:149).

2.4.3.3 Mixed Control by Government and Water-users

Here, the **main system** is controlled by the government, while management at the **tertiary level** is the responsibility of water-users. This system is becoming increasingly popular in many Asian countries (particularly Pakistan, India, China and Philippine), where water management problems at watercourse or tertiary canal level have always been acute. A watercourse has often been a no-man's land (CHAMBERS 1980:29) due to the lack of definition of responsibilities for specific actions. Moreover, the management of a large number of watercourses/tertiary canals is impossible with the help of a limited number of government officials (SAGARDOY et al. 1986:23). Such constraints have been derived to adopt some **innovative actions**. In accordance with this form, certain governments are assisting water users in the formation of „**Water Users´ Associations**" for each watercourse and/or tertiary canal, while the remaining system is still handled by government agencies. The formation of these organizations at watercourse level is very similar to that of small irrigation systems. Such schemes are generally known as „ Irrigation Schemes with Mixed Control." The most conspicuous element of these organizations is that they are managed through the farmers´ active participation.

This ´**jointly managed system**´ (COWARD 1980:27) has been classified by CHAMBERS as the middle outward model of irrigation organization. According to him „a middle outward view of irrigation organization would start geographically and organizationally in the middle of the distribution system. It might differentiate systems according to the decisions, communication and allocations which affect distribution, looking both upward toward the source from which the water derives and downward to the farmer" (1980:32).

This geographical and organizational **differentiation between the roles** of the state and those of farmers determines their spheres of participation in management activities. The state or bureaucracy manages the main irrigation system; this usually covers acquisition, transportation and allocation of the irrigation water. The farmers, on the other hand, assume responsibilities at the tertiary level, i.e., below the canal outlet. According to THORNTON´s classification, this model is equivalent to the type B4 (1976:149). For water management at the farm level, farmers cooperate with each other by participating in various activities such as the construction and improvement of the irrigation infrastructure, its operation and maintenance, conflict management, etc. Such participative activities are sometimes spontaneous and sometimes organized. The model concerning the present study is ´the jointly managed system´ which is discussed in detail in Chapter 3; a general description of the concept of participation, however, follows hereunder.

2.5 Participation

There is little agreement on what participation is, or what its basic dimensions are. The term participation is undefined, an open concept, unspecified, vague, non-transparent, and inoperative (MÜLLER 1996-a:2). To agricultural economists, **benefits** are more important while the political scientists focus on **votes and decision-making**, whereas, according to the sociological point of view, participation is the **regular involvement in interactions** within or between social groups and societies (MÜLLER 1980:1). Participation means literally „**to take part**“ or „**to have a share**“ in a common activity, i.e., take part in decision-making as well as in the implementation process (NURUL-HAQ 1977:2) and in sharing the accomplishment. This notion has been defined by McPHERSON and McGARRY[27] as the inclusion of intended beneficiaries in solving their own problems. According to another approach, participation, in its narrower terms, is the involvement of individuals in decision-making and in the implementation process through resource contribution as well as in the actual process of effectuation (MUTHABA 1987:6).

After analysing current literature, COHEN and UPHOFF have arrived at a more cohesive and embracing definition. They state the following: „We saw ‘participation’ including people’s involvement in decision-making processes about what would be done and how; their involvement in implementing programs and decisions by contributing various resources or cooperating in specific organizations or activities; their sharing of the benefits and development in efforts to evaluate such programs“ (1977:6). Some (BUNGICOURT 1982:58) are of the opinion that instead of discussing abstract definitions, it may perhaps be more useful to try to define some cases of popular participation to take its exact measures. The reviewed literature presents some criteria which help to specify the **dimensions** of participation (COHEN & UPHOFF 1977:27ff, UPHOFF et al. 1979:5-8), which will be discussed in next section.

The issue of **beneficiary participation** has always been a part and parcel of the debates concerning development projects, but got a steady momentum as it became part of the official rhetoric (FINSTERBUSCH & WICKLIN 1987:1). The participatory approach for

[27]Quoted in SMOUT 1990:7.

the USAID projects was adopted in the mid sixties, and by the mid seventies, the approach became conventional wisdom. From this point onward, the discussions on the participation of target groups have become an essential feature of development projects. The main emphasis was laid on the management and operation of the development schemes through mobilizing the participation of the indigenous people. The strategies concentrating on participation **from below and within** the community became more attractive than those imposed from outside. The concept of participation was advocated for solving the problems of target groups through their active role in proposing, finding and actualising alternatives. The involvement of target groups in their own development can secure some specific benefits which otherwise are difficult to achieve. Although it is difficult to enlist all the possible benefits of beneficiaries´ participation, **some main benefits** that are **generally valid** can include the following.

Therefore, participation is

- a humanistic approach for solving peoples´ problems
- essential for the sustainability of projects
- an appropriate approach to benefit from the local knowledge, wisdom and resources
- essential for the preservation and dignity of indigenous cultures
- a key for unlocking and enhancing human capital
- a possible solution to hinder a wholesale replacement of existing systems with foreign models
- necessary for increasing consciousness, building capacity and empowering target groups
- a most suitable way for the democratic distribution of power and resources
- necessary to fully profit from economies of scale
- to realise better designing and implementation according to felt needs
- a catalyst for mobilizing further local development efforts, and is
- economically efficient and causes greater spread effects (ibid. 1987:4-5).

In view of the above discussion it should not be assumed that participation is a totally unmixed blessing because it has not been always praised and can thus cause some **disadvantages**. HUNTINGTON (1968) regards it a danger to stability which is necessary for economic growth[28]. The use of the existing local power and organization for an easy mobilization of participation can reinforce the existing inequalities instead of stimulating a desired change in the system. As a result, the upper strata can exploit and make others participate for their interests or at least to justify them. In communities with centralized patterns of power and influence, participation can face political opposition at the local as well as at the national level. It can be perceived as a threat to the existing political system. The process of participation can consume more time and resources to mobilize less developed communities (FINSTERBUSCH & WICKLIN 1987:4-5). The process of decision making can be lengthy in case of ´over´ participation. There can occur some

[28]Cited by ESMAN & UPHOFF 1984:101.

ambivalence of participation and technical know-how which, in some cases, is not equally available to all participants[29].

2.5.1 Dimensions in Participation

Not for the exact measurement, but for the **general intensity or degree of participation**, the following three dimensions have been given special emphasis:

- ´**What**´ in participation, e.g., decision-making, implementation, benefits, evaluation, etc.
- ´**Who**´ in participation, e.g., local population, state, foreign experts, etc.
- ´**How**´ in participation, e.g., organizational form, institutional setup, functions, duties, etc.(COHEN & UPHOFF 1977:27ff, UPHOFF et al. 1979:5f, ULLRICH et al. 1991:7f).

Participation may be divided into two useful forms: organized and spontaneous. **Organized participation** is usually created by the forces outside the local community, while spontaneous participation is the outcome of the community members´ self initiative of to fulfill certain social and economic needs (KALSHOVEN 1989:9). UPHOFF et al. treat these forms of participatory organizations as ´introduced´ and ´indigenous´, respectively (1979:49f). Organized participation is mostly named as top-down approach. Standard or top-down refers to participation at village level, in package programs, where planning and decision-making processes are done by high level policy makers, mostly at the national level. On the other hand, **spontaneous participation** is graded as bottom-up approach, where community members participate at all levels to perform all relevant activities (TAPAY 1989:40f, CHAMBERS 1980:29, 32, IDS WORKSHOP 1989:46, CHAMBERS 1989:187-188).

2.5.2 Determining Factors of Participation

Participation, definitely, does not function in a vacuum; therefore, there are some **socio-economic factors** which can either have a positive or negative impact on it. Furthermore, the **physical and social environment** is much more complex than participation itself. These factors are:

a. Physical and ecological factors: population density, topography, climate, etc.
b. Social factors: open or closed traditional community, existing authority pattern, social organization, etc.
c. Cultural factors: norms, values, attitudes, belief system, etc.
d. Economic factors: availability of production factors, infrastructure, existing skills, knowledge, technology, etc.
e. Historical factors: experience of communal activities, forms of cooperation being practiced, etc.
f. Political factors: democracy, tribal system, anarchy, etc. (COHEN & UPHOFF 1977:18-19, FAO 1985:16f, MUTHABA 1987:8, NOTOATMODJO 1985:40f).

[29]Personal communication with Prof. KUHNEN.

2.5.3 Participation in Water Management

The most ignored and underrated aspect of the irrigation system in the past, and even today, is the collective or individual participation of the end beneficiaries: the water-users. The physical dimension has always been overemphasized, mostly at the cost of the social factor. Furthermore, there are some **negative common beliefs and sentiments** conferred upon the effective participation of water users in the management of the irrigation system (LOWDERMILK 1986:440). The prevalent view about the unpopularity of the social and organizational factor in an irrigation system can be well justified when one finds that hardly eighteen pages has been devoted to this problem in an extensive study, comprising twenty-four volumes, on the Indus Basin of Pakistan by SIR ALEXANDER GIBBS and Associates in 1960s (ibid. 1986:440). In developing countries, especially in Pakistan, there is a rather widespread view according to which farmers must be commanded or put under great pressure in order to force cooperation. The development of the **Water Users Associations Ordinance** in Pakistan by the martial law authorities is, perhaps, a unique example in the history of world irrigation (ibid. 1986:440).

The concept of 'participation' in the field of irrigated agriculture is relatively a **new addition**, and the factor which makes it a complex one is its use in many contexts such as participation in management, system organization, development, etc. (CERNEA 1985:357). Its use in so many different contexts has caused some confusion as to its exact meaning (MUTHABA 1987:6). Anyhow, participation is regarded as a possible suitable recipe for solving not all, but most of the problems, the rural population is facing today. The involvement of farmers in the management of irrigation water has only recently been realized (LOWDERMILK 1986:429). In the past, this field was exclusively dominated by engineers who concentrated their efforts on the engineering and design of irrigation systems (KALSHOVEN 1989:5). Such a difference is no longer tenable, since the irrigation system is viewed as **a socio-technical process** in which human and physical elements are combined to make agriculture viable (KALSHOVEN 1989:1, HUPPERT 1989:27, UPHOFF 1986:3). Furthermore, the ultimate objective of maximizing the yield makes farmers´ participation an undeniable fact (LOWDERMILK 1986:434). Gradually, however, the role of water-users is being appreciated and considered to be a vital component for the management of irrigation water, especially at farm level (KALSHOVEN 1989:6, FAO 1985:12, FAO 1982:2, UPHOFF 1985:363).

In regard to water users´ participation in the management of irrigation, the term participation does not reveal the water users´ frame of mind, their attitude towards the object of their participation, their intentions and their wishes and expectations. On the basis of water users´ objectives and motives of participation, some **generalizations** which are determined by their activities are arrived at. This includes a state of mind advocating the realization of a better supply of and control over water by improving the infrastructure, whereby the participation of the water users is a prerequisite. It also includes their relatively positive attitude towards participation supported and witnessed by a more frequent occurrence of participation and a general avoidance of free-riding. Their

intentions, wishes and expectations regarding participation are reflected through their objectives and their struggle in realizing these objectives.

There are **different approaches for the participation of water-users (WUs)**, these are usually determined the by size of the system. For comparatively larger systems, three approaches are worth mentioning (TAPAY 1989:30).

2.5.3.1 Through Community Organizers

To motivate the water-users and to increase their participation in water management activities, the services of **professional community organizers** are utilized (FAO 1982:26). Mostly, they are government employees or project staff members responsible for irrigation management (TAPAY 1989:30). The community organizer is supposed to live in the community to have a regular contact with WUs through involvement in day-to-day social, cultural, religious and economic activities. The house to house visits are considered very important to integrate the community (BAGADION & KORTEN 1985:56f). When a community organizer is accepted as a part of the social system, the performance of task oriented activities becomes very easy. A good level of **communication** is very important to make Wus realize the benefits of their participation in the management of irrigation water. This approach can only then be successful when community organizers are properly trained in the basic organizing procedures, integration and mobilization of WUs, and in the action-reflection process. The community organizer assists WUs to organize themselves into Water Users´ Associations for preparing and implementing their irrigation management plans. The validity of this approach can be witnessed in the Philippines (BAGADION 1985:66-67, TAPAY 1989:30-31).

2.5.3.2 Through Water-Master or Ditch Tender

To optimize the participation of WUs, the assistance of a water-master or ditch tender is of benefit. A water-master or ditch tender is usually appointed by the village headman, with the consent of WUs, and finally confirmed by the local government administration. He serves the whole village instead of one watercourse or scheme. He is responsible for the O&M required for the irrigation system, including the mobilization of communal labor to perform these activities. Water distribution and acting as a communication link between waterusers and government officials figure among his duties. This post is directly linked to performance and efficiency, as the WUs, if not satisfied, can select any other member as water master or ditch tender. This approach to manage the **participative activities** is practiced in different irrigation schemes in Indonesia and the Philippines (NOTOATMODJO 1985:33, FAO 1982:19, SCHREVEL 1989:60f, TAPAY 1989:30-31).

2.5.3.3 Through Selected Water-Users as Organizers

Here, an attempt is made to achieve the optimal participation by utilizing the services of selected WUs as organizers. The most general form of organization, as a result of this approach, is commonly named **Water Users´ Association** (WUA). This form is widely practiced in Pakistan, India and in many other Asian countries. An **executive committee** is

selected by the WUs, generally comprising three to five active members. Usually, a WUA is organized at a watercourse or a tertiary canal level. The duties and responsibilities for each WUA are mostly situational. This approach adopts **a more democratic way** to reach decisions, as every member enjoys equal rights and status - theoretically. Some of the common functions are: planning, decision-making, implementation, dispute settlement, O&M activities, etc. (KHAN 1985:175f, FAO 1982:23, SINGH 1985:102, TAPAY 1989:30-31).

2.5.4 Impact of Water-Users Participation

Depending upon the objectives and organizational form, the results and impacts of WUs participation may differ from scheme to scheme. Some **general impacts**, however, can be identified (FAO 1985:14f, MUTHABA 1987:7, SMOUT 1990:7, KALSHOVEN 1989:10):

1. **Increase in production** due to greater cropping intensity and expansion of the area under irrigation. There may be some other decisive factors increased production which may not be neglected, WUs participation, however, played a more definite role, although it is difficult to measure. The expansion in the area under irrigation is, however, directly related to participation (FAO 1985:14).
2. WUs participation in irrigation schemes is always helpful for **improving relations and reducing conflicts**, not only between government officials and water-users but among water-users as well. Their participation provides an effective channel to ventilate grievances and to solve problems. Frequent contact between WUs and government officials provides better chances of communication to reduce the distance and misunderstandings (UPHOFF 1986:87f, SMOUT 1990:7).
3. Participation is always **cost-effective**, enhances contributions to labor and material inputs by the community. The **local resources** can best be mobilized when WUs participate in every developmental phase, i.e., planning, implementation, evaluation, etc. For the remittance of costs of construction, etc., participative models have always been found to be very helpful (LOWDERMILK 1986:432f).
4. The **sense of belonging, ownership and responsibility** can be strengthened by involving WUs in all phases of system development. This sense leads O&M operations of a better quality (SMOUT 1990:7) which is necessary for the longer existence of irrigation facilities. Moreover, participatory experience helps WUs to accept greater responsibilities in the future, as it also gives them self-confidence (UPHOFF 1986:118).
5. The participation of WUs can be a guarantee for the **quality of construction and design**, as their specific requirements and needs are met. Their information and knowledge about local hydrology, topography, agronomy, geology and climate, based on their long experience, can be very useful in planning and implementing schemes. Their regular involvement serves as an automatic check of all the activities. Moreover, beneficiaries´ participation leads to an appropriate and socially accepted design (SMOUT 1990:7).

6. WUs participation is helpful when creating an environment for a more **effective coordination** of agricultural services and farming practices. The experience gained thereby can equally be useful in other spheres such as marketing of agricultural produce, joint purchase of inputs, etc. Being dealt as an organization, they can enjoy facilities which are not available to them as individuals (FAO 1985:14f).
7. The impact of participation can be viewed as some positive **social changes** with long term implications. Some examples of long term benefits are the development of local leadership and organization, increase in agricultural skills and capacities required for more production, self-confidence to manage their affairs by themselves and promotion of the mechanisms to express local needs and interests to the government (ibid. 1985:15).

The impact of farmers´ participation in irrigation systems has been appreciated and encapsulated by CHAMBERS as: „Making known the local wishes; generating development ideas; providing local knowledge; testing proposals for feasibility and improving them; increasing the capability of communities to handle their affairs and control and exploit their environment; demonstrating support for a regime; doing what government requires to be done; exacting, developing and investing local resources (labor, finance, management skills, etc.); promoting desirable relationships among the people especially through cooperative work“ (1974:85).

2.6 Organization and Participation in Water Management

The study of irrigation literature suggests that water-users have always been involved in O&M of water. Historically, they developed their own informal participatory organizations for water management (LOWDERMILK 1986:430). Without the farmers´ active participation, the bureaucracies alone cannot manage irrigation water efficiently, especially at the farm level. In the case of large irrigation systems involving many small farmers, it is virtually impossible for the irrigation agencies to deal with each and every farmer. The organization of farmers into participatory groups makes it easy for them to deal collectively with the main system authorities, and, in turn, it is easy for the main system management to deal with a relatively small number of organizations (KELLER 1986:333-334). Farmers´ participation not only renders it easy for irrigation agencies to perform their managerial activities but it also helps thems in realizing their objective of improving the supply of water and, ultimately, of achieving a better crop production. There is a long list of arguments favoring farmers´ participation in irrigation system management which covers, along with others, cost effectivity, provision of work force, better communication, conflict resolution, optimal use of water at field level, better quality of O&M activities, etc. The literature provides several evidences of precise gains through farmers´ participation in irrigation management; some of them are:

- In the Minipe scheme in Sri Lanka, there occurred a 30 percent increase in the downstream flow of water within the first year of farmers´ participation in irrigation management.

- The irrigable area of the Pochampad scheme in India extended by 25 to 30 percent when the Pipe Committees were established.
- Through farmers´ participation, the cropping intensity in the Nong Wai scheme in Thailand increased from 50 to 90 percent within a short period of only two years.
- Farmers´ participation in the Buhi-Lalo scheme in the Philippines helped to complete the construction of irrigation infrastructure some four months ahead of schedule, and the quality of work, as evaluated by the engineers, was better than average.
- Farmers´ organizations replaced anarchy by a certain degree of order in the Muda irrigation scheme in Malaysia.
- In Tamil Nadu State in South India, about 50 percent of the irrigation tanks are being managed by the farmers themselves, either privately or communally.
- The Marakwet farmers of Kenya have developed a furrow system where they take water from the Rift Valley through indigenous channels to irrigate cultivable areas as remote as some 15 kilometres.
- In Korea, the Farmland Improvement Associations are fully responsible for the operation and maintenance of the small and medium scale irrigation systems.
- The Meichuan irrigation authorities in China accepted a „melons-on-the-vine“ strategy after seeing a farmer-built system with several small reservoirs storing and controlling water along a main channel. With the participation of farmers, they constructed 21 small reservoirs and more than 6000 ponds to add almost 30 million cubic meters of storage capacity to the already existing 27 million cubic meter capacity of the main Meichuan reservoir.
- Through farmers´ active participation in a rehabilitation program in Pakistan, an amount of 7.6 million US Dollar (in a $42 million program) was saved through the provision of labor by the farmers. Pakistani farmers are also contributing 30 percent of the costs for a World Bank rehabilitation project (UPHOFF 1986:24-25, LOWDERMILK 1986:430f, FAO 1982:8f).

These facts have helped many governments and donors to realize the high economic, social and even political benefits which can be achieved at through farmers´ participation in schemes and projects which are basically meant for them (FAO 1982:2).

The above-narrated examples indicate that different forms of organization structure can be adopted, through which farmers´ participation can be realized and promoted. Out of a great variety of possible organization forms, the Water Users´ Associations have gained special attention since they are serving several countries as a valuable tool to encourage and achieve farmers´ participation (ibid. 1982:8). This model is also being widely practiced in Pakistan as well as in many other Asian countries. As the present study also focuses on a Water Users´ Association (WUA), it becomes necessary to explore **some theoretical structural and organizational aspects of a WUA** to get a better understanding.

2.6.1 Water Users´ Associations

The current studies on irrigation management have diverted more attention to the **organized participation** of WUs in the management process of irrigation systems[30]. The most common and effective tool to encourage WUs organized participation which is used in several countries of the world is the formation of Water Users´ Associations (WUAs). A WUA is generally defined as **an organization of water-users that manages, allocates and distributes water from a common source in the most efficient participative manner to benefit all the members** (FAO 1982:8). In the general sense, the main objective when establishing WUAs is to involve the end beneficiaries, the water users, in the management of irrigation water whereby, the **transfer of irrigation activities** to the water users is the ultimate goal. The Philippines and Indonesia have started much earlier the process of transferring irrigation management to farmers and have gone the farthest. In both countries, the old communal systems like the Balinese Subak were and are managed by the user communities (VAIDYANATHAN 1994:2965). Similar efforts are being made in other South Asian countries like Sri Lanka, India, Bangladesh, Nepal and Pakistan, but on a more limited scale. Sri Lanka, India and Pakistan are experiencing this approach on surface systems, whereas the other two countries are implementing the concept mainly for state tubewells. China and Vietnam are planning a major institutional reform in the direction of joint management by state agencies and users. In China particularly, the communes have invested a substantial amount of their own resources so that the beneficiaries of even government-managed irrigation systems have a direct stake in them (ibid. 1994:2965).

Latin America presents examples of attempts of the most thorough-going reforms in irrigation management. In Chile, for instance, the state is funding only part of the costs of an irrigation project. These costs are provided only for the projects which can earn a prescribed minimum return. A prior commitment of users to share costs and participate in management is strictly observed as a prerequisite to start the proposed project. In Mexico, the government is gradually transferring responsibilities of the O&M to the water users (ibid. 1994:2966).

WUAs are well suited for those areas where problems at watercourse or tertiary canal have always been acute. The analyzed case study presents a typical example of socio-technical problems at the tertiary level in Pakistan. The management problems have led to some innovative actions in the country where government is promoting the formation of WUAs for each watercourse or tertiary canal, whereas the rest of the irrigation network is still managed by government officials.

[30] From a long list, some example are: UPHOFF et al. 1991, UPHOFF 1986, UPHOFF et al. 1979, SAGARDOY et al. 1986, KNOTH 1989, NOBE & SAMPATH 1986, FREEMAN 1989, CERNEA 1985, CHAMBERS 1989, FAO 1985, FAO 1982, BOTTRALL 1981 and HUPPERT 1989.

2.6.1.1 The Formation of a WUA

The formation of a WUA is a tedious job demanding **a considerable change and/or readjustment in behaviors**. The main problems lie, especially, in the difficulty of explaining its advantages to the future managers of the association and in convincing them satisfactorily of these (FAO 1982:9). The task becomes more difficult in cases where the government bureaucracy and/or irrigation officials are not convinced either of the dynamics of a WUA. This step is of greater importance because the future functioning of a WUA is mainly based on the understanding of these factors. For the formation of a WUA, **two approaches** are referred to in particular:

i. **The Model Approach**: According to this approach, the association is initially operated by the government or project management to show how the system works. The members are required to observe its functioning. After some time when WUs are able to handle organizational activities, the job is handed over to them at adequate intervals. This process generally consumes more time.

ii. **Training**: The WUs must have a preliminary knowledge of irrigation, this is the basic condition for this approach. A positive attitude towards communal and cooperative activities is also desirous. The WUs and their representative, especially, are trained in such a manner that they are able to establish an irrigation association (SAGARDOY et al. 1986:41, FAO 1982:10).

2.6.1.2 The Functions of a WUA

Should the structure of an irrigation organization or a local organization be **single** task oriented or should it be fulfilling **multiple** functions? The relevant literature shows sharp differences of opinion on this subject. ESMAN & UPHOFF are of the view that „ .... multifunctional local organizations were more likely to build up both the resources and the commitment from members to operate effectively over time. Particularly when associated with agricultural production, single function local organizations have peaks and throughs of activity that make institutionalization more difficult“ (1984:139). GHAI & RAHMAN (1979) and ALAM (1979)[31], on the basis of their experience in Small Farmer Development Program (SFDP) in Asia, arrived at the result that a **diversification of an organization´s functions** is important when the rural poor themselves initiate mutiple activities. The accumulation of related functions can increase the effectiveness and solidarity of a local organization (BOTTRALL 1980)[32]. While discussing the number of functions, ESMAN & UPHOFF consider them to be more likely a consequence than a cause of local organization (1984:140). Some[33] have voted for a single function structure of the organization whereas JOHNSTON & CLARK have discussed the matter in the following terms: „Mature organizations have sensibly and naturally diversified their functional base after getting

[31]Cited by ESMAN & UPHOFF 1984:139
[32]Quoted by ESMAN & UPHOFF 1984:141
[33]See, for example, the case studies of TENDLER 1976, BORDA 1976, PETERSON 1982-b and GOLLADAY 1983 analysed and discussed by ESMAN & UPHOFF 1984:139f.

started and gaining experience from a narrow - and often single-function - beginning“ (1982:179).

With regard to the organization form, there exists **no universal set of functions** undertaken by every WUA. The functions of a WUA are usually determined by its organizational structure (FAO 1982:14), which is basically shaped according to the water users´ objectives and goals. It must be stressed here that the set(s) of these objectives do not have a universal character but differ from country to country, and more specifically, from system to system, even within the same country. Referring to Water Users´ Associations as a synonym of the organization of irrigation groups, COWARD (1980:7) is of the opinion that these groups are intended to assume the following tasks: completion and maintenance of local infrastructure, collection of irrigation fees from group members, settlement of disputes over water distribution, and coordination of the timing of planting and harvesting. While explaining functions of a WUA in India, for example, WADE enlisted them as: „... (to) oversee the distribution of water, to help resolve disputes, to be a means of communication between users and irrigation officials; and also to collect water rates and be responsible for the maintenance of watercourses and drains“ (1975:14). The main activities of formal irrigation organizations in the Philippines, however, are aimed at „active and effective O&M and collection of irrigation fees“ (TAPAY 1989:28). The WUAs function as local organizations, so that the functions specified by ESMAN & UPHOFF for a local organization are equally valid to understand the tasks of a WUA. These functions include:

a) **Intra-organizational functions**
   - aa) Planning and determination of goals
   - ab) Management of disputes

b) **Resource functions**
   - ba) Mobilization of resources
   - bb) Management of resources

c) **Service functions**
   - ca) Provision of necessary services
   - cb) Integration and coordination of services

d) **Extra-organizational functions**
   - da) Control of bureaucracy
   - db) Claim-making to government (1984:72-73)

Considering the administrative activities, a WUA is controlled either by government officials or by the water-users. Commonly, the term ‘Water Users´ Association’ is used for the latter form. A WUA can be **voluntary or compulsory** (FAO 1982:10), however, as the need for more administrative control appears, a response to the higher demands, a transformation from voluntary to compulsory characteristics can be observed. Being determined by the objectives, a WUA can be **a single purpose** or a **multipurpose organization** (UPHOFF et al. 1979:217-218). A multipurpose organization undertakes a wide variety of activities including mainly **water management along with marketing, non-water inputs provision, extension and advice** (SAGARDOY et al. 1986:42f);

whereas the emphasis of single purpose organization is the management of irrigation-related activities. The multipurpose nature of a WUA represents **a multifunctionality of the concept** of Water Users´ Association.

For a better understanding of a WUA, a brief description of its **general functions** is appropriate. A WUA can undertake the following functions:

- directing the participation of WUs in the local decision-making process;
- solving disputes and problems within the association and between the WUs and the irrigation authority;
- managing issues relating to the distribution, delivery, application and removal of water to make the system more efficient;
- serving as a communication link and a forum for the two-way flow of information; top-down and bottom-up;
- assuming first hand representation of WU's needs and problems to the government in a more organized and collective way, without needing any 'mediator´ who may color the messages;
- organizing collective action for water management, which may be difficult to accomplish for an individual water-user. These objectives are easy to achieve when resources are pooled;
- selecting a better organized management mechanism for a better administration and utilization of resources, either self-mobilized or granted as aid, and
- being more advantageous as 'economies of scale´; scarce financial and technological resources benefiting a greater number of WUs (RADOSEVICH 1977:1-2, UPHOFF et al. 1979:215f, SAGARDOY et al. 1986:32f, 42f and KNOTH 1989:52f).

While discussing the functions of a Water Users´ Association, a FAO report also confirms the above tasks with some overlapping and additional features. According to this report, some **additional functions** of a WUA may include: mobilization of local resources in the form of cash and kind to construct, improve and maintain facilities, collection of fees and fines, arrangement of loans for construction or improvement purposes, and the provision of organized means for extension and for training members (FAO 1982:14).

In connection with Pakistan particularly, LOWDERMILK et al. found the following functions most important for a farmer´s organization:

a) construction and maintenance of improved watercourses,
b) building-up of linkages to sources of irrigation and agricultural knowledge, and
c) achievement of a greater control over the timing and amount of water (1978 Vol. I:66).

2.6.1.3 The Structure of a WUA

Although there did not exist any ideal model of a WUA which may satisfy all the contingencies, some **general models**, however, have been proposed to fill the gap. The proposed models are an outcome of developmental experiences gained in the course of history of WUA´s development. There is no doubt that such models are not universal in

their nature and structure, but can provide **a base line for comparing and analysing** divergent activities performed by other WUAs. Such a model, from the organizational point of view, has been **presented by the FAO** (FAO 1982:14f). While narrating the purpose of this effort, SAGARDOY, et al. are of the opinion that the guidelines provided can be „ ... followed in the course of any evaluation and/or planning exercise“ (SAGARDOY et al. 1986:1). In view of many instances of poor performance of irrigation schemes due to inappropriate organizational structures, a considerable emphasis has been placed on the establishment of a suitable organizational structure (ibid. 1986:2). For an analysis of the structure of the WUA studied, at a later stage in the dissertation, the details of the model are presented hereunder in the light of **the FAO model**.

a. **The General Assembly** (GA): The GA is composed of **all members** of a WUA. As it is the highest authority, it is responsible for the performance of the following main tasks:
- setting targets
- determining the authority pattern and the delegation of tasks
- establishing a code of rules and regulations
- selecting the representatives (Board of directors)
- approving the budget and assessments, and
- deciding about the extent of physical improvements (FAO 1982:14-15, SAGARDOY et al. 1986:33).

b. **The Board of Directors** (BOD): The BOD is the **highest executive body**. There is no fixed number of directors, it is determined by the size of the association (sometimes by the number of participating groups as well). The directors usually represent the various interests that make up the WUA. Special skills, socio-economic status, location in the system, etc., are paid special attention during their selection. The BOD performs and supervises the tasks approved by the GA (FAO 1982:15, SAGARDOY et al. 1986:33).

c. **The Management Office** (MO): The MO is directly controlled by the BOD as it is responsible for the **execution** of the mandate given by the BOD and for day-to-day activities (SAGARDOY et al. 1986:33). These activities may include:
- record-keeping
- holding elections
- organizing and convening meetings and,
- collecting fees and funds (FAO 1982:15).

d. **The Executing Units** (EU): The EUs perform the actual **implementation** of tasks at the request of the MO; these tasks are actually designed by the GA. The EUs are usually responsible for:
- operation
- maintenance and,
- administration (FAO 1982:15, SAGARDOY et al. 1986:33).

e. **The Judicial Section** (JS): The conflicts and problems over water, especially, in traditional societies require their own juries to be solved according to a traditional pattern.

The JS, therefore, serves as a „**tribunal**“ for the WUs in order to settle their disputes and to punish whoever deviates from the set rules and regulations. It cosists of some distinguished members of the BOD (FAO 1982:15, SAGARDOY et al. 1986:34).

2.6.2 Factors Influencing Water Users´ Participation

Of course, WUAs do not function in a „social vacuum“ (MANIG 1989-a:336) but in a physical and social atmosphere where **institutional, social, economic and political** structures along with **norms, values and attitudes** prevailing in the community have an influential impact on them. Like participants in other organizations, the water users are also affected by the incentives/disincentives offered which, in turn, shape their decisions to participate or not. The participation of water users in WUAs for the management of irrigation water does not evolve automatically, but is influenced by a series of factors (KNOTH 1989:39) which range from **political, physical, economic** and **social** to **historical factors**. However, only the need to manage water for agricultural production does not suffice for the evolution of participation. As in the case of other collective actions, the realization of the fact that certain objectives can only be achieved when expected beneficiaries cooperate with each other paves the ground for participation. The non-existence of a homogeneous flow of participation for all types of activities confirms the thesis that participation is always **contextual** and is influenced by several contingencies (UPHOFF 1986:79, WALKER 1984:21). The identification of influencing factors is helpful in indicating the participants´ motives (MUTHABA 1987:7), however, it is not an easy task, as these factors are often interrelated and are difficult to be ranked according to some fixed priority (UPHOFF 1986:19). The following factors, as supported by the literature, should be given high consideration as they may affect, either positively or negatively, the farmer’s capacity to organize themselves in a WUA (MERREY 1980:205, UPHOFF 1986:79f, BOTTRALL 1981:216).

2.6.2.1 Political Factors

The **agricultural policy** of the concerned country has a direct impact on the water users´ active involvement in the organized activities regarding water management. Although most of the water users (especially in case of Pakistan) are not aware of the details of the government´s agricultural policy, the reflexes of the local and regional authorities and their commitment to development projects are, however, indirect means of convincing and motivating the water user. The **attitude and behavior of irrigation officials** in the case of water management along with their understanding of farmers´ participation affect the water users´ willingness and ability to participate. The kind of activity and the levels of participation within the activity shape the intensity and extent of farmers´ active involvement (UPHOFF 1986:79). The nature and extent of water users´ participation, in agency controlled specifically and in mixed controlled irrigation systems generally, is usually defined by the higher authorities.

BOTTRALL is of the opinion that water users will not fulfill their set tasks spontaneously; they have to be stimulated by the irrigation authorities or by other government

institutions[34]. CHAMBERS also suggests that the government should play a leading role in the organization of water users by providing some facilities and stimulating incentives (1980:39). While discussing the impact of political decisions regarding water users´ participation, he criticizes the prevailing attitude of the irrigation officials as follows: „Politically there is ignorance of the processes of decision making and allocation which influence the timing and quantity of water which farmers receive. In terms of political economy, there has been little analysis of who gets what, how, when and why, and with what costs and benefits“ (ibid. 1980:29).

There are some situations such as manipulation of the farmers for political purposes or to please outside agencies, use of tricks or coercion to make a short term project look good, or involving only the elite or special classes of farmers which, according to LOWDERMILK, are **not conducive** for water users´ participation (1986:429-430). As a result of the active involvement of the elite or large landowners, they usually profit more than the small farmers. Due to their sound socio-economic position in the society, they are able to exercise their **power and influence**. As a result, it is the group of large landowners who profits more from illegal means and is more indulged in corruptive transactions with the lower level officials than the small growers. The lower level officials are poorly paid but delegated with strong regulatory powers so that a great majority of them use every chance to make a balance between the two extremes by indulging in corruption. The small landholders avoid causing any problem with these officials as they cannot stand against their **regulatory powers**, whereas the large landowners usually bribe them to illegally profit from their delegated discretionary powers[35].

In Pakistan, the water users´ role is restricted to activities below the outlet which not only limits the extent of participation but also proved a disincentive. All this causes water users´ participation to be a potential rather than a reality (UPHOFF 1986:19).

2.6.2.2 Economic Factors

The most important incentive for the water users to participate in an organized or collective action is to increase production or to achieve a greater productivity. According to TAPAY, **the attainment of higher agricultural production** is the farmers´ main criterion of success or effectiveness in irrigated agriculture (1989:26). It is expected that through their active participation in water management activities, they will be able to achieve the following objectives more easily than they can individually:

- Increase in output/yield,
- Increase in area under plow, and
- Increase in cropping intensity (UPHOFF 1986:19)

All the three objectives (either independently or in some combination) are regulated through an efficient and equitable water supply, which is itself one of the important objectives of the WUA.

[34]Cited in KALSHOVEN 1989:7.
[35]Cf. BERGER 1986:92.

An important factor which lies at the heart of the water users´ decision to participate is that he must be convinced that, **through collective activity, some specific economic benefits/goals can be achieved which, for him alone, are difficult, if not impossible, to arrive at**. A water user will be eager to participate in a WUA when the profit he expects as an individual is larger than that obtained by any other means, due consideration being given to the transaction costs and the loss of individual discretionary powers (BOTTRALL 1981:216). The formulation of group activity also influences in the sense that the individual water user while pursuing his benefits, should also consider group benefits. This will lead to the sustainability of the organization. A **reciprocal distribution of the benefits** earned by individual water users will influence positively the level and continuity of participation. In other words, an **equity in the distribution of benefits** must be assured (BOTTRALL 1981:216).

How much a water user relies on agricultural production for his and his family´s living, is one of the decisive factors for participation. The maximization of agricultural production is not always the farmer´s main interest, he „ .... is far more interested in maximizing income, or family benefits .... Agricultural production is usually a means to an end, not the end itself“ (HUNT 1990:152). Therefore, a full-time farmer earning his income mainly from agriculture in comparison to a part-time farmer (who may have some non-agricultural sources of income generation) will be more interested in O&M and in the expansion and efficiency of the system. Not only he himself will devote most of his time to irrigation activities but he will also be interested in a widespread water users´ participation (UPHOFF 1986:80, KALSHOVEN 1989-a:12).

The **exclusive use of water for agricultural purposes** will help to avoid interest conflicts between agricultural and non-agricultural users. Being alone responsible for the management of water, water users will feel agreater commitment towards organizational activities and will participate more eagerly, as they are the ultimate beneficiaries (UPHOFF 1986:81).

2.6.2.3 Social Factors

Social Homogeneity/Heterogeneity: The indigenous social organization is directly related to the formation and operation of a WUA. In a more homogeneous and cohesive atmosphere, the mobilization of WUs is much easier as compared to a heterogeneous one (KALSHOVEN 1989-b:114) The **degree of solidarity** among the water users is directly related to the effectiveness of the group (KALSHOVEN 1989-a:7). The **common interests, needs, attitudes and behavior** pave the path for a more active and effective WUA. The experience in Pakistan’s Punjab has confirmed that the core groups of the **village social organization**—‘*biraderi*s’ or brotherhoods, are very tight structures that are able to facilitate cooperation within the group but that often lead to serious competition and strife between groups (MERREY 1986-b:37f). A *´biraderi´* is an endogamous group of individuals who are related to each other through blood or marriage (MIRZA et al.

1975:6)[36]. The watercourses having fewer '*biraderi*s' or only one '*biraderi*' usually proved more conducive to WUA's activities (FREEMAN & LOWDERMILK 1976:8ff). A greater **diversity** between and within groups makes it more difficult to arrive at decisions which are favored by the majority. Many empirical studies (MERREY 1983, MERREY 1986-b, MIRZA et al. 1975, MIRZA & QAZI 1992, LOWDERMILK et al. 1978, PARC & FAO 1981, REUSS et al. 1979, BOTTRALL 1981, UPHOFF 1986) confirmed that there were greater difficulties in establishing group responsibilities in more stratified and less cohesive communities. Favoring the same fact, BOTTRALL arrived at the conclusion that „...the more stratified and /or friction-ridden a society is, the more difficult it will be to stimulate the development of self-sustaining watercourse groups" (1981:216). In some cases the **ethnic background** also plays an important role (UPHOFF 1986:81).

The validity of a relative equity in the **socioeconomic status** of potential members is of fundamental importance. In this connection, GOLLADAY quotes a brilliant example in which differences in the participants´ socioeconomic status altered the results of a rural development program head-down. According to him, the Bangladesh Rural Advancement Committee (BRAC) developed a joint scheme for landowners and landless laborers to resolve community problems through their collaboration. The experiment was plagued at its initial stage due mainly to differences in the members interests. Stated clearly, the concerns and interests of the landowners were in conflict with those of the landless. When the program was restructured to include only the landless, it functioned well and developed into an effective organization (1983:27-28).

It is not always the material incentive only which mobilize the water users; the existence of some **harmonious relations** within the community as well as the **social norms of participation and cooperation** also play a vital role. The ethics of sharing water can, in this regard, be a relevant example which may mobilize the cooperative and participative behavior (UPHOFF 1986:85).

Power and Influence: The relative equal distribution of power and influence along the irrigation system is helpful for the creation of a more **democratic atmosphere**. Here, the shareholders seem more eager to participate in collective projects (MERREY 1980:205). In some cases, the concentration of power and influence in the hands of a few shareholders has also proved to be a better solution, as it has filled the gap of leadership[37]. Effective **leadership** causes participation to be better coordinated and more efficient by providing direction, discipline and encouragement (UPHOFF 1986:86). While determining a relationship between leadership and participation, they have been regarded as the two sides of the same coin (ESMAN & UPHOFF 1984:246). The WUAs, in which concentration of power and influence is at the tail or middle of the system, proved generally to be better than those in which the situation is the reverse. Tail-enders, everywhere in the world, are suffering more than those towards the head, therefore, the tail WUs draw the greatest

[36]For a detailed discussion of *´biraderi,´* see sections 3.3. „Sociopolitical Framework" and 4.5.4.1. „Social Organization."
[37]For a detailed discussion, see HUPPERT 1989:165ff.

benefits from improvement and WUA activities (MERREY 1980:205). In this particular situation, WUAs are very often more active and effective.

To avoid ´**free-riding**´ primarily and to regulate group activities, there must be some sort of policing in terms of sanctions (traditional or legislative) to protect the participative activities from external and internal harassment and exploitation (BOTTRALL 1981:216). The existing pattern of power and influence may be helpful in solving the problem of free-riders.

In connection with **decision making**, ARISTOTLE has presented three main classifications of the political system: rule by one person, by a few persons or by many. Following this pattern, a local organization may be ruled by an executive, by a committee(s) or by an assembly of participants (ESMAN & UPHOFF 1984:144). On the basis of their analysis of 150 local organizations, ESMAN & UPHOFF have classified decision making structures into **five possible ways**: 1) essentially executive decision making, 2) an executive plus committee(s), 3) decision making by committee(s) including the executive committee as one possibility, 4) committees plus an assembly or committee of the whole, 5) essentially assembly decision making (1984:144). In Sri Lanka, for example, decisions are made by appointed irrigation headmen or elected farmer committees, which, according to CHAMBERS proved efficient in dealing with matters of water management (1975:56-59). WILLET, on the other hand, argues in favor of vesting responsibility in one person instead of a committee (1981:893). His argument is mainly based on the mobile nature of the population due to their pastoral and agricultural activities in which the rural local organizations in Botswana have to function.

Education and Experience of Irrigated Agriculture: The WUs already having experience of irrigation are found to be better managers as compared to the inexperienced ones. The specific **knowledge and skills** required to deal successfully with the local conditions are of great value (MIRZA & MERREY 1979:125). The previous history of cooperation in community projects and lack of serious recent conflicts are also indicators of a better atmosphere for a WUA. An adequate handling of conflicts and their solution among water users may make the WUA an attractive forum (KALSHOVEN 1989-a:7). A better level of education provides a more **flexible atmosphere** in which all the matters regarding management and organization can be comfortably handled. Education is regarded as a sign of **progressiveness** (MIRZA & MERREY 1979:13) and allows sufficient room for new ideas. Moreover, education enhances the ability to profit from different information sources in a much better way.

2.6.2.4 Physical Factors

Location: Usually, water users are spread over all reaches, i.e., head, middle, and tail, of the command areas, and, hence, experience different **situational problems** regarding supply, control and management of water. The basic motive of the tail-enders to participate in a WUA is to overcome or reduce these differentials by voicing in decision and implementation processes (UPHOFF 1986:80). **Spatial factors** do have an impact on who will participate and how intensively. Considering the fact that tale-enders of a command

area usually do not get their due share of water, it is expected that they will have more incentive to participate. The command areas where the largest and most influential landowners had their land at head reaches, do not function well. On the other side, if such farmers are concentrated at the tail-end, or if land is more equally distributed at all reaches of the command area, WUAs easily emerged and functioned effectively (ibid. 1986:85).

Landholding and Tenure Pattern: The size of landholding and tenure pattern have a direct impact on water users´ participation. The size of the holding may split the water users into two **functional spheres**, where one may consist of large farmers responsible for decision making and the other comprising small ones who may be responsible for the labor intensive activities of water management. The tenure system may permit as well as restrict some specific activities to the water users, allowing landlords, for example, to conflict resolution decisions whereas the tenants may not be considered for this process (ibid. 1986:80).

Supply of Water: The main incentive which influences the water users´ decision to participate is the acquisition of an **adequate and reliable supply** of water. This desire will be entertained when the main system provides a specific quantity of water. Therefore, the **abundance and extreme scarcity** of water will have a negative impact on water users´ participation (ibid. 1986:83). In case water is abundant, the management activities will be considered as least important as only occasional maintenance will serve the purpose. On the other side, if water supply is too scarce or unreliable, the water users will have nothing to manage and participation will be undesired (KALSHOVEN 1989-b:114, CHAMBERS 1980-b:32). The water users will participate in an irrigation management activity enthusiastically when they hope for a better control over water supply. Such a situation arises from a general scarcity of water and, when water is a scarce factor, its use can be improved through the users´ active participation (WICKHAM 1972:108).

Number of Water-Users: Both a large as well as a small number of WUs have specific advantages and disadvantages. Therefore, there exists no absolute group size for the WUA, rather, an **optimal size** is mainly dictated by the social structure of the local community (KALSHOVEN 1989-a:7) A larger number of water-users is considered more suitable for the '**economies of scale**' in operation, while a smaller WUA is more cohesive and shows more **solidarity of action**. Although larger WUAs show certain advantages, especially for major maintenance and rehabilitation programs, that are more effective in labor mobilization, communication and training, an increasing tendency for smaller groups can be observed because several countries no longer lay emphasis on large scale as was the case formerly. In larger associations, communication between the individual WUs and the executive body becomes more difficult. In smaller associations, on the other side, **communication** is easier, but the administrative costs are greater, and this places a heavier burden on the shareholders. Small scale is more conducive to increase the potential of participation in providing almost equal chances of performance. Moreover, the efficiency and effectiveness of each participant are more visible and identifiable in smaller groups.

The question of optimum size is, definitely, important in determining the association´s potential capability to undertake its functions efficiently. Therefore, up to a certain size of

irrigation scheme, the size of the association is predetermined by the physical size of the scheme.

Size of the Irrigated Area: Generally, smaller areas are found to be appropriate for management through WUAs. There is an upper limit to the size of the irrigation unit, above which efficiency is likely to decline if all the matters of irrigation are left to the WUs. The larger areas demand a **complex technology** with which farmers, in most cases, are not able to comply to supply water at various levels. A precise determination of the upper limit of a smaller system depends on the complexity of technology, the supply of water and the degree of social cohesion. However, as a result of the good management of small areas by WUs, several studies recommended to **establish WUAs at watercourse level** instead of at village level.

Farm Size: Very small and very big farms are both inadequate. Small but '**economically viable**' farms owned by a large percentage of shareholders are considered to be best for a WUA (MIRZA & MERREY 1979:103). In Pakistan's Punjab, for example, the holdings in the range of 2.6 to 10 hectares are defined as ´small but economically viable' (MERREY 1980:205). Very small farms increase the number of shareholders which are very difficult to organize, making the activities of WUA more difficult. Furthermore, the WUs whose holdings are insufficient for **subsistence** often have other sources of income; this reduces their interest in devoting much time and labor to their land and ultimately to the WUA as well. The big farms, on the other hand, are mostly managed by servants and/or tenants (especially in Pakistan); as a result, water management activities are also performed by them. The work done by these servants and/or tenants is mostly of low quality; this reduces the efficiency of a WUA.

2.6.2.5 Historical Factors

The **age of the irrigation system**, on the one hand, and the **tradition of cooperative activities**, on the other, can affect positively or negatively water users´ participation. In the areas which have been under irrigation for a long time, farmers will have more knowledge of and experience with water and land. Participative activity will be of great benefit in this case, both in matters regarding operation and maintenance, and in the design and construction of the system. Farmers´ participation will produce system and design of a good quality, especially when a system is being rehabilitated or expanded (UPHOFF 1986:94).

The **nature of past relations** between main system managers and water users will influence the perceptions and expectations both of the irrigation agency officials and end beneficiaries. In the light of past experience, the water users will decide whether or will be willing to participate, cooperate, finance, etc. (UPHOFF et al. 1991:94).

Moreover, the **history of creation** of an irrigation system does play an important role in shaping the expected roles of the irrigation agency and of the water users. In the course of history, certain roles are shaped and finalized which effect the future distribution of duties and undertaking of activities regarding the management, operation and maintenance at

different levels of the system. The next chapter deals thoroughly with the historical as well as the prevailing features of Pakistan's irrigation system; the world´s largest contiguous irrigation system.

2.7 Analytical Framework

For the purpose of analysing the study, the concepts discussed above in detail are delimited as follows:

- In the absence of a unanimous definition of institutions, on the one hand, and explanation of the term by emphasizing different aspects, on the other, it is difficult to follow any particular view absolutely. The institutions, for the purpose of the present study, will be regarded as regulatory and organizational patterns and rules which dictate socio-economic interactions between the individuals and their groups. The socio-economic environment in which the institutions function will be considered as influencing and, hence, structuring factor.
- Collective action means participatory activities of the water users organized to internalize those production externalities which are difficult, if not impossible, to accomplish for an individual water user.
- An organization means an institutional unit in which people interact with each other to achieve a specific goal or a set of goals. The organization provides a stable structural framework to carry out the current functions, i. e., management. Management itself means the integration of diverse elements to realize and implement the production activities. The formulation and establishment of an organization is considered here as a function of management.
- The transaction costs will include all the costs of information and coordination of a social interaction.
- An irrigation system will be dealt with as a socio-technical system which is goal oriented and open to the environment.
- In the presence of divergent ways to categorize the irrigation organizations, the criteria followed in the study are based on the level and extent of activities performed by an irrigation system.
- The followed definition of participation will profit from economic, political and sociological viewpoints, i. e., participation means having a share in benefits and losses, participating in the decision making process and being regularly involved in interactions among the water users and between the water users and the development agencies.

2.8 Summary

The main aim of the above discussion was to formulate a framework, on the basis of which the results obtained from the empirical research will be discussed, analyzed and evaluated. The objective of this framework was:

a) to present and, thereby, interpret the components of farmers´ organization and participation for the management of irrigation water, and
b) to identify different methods and strategies for the participation of farmers in the management of their agricultural resources, generally, and of water, particularly.

The major concepts discussed in the above presentation are summarized as under:

- The farmers historically played a central role in constructing, managing and operating irrigation systems around the globe. Their active involvement in the development of irrigated agriculture resulted in the social and economic development and stability of hydraulic societies.
- Irrigation management, being basically a collective action, has always been influenced by the existing socio-economic regulatory patterns of the participants. It makes no difference whether institutions are dealt with in the perspective of behavior or rules, since, as collective conventions and rules, they provide a base for socio-economic interactions among the individuals and their groups.
- The management of irrigation is definitely an economic activity and, like other economic activities, is tied to some specific transaction costs. The study does not aim to calculate transaction costs involved in irrigation water management; it rather emphasises the importance and dynamic of transaction costs which have a direct impact on the distribution of benefits.
- Irrigation water, being a collective good, demands collective actions for its management. The relevance of the concept of collective action for the management of irrigation water is of crucial importance, as it is necessary to internalize those production externalities which are difficult to accomplish for an individual water user.
- The concept of organization provides an important theoretical basis for the present study. The existence of several organization models does not imply that they substantiate each other, as one can prove more efficient than the other, however, only under a set of specific contingencies. The practice of different organization models for different situations verifies the legitimity of various organization structures.
- Irrigation organizations, regardless of the structural model being followed, are mainly established to manage water efficiently and effectively. The structure of a particular irrigation organization, however, is mainly determined by the set of objectives it follows. The absence of an ideal form of irrigation organization leaves enough room to practice different models, ranging from integrated to multipurpose and specialised management organizations.
- Participation, in fact, demands to a considerable degree the incorporation of the local community, so as to make the system more stable and productive. Therefore, the degree of participation is always determined by the concrete situation, as the contingency approach also explains. WUs participation or involvement means WUs playing an active role not only in decision-making regarding planning, implementing, operating, maintaining and evaluating the irrigation system, but taking an active part in designing

the programs to improve the productivity, equity and effectiveness of the system. Hence, participation does not mean „to take part“ (*teilnehmen*) only, but „to have part“ (*teilhaben*).

- The concept of organized participation of the water users leads to the concept of Water Users´ Association, which, over time, has been identified as the most suitable mechanism for the solution of most, if not all, problems the water users around the world are facing. Even in the absence of an agreed structural model and a set of functions, the validity and importance of Water Users´ Associations for the organized participatory activities of water users have not decreased. Some guidelines in this context have tried to fill the gap, which, after reformulation according to the specific situations, can serve as structural and functional models.
- The farmers, as an integrated part of the agrarian structure, are equally influenced by the socio-economic and socio-political atmosphere surrounding them. It is not always the internal environment of the agrarian sector which influences their decisions to participate in irrigation system management, some external factors, usually controlled by the state and the political administration, are equally effective.
- The concept of organization and participation have a direct link with the management of irrigation water. An interplay of these concepts provides a structural as well as functional dimension to the phenomenon of water management. Their relevance becomes tangible when one is concerned with a formal method of irrigation water management through the participation of all concerned. A relationship among the concepts of organization, participation and management is established for their relevance to WUAs.

3. Institutional and Sociopolitical Framework for Irrigation Water Management in Pakistan

> *„Lack of development is always and everywhere a political, not an economic problem"* (STIGLITZ 1989:20).

The emphasis on water management at watercourse level has implied that some interesting topics on the management at the main level including the acquisition and transportation techniques are not extensively covered here. Some relevant background information along with the institutional and sociopolitical conditions prevailing in Pakistan, however, are provided to make the study more comprehensive and meaningful.

3.1 Main Features

After the partition of **British India** in 1947, Pakistan emerged as an independent sovereign Islamic state on the world map, with **agriculture as the backbone of its economy**. The country covers a land area equal to 796,095 sq. km (roughly twice as large as the F. R. Germany) with a population of 124,25 million and a population density of 156 persons per square kilometer (UNDP 1994:34). The majority of the population live in the fertile Indus river plain in the Punjab and Sindh provinces as the other two provinces, namely the North-West-Frontier Province and Baluchistan are, far less hospitable, causing wide variations in the population density between the provinces. According to the figures for 1981, the population density in Baluchistan was only 12.5 per sq. km whereas in the Punjab it was 230.3 per sq. km. 31.5 per cent of the population lives in urban areas, whereas 68.5 per cent is rural resident. The annual population growth rate equals 3 percent. The GNP per capita, in 1992, was US $ 420. The country has an adult literacy rate of about 36 per cent (ibid. 1994:34).

Pakistan has **diverse nature landscapes**, ranging from high mountains capped by snow throughout the year to fertile plains, marshes, sea, and deserts. She possesses the towering mountain ranges of the Hindu Kush and the Karakorum, dominated by high peaks and glaciers. The ranges of Suleiman and Mari-Bugti represent a chain of medium and low mountains. The fertile lands of the Punjab and partially of Sindh, the plateaus of Baluchistan and Potwar, the deserts and the sea coasts of Baluchistan and Sindh equip Pakistan with quite complicated and attractive physiographical features (AHMED & CHAUDHRY 1988:1.4).

Pakistan has a **highly centralized political system** that follows a ´top-down´ decision making structure (MANIG & KUHNEN 1986:22). The economic structure shows an unbalance, concentrating on industrialization in a few centers where the growth rate is high, but neglecting the rural area seriously, thus characterizing an **economic dualism**. The centralization of developmental activities in some privileged areas is increasing regional disparities and social polarization (ibid. 1986:23). The rural economy itself is characterized by a high degree of economic dualism, possessing a relatively richer and dynamic rural sector consisting of large farmers and, at the other extreme, of small and marginal farmers

plus landless villagers living in poverty (LOWDERMILK 1990:161). The **share of the agricultural sector in Pakistan´s GDP** has decreased from 55 per cent in 1948 to 29 per cent in 1982/83 (MANIG & KUHNEN 1986:23) and has definitely sunk in the following decade. The agricultural sector is contributing about 26 per cent of the gross domestic product (GDP) which is considerably less than in the past[38] and has risen, recently, to well above the rate of population growth, 3.1 per cent (EIU 1992:12, 24).

The total cultivated area in the country amounts to about 38.63 million acres which is 81 per cent of the total farm area: 47.32 million acres. The average size of a farm by farm area is 9.4 acres and 7.6 acres by cultivated area. The average farm area in the Punjab is 9.2 acres and the cultivated farm area is 8.3 acres (GOVT. OF PAKISTAN 1993: Vol. I, p. xlvi).

Out of a total 5.07 million (m.) privately managed agricultural farms, 69 per cent (3.49 m.) are owner cultivated, 12 per cent (0.63 m.) are cultivated by owner-cum-tenant and 19 per cent (0.95m.), by tenants. Whereas in the Punjab, out of a total number of 2.96 m. farms, 2.05 m. (69 per cent) are owner operated, 0.46 m. (16 per cent) operated by owner-cum-tenant and 0.44 (15 per cent) are cultivated by tenants (ibid. 1993::xlvii). The c**ropping intensity** in the country is estimated at about 137 per cent and, in the Punjab 141, at per cent (GOVT. OF PAKISTAN 1993: Vol. I:xlvi).

Although its share in Pakistan´s GDP has continued to decline from 53 per cent, in 1950, to 25 per cent, in 1990 (EAN 1990:38), agriculture continues to be the most important sector of the country´s economy. Currently, it provides **employment** to 54 per cent of the total labor force, whereas another 16 per cent of the rural population is dependent on agriculture-related activities. The bulk of export earnings, about 56 per cent of the total exports (ibid. 1990:38) is saved through the export of agricultural commodities or products. The agricultural sector, in 1989/90, was responsible for approximately 20 per cent of the exports, and indirect agricultural products accounted for a further 38 per cent (EIU 1992:24). Most of the manufacturing done in the country is, in one way or another, linked to agriculture (BADRUDDIN 1990:1). The agricultural production in the country has a lower rate than the increase in the **population rate**, which caused the country´s economy to be dominated by the import of food commodities resulting in economic and political dependence (KUHNEN 1989:510).

The introduction of high yielding varieties by 1970, the period of „**the Green Revolution**“, along with more effective crop production technologies and expansion in irrigated areas contributed an enormous increase in agricultural production. The results of the Green Revolution have, however, not always been appreciated, as KUHNEN is of the opinion that the Green Revolution has not launched an actual development of agriculture but only raised production to a higher level (1989:513). Moreover, it has intensified the dependence of developing countries on industrial countries for the acquisition of new necessary inputs such as hybrid seeds, chemical fertilizer, insecticides and pesticides (DAG HAMMARSKJÖLD REPORT 1975:19). During and after the 1960´s, the massive

[38]According to the EIU, the agricultural sector was contributing about twice its 1991/92 share in 1959/60 (1992:24).

exploitation of **ground and surface water** was the most significant factor which also contributed towards increasing the agricultural production (BADRUDDIN 1990:1-3). The existing landholding patterns in the country are not considered favorable for improved yields. At the time of Independence, less than 1 per cent of the farms accounted for more than 25 per cent of agricultural land. Despite the land reforms of General Ayub and Mr Bhutto, land fragmentation, tenancy and share cropping remain problems. The agricultural census of 1980 reported that the farms of less than 1 ha. constituted 20 per cent of the total farms and covered 3 per cent of the total farm area, whereas the scale farms above 60 ha. constituted 0.3 per cent of the total, but shared 8 per cent of the farm area (EIU 1992:24). A change in a time period of one decade led the situation to become more unfavorable; in 1990, the farms of less than 1 ha. constituted 13.59 per cent of the total number of farms and covered 2.66 per cent of the total farm area. On the other hand, farms of 60 ha. and above constituted 0.31 per cent of the total farms but shared 10.13 per cent of the total farm area (GOVT. OF PAKISTAN 1992:2). Since 1971/72, the agricultural production has been growing at a rate of about 3.3 per cent per annum. More recently, since 1983/84, it has increased to 5.7 per cent per annum (EAN 1990:5).

Each year, the **Indus irrigation system** supplies water, definitely with a varying quality, to approximately 34.5 million acres, which amounts approximately to 89 per cent of the total cultivated area. More than 139 MAF (million acre foot) of irrigation water (BANDARAGODA & SAEED-UR-REHMAN 1995:2) are distributed through 3 major storage reservoirs, 19 barrages, 12 link canals and 43 canal commands to deliver water to about 107,177 watercourses (NESPAK & PCI 1990 Vol.1:4-1), which are mainly responsible for the optimal land utilization and good cropping intensity (BHATTI 1984:41). The system is so massive that, when major irrigation canals in the country are placed end-to-end, it could stretch around the world more than four times (IIMI 1992:16). The part of the Indus Basin occupied by the Punjab is irrigated mainly by canal network, whereas the tubewells, the open wells and rains also contribute substantial amounts of additional water (BHATTI 1984:41). There exists no prescription of the provincial shares in surface water; therefore, the distribution of available water is being regulated on an ad-hoc basis, confirming the historic patterns (BADRUDDIN 1990:8).

It is estimated that **four-fifths of cropping depends on irrigation** and that the increase in cultivated land by more than one-third since 1947 has largely been due to improvement in irrigation. It is, however, still believed to be a considerable potential for the extension of **irrigated agriculture** by improving the management of the irrigation system, which is regarded as being geared to extensive rather than intensive farming. The total water availability in 1991/92 was estimated at about 122.1 MAF, surface water contributing approximately two-thirds and ground water one-third (EIU 1992:25).

For **irrigation** purposes, both surface and ground water sources, with a changing share over time, are being extensively used. The total supply of irrigation water at farm gate increased by about 112 per cent from 63.87 MAF in 1965/66 (EAN 1990:41) to 176.02 MAF in 1990/91 (GOVT. OF PAKISTAN 1991:166), representing an average rate of increase of about 4.5 per cent per annum. This increase in water supply expanded the area

under irrigated cultivation from 11.48 million ha. in 1965/66 (GOVT. OF PAKISTAN 1987:45, Tab 3.17) to 20.23 million ha. in 1990/91(GOVT. OF PAKISTAN 1991:163, Tab 4.13).

Table 1: Land Classification and Irrigated Agriculture in Pakistan

Type of Irrigation	Area (mha)	% age
Canal Irrigation		
– Perennial	8.19	10.3
– Non-Perennial	5.80	7.3
– Culturable waste inside CCA	-2.25	-2.9
Wells, streams. karezes, etc.	5.22	6.6
Sailaba (Riverain)	1.25	1.6
Saliaba (Torrent)	0.97	1.2
Barani (Rainfed)	4.15	5.2
Total Cultivable Area	**23.33**	**29.3**
Other Land Uses		
– Range Lands	8.62	10.9
– Forests	3.44	4.3
Total Suitable for Agriculture & Forestry	35.39	44.5
Total Unsuitable for Agriculture & Forestry	44.22	55.5
Total Area of Pakistan	**79.61**	**100**

Notes: mha = million hectare

Source: AHMED 1994:192

In spite of the massive increase in the supply of irrigation water, the system failed to provide the expected results, due mainly to the inefficient and inflexible conveyance and distribution patterns. It is now widely believed that Pakistan is suffering substantial losses in the conveyance process, both at main and farm levels. The overall losses were estimated to be about 40 per cent, which, in the past especially, proved a major bottleneck affecting irrigated agriculture adversely. It is estimated that improvements in management together with some fairly modest physical improvements can save a substantial amount of water which may irrigate over 13 milliom ha. of land; this is equivalent to the water available from three Tarbela dams[39] (CHAMBERS 1988:26, BOTTRALL 1981:24).

The loss of the precious resource - irrigation water - is not only causing a hindrance in increasing production potential but has also caused the problem of **waterlogging**. The considerable static and dynamic water losses combined with imbalanced field applications have caused the ground waterlevel to rise constantly. The absence of efficient drainage

[39]Tarbela dam is one of the two largest water reservoirs in Pakistan. It is the largest rockfill type dam in the world.

infrastructure has intensified the problem of waterlogging to a considerable degree. According to MANIG & KUHNEN, about 35 per cent of the Culturable Command Area in the Indus Basin is reckoned as disaster area (1986:31). The imbalanced irrigation practices at field level have also caused an imbalance between salt input and output, which is resulting in a drastic increase in the salt contents of the land. The agricultural system is adding about 16 million tons of salt per year, whereas only a part of it is leached. The **waterlogging and salinity** have affected about 11 million acres of irrigable land to different degrees in the country. The efforts made by the irrigation system to increase agricultural production are being seriously affected by the waterlogging and salinity problems, as the **productivity** of large areas has been either destroyed or significantly reduced (MERREY 1986-b:26). Although the problems of waterlogging and salinity can be partially attributed to the farmers´ behavior of imbalanced irrigation, their behavior is basically shaped by the uncertainties and inequalities found in irrigation system management. It is widely believed that waterlogging and most forms of salinity are a direct outcome of inadequate water management and poor drainage (CARRUTHERS 1986:266). Therefore, a sustainable solution through drainage facilities and proper irrigation management has become increasingly desperate, as the goal of high yields cannot otherwise be achieved. A high underground water table is affecting the rooting patterns of the crops, resulting in a decrease in yields (ibid. 1986:270).

Some efforts such as the **SCARP program and drainage** construction have been made; they had some impact in controlling waterlogging and salinity. However, these efforts have proven so costly that their continuation is being seriously questioned (MERREY 1986-a:14). For the construction, operation and maintenance of SCARP tubewells and drains, the non-involvement of water users is making these efforts costly as well as inefficient. As in the management of irrigation water, the active participation of the water users in efforts to fight against waterlogging and salinity is a need of the day.

3.2 Aspects of Irrigation Water Management

As stated earlier, no social activity, hence, nor participation as well, takes place in a social vacuum, rather it is influenced by the structural and functional patterns of the social system in which it is exercised (ESMAN & UPHOFF 1984:71). In the case of irrigation, it is determined by the **objectives and goals** of different actors who evolve, erect, manage, maintain, operate and benefit from a particular irrigation system. It means that the social, political, economic and physical determinants of a system, shape the possibilities and extent of participation of the different people concerned.

Pakistan´s irrigation system is **about five centuries old** (MICHEL 1967:51, HOFFMANN et al. 1990:6) and managed by different managers with their own particular objectives and goals. Certain of these managers´ objectives have not only shaped the physical infrastructure of the system but also framed the institutional structure, which, in turn, has affected the extent and degree of participation of different beneficiaries. It is a well admitted fact that the major part of today's irrigation drama in Pakistan was played during **British rule,** and the existing network (both physical and institutional) is a continuation of

the process the British started in the nineteenth century (WOLF 1986:1, BANDARAGODA & BADRUDDIN 1992:3). It is also true that farmers´ participation in the management of irrigation water had never been a component of the policies which the British envisaged for the development of irrigation in the area. Although the **apparent motives** of the British were to improve the production capacity of newly annexed lands, to settle the Sikh army veterans (who were considered a possible political threat), and to fight against drought and famine (MICHEL 1967:65-71, UPHOFF et al. 1991:95, MERREY 1983:129f), the **underlying objective** of all these motives was to maximize their profit by a speedy return of their investments, which they made for the development of irrigation system, in the form of revenue (PAUSTIAN 1930:29-32, 65, 123, BARRIER 1966:356, MALIK 1963:78-79, MERREY 1983:130). In accordance with their desire, the system was deliberately designed to serve the maximum possible area (about 140 hectares per cubic meter/second or 0.21 liters of water per second/hectare) by applying a minimum of managing staff (WOLF 1986:1, MERREY 1986:14). The system was basically developed for a cropping intensity of 70-80 percent (BERGER 1986:89f, FREEMAN 1989:67f). Apart from technical limitations, the British were of the opinion that a flexible system of water distribution would lead to uncontrollable abuses. This was basically assumed on their hypothesis that the recruitment of local, competent, and responsible people would be difficult (MERREY 1983:134), which also corresponded to their objective of optimal benefits without coping with the problems at the local level. This negligence proved a great setback for the management of irrigation water at the field level and made it **a ´no man´s land´** (CHAMBERS 1980:29, SAGARDOY et al. 1986:42). As the true successor of the British, the Irrigation Department (ID) maintained the status quo by effecting a major remodeling at the main system level, whereas management at the local level is still operated according to the principles established by the British (MERREY 1986:14). The technical side was overemphasized while the social factors were neglected, as the situation following World War II in Southeast Asian countries has been described by KALSHOVEN (1989-a:2-3). The building of new irrigation systems and/or the rehabilitation of already existing systems was so predominant that KALSHOVEN has termed it a period of design and construction (1989-a:3).

The farmers were expected to build and maintain their watercourses and settle disputes among themselves, by themselves. This led them to depend on their **conventional cultural traditions** to resolve their mutual disputes over water management as well as for the production of crops (MERREY 1983:135). As a result, Pakistan´s agricultural productivity, despite the favorable climate, fertile land, hard working farmers and possession of the world´s largest integrated irrigation system, is very low by world standards. Many macro and micro level studies conducted in Pakistan have concluded that the mismanagement of irrigation water in the main system, generally, and at the local level, particularly, is the main cause of low production as compared to its potential[40].

According to the conventional approach, the physical infrastructure of the main system is designed to deliver water to the heads of the command areas with no organization or

[40]For details, see MERREY (1986:14) and references cited there.

infrastructure below the *mogha* (MERREY 1983:134). **The gap between the farmer and the central bureaucracy is wide and unfilled by any appropriate viable entity** (MERREY 1983:135). The farmers at the local level are generally so poorly served by extension and other agricultural agencies that they do not fully understand the methods of an optimal water application (MERREY 1983:134, FREEMAN & LOWDERMILK 1985:97, LOWDERMILK et al. 1978 Vol. II:129). Such a great emphasis has been put on information and knowledge of the agronomic factors that the hydraulic side has been neglected. The poor and inadequate supplies combined with misunderstandings about the concept of **balanced irrigation** has made the situation worse. At the local level, the farmers face the worst of both worlds: they receive inadequate quantities of water because political pressures have historically spread available supplies thinly over wide command areas, and they face rigid systems of distribution (FREEMAN & LOWDERMILK 1985:97).

The **timing and quantity** of water supplied, according to the rules of water distribution set by the ID, are relatively fixed and cannot be influenced by water users (CHAMBERS 1988:92f, BANDARAGODA & BADRUDDIN 1992:1, LOWDERMILK et al. 1978 Vol. II:121). As a result, they attempt to match their cropping pattern according to the supply of water. In this exercise, they tend to stretch water at peak times and often underirrigate, whereas they overirrigate the fields when water is available in excess of their demands (LOWDERMILK et al. 1978 Vol. I:11). Overirrigation is actually an attempt of store extra water in the root zone. This overirrigation and underirrigation are considered to be one of the main causes of waterlogging and salinity in Pakistan. To simplify, overirrigation contributes to waterlogging by raising the underground water table; underirrigation contributes to salinization by causing an upward movement of salts in the soils, through capillary action and evaporation, and by failing to leach salts downward below the root zone (ibid. 1978 Vol. II:56).

The problem of **waterlogging and salinity** dates back to the first large canal construction by the British in the mid 19th century. Even after identification of the problem at an earlier stage through proper research, the British never seriously addressed the issue. They stressed the expansion of the system by constructing of new canal colonies instead of making any major efforts to solve these problems (MERREY 1986:14, LOWDERMILK et al. 1978 Vol. II:56f). Following Independence in 1947, Pakistan inherited this problem along with other problems of water acquisition. Every year, huge areas were going out of production due to waterlogging and salinity. As a result, the per acre productivity remained low as compared to its demonstrable potential and to other countries with similar conditions[41].

This progressively degrading situation led donor agencies, such as the World Bank, The Asian Development Bank, USAID and many others to make massive investments to improve the main as well as the local systems of irrigation management. To fight against the problems of waterlogging and salinity, within the framework of the SCARP (the Salinity Control and Reclamation) Program, tubewells were installed to rehabilitate

[41]For details, see LOWDERMILK et al. 1978 Vol. II:56ff.

severely affected areas. In addition to continuing SCARP programs and constructing new canals, the donors have recently invested large amounts in watercourse improvement programs, rehabilitation of major canals, in the On-Farm Water Management (OFWM) Project[42] and the Command Water Management Project (CWMP)[43] (JOHNSON III 1986:183f, NOBE & SAMPATH 1986:7-8, MERREY 1986:14).

3.2.1 Institutional Framework

Until 1970´s, the local level management of irrigation water at the local level remained the domain of water users without any assistance from the ID regarding organizational aspects. This content on the part of the ID, particularly, and other agricultural development agencies, generally, was based on the **misconceptions about water losses in the main system as well as at the watercourse level.** They were of the opinion that losses from the watercourses were only 10-20 percent (KEMPER et al. 1980:3, KANGO 981:125). This loss was assumed to be minimal and was thought to be caused mainly by evapotranspiration. A connection between the rise of the underground water table and the loss of water was not seriously considered. In the case of watercourses, particularly, it was assumed that they transport most of the water they received to the root zones of the crops (MERREY 1986:26). The national agencies did not consider the losses to be very drastic, since, according to their measurements, they did not amount to more than 30 per cent (ibid. 1986:27).

In the early 1970´s, a research team from the **Colorado State University** (CSU), USA, in cooperation with the **Mona Reclamation Experimental (MRE) Project,** began to explore the causes of water losses in Pakistan´s irrigation system. They started by measuring watercourses and field application efficiencies. The results of their results showed a substantially greater loss of water than was previously assumed. According to these results, about 60 per cent - often substantially less[44]- of the water entering the watercourses reaches the fields (ibid. 1986:27). The inadequate knowledge about **plant-soil-water relationship** along with unleveled fields reduces the efficiency even further. The CSU and MREP concluded that Pakistan´s overall irrigation system is operating with a conveyance efficiency[45] of less than 30 per cent, which means that less than 30 per cent of the water is reaching the root zones of crops (ibid. 1986:27).

[42]The details about the OFWM Project have been discussed by PAINTER et al. (1982).
[43]For a detailed description of the CWMP, see FAIRCHILD & NOBE 1986:358 ff and PARC & FAO 1981.
[44]According to LOWDERMILK et al. the conveyance efficiency of forty sample watercourses ranges from 35 to 67 percent (1978 Vol. I:4).
[45]Conveyance efficiencies are defined by LOWDERMILK et al. as the proportion of water passing through the canal outlet which actually reaches the farmer´s field outlet (1978 Vol. I:4).

Table 2: Water Losses in Watercourses Measured by Different Studies

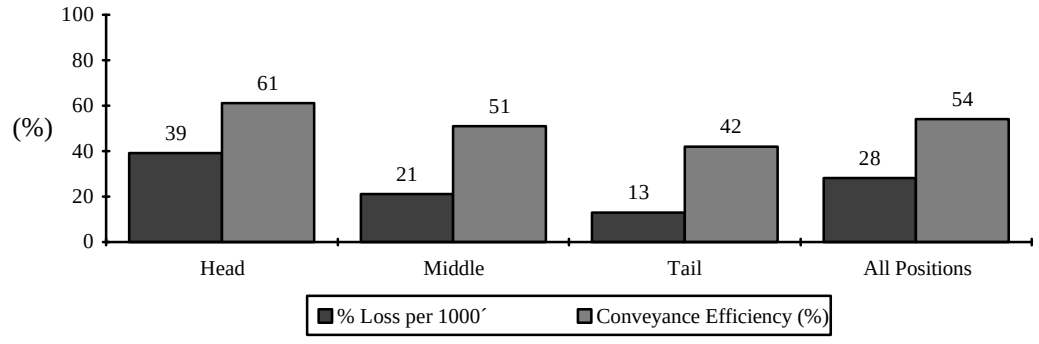
Investigation	% Losses Reported
Kennedy	28.6
Benton	28.3
Blench	10.0
Hunting Macdonald	13.9
Irrigation Research Institute	15.0
Expert Committee on Water Losses	15.0
Colorado State University (CSU)	47.0
CSU/WAPDA (40 sample watercourses)	45.0
Recent Studies*	40 to 50

*. Include farmers´ channel.

Source: Adapted from AHMED 1994:199

Such a great difference in losses was unbelievable for Pakistani irrigation bureaucracy. They refused to acknowledge the results by raising questions about the measurement methods and non-representation of the watercourses studied which may suffice for generalizations at the national level (KEMPER et al. 1980:8). Hence, a study covering forty watercourses from all four provinces of the country was conducted. The results of this study were not different from the previous one (KEMPER et al. 1980:10, ASHRAF 1981:70-71). The results obtained are summarized in Diagram 1.

Diagram 1: Conveyance Efficiency and Loss per 1000 Feet at different Positions on Watercourse



Source: LOWDERMILK et al. 1978 Vol. III:111.

These findings led to the development of pilot projects designed to improve the efficiency of water use and delivery at all levels of the irrigation system. The main target of the

projects was to improve the system efficiency by controlling water losses. For the first time in the history of Pakistan, **the involvement of farmers** was made a key component of these projects. Through these projects, an attempt was planned to induce local water users to participate in the reconstruction and maintenance of their watercourses (FAIRCHILD 1981:51, BADRUDDIN 1981:66, KANGO 1981:127f, REUSS et al. 1979:418). Through these projects, a planned research has begun to focus on local level water management; it has duly recognized the importance of farmers´ participation in water management at the local level (MERREY 1986:27). In the light of recommendations made by these studies, the formation of **local level water users´ association s** is being nationwide experimented (FAIRCHILD 1981:51).

The history of irrigation administration in the Philippines is similar to that of Pakistan, as the responsibility of irrigation management was assumed by several state organs before the creation of the National Irrigation Administration (NIA), which was put incharge of the construction, operation and maintenance of the national irrigation systems (TAPAY 1989:18).

3.2.1.1 The Mona Reclamation Experimental Project

In continuation to the development of pilot projects for ´**on-farm water management**´ and research, the Mona Reclamation Experimental (MRE) Project was initiated in 1965 (ASHRAF 1981:68) (referred hereafter as Mona project). The **main objectives** of the Mona project was to conduct field level research regarding the problems of irrigated agriculture in SCARP areas to reduce waterlogging and salinity on the one hand, and to improve the water use efficiencies at watercourse level, on the other (ibid. 1981:68-69). The studies conducted there provided the base for the present On-Farm Water Management programs all over the country. For the first time in Pakistan, the Mona project started a planned research on the problems of water management at the local level. The need and importance of local farmers´ organizations, as a result of this research, was largely acknowledged. The initial experiments concerning **Water Users´ Associations** (WUAs) in Pakistan were undertaken in the Mona project area, and the rehabilitation activities along with the formation of the WUA at the watercourse studied for this thesis was the very first experiment, which, afterwards, was replicated in other areas of the country (MERREY 1983:676). Along with research activities, the development of appropriate technology for the optimum use of land and water resources is also part and parcel of the project´s activities (ASHRAF 1981:69).

The Mona project is located at about 50 km. north-east of Sargodha District, to the north of the central part of *Chaj doab*. It covers about 177,000 acres in the SCARP II area (ibid. 1981:68). The **main identity** of this project, in comparison to other research stations in the country, is that its research program concentrates more on farmers´ fields than on Government-owned farms. It emphasizes **farmers´ participation and cooperation** for their own development. This emphasis was basically adopted in the light of past experiences, when heavy investments for technical development proved insufficient as the key to their success, i.e., the local level organization was not dealt with (REUSS et al.

1979:415). In line with this realization, special consideration was given to the social aspects of local communities in a nationwide irrigation research project, when the On-Farm Water Management (OFWM) Research Project funded by the United States Agency for International Development (USAID) was launched in the 1970´s. The Colorado State University (CSU) acting as a contractor to this project made a substantial **sociological contribution**. There is no doubt that it required a reasonable dialogue and argumentation for some period of time to convince the Irrigation Department officials (the engineers). The main areas covered by social scientists during this pilot project range from caste, *biraderi*, factions, farmers´ collaboration and conflict to the scope of their participation and organization for the management of irrigation water. As a result of the CSU & Mona project research, along with other recommendations to the Government of Pakistan, the need for **a formal grass-root level farmers´ organization** for the improvement of water management at watercourse level was strongly underlined (LOWDERMILK et al. 1978 Vol. I:72). Due to this approach, basically, the project has established a great deal of credibility with the farming community (ASHRAF 1981:68).

The Mona project is also imparting **extension services** to farmers in the area through a team of Field Assistants, backed by senior extension scientists. The field assistants have a basic education equivalent to the tenth or twelth grade, with two years of extension training (BOWERS et al. 1977:18). They impart basic knowledge to the farmers and advise them about the field level irrigation practices. They also impart to the farmers the new research results about water applications, based usually on the findings of the Mona scientists. They are basically a medium of two-way information between the farmers and the Mona project. Along with arranging meetings between farmers and the Mona officials, it is also their duty to manage the stock of new **agricultural implements** provided by the project. Last but not least, they assist the farmers in managing the labor force and maintaining the quality of improvement works during the rehabilitation of watercourses by the Mona project (ibid. 1977:18). Although the activities ´**to be**´ performed by the extension staff look very promising, due to poor follow up and application of these tasks at field level, the Mona project Field Assistants, like other extension services in the country, could not achieve the desired results. Although they live in the villages, they are not performing their duties actively. The Field Assistants are usually busy managing the agricultural implements provided by the Mona project, and a lot of their duty-time is wasted in commuting between the Mona project office and their place of work. The level of **extension knowledge and training** is not up to mark. Due to their official engagements, they are unable to impart whatever knowledge they have.

Along with the above-mentioned activities, the Mona project is assisting the farmers in the area in adopting new agricultural technology. To introduce and to train them, the project is providing modern agricultural implements on an experimental basis to farmers in the project area. This facility is being provided without any service and/or rent charges.

3.2.1.2 The Irrigation Department

The irrigation systems do not evolve automatically, but are either evolved by the indigenous water users or are built by the state. Whatever the case may be, the **objectives**[46] **and orientation** of early managers have long-lasting impacts on the infrastructure as well as on the institutional structure developed. When the irrigation systems have been developed by the native water users, the extent and intensity of their participation is likely to be more extensive and elaborated. On the other side, the role of the state is dominating if it has built the major irrigation schemes. In case an irrigation system is evolved by a colonial government or entirely with the help of foreign donors, the role of the state becomes more dominating (UPHOFF et al. 1991:95). When an irrigation system is developed over time by a local community, both **the technology and the organization** evolve simultaneously. However, when engineers design and construct large-scale irrigation systems, there is a tendency to concentrate on the civil works and to assume that, at least at the local level, whatever organization is required will evolve by itself[47]. This assumption certainly coincides with the developmental process of the irrigation network in Pakistan.

How the objectives of the British and afterwards of the Irrigation Department (ID) of Pakistan shaped the relevant institutional structure, is dealt with hereunder. Basically, the **institutional arrangements** developed by the British were to serve two fundamental premises:

- the limited water supplies should be applied thinly over wide areas and must be managed by the minimum possible administrative staff,
- there should be a minimal control of the water supply by local farmers (LOWDERMILK et al. 1978 Vol. II:121).

To accomplish these tasks, **the British never established an independent and autonomous irrigation administration**. Right from the first arrangements for the management of irrigation water to their departure from the Sub-continent, the irrigation department remained a sub-division of different ministries or departments. At first, the Public Works Department (PWD), along with other tasks, was made responsible for the management of irrigation water in the area. As a result of some administrative adjustments, PWD was split into three sub-branches, and the management of irrigation water became the sole responsibility of the Civil Works Branch. This made the management of irrigation an activity concentrating mainly on design and structure (BOTTRALL 1981:76f). After the creation of the Public Health circle, in 1928, the responsibility of irrigation management activities was handed over to it. This institutional structure managed irrigation water in the Punjab until after partition (MICHEL 1967:60f).

[46]To maximize the production is not always the dominating motive of the evolvers of an irrigation system; sometimes it is to deal with land tenure and overpopulation (as in the case of Sri Lanka) and sometimes it is to fight against drought and famine (as in parts of India and Pakistan during the colonial time) (UPHOFF et al. 1991:95).
[47]Cf. MERREY 1987:1.

The **geographically and demographically disputed partition** of the Sub-continent between Pakistan and India gave birth to many problems and disputes regarding the division of the irrigation water and the hydraulic facilities (TRAXLER & RUTTAN 1986:73), along with many others. The portion of the system awarded[48] to Pakistan was delivering an annual supply of 7.82 million ha. meter of water with a command area of 11.34 million ha., out of which 7.89 million ha. were producing food grains under artificial irrigation. Although Pakistan received a lion´s share[49] of irrigation water and irrigated command area, the water supply itself was not secure, as all the six tributary rivers of the Indus have their origins in India. Moreover, India possessed the diversion facilities of the only existing two headworks in the Indus Basin (MICHEL 1967:189), and was in a position to stop the supply of water to Pakistani canals. India confirmed this by stopping the water supply in April 1948, just eight months after the partition (FAIRLEY 1975:39).

This critical situation made it necessary for Pakistan to concentrate more and more on the irrigation issues. By 1955, the Department of Irrigation, Communications and Works was established to deal the matter exclusively (MICHEL 1967:343). Just after its establishment, instead of strengthening the department to meet the prevailing challenges adequately, it became a play-ball in the game of authority between the Central and the Provincial bureaucracies. Its authority was circumscribed first by the Provincial departments of Finance, Planning and Development, and the second blow which reduced its authority was a combined effort of the Central Ministries of Finance, of Fuel, Power and Natural Resources, and the Central Planning Commission. Another shock appeared in the form of the Soil Reclamation Board, established in 1957, which, being theoretically a subdivision of the Department of Irrigation, practically deviated from obeying the instructions. The establishment of the **Water and Power Development Authority (WAPDA)** in Pakistan, in 1958, proved to be the strongest blow the Irrigation Department (ID) ever received. What was left with the Department of Irrigation has been adequately described by MICHEL: „The Department was shorn of its surface and ground water development function in the Indus Plains. It was left with canal operations and maintenance, assessment of water rates, enforcement of irrigation ordinances, irrigation and hydrological research, various aspects of flood control and a few small projects outside the Indus Plains“ (1967:344).

After the introduction of the **Basic Democracies System**, in 1959, in Pakistan (at that time West Pakistan), there occurred **a modification in the administrative power structure** which also affected irrigation management. As a result of an administrative reshuffling, in 1962, the Department was reorganized into the secretariats of Communications, of Works Department and of Irrigation and Power, coordinated under the Minister of Food, Agriculture, Irrigation and Power. The most remarkable change made in that respect was a return to the traditional practice, i.e., the head of the Department was to be an engineer instead of a civil servant (ibid. 1967:344). This made the Irrigation Department a purely

[48]The boundary line between today´s Pakistan and India was drawn by the Boundary Commission which became famous as ´the Radcliff Award´. For details, see MICHEL 1967:192ff.

[49]At the time of partition, the Indus irrigation system was supplying an annual delivery of 8.82 million ha. meter of water to a command area of 13.72 million ha., where 9.55 million ha. were irrigated.

technical domain rather than a socio-technical one, which proved, along with other factors, a decisive setback, causing today´s problems of farmers´ participation.

Today, the **operation and maintenance of the irrigation system** is the basic responsibility of Provincial Irrigation Departments (PIDs). They are, however, partly helped by the Agriculture Department, WAPDA, the Agricultural Development Corporation and the Land and Water Development Board (FAO 1985:20). The starting point of PID´s activities is where water is diverted from the dams into canals and ends at the canal outlet, the *´mogha´*. The allocation and distribution of water in Malaysia is also similar to Pakistan´s where the main system is controlled by the central irrigation authorities, whereas the distribution and management of water at field level is the responsibility of the water users. This organizational structure resembles the **bureaucratic-communal model** of irrigation system (KALSHOVEN 1989-b:95). The process of management, maintenance and distribution of water is controlled by the PID alone, without sharing with any intermediary organization, which is in sharp contrast with other large gravity flow systems. A comparative example of the Punjab and California irrigation systems makes this contrast more widen, as the Punjab irrigates 8.32 million ha. through a single institutional entity, whereas California utilizes a decentralized network of 244 water districts to irrigate a relatively small area of 3.8 million ha. (DEPARTMENT OF WATER RESOURCES 1983:4). The **hierarchical administrative division** of provinces into Regions, Circles, Divisions, Districts, Tehsils, etc., established by the British, has been strictly observed up to now. All these divisions were made at that time mainly to facilitate the assessment and collection of land revenue, not for an efficient and equitable management of irrigation water.

3.2.1.3 Organizational Structure of the PID[50]

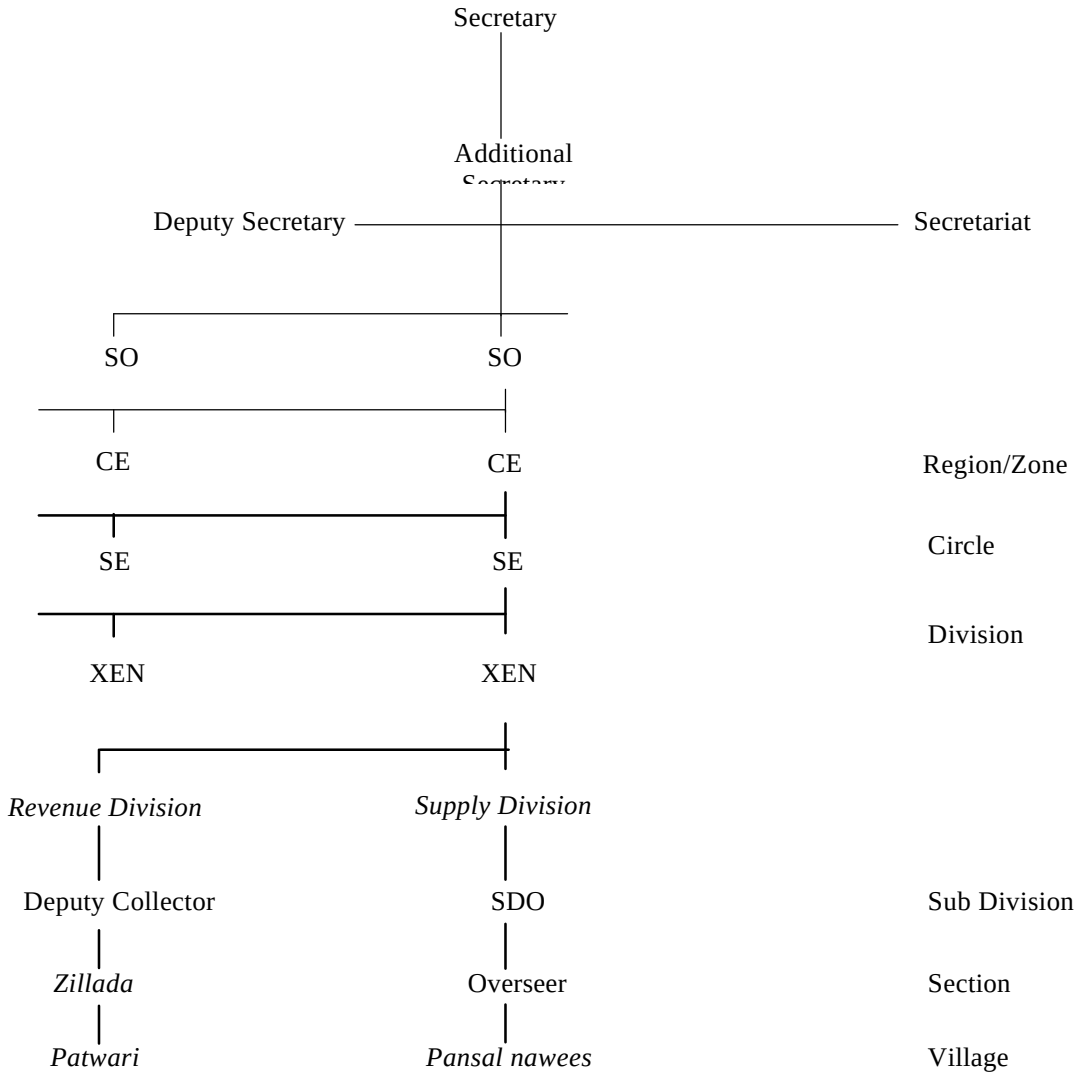
The Provincial Irrigation Department is the only organization which structures and controls the irrigation water from canal head to the *mogha* after receiving it from dams and reservoirs. For this purpose, the PID is equipped with a large team of professionals with a set of defined roles on a hierarchical basis. The activities at all functional levels are highly centralized, depicting a **´top-down´** organizational model. The physical features of the Philippine National Irrigation Systems (large scale) are similar to Pakistan´s, with the distinction that Pakistani farmers are served by ungated canal outlets, whereas the Philippine irrigation system profits from gated permanent turnouts (TAPAY 1989:18).

The topmost chair in a PID is occupied by a Secretary of the Provincial Government, assisted by an Additional Secretary and a secretariat. The regional or zonal head is addressed as Chief Engineer (CE), whose strength depends on the number of regions or zones in the department. To share the administrative burden of a large region or zone, a CE is usually supported by three to six Superintending Engineers (SE). Each SE with the help of supporting staff supervises an area administratively called a ´Circle´. To set the boundaries of an irrigation ´circle,´ topographical factors, instead of political, are taken into

[50]This section is based on the description of Pakistan´s irrigation system in WOLF (1986:4ff) and MICHEL (1967:383ff).

consideration (FOSS et al. 1970:27, LOWDERMILK et al. 1978 Vol. II:121). A circle is usually composed of numerous ´Divisions,´ ranging usually from three to five. The divisional level authority of the irrigation department is the Executive Engineer, whom farmers commonly remember as ´XEN.´ Hereafter, the irrigation department is divided into the Revenue and Supply branches. The head of the Supply branch, the Sub-Divisional Officer (SDO) and on the Revenue side, the Deputy Collector, are answerable to XEN. To maintain and operate the supply of water up to the ´*mogha*,´ a SDO is assisted by a Sub-Engineer (Overseer) at each ´Section´ of a canal which is usually about twenty miles long. To keep the records and to regulate the flow of water, a Gauge Reader (Pansal Nawis) is appointed at the head of a distributary (MERREY 1983:447), again under the SDO´s authority. The Deputy Collector, on the other hand, also has supportive staff both at section and village levels. The village level official of the Irrigation Revenue Department is the most famous and most notorious character of Pakistan´s agriculture: **the *Patwari***. All officials occupying posts above the division level are essentially administrative or supportive staff. The grass-root level activities are basically performed at the divisional level and below.

Diagram 2: Organizational Structure of Irrigation Department at Provincial Level



Notes: SO - Section Officer; CE - Chief Engineer; SE - Superintending Engineer; XEN - Executive Engineer; SDO - Sub-divisional Officer.
Source: Adapted from MICHEL 1967:388, WOLF 1986:5, UPHOFF et al. 1991:111.

The Irrigation Department, as most other services in Pakistan, is a **centralized system**; the decisions are made at top level; the implementation, however, is not made in an authoritarian style. For this purpose, the Irrigation Department is making use of so-called **extension services**, which motivate and „educate“ the water users to impliment government policies. Water users do not participate in the decision-making and policy formation. Thus, the Irrigation Department is utilizing a sub-type of centralized model (REUSS et al. 1979:416). The organizational pattern followed by the Pakistani Irrigation Department is strictly „top-down.“ The organizational model of the ID is similar to **the mechanical form or Weber´s bureaucratic model.** The main characteristics of this model can be summarized as: non-innovativeness; suitability for sizable and constant services; specialization, rationalization and routinization of work; minimum operational

costs; simple technology; medium quality services; insensitiveness to local needs and individual desires; rigidity in functions; validity for mass services and mass production.

The PIDs employ a relatively **large number of professionals** to accomplish their labor-intensive duties. The total strength of individuals performing their duties at various levels in the four PIDs, in 1983-84, was more than eighty thousand (see Table 3).

Table 3: Staffing Levels for Provincial Irrigation Departments

Position	Numbers of Staff			
	Punjab	Sind	NWFP	Baluchistan
Secretary	1	1	1	1
Chief Engineer	13	7	1	1
Sup. Engineer	47	26	7	10
Executive Engineer	145	87	20	17
Sub-divisional Officer	574	246	64	49
Sub-engineer	2,312	873	208	177
Sub-total:				
Officers	3,092	1,240	301	255
Other Staff	47,185	22,466	4,731	2,859
Total Staff:	50,277	23,706	5,032	3,114
Area (ha)/Employee	166	215	88	123

Source: WOLF (1986:6).

According to the figures shown in Table 3**, almost each watercourse could be served by one employee**. In other words, 88-215 hectares of irrigated land can be served by one employee, whereas, in other Asian countries, the ratio between the number of employees and irrigated land is 1:122-496 ha. (WOLF 1986:5). How large and enormous Pakistan´s irrigation fleet is, can be identified merely by comparing more than fifty thousand employees of the Punjab Irrigation Department with about seven and a half thousand employees of the United States Bureau of Reclamation. Of these more than fifty thousand employees, 40 percent is assigned to canal work, 26 percent to tube wells, 15 percent to the special revenue group, 6 percent to drainage, while 13 percent is entrusted administrative and other less labor-intensive activities.

In context of the present study, the point which needs to be duly emphasized is that, right from the provincial head to the Overseer or Sub-engineer, **all posts essentially require an engineering degree/diploma**. Most of the officials possess a degree in civil engineering, whereas a small number is specialized in mechanical and electrical fields of engineering. A degree in management, finance, or social sciences is not considered as a substitute for the engineering degree, therefore, anyone holding such a degree is not considered for any position of authority in the PID (ibid. 1986:5); this has caused the management of irrigation water to be assumed only by engineers. As a result of the engineer´s exclusive dominance, more emphasis is laid on physical work as compared to non-physical inputs. A

recent evaluation report of a leading irrigation project in Pakistan (On-Farm Water Management Project-II) has confirmed the above thesis by stating that **96 percent of the budget is alloted to the civil works and just 4 percent to the strengthening of Water Users´ Associations (WUAs) and other institutional arrangements** (NESPAK & PCI 1990:7-9, 10).

The on-farm water management is the responsibility of the **Department of Agriculture**. This organizational structure for the management of water, where the main activities at the system level are performed by the ID and those at the field level are managed by the Agriculture department, desires a high degree of coordination between the two, which, unluckily happens to be weak. The main reason of this weakness is due to their organization on a **different territorial basis**; the ID is organized on the basis of canal commands, whereas the Agriculture department observes the boundaries of civil administration. Moreover, there are four agencies responsible for the management of irrigated agriculture: canals, drainage, tube wells and agricultural extension. Each of them has a different boundary of jurisdiction (BOTTRALL 1981:77). The farmer, in his effort of combining all necessary inputs for crop production, is puzzled due to the overlapping and unclear responsibilities of these agencies. This confused organizational set-up of line-agencies has made the atmosphere unsuitable for the involvement of farmers in agricultural development programs. Different patterns of activities of these agencies, mainly written by their several objectives, have entangled the end-beneficiaries in a web of several push and pull forces. Such a stratified organizational structure which, according to BOTTRALL (1981:97), is an inheritance from the British colonial period, would create problems of motivation among the agency workers as well as among the farmers.

The ID, in comparison to Department of Agriculture, is enjoying more power, influence and prestige due to its creation before the Department of Agriculture, on the one hand, and due to its historical importance as a **revenue-generating department,** on the other hand (ibid. 1981:76). As a result, to serve in the ID is still ranked as being more prestigious than in the Agriculture Department.

3.2.1.4 Organizational and Legal Regulations

To perform the administrative duties, irrigation department officials are equipped with **jurisdictional and institutional powers**, not only to keep the system flowing but to make it more efficient. These regulations the govern maintenance of infrastructure, distribution of water, settlement of disputes and other farm level irrigation activities. The ID retains reasonable **residual power** delegated under the Canal and Drainage Act of 1873 (and subsequent amendments in 1974)[51], which is still the basic irrigation law today. There is, however, hardly any evidence about its exercise, except upon farmers´ request (MERREY 1983:134).

Some **examples of the delegated powers** to irrigation officials are as follows:

[51]Page numbers referred to hereunder follow the 1974 edition.

- The Divisional Canal Officer **may stop the supply of water to any watercourse** whenever and so long as any watercourse is not maintained in such proper customary repair as to prevent the wasteful escape of water therefrom (CANAL & DRAINAGE ACT 1974:21).
- No person can sell or sublet canal water (ibid. 1974:22).
- Applying water **outside the outlet area or command boundary** and taking water out of turn is illegal (ibid. 1974:28).
- The Sub-divisional Canal Officer (SDO) is **the officer responsible for inquiry** into any watercourse disputes regarding rights or liabilities associated with watercourse use, maintenance or construction. The SDO is empowered to issue orders: such orders may be appealed within fifteen days to the Divisional Canal Officer (ibid. 1974:47).
- When on tour, the *Zilladar* should **take steps by using his influence** with the Zamindars (farmers) to persuade them to put any watercourse in order which he finds to be in a bad state of repair. Should they refuse to do so, he should report the matter to the Sub-divisional Officer, who will warn the owners jointly in writing that if the repairs are not done within a given time, after personal inspection by himself or the Deputy Collector, the watercourse will be closed by the Divisional Officer under Rule Section 32, Act VIII of 1873 (ibid. 1974:115-116).
- Irrigation officers should **interfere as little as possible** in the internal distribution of water on watercourse when disputes arise. They should endeavor to persuade the parties to settle the matters by mutual agreement or, if a *´panchayat´* has been instituted in the village concerned, to refer the matter to that body (ibid. 1974:123).
- The **responsibilities of a *´numbardar´*** include: a) reporting any cases of concealment of irrigation water, b) reporting a breach or cut in government channel, and c) helping the canal staff to investigate water waste, cuts or breaches in the government channel (ibid. 1974:91-92).

In the same context, analyzing the **Canal and Drainage Act**, LOWDERMILK et al. state that: „In the same section of the Act, the *Zilladar* is admonished to try to get the farmers to settle such problems (of water theft, cleaning, etc.) amicably among themselves“ (1978 Vol. III:68).

The **regulations** regarding the maintenance, cleaning and up-keep of a watercourse have **never been enacted**, accept on the farmers´ request. The nonenforcement of these rules has led to a lack of respect for them. Up to now, the Irrigation Department Officials are abiding by the theory of non-interference at watercourse level. According to a World Bank report (WORLD BANK 1976 Vol. III:vi), it is estimated that, during the two year period of 1976-78, more than 0.6 million ha. meter of scarce water could have been saved, without any extra capital investment, merely by enforcing the Canal and Drainage Act of 1873.

A set of codes and regulations more than a century old has undergone only some minor changes, whereas other factors (such as farm size, cropping patterns, cropping intensity, tenure system, social structure of the village communities, etc.) concerning irrigation water have experienced a lot of changes (BANDARAGODA & BADRUDDIN 1992:xiii). According to LOWDERMILK et al. (1978 vol. I:60), the Canal and Drainage Act of 1873

is not only out of date but, is also causing constraints to farmers´ participation in the management of irrigation water. As a result, the rules are frequently evaded and ignored. Several micro-level studies[52] and the author´s personal observation of have witnessed a series of violations of the rules. Both ID officials and farmers do not abide by these rules. One could not find any example showing that the ID officials had persuaded the farmers to maintain and repair the watercourse (MERREY 1980:202), stopped the water supply due to poor maintenance, and ever influenced the farmers for the up-keep of the water channel, and so on. The **nonenforcement of rules and regulations**, along with corruption in water distribution, has caused a disrespect for irrigation authorities among the water users. The inability of the irrigation bureaucracy to enforce the acts has generated a widespread and complex system of **extralegal payments** which the water users and minor irrigation officials have mutually **institutionalized**. About 68 percent of the sample farmers studied by LOWDERMILK et al. admitted paying bribes to the *´Patwari,´ ´Pansal nawees,´* and Overseer. The bribes are paid both in cash and in terms of established ***´faslana´***(grains, etc., paid as bribe to officials at harvest) (LOWDERMILK 1990:167-168).

An overwhelming majority of water users, over 90 percent estimated by LOWDERMILK et al. (1978 Vol. I:71), is modifying the regulated *´warabandi´* system into a non regulated system. To achieve a better control of the water supply, they frequently trade, sell and steal the water. The use of water in command areas other than those allotted is common. The frequency of transactions, such as trading and selling, is very high in the caste and *´biraderi´* groups. The watercourse level associates hold the next position after caste and *´biraderi´* groups, as trustworthy partners for such transactions. The trading between caste and *´biraderi´* groups helps them to emerge in **a quasi-demand system** (ibid. 1978 Vol. II:36) which, due to changed and intensified cultivation patterns, is a demand of the day. This outdates the conventional wisdom according to which the trading of water, due to its scarcity and great demand, was not considered affordable for the water users (ibid. 1978 Vol. II:36). In the light of these informal arrangements, one can conclude that the fixed supply through a fixed *´warabandi´* system and fixed *´mogha´*, established to provide an equitable supply is **a serious flaw** (ibid. 1978 Vol. II:38). It is commonly reported that the farmers near the head open outlets onto their land during the others´ turn (MERREY 1987:5).

The rules and regulations established in 1873 have proved inflexible and very rigid for the prevailing situation and, hence, are **influencing farmers´ participation negatively**. Trading, stealing, buying and selling of water is an outcome of the rigidity and insensitivity of the ID rules to the prevailing situation which the farmers are trying to make flexible by adopting a series of non-authorized solutions. The ID remains insensitive to such issues, unless they are formally reported and adequately persuaded by the farmers (ibid. 1987:5). Their philosophy, goals and assumptions are least relevant to today's developmental needs (LOWDERMILK et al. 1978 Vol. I:65) and to farmers´ active participation as well. Considering the facts of „acute scarcity of resources, the inherited traditions of a

[52]Some of the studies reporting this problem are those of LOWDERMILK et al. 1978, MIRZA & QAZI 1992, MIRZA et al. 1975, MERREY 1986-a, 1986-b, 1983, 1980.

patrimonial-bureaucratic state and a wide educational and status gulf between officials and the mass of population, it is hardly surprising if a sizable gap between legality and practice persists“ (WADE 1982-b:288). A careful revision of the Act is necessary to make it favorable according to the actual needs of water users regarding the control and effective application of irrigation water. Moreover, some changes in the act to make it conducive to the farmers´ active participation at all possible levels of water management is also desirous.

The above-stated situation has been very well encapsulated by LOWDERMILK as: „No gravity irrigation system in the world operates strictly in conformance with the rules all the time, but Pakistan data shows that outdated rules and regulations are honored more in the breach than in actual practice“ (1990:163).

3.2.1.5 Functional Arrangements

The British engineers who built the irrigation system did not have enough practical knowledge of the matter, except a theoretical base. The main urge which motivated them was a ´**set of motives**´ (see section 3.1). Without modern construction facilities and experience of constructing canals and headworks, by trial and error (MERREY 1983:131), they developed a considerable portion of the irrigation infrastructure which is stillbeing used today[53].

The Pakistani irrigation system is making use of **reservoirs and barrages** to divert river flows into canals. The system irrigating the Indus Plains consists of three major storage reservoirs including the world´s two largest earth-fill dams, Tarbela and Mangla, that divert about 71 percent of the 18.46 million ha. meter of river water. The estimated average annual flow of the Indus river is almost twice that of the Nile and more than ten times that of the Colorado River (FOSS et al. 1970:3). The diverted 18.46 million ha. meter of water are transported by a network of canals, about 63,100 km. in length (WOLF 1986:2, LOWDERMILK et al. 1978 Vol. II:8). The system includes 19 barrages and headworks, 12 link canals and 43 canal commands (NESPAK & PCI 1990:4-1).

Table 4: Basic Facts about Irrigation Canals in Pakistan

Province	Total Length (km)	Discharge (cumecs)	Command Area (million ha.)
Punjab	36,481	4,288	8,321
Sind	21,192	3,544	5,101
NWFP	2,772	176	,446
Baluchistan	2,655	135	,384
Total	63,100	8,143	14,252

Source: WOLF 1986:2

These canals function basically in two ways: they are utilized on a perennial and non-perennial basis. **Perennial canals** supply water all the year round, except in December and

[53]Regarding the contribution of the British, see also BAUER 1987:66

January, when the demand for water is low and when the canals are closed for annual cleaning and repairs, whereas **non-perennial canals** function only in the summer season (GIBB, SIR ALEXANDER et al. 1966 Vol.10:108-110). These canals are designed to operate at full or near full capacity, supplying water to distributaries and watercourses on a continuous flow basis (MERREY 1980:202). The existing system of water distribution at canal and watercourse level is not conducive to farmers´ participation, because farmers cannot influence the distribution and allocation of water supply at either level. Such decisions about the distribution of water are made by the ID exclusively, without any involvement and consultation of farmers. The top-down approach in decision-making and its implementation is also a hindrance to farmers´ participation (REUSS et al. 1979:416).

The system was developed on a **supply rather than demand basis**, and cannot, therefore, be regulated according to demand. The demands made by water users according to their cropping patterns in different agricultural zones are not considered. These inflexible arrangements also limit and reduce the chances of water users´ participation. Considering the problems of supply-oriented distribution of irrigation water in Pakistan, many recommendations have been made to shift it from the traditional supply-oriented system to a demand-based one[54].

The Indus Basin irrigation system is, therefore, classified as ´**a continuous flow and fixed rotation**´ system (AHMAD 1991:3). The disilting, mainly, had been a historical problem in the river basins of the Indus, Nile, Mesopotamia, etc. Keeping this fact in mind, these canals are designed in such a way that „ the tendency to scour in the clear water periods (winter) offsets the tendency to silt in the summer when the river carries a heavy silt load.“ This design is termed as **stable or permanent regime** (MICHEL 1967:61).

These canals, along with distributaries, supply water to about 107,177 watercourses (NESPAK & PIC 1990 Vol.1:4-1) through concrete and brick outlets (moghas). The flow of water within watercourses is rotated to adjust to the inadequate rate and volume of flow to cause simultaneous irrigation from all the outlets (MERREY 1990:946). Each watercourse has a cultivated command area of about 60 to 242.9 ha with an average of about 161.9 ha (FREEMAN & SHINN 1989:66ff, LOWDERMILK et al. 1978 Vol. II:29), generally cultivated by 10 to 150 farmers. Here, a single outlet commands a relatively large area in comparison to other Asian countries, as 50-80 ha are being served by an outlet in Thailand and Malaysia, 20-30 ha. in Indonesia, 12-16 ha. in Sri Lanka, 10 ha. in the Philippines, 0,8 to 2 ha. in Korea, and about 0.4 ha. in Japan (WOLF 1986:2). There is **no absolute standard for the size of the command area and the number of water users**, as it is regulated by the hydrological features of the system. Sometimes, small-scale projects show better results in terms of better communication, cohesiveness, control over participants, etc., but are usually costly and unsuitable for more formal mechanisms which require a larger size and number. Large projects, on the other hand, are thought beneficial in terms of ´economies of scale´ and for infrastructural developments, for example. Regarding organizational and participative tasks, the smaller irrigation sytems are found to

[54]For a detailed description of the problem and its proposed solution, see BANARAGODA & BADRUDDIN 1992.

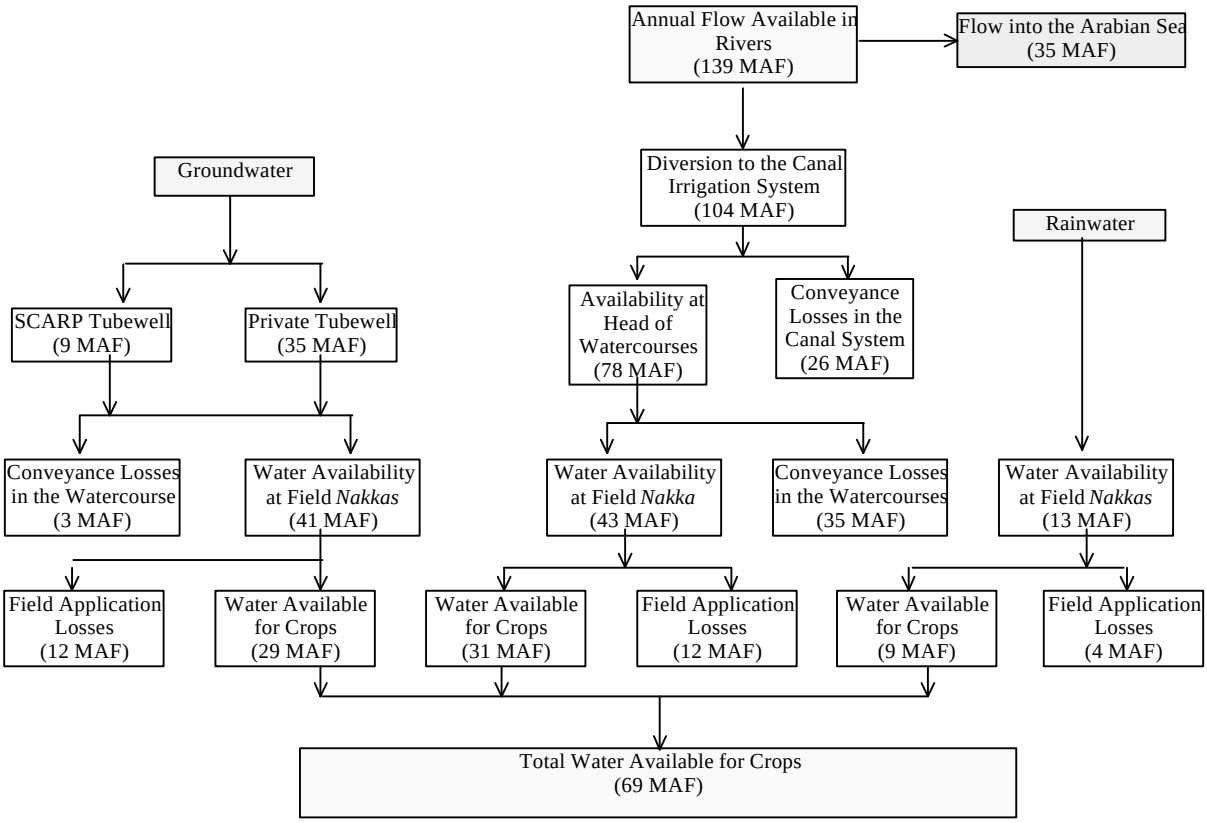
be more advantageous than larger ones (UPHOFF 1986:130). Anyhow, for socially stratified village communities, small sized irrigation systems yielded better results.

The estimated length of these watercourses plus field channels and field ditches amounts to about 1.6 million km. (NESPAK & PCI 1990:4-1, FAIRCHILD & NOBE 1986:361). At the watercourse command level, **water distribution** is regulated on the basis of a weekly rotation. Each farmer receives a share of water at a fixed time and day, according to the amount of land he owns. This share is estimated on the unit flow of water per hectare (AHMAD 1991:3). The widely practiced method of irrigation is the flooding of small basins, as recommended by the ID[55]. Time to irrigate the fields is allotted to the people, not to parcels of land (MERREY 1987:5), as the fragmentation of land on different reaches of the command area is not considered. The distribution of water at watercourse level is established according to set procedures laid down by the ID, and the actual problems at the site are not adequately dealt with. Moreover, the distribution of water is handled by civil engineers who are not trained or have little knowledge of agriculture and extension matters (BOTTRALL 1981:76) and, therefore, fail to address the field level problems of the water users. This ignorance or lack of knowledge on the part of irrigation managers has affected farmers´ participation negatively. All this makes it a rigid system, insensitive to farmers´ needs which, in turn, leaves little room for them to participate in decision-making procedures, especially, and in other activities, generally. According to BOTTRALL, the supervision and regular contact between officials and farmers in Pakistan are the weakest, this limits the farmers´ knowledge about several activities of the ID and, hence, affects farmers´ participation negatively (1981:212).

As a result of the above-mentioned organizational and institutional efforts, the system is presently diverting about 104 MAF of water into the Indus Basin (BANDARAGODA & SAEED-UR-REHMAN 1995:1) (see Diagram 4). Consequently, the area under plow has increased from 10.4 million ha., in 1960-61, to 20.8, in 1987-88 (NESPAK & PCI 1990 Vol.1:4-1). By far, the Indus Basin irrigation system is irrigating the largest single area on the earth´s face, i.e., about two thirds of all the cultivated land in Pakistan (FOSS et al. 1970:2).

[55]TREVASKIS (1931) cited by MERREY 1990:946.

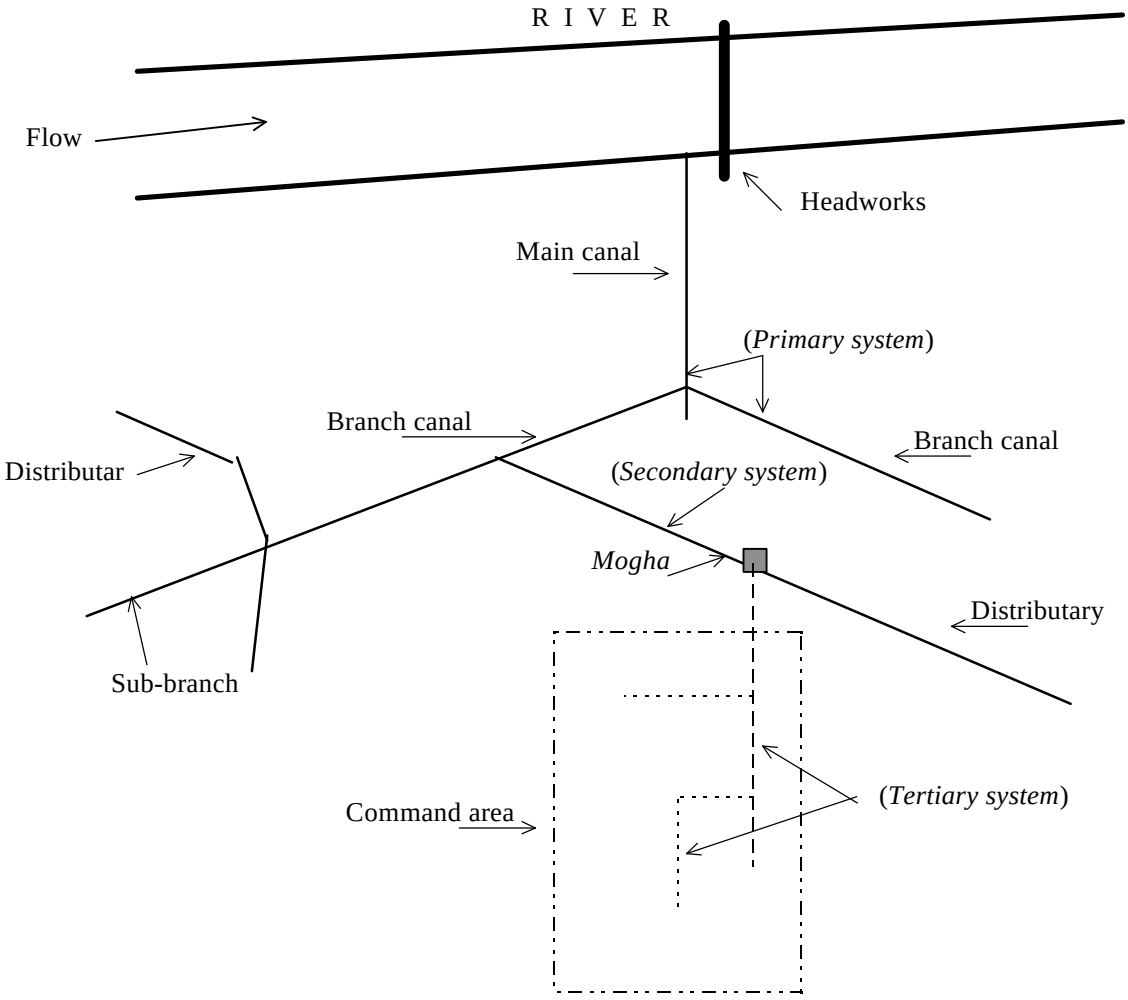
Diagram 3: Flow of Water in the Indus Basin Irrigation System per Year



Source: Adapted from BANDARAGODA & SAEED-UR-REHMAN 1995:2

The **last point**, at which the functional duties of Irrigation Department come to an end (practically not principally), is the canal outlet or *mogha*, as below this point the management of irrigation water is regarded as the farmers´ responsibility. The route and command area, however, are laid out by the Irrigation Department, but the O&M is the joint responsibility of farmers (MERREY 1986:28). As designed by the British, the water is still controlled either at the head of a canal or, to some extent, at the starting juncture of a distributary (ibid. 1983:133-34). At the main system level generally, and at watercourse level, particularly, there did not exist adequate physical structures to control, measure or monitor water. Every distributary and watercourse is allotted a specific amount of water, neither irrigation officials nor water users have the possibility to check the actual supply. Occasionally, field personnel checks the water flow by installing a measuring device, however, this is done very rarely (FREEMAN & SHINN 1989:91-92).

Diagram 4: Schematic Diagram of Canal System in Pakistan



References:

State managed, Farmers managed

Source: Adapted from AHMED & CHAUDHRY 1988:8.12

The canal outlet may be viewed as a **boundary-line** separating clearly the developed and underdeveloped features of Pakistans´ irrigation system. Above the *´mogha´*, there is a well elaborated and highly qualified team of experts to manage the system, whereas the area below the *mogha* has been technically as well as administratively neglected. This neglect and the policy of ´**non-interference**´ below the *´mogha´* are a „direct outgrowth of the tradition-laden philosophy of Irrigation Department and its lack of change in policies, codes and procedures since the system was established by the British“ (LOWDERMILK et al. 1978 Vol. II:80). Moreover, the Irrigation Department is ´faithfully´ abiding by the early policy of not allowing the local farmers to have control over water supplies.

Until the 1970´s, the organization of irrigation water **at all levels** in Pakistan has remained an engineer´s game, as, on the one hand, the irrigation system was considered and believed to be a purely technical (instead of socio-technical) one, on the other hand, the social

scientists (social anthropologists, sociologists, etc.) had pre-occupied themselves with the studies of caste, faction, social change, etc. Irrigation has long been treated as exogenous feature or part of the environment (CHAMBERS 1988:80).

The above details of institutional development reveal that all the decisions regarding planning, modeling, construction and operation and maintenance (O&M) were taken without involving the end-beneficiaries. The decisions are usually made far away from the actual field of battle and are extremely top-down in structure and follow up. Drastic changes are needed in the institutional, legal, allocative and distributive patterns of irrigation water. All of them affect participation negatively.

The **divergent nature of activities and interests** of the irrigation system managers is a reason of low performance and ineffectiveness of large-scale irrigation systems in Southeast Asia (TAPAY 1989:25). Similar reasons may also be causing effectiveness in the management of the irrigation system in Pakistan. The NIA in the Philippines, for example, value highly the payment of a fee for irrigation service, whereas farmers, on the other hand, value high yields above all else[56].

3.3 Sociopolitical Framework

The phenomenon of water management cannot be discussed usefully and meaningfully without placing it into **specific local socio-cultural contexts** (FREEMAN 1989:22). Water management being a socio-technical matter, is equally affected by the specific time, place and culture as it is influenced both by the institutional and physical arrangements. The cultural context becomes more important because it does not travel well and remains unique and site-specific (ibid. 1989:23). The contextual framework discussed so far is relatively of an observable and measurable nature. This should not lead to the misunderstanding that the **more abstract institutions of social and cultural factors** do not influence the participation and organization of water users. On the contrary, the socio-cultural factors play a basic role in shaping the water users´ orientation towards participation and organization (UPHOFF 1986:102).

The structure of an irrigation organization is strongly influenced by the surrounding social patterns of which this organization is a part (BOTTRALL 1981:72). In the course of the economic development of different countries such as the USA, Japan, France and England, different models of work organization were adopted which basically reflected the historical and social characteristics of these countries (ibid. 1981:72).

3.3.1 Socio-cultural Framework

The pivot of an irrigation system for agriculture is the farmer who manages the scarce resources of production in his field to produce foodgrain (FREEMAN 1990:112). Along with farm-oriented groups, farmers are members of various **village level social groups** which have a great influence on their day-to-day behavior. It is essential, therefore, to have a deep understanding of the patterns of social stratification/organization which influence

[56] ROBINSON (1982) quoted by TAPAY 1989:26.

their participatory interactions for the management of collective goods such as water, and ultimately, the watercourse. Moreover, the multifaceted concept of participation is not limited just to dealings with water, but it also covers the interaction of water users with the **physical and social environment** which controls the water (UPHOFF 1986:9). Thus, the watercourse, here, must be viewed as a social, economic and physical subsystem of the village social system. Farmers adopt many ways and techniques in the face of prevailing constraints to achieve maximum benefits in the form of optimal crop yields. A grass-root level knowledge of the patterns of cohesion and cleavage of water users is thus a prerequisite for understanding and evaluating their participation in the management of irrigation water.

The **ethnic, cultural and other social similarities** often contribute positively to participatory and cooperative activities. By providing a shared base for collective action, these factors can enhance the ability and willingness to participate in formally or informally organized activities. These factors can also lead to cleavage and conflict, when the groups of water users are stratified on the basis of ethnicity, culture, etc. These differences combined with differences in land tenure status and/or access to water can make the situation undesirable for participatory activities (ibid. 1986:102-103). The socio-cultural environment needs significant attention, because it influences the performance capability and motivation of water users in irrigation (HUPPERT 1989:83).

Pakistan´s rural society lacks social cohesion and had no strong local institutions of any kind (BOTTRALL 1981:209). The inter and intra cohesion and conflict of *´biraderi´* groups affects substantially the participation of water users in formally or informally organized activities related to the improvement, rehabilitation and O&M of the water channels. In stratified and factional societies, there is no identity that can be used as a weapon by one sub-group against another (ibid. 1981:217). A great majority of rural area dwellers in Pakistan have no experience to work with or under some formal organization. The formal organizations to which they are introduced are usually banks and the government, which, for them, are remote as well as somewhat mysterious (FAO 1982:22). A villager spends his life as part of a complex informal social organization, characterized by several complex interactions with many different people (ibid. 1982:22), following different norms, values and traditions.

Historically, the village community in Pakistan is **socially organized or stratified on the basis of caste groups, religious sects, political affiliations,** etc. The prevailing empirical studies on the rural population of Pakistan reveal that social groups at the village level are based mainly upon the inter-kin and inter-caste hostilities/linkages and not upon differences in land tenancy status, as they are interdependent in terms of the latter (MIRZA et al. 1975:9). The village level studies suggest that the traditional regulatory patterns of Punjabi rural life are **essentially regulated by three social factors**: a) caste system, b) *biraderi* network, and c) tenure status (ibid. 1975:6).

The basic social units such as **caste and *biraderi*** provide a basis for **social interactions** between the members of the respective social group, this leads to social cohesion in the group. The tightly structured social systems, based on the group´s internal cohesion are

expected to abide by the **social norms and traditions**. At the inter caste and ´*biraderi*´ level, such an internal cohesion of the groups may lead to the society being structured in a relatively loose form, where the individualistic behavior of the groups may dominate communal interests (HAYAMI & KIKUCHI 1981:21).

The basic criterion according to which the Punjabi rural population differentiates itself is the **caste system**. There exists a great deal of confusion in the use of the term ´caste.´ In general usage, the terms ´caste´ and ´tribe´ are interchangeably used, but MERREY (1983:246) differentiates between them as two independent social categories, and he limits the use of caste to „....categories which are ranked vis-à-vis each other, recruited by birth, endogamous, at least ideally, and linked to an hereditary occupation as being most appropriate" and describes tribe as „....named categories whose recruitment is by patrilineal descent, and which generally have a myth of being descendants of a common ancestor" (1983:247). Caste membership is strictly inherited and is ascribed for life[57]. The caste system was basically originated by the **Hindu religious teachings**, and therefore has a religious significance too[58]. Each caste group has an associated sense of honor and prestige which has a great impact on traditional behavioral patterns. Caste and kinship form the core of social organization in the villages (LEWIS 1958:148). To differentiate the village as multi-caste type, only agricultural castes were taken into consideration. If all the agricultural and non-agricultural castes are counted, one could not find a truly single-caste village in Pakistan (MIRZA et al. 1975:20). The villagers differentiate themselves into **agricultural and artisan (*moeen*) castes**[59]. The artisan castes have a substantially lower status than the agricultural ones and are involved primarily in non-agricultural services for the agricultural sector. The members of these castes usually have no access to cultivable land[60].

The literature reviewed[61] leads to the consensus that relatively homogeneous groups are more likely to be effective for **participatory activities** (ESMAN & UPHOFF 1984:116). To introduce participation and to sustain it would be difficult where people are scattered over the area, whereas it is easier where they have clustered settlement patterns (ESMAN & UPHOFF 1984:115). The Punjabi rural settlement patterns can fairly be graded under

[57]The caste system being practiced in Pakistan is not identical to India´s. To qualify for the caste system, the social system must have the following properties: 1) A clear line of hierarchical status; 2) The hierarchical status is fixed and ascribed for life; and 3) The existence of gradual levels of ritual purity (LOWDERMILK et al. 1978 Vol. II:104). Pakistan´s caste system observes the first characteristic completely, the second partially, whereas the third one is missing. Today, one can find several examples of inter caste mobilitity. Therefore, it must be stressed that the caste system, in its true sense, is not in practice in Pakistan. One may assume that the prevailing system is a quasi-caste system.

[58]See, for example, ECKER 1981:64f.

[59]In accordance with the focus of the study, artisan castes are not dealt with as they have little perceptible influence on irrigation activities as compared to agricultural castes. (LOWDERMILK et al. 1978 Vol. II:103).

[60]In the study area, the artisan castes are bestowed small plots (2 acres each) of land to assist them in securing their livelihood in addition to what they receive from landowners as compensation for their services. Eight acres, which are the communal property of the village, are equally distributed among four artisans, i.e., blacksmith, carpenter, religious leader and *Musalli*.

[61]For details, see MORSS et al. 1976, BUIJS 1982, HUNTER 1980 and the literature referred there.

the second type. It is assumed that clustered patterns facilitate communication, provide a territorial sense and, hence, is favorable for social interactions.

The term ***´biraderi´*** is a derivative of the Persian word ´biradar´- meaning brother. It has been differently defined in literature. According to EGLAR (1960:75), *´biraderi´* is a patrilineage group, whereas KORSON (1969:153) is of the opinion that it includes blood relatives only. BLUNT (1931:Chapter 1) holds the view that *´biraderi´* is a specifically located ecological and geographical group. For the present study, the definition presented by MIRZA et al. serves the purpose best. According to them, *´biraderi´* is „an endogamous group of individuals who consider themselves related to each other through blood or marriage" (1975:6). The respondents in the study area do not limit *´biraderi´* to one village or area, but claim strong *´biraderi´* ties across these territorial boundaries. Regardless of the definition one follows, it is a fact that *´biraderi´* is the **central building block of the Pakistani rural social network** (LOWDERMILK et al. 1978 Vol. II:103). The *biraderi* can be singled out as the strongest social unit of Punjabi rural society where closely knitted personal relationships in the form of the *´biraderi´* system supersede all other loyalties. WAKIL underlined that „the formal rules and regulations of the official and non-official institutions and organizations are frequently ignored or violated. The claims on personal *biraderi* relationships, whether real or synthetic, ..., supersede the observance of formal rules" (1970:13). **Kinship and extended family** are used in English literature as synonyms of *´biraderi´* (MIRZA et al. 1975:6).

„Principles of organization apply only within a population that is heterogeneous in some dimension. In a community where all are of one caste, there are often familistic or patron-client patterns, though under some circumstances the caste group may remain united vis-à-vis a differentiated outside social world" (ESMAN & UPHOFF 1984:121). The **normative environment** would affect the extent of participation and will influence the effectivity of the operations for the achievement of certain objectives (ibid. 1984:121).

The **socially polarized communities** face more problems in engaging the farmers in collective efforts, so that the „caste structure of villages may well have something to do with capacity to mobilize manpower for watercourse cleaning" (MIRZA et al. 1975:44). The common ethnicity may clearly be identified as one of the major contributing forces which shape the social solidarity of a group or community (ESMAN & UPHOFF 1984:207). Although rural communities are also stratified on the basis of locals, settlers and immigrants, these factors are not of the same significance (MIRZA et al. 1975:44) as caste and *´biraderi´*. Social stratification has an inverse relationship with participatory activities in an organized form[62]. It must not, however, be taken as a hard-and-fast rule; there are some examples which speak of more authority and control by traditional leaders in stratified communities; this proved helpful in moving things in the desired direction (ESMAN & UPHOFF 1984:117).

[62]JOHNSTON & CLARK (1982:168) are of the opinion that „a relatively unstratified population" is conducive to cooperative activities at the local level. The same views have been shared by INAYATULLAH (1972), HUNTER (1976), ESMAN & UPHOFF (1984) and LEONARD (1982).

A ***´biraderi´*** **group** is usually headed by the eldest competent male who represents the *´biraderi´* group internally and externally. Internally, he is responsible for a variety of socioeconomic activities, of which maintenance of group cohesion and solidarity are of central importance. The external responsibilities range from social, economic and political interests to the accountability to other village authorities for the conduct of their *´biraderi´* associates (LOWDERMILK et al. 1978 Vol. II:109). The *´biraderi´* group can fairly be regarded as the most important social unit for water management at watercourse level. The water users usually enter into or exit from the participatory activities of irrigation management at the *´biraderi´* level as a single unit.

It is true that **internal regulatory patterns of the *´biraderi´* system** in rural areas of Pakistan have weakened over time. The village community can no longer be ranked as homogeneous social unit. A variety of external factors such as mass media, better communication means, etc., along with some internal factors as scarcity of economic opportunities, low wages, poor living conditions, etc., have led the rural population on the path of a relatively egalitarian society. As a result, in a relatively less cohesive atmosphere, it has become difficult for *´biraderi´* and caste ties to make the associates abide by them. The awareness and, to some extent, the practice of individual social, economic and political rights have further weakened the communal spirit. A Punjabi proverb which says „**nobody is weak in *´biraderi´* and nobody is strong before the court**" helps to understand the general social setting of today.

The need for an **alternate organization** to deal with the irrigation management has been felt, ever since the ´punchayat´ system (assembly of village or *biraderi* elders to settle local matters informally) failed. In the meantime, some adopted alternatives, such as hiring a watercourse watchman, proved to be a failure, partially due to the vested interests of the individuals and/or groups and, finally, due to the absence of any „legal coverage" (MIRZA & QAZI 1992:98). The importance of organizing the water users has been analyzed in a World Bank´s report as: „An example of the factors that reduce the efficiency of water use throughout (South Asia) is found in Pakistan´s century old irrigation system in the Indus Basin. Wasteful water management and poor maintenance can be lamed in large part on the hierarchy of social relationships among farmers...." (quoted in CHAMBERS 1988:81).

The intensity of *´biraderi´* associates´ **internal cooperation and solidarity** becomes more visible in situations of conflict or competition with other *´biraderi´* groups. The fragility of the groups cannot, however, be exempted[63]. There exists a close relationship between sociological characteristics of a watercourse and the quality of improvement and maintenance. The prevailing forms of organization cannot, however, be graded as adequate to insure good results, even on those watercourses which may be graded as being relatively free of conflict (MERREY 1980:206).

The specific **influence and power patterns** affect the whole range of activities: from water distribution, construction of watercourse, O&M patterns to organization of a WUA, in either facilitating or obstructive way. The relative equality of power/influence facilitate

[63]ALAVI (1972) and MERREY (1979) quoted in MERREY 1980:206.

cleaning and maintenance activities, whereas the existence of some potential leaders supports the organization of a WUA. In cases of inequality in power/influence patterns of the social network, much depends upon the leaders´ personal character. The leaders with dominating personal objectives and interests usually proved exploitative to the disadvantage of the less powerful (LOWDERMILK et al. 1978 Vol. IV:230).

Those farmers are mostly **the potential leaders** in water management activities, particularly, and in other socio-political affairs, generally, who hold relatively larger pieces of land and have good personal contacts at the lower echelons of irrigation, agriculture, revenue and police departments (MIRZA et al. 1975:30). As time passes and due to experience, education is also being regarded as an additional qualification for leadership. The village leadership is usually a mixture of traditional and charismatic styles[64]. The decision-making process is predominated by the ´key´ and ´influentiall´ individuals, even when obviously some **democratic atmosphere** is claimed, the decisions are actually made by those who exercise leadership in all matters of conflict resolution (MIRZA et al. 1975:30).

As in the case of an individual landowner, the power and influence[65] of a ´*biraderi*´ is directly related to the **amount of land** owned by the group members jointly. „The more the land owned by a farmer or *biraderi* group of farmers, the more the *moeen* depends on the farmers, the more income and possessions, the greater the capacity to entertain important officials, and the more ability to make personal contacts with authorities which in turn increase influence, prestige and power vis-à-vis others“ (LOWDERMILK et al. 1978 Vol. II:105-108). The power and influence system is being more practiced in individual and personal matters and yields better results than in matters dealing with collective action or with goods of collective nature. The watercourse is a **collective good**[66] (ibid. 1978 Vol. II:129 & Vol. IV:178), as the benefits cannot be denied to those who do not help or bear the costs of providing the commodity[67], i.e., water. If the supply of water is improved due to maintenance and rehabilitation, a **free-rider** will receive the same additional amounts of water as those who participated in the activities. The rational attitude, therefore, will be not to participate. To rectify the problem, which is of social nature, a strong social organization capable of sanctioning and rewarding becomes a necessity. In addition to this, a training program to foster attitudes and behaviors favoring collective actions and their benefits is highly desirous.

[64]For a detailed discussion of the typology of leadership, see STAEHLE 1985:543f. and HUPPERT 1989:165f.

[65]Various authors have attempted to define the concept of power and influence. Regarding the understanding of the concepts in the rural areas of Pakistan INAYATULLAH (1963) and RAZA (1969) are worth recommending. The conceptual clarity presented by BACHRA & BARATZ (1970) is, however, most purposeful in the context of the present study. According to them, power is the ability to invoke the threat of sanctions upon another party in order to secure compliance, whereas influence makes use of the techniques of logical or moral persuasion, instead of the threat of sanctions (1970:17ff).

[66]BROMLEY & CHAVAS used the term „collective good“ to denote „those activities that are undertaken by a group of individuals for their collective benefit“ (1989:735). They deliberately avoided to use the term „public good“ as it may not be assumed that all collective goods must be provided by the public sector (government). This does not exclude the role of government in providing collective goods.

[67]OLSON (1971) quoted in LOWDERMILK, et al. 1978 Vol. II:119.

3.3.2 Impact on Irrigation Water Management

While discussing the possible arrangements for collective action, **the nature of the good**, i.e., whether it is of social, economic, political or religious nature, must be clearly identified. This is important, because the collective nature of the good has **a direct influence on its management and operation**. The history of rural communities is pregnant with examples of mutual cooperation through financial, material and labor resources for the establishment, maintenance and operation of collective utilities such as mosques, schools, water tanks, sanitation facilities, watercourses and the like. There is **a variety of organizational patterns** in practice for the mobilization of resources; they range from purely voluntary ones to quasi-formal „wash" systems of financing. The *´biraderi´* units play the central role, sometimes in a friendly atmosphere, sometimes in a competitive sense. For the accomplishment of tasks, some informal functional arrangements are made, which usually do not have taxing powers and function without written contracts. The collective actions (for mosques and schools) can be identified as independent and autonomous affairs in which villagers do not deal with any outside organization.

When we compare a collective activity for the construction of a mosque and a school with one for the watercourse, we arrive at the following conclusion. The main difference in the nature of **collective actions** for mosques and schools lies in the collection of inputs (resources) and the distribution of outputs (benefits). Everyone did not have a share in proportion to his resources, and everyone is not profiting equally from the benefits produced by mosques and schools. In the case of the watercourse, on the other hand, everyone must share in proportion to his land, as everyone will draw his benefit equitably. Some regulatory patterns are needed for such a proportionate resource pooling. The existing social institution of *´biraderi´* usually does not serve the purpose, as it has not developed some mechanism to deal with the new situation in water management at farm level. The **changes in water use**, in its relative importance for more intensified agriculture, in water management techniques, in tenure patterns, in inputs application, in the use of machines, in the supply of water, etc., occurred at a greater pace than in the regulatory norms, values and traditions of the *´biraderi´* system. The present situation demands some institutional arrangements equipped with **enacting and enforcing** methods. The *´biraderi,´* in fact, is not **empowered** by any means to handle the matters of resource mobilization and equitable distribution of benefits.

Unlike mosques and schools, the watercourse management is influenced by an ´outside´ organization in the form of ID which plays a central role regarding the amount and supply of water, around which all the management activities of water users revolve. This means that, in irrigation matters, water users are constrained by several sources in the spheres of autonomy, technology, information, resources and the similar necessary factors.

Another factor which has a great impact on the management of irrigation water is **social conflict**. It is omnipresent in social life and is inevitably involved in irrigation activities, too. The existing rules for the delivery and distribution of water affect different water users of the same command area unevenly; they are determined primarily by the water users´

specific geographical positions in the system and, secondarily, by their socio-economic status. The arrangements favoring head farmers could be unfavorable for tail enders; those supporting large landowners could be discouraging for small farmers; and those appreciated by some ´*biraderi*´ members may be rejected by some other members of the same ´*biraderi*´ group. The informal institutions in the form of caste and ´*biraderi*´ groups at the local level proved very fragile to stand against and to provide some sustainable solutions to these problems. With an increasing complexity and situation specificity in irrigated agriculture, the informal traditional and, to some extent, rigid regulatory patterns failed to provide unanimously acceptable solutions to the irrigation problems at farm level.

On the basis of an empirical study, MERREY (1980:206) arrived at the result that various features of Pakistan´s rural society are **discouraging for cooperative and participatory collective actions**. Concepts such as ***izzat***[68] and prestige, generated by the prevailing value system, are non-supportive and sometimes even in contradiction with the concepts of participation and cooperation. The **inter-*biraderi* rivalries**, based actually on personality clashes and embedded in a social system marked by profound inequalities in socioeconomic power, have proved major hurdles when organizing participatory activities. This system does not always lead to unrest and conflicts; at times, it provided a base for healthy competition between ´rival *biraderi* groups,´ too[69]. ´*The game of izzat*´ described by MERREY (1986-b) cannot, however, be generalized for all Pakistani rural communities. *Izzat,* according to LOWDERMILK, CLYMA & EARLY, „ ... can be channeled into constructive cooperative activities when all parties perceive sufficient benefits“ (1975:47). The rivalry and enmity on the basis of *izzat* is not any hard-and-fast rule because it is simply a form of self interest (ibid. 1975:47). Moreover, since the society is relatively oriented towards value and religious teachings, the **Islamic lessons of brotherhood and equality** can help to overcome issues such as *izzat*, if they are applied adequately.

The highly participatory and egalitarian nature of the operations of a local level organization would be helpful in overriding the **indifferent or adverse normative conditions** (ESMAN & UPHOFF 1984:159). The culturally sanctioned patterns of conflict management, when supported by religious ideology such as that dictated by Islamic teachings can improve the efficiency and extent of farmers´ participation in the locally organized activities, for example for the improvement and maintenance of irrigation facilities (UPHOFF 1986:103). Within the cultural context especially, the world must not be considered as being strictly round, as some cultural concepts such as *izzat* (honor) in Pakistan and the traditional belief of witchcraft in Papua-New Guinea were greatly prejudicial to the collective participatory activities[70].

The normative environment of a voluntary organization is likely to affect the degree and extent of participation which, in turn, would determine the efficiency and performance of

[68]The word ´*izzat*´may be the most suitable expression of power and esteem which MERREY has glossed as „honour,“ „reputation,“ „status,“ „face“ or „esteem“ (1986-b:38).
[69]Such an atmosphere was observed on the watercourse studied. For details, see Chapter 4.
[70]For a detailed description of the examples of Pakistan and Papua-New Guinea, see MERREY 1986-b and KHAN 1983 respectively.

that organization in achieving the set objectives[71]. While dealing with norms and values, it is necessary to distinguish between the sets of norms prevailing at the community level and at the societal level. It may be possible that community norms are supportive for participatory activities, whereas the societal ones are non-supportive, or vice-versa (ESMAN & UPHOFF 1984:122). While identifying the characteristics of communal and societal norms, ESMAN & UPHOFF found that the former are „usually traditional, legitimating unequal rank and power or validating the equal involvement of all in decision-making and benefits," whereas the latter are „likely to be more politicized, reflecting the ideological orientation of the regime" (1984:122). On the basis of their analysis of 150 local organizations in Asia, Africa and Latin America, ESMAN & UPHOFF found that community norms were significantly correlated with local organization performance, whereas the societal norms were positively correlated but were not significant (1984:122).

Some of the **values and institutional patterns** such as *izzat*, honor, caste hierarchy, and *´biraderi´* rivalries usually encourage conflict and thus tend to discourage sustainable participatory activities for water management. The field of watercourse level activities resembles the ´tragedy of the commons´ where individuals´ interests have more weight than communal ones. Within this sociocultural context, the role of community leaders gains vital importance. In communities where leaders are trustworthy and relatively less self-oriented, the implementation of organized activities has been successful. One may assume that the organization of participatory activities at watercourse level is a tedious job (BOWERS et al. 1977:19), but not an impossible one. The organization of water users with different interests, having different socioeconomic objectives, with different ethnic backgrounds, tied into a multifaceted network of traditional social organization needs a deep understanding of the prevailing contingencies.

Cleaning and maintaining the watercourse is the collective responsibility of all who **cultivate** land in a particular command area (MIRZA et al. 1975:35). In different socioeconomic settings, different ways are adopted to organize the cleaning activity[72]. One of the **three different channels** is used to inform the water users about the time and day when the watercourse will be cleaned: **a**) an announcement in the mosque through the loud speaker, **b**) announcement by a village *´musalli´* who beats a drum, and **c**) the village *´chowkidar´* informs water users by approaching them personally (ibid. 1975:39). As most of the village mosques are equipped with loud speakers, the first channel is most widespread. This flow of information facilitates the participation of a large number of shareholders and leaves little room for lame excuses.

´The fewer the farmers, the easier it is to mobilize watercourse cleaning´ [73]. MIRZA et al. do not agree with this statement, as their empirical findings suggest that it is not the number of participants but rather the availability of additional amounts of water which influences the cleaning efforts and, to be sure, negatively (1975:9). The participation of the water users is, however, important to organize the activity at all and affects the quality and

[71] See BELLONCLE 1979:22-23 cited by ESMAN & UPHOFF 1984:121
[72]For a detailed description of the three ways, see MIRZA et al. 1975:35f.
[73]OLSON, M. (1971) quoted in MIRZA et al. 1975:34.

sustainability of the cleaning. There exists **no regular schedule for watercourse cleaning**. When the watercourse is to be cleaned is usually decided informally. The water users may be found discussing the matter in the village, in the mosque or in their fields. The discussions intensify in proportion in the delay in cleaning the watercourse.

To secure the maximum participation of water users, some **punishment mechanisms** are envisaged (ibid. 1975:39). The enactment of these methods is determined by the sociocultural environment of the community concerned. Those communities, which abide by the regulatory norms, have a ´*Panchayat*´ system; their socioeconomic inequalities are not very marked or they are socioculturally relatively tightly structured, can enforce punishment mechanisms more easily in comparison to those in which these factors are missing or the communities are partially polarized.

The areas where there is no tradition regarding the management of indigenous small-scale irrigation systems often have a low **natural propensity to cooperate**, and, hence, to participate in jointly organized activities (BOTTRALL 1981:202). This natural draw-back could be overcome through efficient motivation and encouragement of water users to organize themselves into small groups at watercourse level. Slogans that are theoretically democratic nominally only are insufficient for the time-consuming and patience-demanding task of motivating farmers to participate in water management activities. For this, an effective support from the main system administration is highly desirous. The formation of groups at the local level can provide the foundation for a more effective farmers´ participation at higher levels of water management; this could facilitate the job of main system managers (ibid. 1981:203).

The **location of water users along the watercourse** provides them with a different set of interests and benefits. The tail enders, in comparison to head water users, usually receive less and an unpredictable supply of water because of transportation losses, poor watercourse design, inequitable water distribution mechanism and poor O&M of the channel (MIRZA et al. 1975:57). The mismatch of vested interests also hinders the active participation of all concerned, which is basically determined by the amount of water available. The situation becomes more problematic when large landowners are concentrated towards the head and middle reach of command areas (ibid. 1975:58).

For **socially stratified communities** as in Pakistan and India, the local watercourse groups should be as small as possible. The smaller groups would enhance the probability of establishing a community of interest which, in turn, would help to avoid conflicts. It would also reduce the probability of the elite ´hijacking´ the WUA to serve their benefits exclusively (BOTTRALL 1981:202). The area covered by a watercourse in Pakistan is ranked as ´too large´ with respect to the social divisiveness and the technical complexity (ibid. 1981:212).

The effective management of irrigation water at the tertiary level only does not suffice to solve the problems with which the water users are confronted. „It is difficult to believe that transfer of O&M to water users groups at the tertiary level can make much of a difference without improvement in the quality of main system management“ (VAIDYANATHAN

1994:2967). Without an improvement in the management quality of the overall system, the benefits gained through water users´ participation at the tertiary level cannot be optimally utilized; rather it may cause frustration among the main system managers and reluctance for future collective actions among the water users.

Organized participatory activities are directly regulated by human behavior. Attempts are made to achieve them by prescribing some specific objectives, which, in the form of shared interests, are matured through peoples´ participation and cooperation (HUPPERT 1989:54). It is a generally accepted view that the **behavior and performance of officials or functionaries** are as critical as those of beneficiaries[74]. For exploring the reasons of success or failure of a development program, it is necessary to analyze the behavior of the so-called implementers or employees of the institutions responsible for the management of such programs. The widespread failure of development programs in Pakistan, and in other developing countries as well, is mostly due to functionaries not performing their role, on the one hand, and due to the success of vested interests in fostering corruption and cornering benefits, on the other hand. As the study concentrates on patterns of water users´ participation in irrigation management activities at watercourse level, it was not possible to address this aspect in detail, some general information, however, is presented hereunder. It is important to mention that this information is based primarily on the water users´ views, supplemented by secondary data and the author´s own observations.

Just as the socio-cultural factors influence the mutual cooperative relations of the water users, the **views and attitudes of government officials** can have an equally important influence on them for their enthusiasm and willingness to participate in state initiated activities. The general views of officials regarding water users´ participation in Pakistan, which are not always in conformity with those held by the Mona project officials, are not very encouraging. One can observe a gulf between officials and farmers based on ideographic vs nomothetic knowledge (FREEMAN 1989:15), rural-urban bias, etc. The officials did not succeed in overcoming their general preconceptions about water users, their knowledge, their abilities to cooperate and participate, their indigenous skills, etc. For the management of irrigation water, this issue becomes more sensitive than in the case of spontaneous participation, the local norms play a dominating role, whereas, if participation is induced or directed, its sustainability will be more dependent on national norms.

There exists a **dissimilarity of behavioral orientation** between water authorities and water users which ultimately shape their roles for different undertakings[75] (COWARD 1980:26). The high degree of differentiation demands a maximum integration and articulation between water users and irrigation bureaucracies. An intimate and sincere interaction between community and irrigation agency becomes a prerequisite, if a joint venture for the management of irrigation water is wished. This demands some drastic changes in the articulation patterns between agency and water users, where the agency has to elicit and use **local ideographic knowledge, indigenous technology and communal manpower** (ibid. 1980:26).For the joint management of the irrigation system, the water

[74]For details about the impact of behavior of functionaires on a development project, see JAIN 1996:80f.
[75]This point has been dealt with in detail by MASS & ANDERSON (1978).

users should be involved through their irrigation associations at all levels of water management. Some successful examples[76] of the integration and articulation between water users and irrigation bureaucracies offer numerous solutions to the problem. „Better decisions are likely where they result from decision which benefits from an engineer´s knowledge of water availability, an agriculturists´ appreciation of the cropping position, farmers´ knowledge of their resources and problems and a presiding administrator´s appreciation of all these“ (CHAMBERS 1977:357-8).

The **policies of government, and thevalue it attaches to them**, has a direct influence on water users´ participation in irrigation activities, since, if they are favorable, they will facilitate the enactment of activities, but if the regime is not strongly committed and does not provide favorable policies, the task of participation will be difficult to accomplish. The efficiency of high level organizational operations determines the capacity of farmers to achieve their goals (FREEMAN & LOWDERMILK 1985:114).

In their day-to-day business, water users are usually confronted with lower officials of the Irrigation and Revenue departments. They make deals with them, at individual as well as watercourse level, to get extra water illegally, to get reductions in revenue assessments, etc. For such illegal ´favours,´ they reciprocate by offering bribes to the lower level officials. Such deals (**corruption**) which are also resorted to in view of influencing officials, however, only for obtaining legal shares, have negatively influenced and undervalued participatory efforts. This mechanism is usually utilized by relatively large landowners who are earning more profits due to better linkages and resources. As a result of such parallel practices, the large landowners do not seem to show much ambitions and desires for participatory activities.

Irrigation officials are bribed in various ways, and **bribe price** is usually fixed and demanded by the officials concerned themselves. Local level irrigation officials spread rumors about and sometimes cause an actual shortage of the sanctioned water supply to command areas to secure bribes. A great majority of the subordinate officials (e.g., *´patwari´*, overseer, gauge reader, tubewell operator) indulged in bribery and, over time, have **developed some regular patterns** for specific occasions when only money makes the mare go. Some bribes have ´patent´ names according to the purpose they serve, e.g., *´faslana*, *chai pani*[77], *nazrana*[78] or fees´. The modes of payment are not restricted to hardcash only, as ´gifts´ in kind - food grains, fodder, fruit and poultry - are also readily accepted. The bribe system provides a quasi-control over the supply and amount of water and when and where it is needed. Under such conditions the ´beneficiaries´ do not see any extra benefits which they could secure by participating in collective actions. It would not be an exaggeration if such arrangements were evaluated as being more appealing to larger landowners, who, by virtue of their power/influence, are in a better position to profit from them. When one compares these arrangements and their benefits with those **expected** from a WUA, the rational adaptation will be for an arrangement under which ´a bird in the hand

[76]The relevant examples are the jointly managed systems in Gezira, Taiwan, Laos and Californian. For details, see COWARD (1980:330) and the refrences quoted there.
[77]The money paid for tea and drinks to entertain the officials.
[78]*Nazrans* mean gifts or money for gifts.

is worth two in the bush.´ The development of some **hidden unofficial organization** for the management of water at watercourse level, based on illegal arrangements with the main system managers to serve the specific interests of specific water users is usually an outcome of the absence or inefficiency of a network of effective local water management organizations (FREEMAN & SHINN 1989:90). Such hidden arrangements undermine irrigation rules and regulations, on the one hand, and may prove to be disincentives for the water users to participate actively in Water Users´ Associations, on the other hand.

It is typical of the managers of the main system to want to decentralize the unglamorous and costly tasks of system maintenance, but not to act accordingly, as they fear that the empowerment of water users will cause them to lose real authority over water distribution, conflict management and rehabilitation activities (FREEMAN & LOWDERMILK 1985:115). As a result, they keep away from water users´ problems at the local level. They blame the water users for violating and deteriorating the institutional, regulatory and physical arrangements (ibid. 1985:115).

The institutional arrangements of the main system exercise a major influence on the water management activities at watercourse and farm levels. One measure of these institutional patterns is the degree of correspondence between **de jure sanctions and de facto practices**. It is a generally accepted view that a high correspondence indicates strong management effectiveness, whereas a low correspondence is an indicator of low efficiency both at main and watercourse levels. (FREEMAN & SHINN 1989:90). Moreover, the main system´s capacity to control ´free-riders´ is also regarded as a sign of high organizational effectiveness (ibid. 1989:90). „The irony is that even when major reforms in irrigation management are recognized to be essential, they have proved difficult for lack of ´political´ will and of an inability to deal with opposition from vested interests, both signs of a weak state (VAIDYANATHAN 1994:2967).

Many of the governments lack the ability and willingness to work cooperatively and responsively with the water users. Moreover, to encourage water users´ participation in the management of their resources, negative stereotypes about them must be changed (UPHOFF 1985:388). Regarding the management of water at the main and community levels, CHAMBERS has identified some geographical, organizational, political and human management gaps which, in terms of water users´ participation, are of fundamental importance (1980-a:29f). It is also believed that farmers´ non-participation in irrigation management is usually an outcome of ineffective, inappropriate or non-existent social and technological arrangements at the main system level (FREEMAN & LOWDERMILK 1985:114).

The large size centralized irrigation management systems, all over the world, are confronted with serious problems in responding to the **unique and diverse needs** of local organizations (KORTEN 1984:176f) and Pakistan is not an exception in this connexion. All these systems are preoccupied with long established procedures, norms and codes which are usually inflexible in their nature and, hence, are not supportive for the local level organizations (LOWDERMILK 1986:438). For the construction, rehabilitation and maintenance of the huge irrigation infrastructure, these systems are always in need of

foreign assistance. Regarding financial assistance for water management projects, it is well known that a host country can acquire loans for physical infrastructure much more easily than for software items. For this, there are several vested interests on both sides (ibid. 1986:439). This situation makes the development of the irrigation system a physical development-oriented affair instead of the institutional-cum-physical one. This reconfirms the well admitted fact that „design and construction are more prestigious, glamorous and profitable than mundane O&M activities[79]." This factor combined with the standard and fixed attitudes of the irrigation bureaucracy causes the situation to be discouraging for water users´ participation.

„It is sad but true that most government agencies around the world are not oriented toward working effectively with intended beneficiaries, but have a legacy of paternalistic or technocratic, if not authoritarian, relations with their publics" (UPHOFF 1985:388). Only a reorientation in the behavior of bureaucracies is considered to help promote participatory methods of development.

The main system bureaucracy in Pakistan is **preoccupied with a number of common beliefs and sentiments** which are often restrictive for water users´ participation. Some of them are:

- farmers do not have an adequate knowledge of efficient irrigation;
- farmers must be commanded through some regulations and sanctions[80];
- a very small number of irrigation officials is convinced of the importance of social and organizational issues;
- most of the irrigation engineers have no farm background nor practical experience of farm level irrigation[81], and
- there exists a very poor level of communication between farmers and irrigation officials[82].

The officials as well as the water users have little concern for and pay less attention to water resource management and to the efficient use of water for increased production. The deficiency exists not only at lower levels, as a comprehensive field study[83] in Pakistan reports, but there is a need to develop concern about water management at the Office of the Prime Minister, too. The prevailing attitudes of the farmers and officials are not supportive for the development of the irrigation system. The mass media in Pakistan is also not much concerned about the problems of water management, as one could hardly find any comprehensive campaign regarding the matter. The water user is facing the **benign neglect philosophy** of the ID (LOWDERMILK et al. 1978 Vol. II:100) and a general resource

[79]EARLY et al. (1982), quoted in LOWDERMILK 1986:439.
[80]The development of Water Users´ Association´s Ordinance by the martial law authorities in Pakistan is a most conspicuous example of commanding the farmers. Various sanctions and regulations in this ordinance are structured in order to force cooperation and to induce farmers´ participation.
[81]In India, about 65 to 75 percent of all irrigation engineers have a non-farm background. For more details, see LOWDERMILK 1986:442.
[82]Some empirically proved facts from India and Pakistan have been documented by LOWDERMILK 1986:442.
[83]LOWDERMILK et al. (1978), in five volumes.

poverty. These two factors when multiplied by each other, trim the water users´ hard work and efficiency to a substantially low production.

The attitude and behavior of irrigation officials are not supportive towards farmers´ participation in irrigation management activities. Following their ancestors, the British, they keep the water users at a distance and rarely treat them as partners in the business of irrigation management. It is really difficult to draw a silver lining to the picture of Pakistani irrigation bureaucracy presented by MERREY. He states: „Although some of these engineers and extension workers have rural backgrounds, their education has seemingly made them unfit for rural work. Possessing a formal degree and a respectable position in the government bureaucracy, they are **officers**. They create barriers between themselves and their clients by wearing western clothes, speaking an urban dialect, and doing all they can to create the impression that they possess a superior knowledge and position which ought to be respected. When the clients assert themselves and refuse the officer the respect (read obeisance) he claims, conflict arises and the officer´s low opinion of his client is confirmed in his mind" (1986b:37).

There is little evidence available that any of the line agencies or foreign donors have developed a program in which water users´ **attitude and behavior** regarding irrigation management have been carefully dealt with. Considering this deficiency, the World Bank (1976) had, long ago, stressed a massive policy shift in programs inviting water users´ participation. The World Bank also underlined the need of incentives to change water users´ attitudes and behaviors. Whereas the ID, on the other hand, wishes, as much as possible, to avoid the commitment of money and manpower utilized in lengthy litigations, settlement of disputes and establishing the *´pukka warabandi´* (LOWDERMILK et al. 1978 Vol. II:35).

The **extension services** provided by the Agriculture Department are of a low density and choked with many problems (ibid. et al. 1978 Vol. II:128). The major problems can be identified as poor and ineffective supervision, lack of required training and weak in-service training, poor salaries and housing facilities, inadequate extension materials, etc. As a result, the farm level knowledge of the agricultural staff is very poor and insufficient to allow them to deal with the farm level agricultural problems[84] (ibid. 1978 Vol. II:129). Agriculture Assistants and Field Assistants are not supplied transport facilities by the department. Contact between farmers and extension workers is poor. The insufficiency of this relationship has been witnessed by LOWDERMILK et al. (1978), when they found that only 16 percent of the farmers in their sample know the name of their local extension worker, whereas 77 percent and 50 percent, respectively, knew their canal *´patwari´* and Zilladars´ names or locations (cited in LOWDERMILK 1990:167).

The role of **agricultural extension** becomes overwhelmingly important for the development of irrigated agriculture constituted mainly by small farms. Its importance becomes a necessity when the holders of small farms are handicapped through limited knowledge of agricultural and irrigation techniques. The desired results of high agricultural

[84]For more details, see LOWDERMILK (1972) quoted in LOWDERMILK et al. 1978 Vol. II:129.

production, especially in the case of irrigated agriculture, would be difficult to arrive at when good water distribution lacks agricultural extension; responsible for a good application of supplied water (BOTTRALL 1981:150). It was supposed that extension work would be intensified regarding institution building and watercourse maintenance, but recent research results report an increasing neglect on the part of extension workers (ibid. 1981:150). The supervision and two way flow of information through regular contact between irrigation officials and water users is weaker in Pakistan (ibid. 1981:209). The agricultural extension service is playing a nominal role for the improving the farmers´ knowledge of crop and water relationship. The smaller farmers, usually in favour of the larger ones, are being evidently neglected. The accessibility of a farm by means of available transport is also a relevant factor, causing little disbursement of new techniques and research. The knowledge of extension workers at field level has been ranked as ´rudimentary´ (ibid. 1981:206), this causes a great loss of already insufficient services.

Another aspect, which needs considerable attention, is the influence of donors such as the World Bank, USAID, Asian Development Bank and others. It is a fact that Pakistani bureaucracy adopted the concept of water users´ participation in water management as a **prerequisite of the donors**, on the one hand and, due to its propagation at international levels, as a proposed solution to community development programs, on the other. In Pakistan, the government´s political preferences and decisions are mostly based on recommendations made by foreign researchers and advisors, as well as on the IDA loan policy and the conditions tied to them (BERGMANN & MAI 1984:96). As a result, up to now, a nationwide commitment by all relevant agencies and the farmers hass not been adopted and practiced; a mere following of the line-of-action provided by the donors will not yield the required results. The author´s experience of working with USAID and Command Water Management Project led to the awareness that most of the WUAs organized by the project officials were of dummy nature. Most of them existed in official files only. When officials of such highly projected model WUAs were asked about the exact title of their position, most of them could not recall it or named it wrongly. At the initial phase of the Project, some real efforts were made through dialogue, regular contact and motivation to organize the farmers, but, later, most of the WUAs were **a product of a conveyer-belt nature**. Most of the WUAs existed only during the physical improvement of the water channels and, afterwards, dissolved slowly or disappeared altogether. The concept of the WUA conveyed to water users was of a transitory nature. Most of the WUAs in the Project area were organized through the threat of sanctions and punishments instead of motivation.

The irrigation water is supplied on **subsidized rates** and this underpricing of water in relation to its productivity causes an undervaluation of this scarce input which ultimately influences negatively the motivation of the participants in water management activities (LOWDERMILK et al. 1978 Vol. II:122). The water rates, both in Pakistan and India, have been stagnant for years. There have been some occasional increases in water rates, but they still lag far behind the increase in the average value of crops. Neither the politicians nor the ID showed some serious concern about increasing water charges. When looking for a

reason of this lack of enthusiasm, WADE related it to the fear that water users may be unwilling to pay both the official and unofficial charges (1982-b:301).

3.4. Summary

Under the prevailing conditions in Pakistan, where about two-thirds of the total population live in rural areas and are earning all or a major part of their income directly or indirectly from activities directed towards agriculture, the continuous decrease of agriculture´s share in the country´s GDP is alarming. **The dualism of agrarian economy** is causing an unbalance in the overall economic structure and is intensifying regional disparities and social polarization. The shaking agricultural economy was stabilized during the wave of the Green Revolution, but its effects have diluted over time.

Extensive farming, instead of an intensive one, is causing an underuse of natural as well as human resources, which has reduced the per unit agricultural production far below its potential. The mismanagement and underutilization of the potential of water are causing serious problems, among which low production, loss of water, waterlogging and salinity are some of the most prominent. **The inefficient and inflexible management** of irrigation water is causing a substantial loss of water, both at the main system and the farm levels.

Since British Rule, the management of the irrigation system has been assumed by the irrigation authorities who followed different institutional patterns, where **the top-down approach** always predominated. The end-beneficiaries, the water users, have never been considered important for playing an effective role in the management of the system, the rule that has been strictly followed was not to deal with the local problems of the water users.

In the decade of the 1970´s, the actual losses measured through empirical investigations shocked the irrigation managers and incited them to develop and adopt measures to control the **causes of heavy water losses**. In this connexion, the importance of water users´ participation for system management was realized and followed accordingly. The Mona Reclamation Experimental Project was initiated and deputized to address the problems of water management at farm level, particularly. The Mona project developed **new techniques and technology** which, after empirical testing, are being replicated in other areas of the country.

The country is making an extensive use of **federal and provincial Irrigation Departments**. These departments are primarily responsible for the acquisition, transportation and distribution of irrigation water. To assume these responsibilities, a well defined system encompassing dams, reservoirs, headworks, main and minor canals and watercourses is being resorted to.

The Provincial Irrigation Departments, like many other services in the country, are performing their respective activities **without any „interruption“ by the farmers**. They are, however, supported by the WAPDA and the Agricultural Department as a result of a poor coordination among them.

A set of rules and regulations in the form of Canal and Drainage Act that are more than a century old has equipped the ID with jurisdictional and institutional powers. A **poor follow-up of the act** by the ID as well as the farmers has created a situation of ´partial lawlessness´ in matters of irrigation regulation which, like many other factors, is also contributing to the misuse and mismanagement of water.

The **socio-political framework** of Pakistani water users is characterized by caste system, ´*biraderi*´ networks, socioeconomic status defined by landholding and education primarily, power and influence, concept of *izzat*, a set of norms and values based on traditional patterns of behavior and religious teachings and, last but not least, leadership patterns.

The **general behavior of the irrigation officials** in the country is not supportive for the involvement of water users in the management activities of irrigation water. There exists a wide gap of understanding, communication, respect, tolerance and acceptance between the irrigation officials and the water users. The general **sociopolitical atmosphere** prevailing in the country cannot be graded as favorable for water users participation in system management activities.

The management of irrigation water at the watercourse studied is being carried out under the institutional and sociopolitical framework discussed above. The watercourse studied can be regarded as **a sub-system of the main system**; therefore, its characteristics have a direct impact on the management of water at the watercourse. To what extent these characteristics are conducive to or obstructive for the local level management of water, within the context of water users´ active participation, constitutes the contents of Chapter 4.

4. Farmers´ Organized Participation for the Management of Irrigation Water at the Watercourse: Empirical Findings

4.1 General Methodological Procedure

The first section of Chapter 4 deals exclusively with the research methods used and applied for the collection of empirical data. The procedure and methods are discussed hereunder in a chronological way.

4.1.1 Selection of the Watercourse

In accordance with the concept of the study, it was necessary to select a village where the potential for the required information must be promising and comprehensive. Special attention was paid to the following criteria:

- It was a basic demand of the study that such a watercourse which has a relatively **long history of water users´ participation** in the management activities of irrigation water should be selected for the in-depth study.
- The watercourse should have undergone a series of **developmental activities** regarding its physical and social infrastructure.
- Since the study revolves around the participation of water users in water management, it was essential to select a watercourse in the case of which **sufficient time** had elapsed since its improvement and the organization of the WUA. It is assumed that this will help in identifying indigenous factors which can hinder or facilitate water users participation in the WUA.
- It should be a watercourse for which **institution-building** has been intensive and which is outstanding in this regards.
- It should be a watercourse owned by a group of **socioeconomically stratified** water users, as this may help to understand the patterns of management of various activities such as organization of the WUA, decision making procedures, role of leadership, ongoing O&M activities, impact of different socioeconomic status on the water management activities, etc.
- The water users should possess a good repute in the area due to their **previous experience** in cooperative activities for various collective actions. On these grounds, it was expected that they may have actively participated in the improvement and rehabilitation of their watercourse which may provide a sound base to analyze water users´ participation at watercourse level.

The watercourse studied satisfies these criteria sufficiently. The watercourse can be singled out as **the first one in Pakistan** for which the concept of Water Users´ Association was experimented. According to the research activities of the Mona project, it was selected as the model watercourse for the full scale improvement and organization of the WUA. It was

selected as the best candidate for the first pilot watercourse improvement program according to the criteria[85] set by CSU/Mona project field party (BOWERS et al. 1977:5).

In the light of the reasons mentioned above, the selection of the village and finally of the watercourse was a **judgment sample** which was primarily determined by the objectives of the study. Although there is a great number of watercourses claimed by On-Farm Water Management (OFWM) and Mona projects to be improved and maintained by water users through their active participation, it is a fact that the number of watercourses where water users participated at all stages of the improvement and maintenance is extremely small. At a great majority of the watercourses, the WUAs were organized solely for rehabilitation purposes, and water users´ participation was **either symbolic or was limited just to labor activities**. Their participation in decision making, planning, implementation, etc., was not considered important. Most of the shareholders do not know whether there is any WUA. They narrate that „irrigation officers" told them that their watercourse has to be improved and that they have to provide labor for this; so they acted accordingly. In this situation, random sampling was not a sensible method for the present study.

4.1.2 Data Collection

The **basic unit of research** was the farm, instead of the household, as all the household members were not involved in managing a farm and, more importantly, water. The methodological procedure applied for the collection of **quantitative** as well as **qualitative** data was determined by the subject of the study and its outline. According to the objectives of the study, it was important to observe the activities of water users keenly, on the one hand, and to interview them with the help of open-end and close-end questions, on the other. Field research was conducted while keeping in view the following statement: „In order to become familiar with the subject, the initial stage of the investigation must be devoted to hearing and seeing, to observing the given facts" (KUHNEN 1968:6).

This guideline was followed from the very beginning to the end. While collecting the empirical data about the nature and extent of water users´ participation for irrigation water management, the **behavior of the water users** was closely observed. Following COWARD (1974), three out of the four categories of farmers´ behavior mentioned by him were paid special attention. It must be made clear that the third category, dealing with inter-system behavior, was not valid for the study. According to COWARD, the first category of irrigation behavior includes the activities performed by farmers for the application and use of water on their own farm. The second category comprises the interaction of the irrigator or water user with co-irrigators in the same system to obtain the water needed for his farm. (The third category involves the social interaction with the

[85]The criteria, among others, included:

- Known reputation for cooperation by the farmers in the area.
- Availability of farmers within the group who were progressive and had leadership ability.
- Size of the land holdings.
- Accessibility of the watercourse to the project headquarters.
- Accessibility of the watercourse to the nearest pakka road (BOWERS et al. 1977:4).

members of the neighboring systems, inter-system behavior.) The fourth category of behavior refers to the interactions between water users and water authorities.

The methodological procedure observed the following sequence:

- **Acquaintance** with some of the water users facilitated the start of investigations, the establishment of first contacts with the other water users and accommodation in the village for the study period. To obtain an insight of the prevailing social conditions which directly or indirectly affect the social behavior of the water users, the researcher lived in the village during the whole period of field work.
- **No sampling** was made due to the reasonable number of the water users, on the one side, and to obtain information from each member of the WUA, on the other.
- The research tool used throughout the research period was **participant observation**, a method extensively employed by social anthropologists and ethnologists, parallel to other techniques. Both, the **planned and accidental participant observation** helped the author in experiencing the course and function of the „social and economic occurrences" (HERBON 1988-b:50) directly. It was necessary to live in the village[86] to practice participant observation. Residence in the village and a sound knowledge of the Punjabi language facilitated and intensified this activity, allowed personal contacts to be established and experiences to be gained, which, otherwise, would not have been possible. Moreover, living among the villagers demonstrates a real interest in studying their patterns of life which leads the villagers to respect the researcher´s work and efforts, on one hand, and puts them under moral obligation to cooperate, on the other hand.
- General information regarding the study were collected in the first phase by making use of **census survey:** the **standardized structured questionnaires** which covered hundred percent the water users of the watercourse. The significant data about the social and agrarian structure of the watercourse was gathered during this phase. This data provided knowledge not only about the social, agricultural, household structure and other basic information, but also provided a base for the special investigations later on. The basic survey helped in identifying important issues relevant to the study which were emphasized and paid special attention during in-depth research on participatory activities for water management.
- The **interview guide and questionnaires**, especially the qualitative ones, were re-structured after completion of the basic survey. Some changes in the interview guide were also made after its pre-test.
- After the census survey, some quantitative information about watercourse maintenance and cleaning, irrigation time, cropping patterns, water users´ participation in different O&M activities, etc. were collected through **unstructured questionnaires**.

[86]The field work was conducted from July 1992 to April 1993.

- All the water users of the watercourse were interviewed through **structured and unstructured interview guides**. A major part of the study information is of qualitative nature, so that an intensive profit was drawn from this method. On the basis of information collected during this phase, key informants were identified. The identification of **key informants** was necessary to get things explained in a more elaborate and intensive way than general respondents did. Like every society, this community possesses some personalities that have a deeper understanding of the socio-economic patterns of the village, particularly, and the outer world generally. These persons have accumulated this knowledge and understanding through performing their roles as caste and *´biraderi´* informal heads, religious leaders, faction leaders, interactors with development agents and local officials, office bearers of different local level institutions, active and progressive farmers and so on. For the present study, the circle of key informants comprises the Executive Committee members, caste and *´biraderi´* heads, faction leaders, religious leader (*Imam masjid*), the Field Assistant of the Mona project and some of the elderly water users. They proved useful in explaining and interpreting some social, cultural, economic and political activities. Some of them were endowed with a good memory which helped to get information about historical facts over time and to record some important changes in the cultural and social conditions. The key informants proved helpful in explaining and discussing whatever catches the eye. The information gathered through questionnaires was mostly recorded there, whereas, for the interviews, the use of a tape recorder and writing down notes was made simultaneously. Some of the respondents were hesitant in recording their interviews, so that the information provided by them was written down as notes and subsequently finalized on the same evening by elaborating the notes supplemented by memory records.
- **Special investigations** according to the subject of the study were conducted in selected farms and with selected respondents (key informants). The in-depth interviews were carried out with the key persons[87] involved actively in farming activities and, hence, managing irrigation water in their fields. In this connection, mostly heads of household were interviewed, whereas members doing actual farming and decision making, in case they differed from the former, were also brought to word. The special investigations based on **interviews** were complemented by **group discussions**. „The findings were complemented by specific measurements and by occasional group discussions“ (MANIG 1988:16). It was, however, not always possible to follow the interview guideline. The unstructured talks developing around the interview guideline were also considered important as they provided some useful information in the form of illustrations, stories, important happenings/rituals, etc. The information gathered through structured questionnaires remained, however, always a focal point during interviews, unstructured talks and group discussions. The more vocal and relatively well informed (usually older) water users were paid special attention, and some of them (referred to as ´key informants´ hereafter) were interviewed several times.

[87]The key persons are described by KORTENBUSCH as actual decision-makers (1988:21).

- In addition to interviews and questionnaires, a **daily diary** was also kept to record additional data gathered during informal discussions and through observation. To collect first-hand detailed information about the sociocultural factors influencing participatory activities either positively or negatively, the author´s stay in the village proved very helpful. This also helped in getting ample information about the functioning of regulatory patterns of social interactions at the village and watercourse levels.
- To study the **locational and geographical factors** and their consequences, the watercourse was broken down into head, middle and tail reaches. The boundaries between these locations were the same as thoseobserved by the water users.
- Being a social scientist, the author was unable to measure watercourse **losses** by making use of hydrological methods. The causes of water loss like seepage, leakage, overtopping, dead storage, damaged control and convert structures, vegetation and parallel sub-branches were, however, identified and recorded while walking along the watercourse.

During the field work, the respondents asked time and again about the **utility of the data** being collected. In connexion with its utility, they were eager to know if their problems and complaints regarding canal and tubewell water would reach the officials concerned, so that they would expect some solutions. It had, again and again, to be made clear to them that the author was not an employee of the ID or of any other government department, which, to some water users, caused a feeling of disappointment in the sense that their voice could not produce the desired echo. As the watercourse studied was selected for the first experiment of the concept of **water management through a WUA** in Pakistan, the water users had, several times, been surveyed by different agencies, and were, therefore, not stranger to interviews and questionnaires. Sometimes, they declared that all this procedure was ´a mere waste of time´ because this exercise never brought them any fruit. It was really difficult to satisfy them about the cause and need of such studies.

Several **small landowners referred to their *´biraderi´* heads** for answers to questions regarding conflicts over water, stealing, etc. Most of them also hesitated in answering questions about the existence and performance of the WUA and frequently referred to the Executive Committee members. To the questions about the bank account of the WUA, the future activities of the WUA, sustainability and continuation of the WUA activities, many of the respondents asked to contact Executive Committee members.

Some of the influentials members of the *´biraderi´* and Executive Committee members used to ask about the tentative program of the author´s activities for the next day, i.e., whom he would visit, who would be interviewed, etc. Such information were not kept secret. On the next day, when the author visited the intended respondents, the said influential people were usually present with the particular respondent. In their presence, the respondent usually did not reply freely and spontaneously and while answering some controversial questions, he waited for the reaction of the influential person(s). These persons **tried to color the information by responding for the interviewee or interfered**

or guided him. To avoid such interference, the interviews and discussions were conducted more spontaneously, and the intended program was not disclosed.

While sitting at the *´dera´* or *´dara´* of a *´biraderi´* head, if a water user appeared who had not yet been interviewed, the *´biraderi´* head usually insisted on interviewing that water user on the spot, in his presence, which definitely was avoided. Regarding small landowners, the *´biraderi´* heads usually **offered their services to ´summon´ the required person** at their *´dera´* or *´dara´*, instead of approaching them in their fields or residences. Such offers were, however, not accepted.

In addition to empirical data, **secondary data** comprising relevant literature and reports was also collected. The secondary data, mainly composed of Mona project and CSU documentation, proved helpful in analyzing the activities of water users regarding water management particularly. Although most of these reports documented technical aspects of the watercourse improvement activities, they proved beneficial in choking the author´s own results and findings. On some issues, when necessary, approachable local level officials of the government institutions were also interviewed. Moreover, **historical, ethnological and ecological accounts, census reports**, as well as literature and theoretical material concerning the study were also used profitably.

4.1.3 Evaluation

The **methods of empirical social research and the ethnological field research** (quantitative and qualitative) were applied and connected with **calculation methods of social sciences**. As no coded questionnaires were used during the field work, the information acquired through structured questionnaires were codified and analyzed by making use of the **SPSS** (**Statistical Package for the Social Sciences**) program, partially at the GWDG (Gesellschaft für wissenschaftliche Datenverarbeitung mbh Göttingen) and partially on the author´s personal computer. For coding, the statistical data was sorted, ordered and structured so as to facilitate the analysis. For the interpretation of statistical results, additional material from secondary sources such as census reports, publications, research reports, unpublished studies, statistical reports, etc., were consulted (MANIG 1991:24).

4.2 Selected Natural and Socio-economic Conditions in the Study Area

Being a socio-technical affair (MANIG 1994:249, KALSHOVEN 1989-a:1), the management of irrigation water at watercourse level is equally affected by the physical as well as the social characteristics of the watercourse. It is in accordance with the **contingency approach of organization and management** which pays considerable attention to the impact of natural and social conditions (the environment) on the behavior and activities of the participants in organizations (MANIG 1994:249, ESMAN & UPHOFF 1984:101f).

How **the environment**, broadly defined, affects or even determines the ability of local organizations to perform effectively, has always been the most common concern of the literature on rural development (ESMAN & UPHOFF 1984:102). There prevail two contradictory approaches regarding the effect or influence of the environment on the performance of local or indigenous organizations. According to the first thesis, the environmental factors are usually evaluated as hindrances or barriers, because, most of the time, they proved vulnerable and manipulatable to the external economic and socio-political environment. The case of cooperatives in East Africa, analyzed by HYDEN (1973) presents an example of such vulnerability and manipulation. Supporting the positive impact of the environment, on the other hand, in the second thesis, GEERTZ attributes the great success of the ***Subaks*** (Indonesian indigenous irrigation associations) to their surrounding social institutions (1963:24ff). HUNTER, in this context, is of the opinion that the influence of the social structure and the norms and values of a society „will show through, like a stain, that cannot be painted out“ (1976:202). Without being biased on either side, the more important task is to identify relevant factors (ESMAN & UPHOFF 1984:104) and analyze them accordingly to build up the opinion about the impact of environmental variables on the watercourse studied. Whatever approach may correspond to a particular community, a sound background knowledge of some relevant factors of a study always helps to get a better grasp on the analysis.

On the basis of the **contingency approach**, a framework can be developed which helps to explain the participation of water users in irrigation water management activities. This postulation should not lead to the misunderstanding that there exists a universally accepted replicable guideline which may fit all situations. On the contrary, heterogeneous contingencies demand some compatible guidelines. In the real world, various situations are, however, characterized with some similar contingencies which can help only to draw some generalizations (MANIG 1994:249). A review of the relevant literature helps to identify some characteristics which may influence the management of water at the watercourse level. The most relevant, in connection with the present study, are:

- technical and physical characteristics of the watercourse command;
- social characteristics of the water users;
- landholding;
- education and experience of irrigated agriculture; and

- unit base of water users´ organization: village or channel (BOTTRALL 1981:72).

All these factors have a **combined, instead of individual, effect** on water management activities, as the impact of one is dependent on the nature of other factors. For example, the effect of the size of the command area is duly affected by the size of landholdings, number of shareholders, their social pattern of cooperation and conflict, etc.

It is important to note that environmental variables are **neither fixed** in their extent **nor constant** in their nature. One of the most acute observation in this connection has been set forth by ECKSTEIN on the basis of his study of Mexican cooperatives (*ejidos*). He is of the opinion that „certain groups have a highly developed sense of social motivation, while others respond only to purely individual inducements .... the most important fact is that neither the positive nor the negative elements are constant .... It is precisely in these .... that men can and must intervene, including those possible transformations that will bring us close to the social and economic goals of development“ (1971:307).

To analyze the **impact** of these characteristics, the study demands that they be discussed in detail so that some most relevant factors influencing the water users´ participation in water management activities can be identified.

4.2.1 Natural Conditions

The village studied is located in the district of Sargodha in the central Punjab of Pakistan and lies in the „*Chaj doab*“ area, between two of the five main rivers of the Punjab: the Chenab and the Jehlum. ´Do-ab´ literally means two waters or rivers, whereas ´Chaj´ is a combination of the initials of the bounding rivers; this is generally practiced when naming a ´Do-ab´. The area which is a part and parcel of the **Indus Irrigation System**, the largest contiguous irrigation system in the world, is claimed to be one of the most fertile areas. The climate and the major natural/ physical characteristics are affected by the surrounding mountain ranges of the Himalayas and Sulaimans. The climate is arid to semiarid and subtropical. The average temperature ranges between 4° C in December/January and 41.5° C in May/June, favoring cultivation throughout the year. Annual precipitation is less than 8 inches over much of the area, whereas pan evaporation may exceed 5 feet, making irrigation a necessity for agricultural production. The monsoon rains fall largely in the months of July and August, and, most of the time, are very unpredictable both in amount and timing (MERREY 1983:73f). In ´Chaj-*Doab*´, irrigation was practiced **on narrow strips along the rivers**. Up to 1860, there were 26 small canals of a total length of about 240 miles. The construction of the Jehlum canal, later on called Lower Jehlum Canal, was started in 1885 and completed in 1900. The canal was opened in 1901 (AHMED & CHAUDHRY 1988:4.18).

The land of the Chaj-*Doab* can be divided into ´**upland**´ and ´**flood plains**´ because of its altitude. The upland area, before the introduction of the canal system, was a grazing zone for animals and a source of fuel and other forest products. There were no demarcated village boundaries and individual land rights. On the other side, the flood plains were intensively cultivated by making use of wells and inundation canals as main sources of

irrigation. The village studied falls in the upland area and became sufficiently fertile for crop production after the construction of the Lower Jehlum Canal (LJC). The opening of LJC increased not only the area under plow but the area under cash crops as well. **The main cash crops of the area** are citrus, sugarcane, wheat, maize and rice. Over time, citrus has became the major cash crop of the area, due partially to good market prices and to the fact that it demands less labor. Due to a large scale production of citrus fruit, the area is also called „California of Pakistan“ (CHAUDHRY 1987:13).

Diagram 5: Map of Pakistan Showing the Study Area

The District of Sargodha borders on the districts of Jehlum and Gujrat on the north, Jhang on the south, Gujranwala on the east and Khushab on the west. About 96.9 percent of the cultivated land in the area is under artificial irrigation[88]. The area lies on the premises of the

[88]Out of a total cultivated area 939259, 910416 acres are irrigated (GOVT. OF PAKISTAN 1992:139).

Salinity Control and Reclamation Project (SCARP) II, where canal water is supplemented by SCARP tube-well water. SCARP tube well is helping in lowering the underground water table, too. The distribution of LJC water is controlled by the PID, whereas the SCARP tube-well is managed by the WAPDA. The Agriculture Department is responsible for on-farm water advisory and extension services to water users.

4.2.1.1 The Village

The empirical data for the present study was collected in ***Chak* Tail-Wala, Main Line**[89] (given a fictive name), in the tehsil Bhalwal of the district of Sargodha. The village dates back to the early 1900´s, when land in the area was allotted under the **Lower Jehlum Colonization Scheme**. For settlement purposes, each canal area is divided into squares of a common base line for the entire area. As a result, the land in a village is laid out in a grid pattern. The squares which start in the north-western part are numbered consecutively. Each square of land comprises of 25 acres, the total area being shared equally. The acres in a square are numbered by following the same sequence as for the numbers of squares (MERREY 1990:946). The peasant settlers were allotted two *´murabah´*[90] of land (50 acres), on condition that they breed a broad mare for horse breeding purposes. The scheme was designed to combine essential features of the needs of the Imperial Government of ensuring a supply of horses to the military and for the provision of transport. Under the „**Horse Breeding Scheme**", 29 families received land rights on the village land. To fulfill the condition of the allotment scheme, each allottee has to keep a mare and provide the offspring to the government. Some settlers were allotted additional land amounting to 1.5 *´murabah´* on the condition that they supply an extra mare. No such cases of additional land allotment were reported in this village. With the departure of the British, this condition was no longer enacted. Some of the villagers do breed horses untill now, partially to satisfy their demonstration of social status and for horse-sports in the area. These sports were very common in the past but are not being frequently organized now.

The village is situated to the **north-east of Bhalwal town**, at a distance of about 10 kilometers. The village is well connected by means of a metal road and is easily accessible by wagon and *´tanga´*[91] shuttle-service from and to Bhalwal. The village is of central importance among the nearby villages as it houses a Primary Health Center, boys´ and girls´ schools, a commercial bank, a post office, a soil-test laboratory and a Union-Council office. The residential area comprises two parts: the main village and an additional colony. The land owning community resides in the main part of the village, whereas the landless inhabitants of the village have been allotted residential plots of 5 *´marla´*[92] each, **under a scheme of late Bhutto´s Pakistan Peoples´ Party government**. Some of the landless,

[89]Main Line, usually used as ´M. L.´ in its abbreviated form, is the name of the canal distributary which supplies water to lands in the village. It is a general practice in rural Punjab that village names are usually linked with the name of water supplying canals or distributaries. Main Line is a distributary of LJC.
[90]*´Murabah´* is the Punjabi denomination for a „Square" of land made up of 25 acres. It is the most commonly used unit of area, especially to describe the size of larger farms. The size of a *´murabah´* varies from place to place and ranges between 25 to 27.7 acres.
[91]Two-wheeled, one-horse carriage.
[92]One *marla* is equal to 0,0025 ha.

usually permanent land laborers, live in the main village in houses provided by employer landowners.

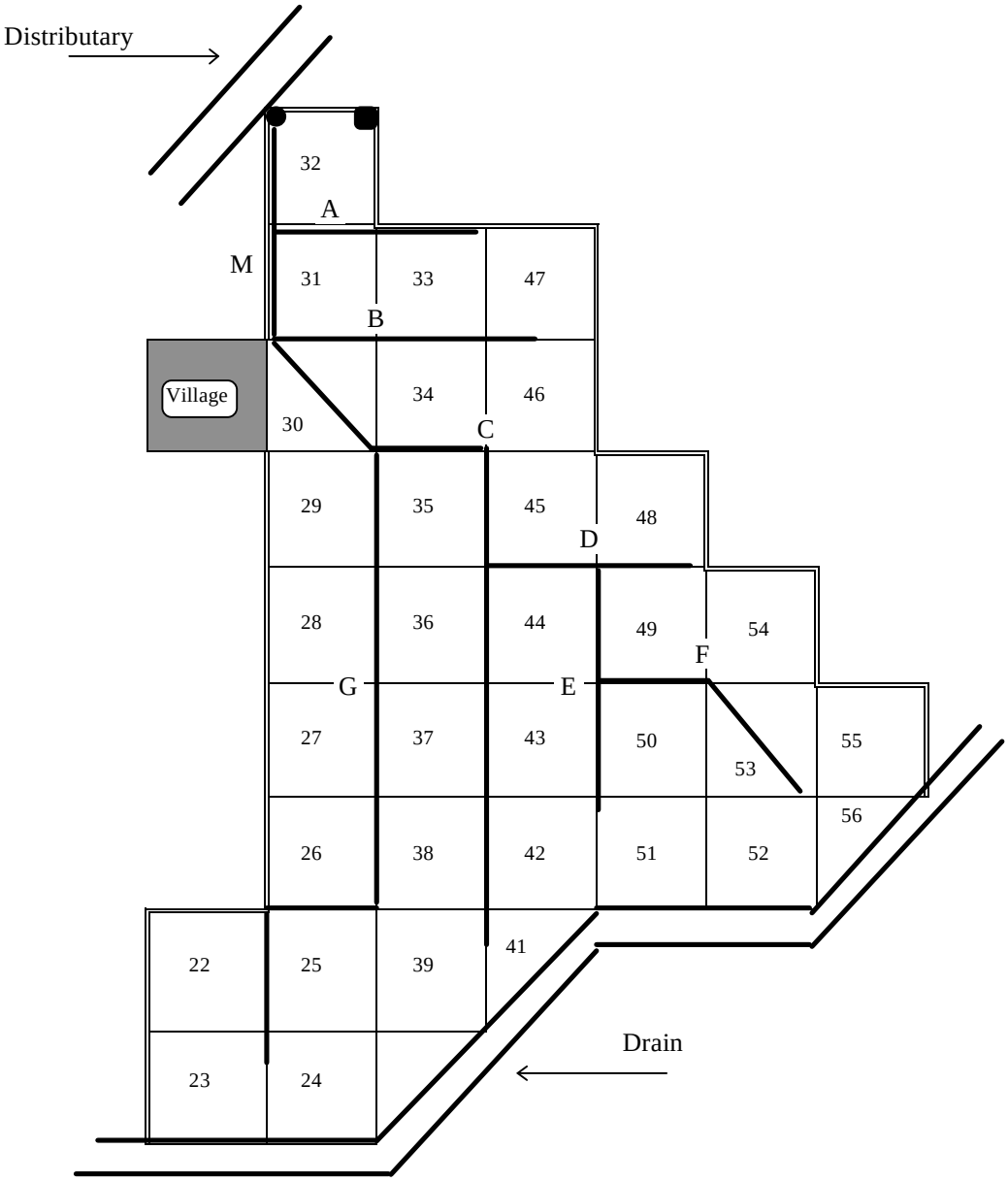
The village commands an area of 1450 acres, of which 1391 acres are under cultivation, whereas the remaining 131 acres are being used for residence and different government institutions. 100 percent of the land is **irrigated** by canal water supplemented by one public and many private tube-wells. The main cash crop and, hence, the major source of income is citrus grown in orchards which occupy about 80 percent of the total cultivated land. Two watercourses carry water to the total command area of the village. Due to their location, these watercourses are differentiated by their calling names: *´sharqi´* (on the eastern side) and *´gharbi´* (on the western side).

4.2.1.2 Watercourse Layout and Command Area

The watercourse investigated, locally known as ´**sharqi *khal*´**[93], has an actual gross area of 862 acres. Out of the total area, 794 acres are under plow, while the remaining 68 acres are used for residence (43 acres), graveyard (6 acres) and government institutions such as boys´ and girls´ schools, Primary Health Center, etc. (19 acres)[94]. The watercourse commands a **relatively larger area** than the average in Pakistan (about 400 acres) which are regarded as being difficult to organize by the socially heterogeneous farmer. This larger area affects the degree of cohesion and conflict among different *´biraderi´* groups within the watercourse command and, hence, the improvement and maintenance activities, too (BOTTRALL 1981:209). The *mogha* and SCARP tube-well are both located at the head of the watercourse. The general details and layout of the watercourse are presented in Diagram 6.

[93]*´Mashraq´* is the Urdu synonym for east, and *´sharqi´* is derived from it. The watercourse is called *´Khal´* in Punjabi.
[94]The data is based on the author´s own survey.

Diagram 6: Physical Layout of the Watercourse



Notes: ● = ´*Mogha*´ - Canal outlet,■ = SCARP tube-well, 22, 23, ..., 56 - *murabah* numbers, A, B, ..., M - watercourse branches, == Boundary of command area

Source: Adapted from BOWERS et al. 1977:9.

To distribute water in the command area, the watercourse is divided into **several branches**. The letters along these sections indicate the designations given to these branches and are in order of the irrigation turns assigned in the ´*warabandi*´[95] schedule. The branch which receives water from the *mogha* and the public tube-well is named ´main

[95]A detailed discussion over ´*warabandi*´follows in section 4.2.1.4

branch´, denoted by ´M´ in the figure. All other branches have their specific names, depicting mostly their dominant character. Branch ´A´ is locally known as „*Santalian Wali*“, the branch which irrigates square number forty-seven (´santali´ in Punjabi), along with others. Branch ´B´ is called „*Qabrastan Wali*,“ the branch which passes through graveyard (*Qabrastan*). The third branch marked as ´C´ is famous among the farmers as „*Mehloan Wali*“. It derives name from that of the ancestral village of a Gujar kinship group who has most of their land on this branch. The branch supplying water to squares 45, 48, 49 and 54 (branch ´D´ in the figure) is locally familiar as „*Qureshian Wali*“ because most of the landholders on this branch are qureshi-syed[96]. „*Mehran Wali*“ is the local term used for branch ´E´ and derives its name from a sub-caste of Gujars. Branch ´F´ is named after „*Sabo Wal*,“ as the biggest farmer of this branch had migrated from the village of Sabo Wal. The branch towards the end of the tail reach, ´G´, is known as „*Adhian Wali*“. Most of the allottees there were given half (´*Adha*´ in Punjabi) a square of land when the village was settled. It is important to note, here, that **branch names indicate some concentration of caste groups** in some particular locations along the watercourse. This locational concentration helps to identify the areas of interest as well as those of power/influence, which definitely affect the activities concerning water management, on the one hand, and improvement and rehabilitation process, on the other hand.

The *mogha* (2.75 cusecs) and the SCARP tube-well (2.70 cusecs) are jointly supplying 5.45 cusecs of water for irrigation purposes. According to a water management survey in Pakistan, the **conveyance efficiency** of watercourses receiving water supply from canal and public tube-wells, is about 47 percent, which is less than 54 percent of the commands receiving only canal water and considerably less than 59 percent of the watercourses where private tube-well are the only source of water supply (LOWDERMILK et al. 1978 Vol. I:6). The watercourse studied falls into the category of watercourses with the **lowest conveyance efficiency**. It should be noted, as highlighted by empirical studies in Pakistan, that in SCARP areas where water is relatively abundant, although more water is wasted, the quality of cooperative activities for watercourse maintenance is poorer, there, than in non-SCARP areas (MIRZA & MERREY 1979:13).

In addition to public sources of water, there are twelve **private tube-wells** installed along the watercourse to meet the farmers´ increasing needs for crop production. For detailed information about the location of private tube-wells, see Diagram 8. All of them are unevenly scattered over the command area, but their concentration at the tail reach is more evident, confirming the general thesis of shortage of water at the tail end (MANIG 1994:252). The distribution of private tube-wells along the watercourse is as follows:

Head reach = 1, Middle reach = 4, Tail reach = 7

Six of these tube-wells have been installed recently while the others have been functioning since the mid seventies. According to key informants, just after the rehabilitation of the watercourse, all the private tube-wells were put out of work, due mainly to a better supply

[96]The villagers treat syed as one caste group and address them as ´shah´ without differentiating between syed and qureshy. The syed, on the other side, differentiate themselves from qureshy, at least in calling names, and clearly say qureshy instead of syed. At the ´*biraderi*´ level, they treat them as group associates.

from the canal and the SCARP tube-well, and due also to **improved conveyance facilities**. The water users reported that during and some time after the rehabilitation of the watercourse, they used to get a good supply of canal water. As long as Mona project staff and foreign experts frequently visited the watercourse for research and impact studies, the better supply of water remained constant. As time passed, the frequency of such visits was reduced, and as a result, the supply also decreased and returned to its old routine. A better supply of water leads to better **cropping patterns and intensity**, and to maintain it, the water users installed some additional private tube-wells. The oldest one, however, was installed in 1971. Most of these tube-wells are irrigating owners´ lands; the sale of private tube-well water is very rare. The installation of twelve small private tube-wells have allowed the water users to maintain higher irrigation frequencies and cropping intensities than would otherwise have been possible.

During the **rehabilitation program,** all the culverts, check, convert structures and field outlets were built in concrete and cement, at government expense. The main branch (*Sarkari Khal*) and branch B of the watercourse are completely lined, whereas branches C and G are partially lined. This lining was done by the Mona Reclamation Experimental Project (MREP) on an experimental basis at different intervals. The **farmers provided their share in the form of labor** but did not contribute in monetary form, which is contradictory to the general practice of the watercourse lining program in Pakistan. At present, about 39.5 acres of the watercourse are lined.

Being located towards the **end of the canal distributary**[97], the water users are facing a great problem of silt accumulation and its removal, which, along with other organizational factors, has been causing difficulty in O&M activities. To deal with the problem technically, at the head reach, adjacent to the *mogha*, a 150 feet long „**sediment trap**" has been constructed which is a foot deeper and about two feet wider than the rest of the watercourse. Almost 60-80 percent of the silt is deposited there, this facilitates the cleaning of the rest of the watercourse.

Before its improvement, the animals entering the watercourse to drink or bathe were the primary cause for the destruction of the banks. As a solution, four „**buffalo baths**" have been constructed along the watercourse, one in the head and one in the middle, and two in the tail section. As a result, the danger of animals damaging the watercourse has almost disappeared. This has helped to reduce the occasions of **disputes over ruptures** caused by animal trespassing. In the past, such damages caused by the animals have been one of the main sources of water wastage. The buffalo baths are providing comparatively large place to animals as compared to watercourse to lay in, to rub their bodies and to dive into for a longer time, especially during the hot summers. The buffalo baths also function as a **trap for silt, pieces of wood, grass, leaves**, etc., allowing a steady flow of water in the rest of the watercourse. During the joint cleaning of the watercourse, the buffalo baths are cleaned

[97]It is the general practice in Punjab to mention the location of one´s farm if it is situated at the tail of the canal/distributary. This geographical location among the farming community is commonly known as ´tailan,´ derived from tail. To have land at ´tailan,´ indicates generally some physical characteristics, of which less water supply and difficult accessibility are the general ones. In the case of the watercourse studied, accessibility, however, is not a problem.

thoroughly. They serve as water store when water is not flowing in that particular location of the watercourse. When these buffalo baths are totally dry or half filled, they cause a loss of water to the farmers during whose turn they are refilled, because water flows further only when these structures are filled to a specific level, i.e., that which is equivalent to the level of the watercourse downstream. The farmers with small landholdings are sometimes adversely affected when this happens during their turn of being supplied with water. Before the construction of these buffalo baths, there were four ponds on the outskirts of the residential area which were used for the purposes now served by the buffalo baths. Due to stagnant water, they were regularly causiing mosquitoes and other insects, which were a constant danger to the health of the villagers, to proliferate.

A **latent function** served by these buffalo baths is the provision of an extra meeting place to the shareholders of that reach. There, they discuss their day-to-day problems in a much more relaxed way, as they use the time for **two purposes** simultaneously; for bathing/watering the animals and for exchanging views. As buffalo baths are not very big and do not allow many shareholders to utilize them at one time, they foster an atmosphere for some discrete discussions, clarifications, development of intimate relations, etc., and sometimes for lobbying, too.

4.2.1.3 Supply of Water

The farms located on this watercourse are **supplied water from two public sources, namely the canal and the SCARP tube-well**. The canal water supply began with the construction of the Lower Jehlum Canal in the early 1900s, whereas the SCARP tube-well has been supplying water to the command area since 1965. Because of the serious problems of waterlogging and salinity, the area of *Chaj doab* was selected as the site for SCARP II program and the tube-well on the studied watercourse was installed as a part of this program. The installation of the tube-well had **two purposes**: a) to provide an additional supply of water for land reclamation and intensification of land use and, b) to lower the underground water table to reduce waterlogging (WOLF 1986:3, MERREY 1986-a:14, MERREY 1986-b:26, MERREY 1986-c:50).

Both water sources are **managed by two separate institutions**, i.e., the Irrigation Department (ID) and the WAPDA. The ID is responsible for the supply of canal water, whereas the SCARP tube-well is under the responsibility of the WAPDA. The two sources are organized on a different geographical basis which, according to BOTTRAL (1985), is „quite illogical“ as their „objective of conjunctive water distribution and use clearly demands that they are operated in a as integrated a manner as possible“ (1985:16). The farmers do not receive any information from the ID regarding changes in the supply of water or closure of the canal,. Although the time of closure for annual repairs and maintenance of the canal system is fixed, it is not followed strictly. The farmers are not informed about any proposed closures and fluctuations in the supply of water.

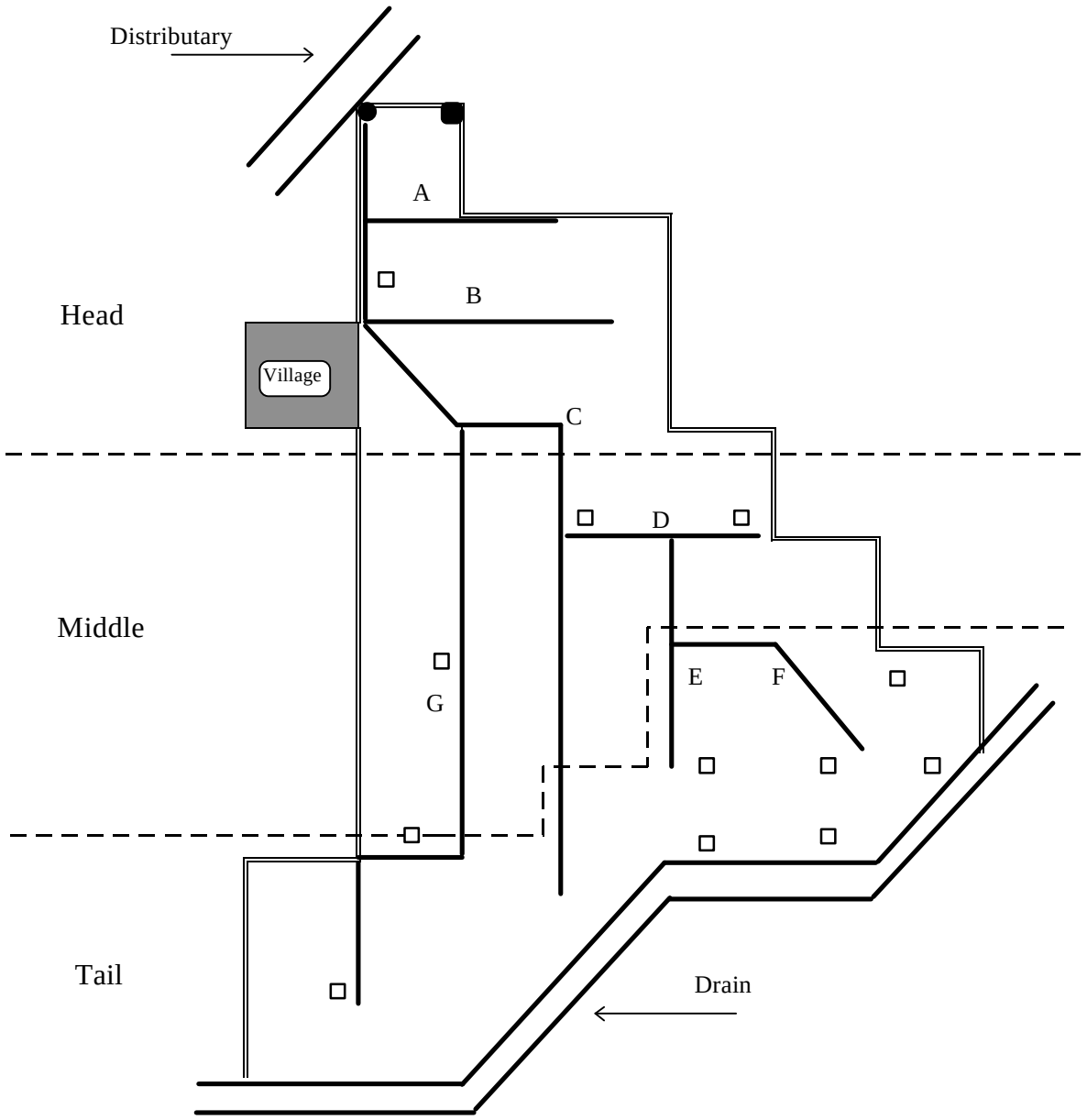
This situation is **highly problematic** for the farmers, as they have to contact several organizations simultaneously. This unorganized distribution of activities between various organizations keeps the water users in a puzzle. For any problem regarding canal water,

they run after the ID officials; when there is a technical defect in the tube-well machinery, they are advised to contact the SCARP authorities and, to get a regular supply of electricity (which is very rare) for the tube-well, they have to apply to the WAPDA.

At present the **functioning of the SCARP tube-well is so poor** that the great majority of the farmers was found to be dissatisfied with the existing water supply. Due to a general shortage of electricity in the country, load-shedding is normally practiced. As a result, the tube-well remains off between 17-21 hours. The farmers having their turns during that time have to rely just on canal water, which is definitely insufficient. The disadvantaged farmers are demanding a rescheduling of this closure time so that this loss of water is borne by all the shareholders. Some of them claimed that they are supplied water from only one source, as the other does not function either, but have to pay water-tax for both sources, which is unfair.

To assure a **better supply and control of water** to their crops, the farmers are making an intensive use of private tube-wells. Private tube-wells are installed at all reaches of the watercourse, with a different intensity of concentration. Diagram 7 clearly shows their concentration at the tail reach, whereas the middle and head reaches have a relatively lesser number of private tube-wells.

Diagram 7: Location of Private Tube-wells in the Command Area



Notes: ● = canal outlet, ■ = SCARP tube-well, □ = Private tube-well, - - - Dividing line,

A, B, ... , M - watercourse branches; == Boundary of command area;

Source: Adapted from BOWERS et al. 1977:9.

The **uncertainty of water supply** from public sources has increased so much that ´the proviso in the rule became the rule itself´. The installation of private tube-wells can be regarded as an effort to confront this ´rule´ and to overcome the problem of unpredictable water supply. The tube-wells are not only providing an additional amount of water, but are

also making the management of water relatively flexible in the sense that it is available where and when it is required (BERGER 1986:54f).

4.2.1.4 Distribution of Water: Warabandi

The main system of water distribution in practice in the area and on the watercourse is *´warabandi´*. The term ***´warabandi´*** is a combination of two words: ´wara´ originates from the Punjabi language and means ´turn,´ and ´bandi´ (originally an Urdu word which is also used in Punjabi) means ´to fix.´ Following SINGH (1981) and MALHOTRA (1982), *´warabandi´* has been defined by BANDARAGODA & SAEED-UR-REHMAN as „ ... a rotational method for equitable distribution of the available water in an irrigation system by turns fixed according to a predetermined schedule specifying the day, time and duration of supply to each irrigator to the size of his holding in the outlet command" (1995:17). The **water-rights allotted** to an individual water user are delegated through the *´warabandi´* system. Such water rights can only be used for the land upon which they have been conferred (BERGER 1986:90-91). The term refers to a water distribution system which is **extensively used in canal commands in Pakistan and in India**. The system is basically developed for rationing irrigation water and distributing it widely and equitably. The scarcity of water in relation to its requirement for a relatively large area is a conspicuous characteristic of this distribution system. According to MALHOTRA (1984)[98], in this distribution pattern, the whole of the water supplied from a canal to a command area is rationed according to a seven-day schedule. This means that every water user has access to his share of water **after an interval of seven days**. The available supply of water is equally distributed among all the shareholders of the command area in direct proportion to their landholdings. In the allotted time, measured by dividing the total hours of a week by the total acreage of the command, every water user has sole access to the water flow during his turn. The rotation begins at the start or head and proceeds to the tail of the watercourse command. Although, theoretically, water distribution is fixed through *´warabandi´*, practically, an equitable and efficient water distribution at the watercourse is influenced by the **prevailing social structure of the water users, land tenure patterns, land fragmentation and position of the individual water user in the command area** (BERGER 1986:92).

The water users on the watercourse reported about **two types of *´warabandi´*** which they have used over time. The type practiced in the past was decided by the farmers only, through their mutual understanding, without any intervention by the ID, it is known as *´katcha warabandi,´* whereas, the *warabandi* being used today is known as ´pakka *warabandi´*; this is the regulated and fixed schedule of water distribution decided by the ID.

Until the early 1950´s, the distribution of water on the watercourse was done according to ***´katcha warabandi,´*** as reported by the water users. There prevails some uncertainty about the exact year of switching over from *katcha* to pakka *´warabandi,´* as some water users told that it was changed some forty years ago, whereas others were of the opinion that it

[98]Cited in MERREY 1990:948.

happened some fifty years ago. Most of the elderly water users were, however, of the mind that the *´warabandi´* was switched over somewhere in the early fifties. *´Katcha warabandi,´* the synonym of which in English is **ordinary, informal and unregulated**, was decided by the water users solely on their mutual agreement. This type excludes the involvement of the ID or of any other government agency in the distribution of water among water users. ´Pakka *warabandi,´* on the other hand, is decided and fixed by the ID, usually after some field investigation and public inquiry (BANDARAGODA & SAEED-UR-REHMAN 1995:19, BERGER 1986:89f).

In *´katcha warabandi,´* the sole responsibility of distributing the available supply of water from the source (canal and/or public tube-well) lies with the water users. *´Katcha warabandi´* is characterized as **an unregulated and informal rotatory system** under which the share of water of every shareholder is **fixed by the water users themselves**. These shares used to be fixed by applying the traditional time measurement method commonly known as ´pehr´ and ´pau.´ A day was divided into eight ´pehrs´, one ´pehr´ being equal to about three hours. The daylight hours were divided into four pehrs and the night also in four. A pehr was further divided into four equal quarters, termed ´pau.´ According to *´katcha warabandi,´* the order of turns was fixed, but not the days, and subsequently the specific time as well. If canal water was regularly available, the pattern of turns used to acquire **a quasi regularity** in terms of days and time. When the water supply is interrupted, the water user who would have had his turn when it went off, used to be first to get his turn to start the rotation, when the water returned. When the duration of one´s turn is over, the water supply is made to be possible to the water user whose turn is next. Due to inexactitude of pehr´s start and end and the lack of watches, the specific time to deliver the water to the next cultivator used to cause confusions leading to quarrels and disputes. The water user next in turn usually tried to get water as early as possible, whereas the former one used to extend his turn, causing delays through argumentation about the exactness of the specific point of time. The larger *´biraderi*s,´ by virtue of their numerical strength and land ownership, were enjoying an advantageous position in *´katcha warabandi´*. Everyone had to be at the point of transfer of water before time to avoid any deliberate delay.

In *´katcha warabandi´*, all the main **kinship groups** were allotted a certain amount of ´pehrs,´ according to their collective land, which was regulated internally by themselves. With the division of land into small parcels among the descendants and a subsequent increase in the number of water users, the equitable distribution of water among kins became a difficult job to accomplish. Due to smaller parcels of land to feed larger families, every water user was trying to maximize land use with a maximum application of water. Disputes over water took place daily. Along with internal problems of the larger kin groups, the disputes over water with smaller groups also increased. The larger *´biraderi*s,´ by virtue of their influence and power, were **misusing this informal and unofficial *´warabandi´*** by using more water than their shares. This rotatory system was regulated on a fortnightly basis, i.e., every water user used to receive his share of water after every fourteen days. If a crop was not irrigated during a turn, the next turn was after fourteen

days, and most of the crops did not stand this long shortage of water which affected their yield. The new hybrid varieties require a steady supply of water after some specific periods, so they cannot be successfully cultivated according to *´katcha warabandi.´* Moreover the **social injustice** regarding the acquisition of water at farm level was very common. The situation described above was negatively affecting the smallerholders. According to informants, this led the smaller farmers to apply for an official and legal *warabandi*, as they were unsatisfied with *´katcha warabandi.´*

Due to non-existence of formal fixed patterns of water distribution and settlement of disputes, the social atmosphere was often tense, although there had been an **informal traditional institution** in the form of *´Panchayat´* (an assembly of village elders and larger farmers to settle disputes informally) which was usually dominated by some interest groups of larger farmers. Moreover, the *´katcha warabandi´* itself was prone to exploitation by larger landowners (BANDARAGODA & SAEED-UR-REHMAN 1995:19) The complaints of the small farmers were not usually dealt with with justice, so they had to endure. Due to shortfalls in the institution of *´Panchayat´*, as the mentioned above, it has lost its general validity in rural areas.

In *´katcha warabandi,´* water was **allotted to individuals or groups of individuals, instead of tracts of land**. The time was calculated according to the irrigator´s total landholding, regardless of the fragmentation and scattering of the land parcels. While distributing the water in this unregulated and informal rotatory system, due attention was paid to the type of soil texture, elevation of the farm and the water user´s position in the command area. The sandy, highly elevated farms used to be allotted extra time, as was also the case for those towards the tail of the system. Such differentials used to attract more attention where the water users were on friendly and cooperative terms with each other.

Due to the dissatisfaction of some of the water users, overwhelmingly small landowners, with *´katcha warabandi,´* an application was filed to the ID for a **change from *´katcha´* to ´pakka´ rotatory system**. The main reason told by the water users was inequity in water distribution where a poor follow up made the situation more complex. The basic motive for this change was to ensure equity and also „to prevent exploitation of the weak by the strong, or of tail-enders by head-enders (CHAUDHRY & YOUNG 1989)[99].

According to **´pakka *warabandi*,´** every landholder on the watercourse has a fixed day, time and duration for his share of water supply. These turns are fixed and cannot be changed by any means, except on request by the ID. Due to the easy availability of watches and a fixed, publicly known in the form of written rotational schedule describing duration and day of each turn, no one can deny the delivery of water to the next in turn. The water is allotted to each individual farm according to its proportionate share measured in relation to the size of acreage. Moreover, water is **allotted to parcels of land and not to individuals or groups of individuals** such as extended family, kin groups, caste or *´biraderi´* groups. In case the land is rented out, the *´warabandi´* rights and the watercourse maintenance responsibilities are shifted to the person who has rented-in the land (BERGER

[99]Cited by BANDARAGODA & SAEED-UR-REHMAN 1995:26.

1986:92). When water is distributed in ´pakka *warabandi,´* the distance of a farm from the source of water has been considered by allotting some extra lead time for filling the watercourse. Elevation and soil texture are not regarded as being so important that some additional time is allowed to overcome these natural deficiencies. ´Pakka *warabandi´* **shifts twelve hours annually** to provide to night-irrigators in one duration the facility to irrigate during the day in the following term. This shift takes place on the 1st of April of every year. The shifting of time does not apply for SCARP tube-well operations. The SCARP tube-well remains off during 17-21 hours in the evening, causing a regular loss of additional water supply to the water users whose turns lie in this span of time. Due to the **annual shifts** in the *´warabandi,´* there is no doubt that the users enduring such disadvantages get some relief for a period of one year, but the overall number and group of disadvantaged users remains constant. The farmers demand the same shift in the closure timing of the SCARP tube-well too.

The procedure of **taking and delivering water** has become easier as compared to *´katcha warabandi.´* There exists no confusion about the specific points of time for transfering water. Every one knows exactly when one´s turn will commence and when the next irrigator´s turn begins. Due to the availability of watches, there occurs no confusion causing any undue dialogues between the water users over the transfer of water. If somebody needs some extra water for some genuine reason, he has to request the user whose turn is next and gets it only through the latter´s will and consent. Due to the **improvement of the watercourse infrastructure**, the water user next in turn does not have to repair the shortfalls in the water channel; in the past, this was necessary before his turn started. It was observed that the next water user used to come just five to ten minutes before the end of the former´s turn. Most of the water users were found to be satisfied with the ´pakka *warabandi´*, apart from complaints about the operation of SCARP tube-well, in general, and about its closure timing, in particular. The small landowners emphasized that they are getting their due share of water at the right time, for the time allotted to them, when water is available in the system at all.

An elderly syed complained about the **internal arrangements** of ´pakka *warabandi,´* which, according to him, are not following the ID regulations. He was of the view that their internal distribution of water is being regulated by following the farm to farm and from field outlet to field outlet system of water supply. To oversimplify, some water users are delivering water to the next water user at the end of their farm area, whereas others transport the water to the field outlet of the next in turn. THe point he emphasized was that both systems cannot be practiced simultaneously. Either of the two approaches should be used for regulating ´pakka *warabandi.´*

The rotation is based on a **weekly basis**, thus helping the water users to irrigate even those crops which they failed to irrigate in the last turn. In the beginning, it was difficult for the farmers to cope with new model, but as time passes and by experiencing its benefits, they are satisfied with the new system, as the water users stated. Moreover, they said that through **mutual barter system** of water, they have partially overcome the rigidity of ´pakka *warabandi.´* The regular distribution of land to next generations is causing farm

areas to become smaller and smaller, and the allocation of irrigation time to decrease further. In this situation, the legitimacy and effectiveness of formal ´*warabandi*´ for a longer period of time is becoming more suspicious and uncertain (MERREY 1987:21). After switching from ´*katcha*´ to ´pakka *warabandi,*´ the conflicts over water have decreased considerably. These conflicts did not lead to any major problem in the past, nor do they do so at present.

The **operation and maintenance** activities were performed collectively and cooperatively by all the water users in ´*katcha*´ and ´pakka *warabandi*.´ According to the water users, no changes occurred in the management and operation of cleaning and maintenance activities as a result of the shift.

4.2.2 Socio-economic Characteristics of the Water Users

The main purpose of presenting a detailed account of the socio-economic characteristics of water users in this section is, **firstly**, to prepare a hypothetical base for the analysis of factors influencing the water users´ participatory behavior in the next chapter and, **secondly**, to provide basic background information to comprehend the processes of organization of the Water Users´ Associations and participation of the water users in the WUA in the study area.

The management activities of irrigation water are directly affected by various socioeconomic characteristics of the water users such as structure of **social organization, patterns of power/ influence, conflict management, decision-making, landownership, landholding patterns** and, last but not least, the ability to organize collective action through water users´ participation. In rural communities like the one studied, the knowledge of physical and agronomic problems „without probing into underlying social organization is like attempting to understand deficiencies in plant growth without reference to conditions of climate“ (LOWDERMILK et al. 1978 Vol. IV:176).

In this section, some selected background information - relevant to the subject - about water users[100] are presented. To serve the purpose, at first, the **social organization of water users** is given particular consideration. Thereby, emphasis will be laid on land rights, which will be followed by landholding patterns and land tenure mechanisms. The discussion would be incomplete without providing information about cropping patterns and intensity as well as about the supply and distribution of water. Therefore, these facrors will be dealt in detail towards the end of the section.

4.2.2.1 The Water Users´ Societal Patterns

As other communities of rural Punjab, the water users on the watercourse are **socially and economically stratified**[101] and, hence, organized on the basis of caste and ´*biraderi*´

[100]The term ´water users´ will keep on being exchanged for ´farmers´ and ´shareholders´ throughout the study, where all these terms refer to actual or potential water users, whether as owner cultivator, sharecropper or contractor, who are responsible for the actual practical management of irrigation water at the watercourse.
[101]See BHATTI 1984:65.

groups, ethnicity, place of origin, religious sects, political affiliations, etc. The social groups in the village are based primarily upon the inter-kin and inter-caste hostilities/linkages and not upon differences in status with regard to land tenancy, as they are interdependent in terms of the latter (MIRZA et al. 1975:9). The ***´biraderi´*** **can be singled out as the most important social unit** both at the watercourse and the village levels, through which cooperative activities can be mobilized (LOWDERMILK Et al. 1978 Vol. IV:185). Moreover, the knowledge about existing patterns of inter and intra *´biraderi´* ties is important for understanding water management activities at watercourse level, because „patterns of cooperation and conflict are nearly always *´biraderi´* based" (MIRZA & MERREY 1979:11). The **number of *´biraderis´***[102] plays an important role for a successful organization in view of improvement and maintenance. In this regard, single *´biraderi´* watercourses are considered to be more successful for collective actions in comparison to multi-*´biraderi´* ones. The socioeconomic status of these *´biraderi´* groups is equally regarded as a relevant factor (ibid. 1979:11).

The **most important factor** found on the studied watercourse is the caste group which governs the water users´ social organization. The social network of the village, which primarily manages irrigation water at local level, consists basically of individual households which are stitched together to establish *´biraderi´* groups, who influence the management of water at watercourse level through their ability to make decisions and to exercise power/influence (LOWDERMILK et al. 1978 Vol. II:103). By searching deep into the caste system, one finds further subdivisions in the form of sub-caste, lineage and kinship groups. Moreover, the place of origin is also duly effective in the formation and reformation of social groups. On the basis of the **place of origin**, the village community is stratified into locals, settlers and refugees. Locals are those people who have been living there before the canal system was established in the area. The term ´settler´ refers to those who migrated to this area, when land in the area was allotted in the early 1900´s. The third category comprises those who fled from India to Pakistan at Partition, in 1947. A few shareholders on the watercourse lived in the area before the land was allotted under British Rule as well as a few refugees who were given land-rights after Partition. The details about farmers with reference to their origin are listed below in Table 5:

Table 5: Distribution of the WUs According to Place of Origin

	Local	Settler	Refugee
Number of the WUs	3	46	1
Percent of Total	6	92	2

Source: The author´s own survey

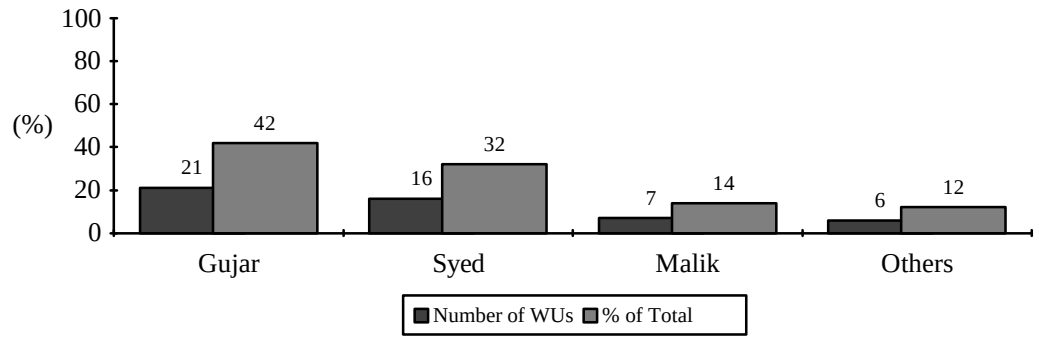
The **settlers and refugees may be ranked as being better than the original inhabitants** (locals) in managing the cooperative activities on the watercourse (MIRZA & MERREY

[102]Following EGLAR, the Punjabi terms used in the dissertation are pluralized by adding ´s´ (1960:28). Thereby, the plural of *´biraderi´* is *´biraderis´*.

1979:13). While reasoning out this difference, MIRZA & MERREY are not clear about the factors, but have labeled locals as quarrelsome and litigious. According to the author´s view, the disinterest for irrigation activities may be an outcome of their historical undervaluation of agricultural land and, hence, of irrigation water as well.

If the numerical domination of settlers is considered, the watercourse may not be misunderstood as comprising a homogeneous group of farmers. Contrary to this, there are **several caste groups** having land-ownership rights on the watercourse. These groups are namely Gujar, Syed, Malik, Raja, Arain and Kammis[103]. The size and percentage of each group is presented in Diagram 8.

Diagram 8: Caste Distribution of the WUs at the Watercourse



Source: The author´s own survey

Although there are **six different caste groups on the watercourse**, only three of them are numerically dominant, controlling jointly 88 percent of the total strength. These three caste groups exercise definitely a dominating influence on the watercourse, but this does not mean that all these caste groups enjoy an equal degree of **influence and prestige**. Regarding water management practices, in multi-*´biraderi´* networks, it may be difficult for farmers of a *biraderi* group to cooperate with farmers from other *´biraderi*s*´*. The underlying reason of this difficulty is that within a *´biraderi´*, the non-cooperative members, or formulated in other words, the violators can easily be punished as compared to the members of other *´biraderi*s*,´* because intra *´biraderi´* sanctions are easier to enforce than the inter *´biraderi´* ones. According to LOWDERMILK et al. (1978 Vol. IV:192), about seventy-nine percent of the farmers in their sample of forty watercourses are **moderately to highly bound by *´biraderi´* ties**. A brief description of these caste groups along with their main characteristics will help to grasp the scene more clearly.

The gujar are the largest caste group on the watercourse. They migrated there from different villages of the district Gujrat (Pakistan) and are usually identified and called by the name of their native village from which they had come from. For example, Gujars belong originally to three different villages and are called by the name of these villages, i.e., „Machiane Gujar“, „Sabo-walie Gujar“ and „Mehloan-walie Gujar“. Along with identification/stratification on the basis of village of origin, they are **internally**

[103]The Raja (1), Arain (1) and Kammis (4) are relatively smaller in number, therefore, are treated jointly under the one group named ´others´.

heterogeneous in terms of kinship groups and political factions. Despite these dissimilarities, they share, however, the same social and cultural background as they migrated there from different villages of the same area. As a caste group, they have a high social rank. The great majority of them are **practicing farmers**, whereas some are involved in small shopkeeping, low ranked government services, transport, etc. In terms of local political affiliations, gujars are not a homogeneous group and are divided into two factions. Within the caste group, they have **conflicts and disputes at various levels**. Despite all these internal stratifications, the gujars possess the important theoretical elements of dominance in the form of numerical strength and landholding, but practically they do not dominate the watercourse exclusively with regard to social status and influence. During the watercourse improvement activities, gujars participated actively under the supervision and motivation of their *´biraderi´* leaders. Two gujars were selected as Executive Committee members and used their influence and power to bring their *´biraderi´* associates to work and participate in the O&M activities.

With reference to numerical strength and landholding, **the syed are the second largest** *´biraderi´* on the watercourse. They are well respected in the village as landlords and due to high hierarchical position ascribed by religion and determined through their affinity with the Prophet (Peace be upon him). Theoretically they are considered superior to all other castes. Most of the syeds are agriculturists by occupation but are not considered competent cultivators by their companions, as their traditional occupation is preaching and imparting the religious knowledge. Like gujars, syeds are also **internally stratified on the basis of caste and kinship groups**. They cosist of the two caste groups; syed and qureshy. One of the various branches of the watercourse derives its name from the qureshy-syed. As a *´biraderi,´* they are considered as one group whereas they themselves differentiate from each other as syed and qureshi. Unlike others, syed are further divided on the basis of religious sects, i.e., **Shia and Sunni**. These cleavages are, however, not so tense that no social and cooperative activities take place between them. The syeds as a group are not very mobile and active in the socio-political spheres, rather they function as a part of the already existing factions of gujars and maliks. Due to their reasonable numerical strength and landholding, they are considered as an **effective group**. The faction which they join as *´biraderi´* members enhances the influence and prestige of that faction. Usually, they join the malik faction, as, at an early stage after settlement, their ancestors entertained more intimate social relations with the malik, as a tradition this is being maintained by their descendants.

Although **the malik hold the third position regarding numerical strength and landholding**, they are the most active factor of the social organization in the village and on the watercourse. Like a majority of the shareholders of this watercourse, the malik also fall in the category of settlers. All of them migrated there from the district the Gujrat. The malik constitute one kinship group and are not internally divided into factions; thus they are relatively more **homogeneous** than the gujar and the syed. Although, by comparison, they are less in number and hold less land, enjoy relatively more respect and influence within and outside the village. The elders of this caste group are thought to have more

ability to give advice and solve disputes. Having more educated ´*biraderi*´ members, they have fairly good connections with local government as well as MREP officials. The malik kinship group builds up and maintains an extensive **network of personal contacts and obligations;** this provides a store of useful **social capital** over time. This capital is usually utilized on very opportune occasions for important tasks. They use these connections and obligations to serve as effective lubricant to ´get the process right´ at local government level, on the one hand, and to accumulate and exercise social influence/prestige in the village, on the other hand. Keeping in view maliks contact with local officials and their effects at village level, one has to admit that personalism works. The complete lining of branch B, serving only the land of a highly educated malik, who is on **fairly good terms with MREP officials**, is an evident proof of this personalism. Due to their internal homogeneity, they are proud of their unity and consensus. On socio-political occasions, they make an effective use of this characteristic and are, most of the times, duly rewarded. For every cooperative activity at village level, not only is their participation essential, but they are constantly considered for **leadership roles**. The underlying reason of the maliks´ relative ´monopoly´ was the high cost of information. It is difficult for other farmers to maintain such a reservoir of information and regular contacts, as this costs a certain amount of money. For small farmers, this amount is usually too high, whereas others, like syed, consider it a misinvestment and/or a luxury which they do not consider worth paying.

Other castes on the watercourse consist mostly of just one farm; therefore, they usually cope with the decisions made by larger ones.

As no marriage was ever reported between the caste groups, this does not mean that they are not on good terms with each other. There did not exist any serious conflict between them. They jointly take part in most of the **social and cooperative activities** such as smoking the ´hukka´, visiting each other generally and at ceremonies particularly, trading of water, animals and equipment, etc. Some personality clashes do exist; however, at first glance they are difficult to observe. These personality conflicts are usually of petty nature and are strictly followed by the persons concerned. The general behavior of other ´*biraderi*´ associates regarding such conflicts is usually not of an extreme nature and varies according to the nature of the conflict.

In terms of social organization, one may summarise that the water users on the watercourse are highly stratified in terms of caste/´*biraderi*´ affiliations, political factions, religious sects, place of origin, power/influence, leadership and ethnicity. Such a socially heterogeneous group of water users is assumed to be partially suitable for participatory water management activities organized for a long term organized. A relatively large number of shareholders is also considered as problematic in comparison to a small number as „the smaller the group the greater the probability that community of interest can be established and conflict avoided within the group and lower the probability that it will be dominated by powerful members of the local elite“ (BOTTRALL 1981:202). Being based on their empirical findings, the same thesis has been confirmed by MIRZA & MERREY when they state that „the larger the number of shareholders on the watercourse, the more difficult it will be for them to organize and cooperate for watercourse work“ (1979:13).

4.2.2.2 Land Rights

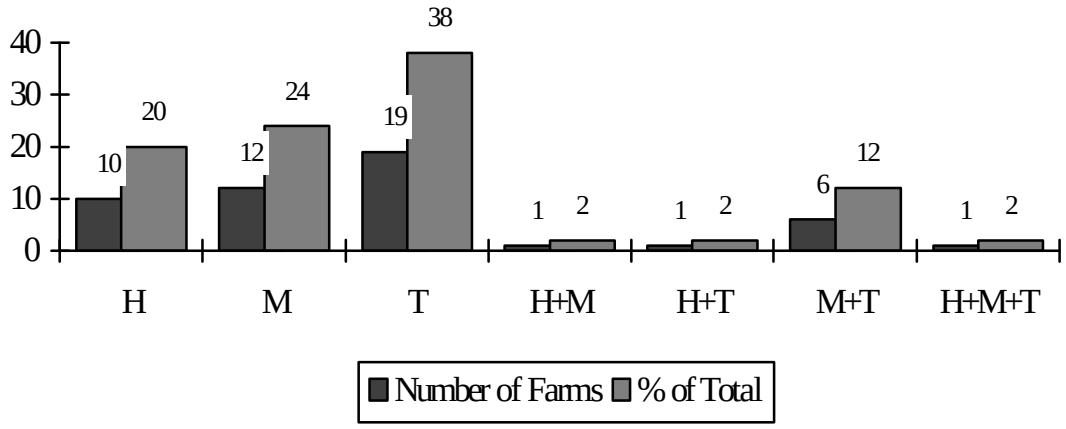
Land is abundant in the upland area of *Chaj doab* but its value has not been perceived. Hence, the locals were not greatly interested in land right there. Consequently, the claims on land by the local population during the **allotment** phase in the early 1900s´ were comparatively few, in some villages almost negligible, and were settled without any difficulty. The majority of settlers was recruited from northern districts of the Punjab, as they proved successful in **horse breeding**, the main condition of land allotment. Another important feature of the allotment was the peculiarity of the inheritance rule according to which land was not equally inherited by all sons; rather, ´**primogeniture rule**´ was practiced. This rule, however, is no longer retained. After the allotment of land in the early 1900´s, seventeen families obtained land rights in the watercourse command area. In a span of almost ninety years, the number of shareholders has increased three-fold, raising the numerical strength to fifty, mainly as a result of subdivision of land among the succeeding generations through inheritance.

As water use rights in canal colonies in Pakistan are always connected with land rights, the knowledge of land rights is important to understand water management activities at the watercourse level. Covering a relatively **larger command area** (794 acres) than the average in Pakistan[104], the watercourse can be ranked as a ´large´ watercourse, where the amount of water received by different water users may be affected by their location in the command area. This thesis is based on empirical findings provided by secondary data which suggest that the amount of water received by different water users along the watercourse varies as a function of the quality of maintenance and generally goes on decreasing as the distance from ´*mogha*´ increases (BOWERS et al. 1977:10).

This makes **location** a relevant factor which may affect water management activities as it affects both the amount and timing of water. On this basis, FREEMAN & SHINN (1989:75) developed a ´**locational bias hypothesis**´. This factor, in its relation to water users´ socioeconomic characteristics, will be discussed in detail hereunder. In Java, for example, the differences in social, economic, and geographical positions are also affecting water users´ access to water supply (SCHREVEL 1989:79). Considering location as a base, the distribution of the fifty farms along the watercourse is shown in Diagram 9.

[104]The command area covered by an average watercourse in Pakistan is equal to 400 acres (BOWERS et al. 1977:8)

Diagram 9: Farm Distribution Along the Watercourse



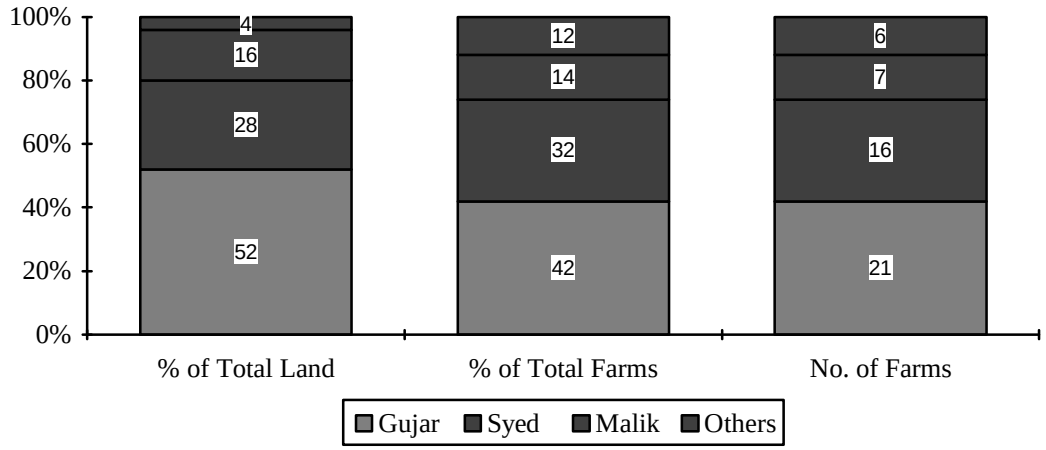
Notes: H - head; M - middle; T - tail.

Source: The author´s own survey

Unlike other watercourses in Punjab, the majority of the farms at the watercourse is **concentrated at the middle and tail** of the watercourse instead of near the sources of water, i.e., the *´mogha´* and the public tube-well. The greater distance of a large number of farms from the sources of water shows that they are not receiving their sanctioned share of water due to transport losses which are higher as a result of the poor condition of the watercourse. It is expected that middle and tail farmers will have more incentives to join the rehabilitation program, as farmers at these locations tend to benefit proportionally more from irrigation development projects (MIRZA & MERREY 1979:12). Due to the **fragmentation of land**, 18 percent of the farms are located on more than one reach of the watercourse; this fragmentation is less that which occurred in most areas in Pakistan. Out of **fifty farms**, forty-one constitute a single unit, eight consist of two units, and one farm, of three units.

The identification of locational concentration may help in identifying some **interest pockets** of specific water users, which can affect mobilization and the organization of cooperative activities. The lion´s share of the command area is owned by the gujar, followed by the syed and the malik. The gujar, at present, are holding ownership rights on 52 percent of the land on the watercourse and make up 42 percent of the total fifty farms. The syed and the malik own 28 and 16 percent of the total land with a number of 16 and 7 farms respectively. Four percent of the watercourse command area is owned by the rest, who jointly account for six farms. The landownership data with respect to caste and their percentage is shown in Diagram 10.

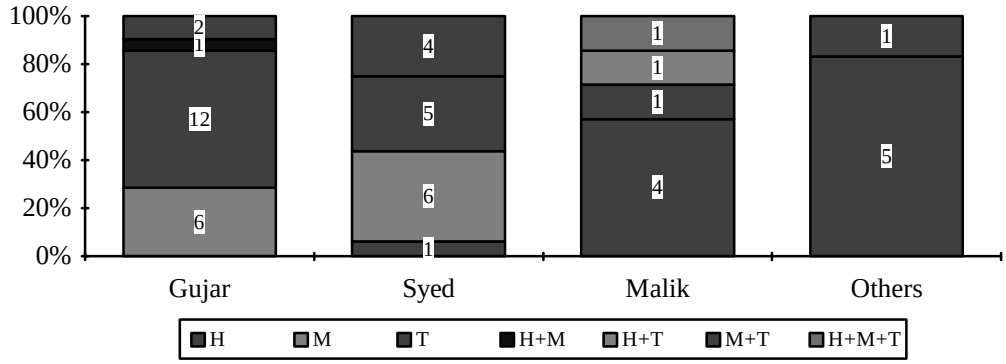
Diagram 10: Land Ownership Data by Caste Groups



Source: The author´s own survey

The land rights held by different caste groups are unevenly distributed along the watercourse; this confirms the **socio-economic stratification** within the watercourse command area. Although there is no visible concentration of any caste group at a specific location, some pockets, however, are identifiable. A further investigation of the watercourse helps to discover some caste concentration points.

Diagram 11: Caste Distribution Along the Watercourse



Notes: H - head; M - middle; T - tail.

Source: The author´s own survey

Diagram 11 shows that land at the **head reach** of the watercourse is owned by the syed, malik and other castes with 1, 4 and 5 farms respectively. Out of total 129 acres, 79.5 acres (about 62 percent) are owned by the malik, whereas the syed and others own 25 (about 19 percent) and 24.5 acres (about 19 percent). Although the number of ´other´ caste groups at the head reach is higher than those of the malik and the syed, they cannot be labeled as dominating in any sense. The group of ´others´ at this reach is composed of four ´kammis´ belonging to different caste and occupational groups who, being ´kammis´ and very small

landholders (2 acres each), are socio-economically dependent upon landowners. It is important to mention that, **according to the Land Alienation Act of 1901, non-agriculturists were forbidden to purchase land**, even the business class was not entitled to property rights either. After the creation of Pakistan, this act was abolished, and non-agriculturists were allowed to purchase land (EGLAR 1960:28). The fifth water user in this group is the only farmer on the watercourse who belongs to the Raja caste; therefore, he does not have much weight in the presence of ´*biraderi*´ groups whose numerical strength is substantially higher relatively. Only one farm at this location is owned by a syed. He is the same water user who, in the initial phase of the organization of the WUA, did not agree with the project program. Moreover, he is a ´Sufi-type´ man and is not judged by co-farmers to be a progressive farmer. All this makes the head reach an interest and influence pocket for the malik. Being relatively progressive farmers and equipped with socio-economic means, they have good prospects of causing rehabilitation activities to be concentrated there.

The **middle of the watercourse is equally dominated by gujars and syeds**. The amount of owned land, however, shows large differences, i.e., the gujar hold 212.5 acres (65 percent) out of a total 325 acres, whereas the remaining 122.5 acres (35 percent) are owned by the syed. It is important to note that the most active and sociable malik also has a parcel of his land at middle reach. The tail reach is again dominantly occupied by gujar farmers, with 5 farms owned by syed, 1 by malik and 1 by others. Most of the water users having their lands at the tail of the command area belong to the group of small landholders. One farm in the category of **head and middle reach** is owned by a gujar. There is only one farm fragmented between **head and tail** of the watercourse which is owned by a member of the malik ´*biraderi*´. Six of the shareholders (4 syed and 2 gujar) have their lands at both **middle and tail reaches** of the watercourse. The highest educated farmer, who belongs to the malik ´*biraderi*´ and who is also an active official of the WUA, has his land fragmented at all reaches of the watercourse, namely **head, middle and tail**.

According to FREEMAN & SHINN, caste concentration cannot be entertained as a rival hypothesis to location in connection with water control (1989:88), but according to the author´s empirical findings, it is equally relevant regarding matters of improvement and rehabilitation, especially, and O&M, generally, which definitely contributes to better **water control**. On the watercourse studied, those locations where the caste members of leading and influential water users are concentrated, have overwhelmingly been ´pakka´ improved. The branch ´B´ is a most relevant example in this connection.

The above-discussed location details tend to show that **improvement and rehabilitation** activities may concentrate at the head and middle reaches of the watercourse. The concentration of malik water users at head reach clearly indicates their area of interest which, as they would prefer, should be improved on a priority basis. The same applies to the middle section of the watercourse, where the gujar can be identified as dominating landowners.

4.2.2.3 Landholding

The basic reason for calculating the number of farms with different sizes was the thesis, obtained from the analysis of literature[105], that the farm size of a water user determines his **power and influence** which ultimately affects his level and intensity of participation in the Water Users´ Association, and his active or inactive role for the management of water at watercourse level, starting from planning to implementation and continuing in O&M.

After allotment, the watercourse command area has undergone a series of divisions and subdivisions over generations. In the early 1900´s, the total area of the watercourse was owned by seventeen shareholders, each owning about two squares of land. At present, the number of shareholders has reached fifty. Due to different **internal de-facto patterns of inheritance and purchase and sale of land**, the size of landholding varies between a minimum of 2 acres and a maximum of 63 acres, with an average farm size of 16 acres. The inheritance rules have usually enhanced the percentage of marginal farms (KUHNEN 1988:6). The average farm size on the watercourse is larger than the average in the Punjab and Pakistan (BOWERS et al. 1977:10).

With regard to farm-size, the landholdings on the watercourse are divided into four groups. This grouping is based on the local conception of the farmers on the watercourse who consider group one to four as ´**very small, small, medium and large**´, respectively. The ´very small´ category denotes those farms which have an area of >5 acres, ´small´ farms fall within the limits of 5 - >12.5 acres, ´medium´ represents the farm size from 12.5 to less than 25 acres and the ´large´ group is composed of those farms which have an area equivalent to 25 acres and above[106]. Table 6 shows the number and percentage of these groups, in comparison to national and regional conditions, as under:

[105]See, for example, MIRZA & MERREY 1979:10.

[106]When one follows KUHNEN´s (1989:517) breakdown of farm sizes, one could not find any ´large farms´ (described by him as having an area more than 60 ha). A great majority of the farmers fall in to categories of small (3 to 10 ha) and marginal (less than 3 ha), leaving a small number to comprise medium farms (10 to 60 ha).

Table 6: Number and Percentage of Farm Size Groups at National and Regional Levels and on the Watercourse Surveyed

Farm Size Groups	Pakistan[1]		Punjab[2]		Sargodha District[3]		Survey Watercourse[4]	
(Acres)	in ,000[a]	%[b]	in ,000[a]	%[b]	in ,000[a]	%[b]	n	%
> 5	2404	47.4	1342	45.4	25	27.8	7	14.0
5 - > 12.5	1701	33.5	1007	34.0	44	48.9	16	32.0
12.5 - > 25	622	12.3	405	13.7	14	15.6	14	28.0
25 <	344	6.8	203	6.9	7	7.7	13	26.0
Total	5071	100	2957	100	90	100	50	100

Notes: a. The figures presented in ,000 have been rounded up by the author
b. The author´s own calculations

Sources: 1. Adapted from GOVT. OF PAKISTAN, AGRICULTURAL CENSUS ORGANIZATION (1993), All Pakistan Report, Vol. 1, p. 3.
2. Adapted from GOVT. OF PAKISTAN, AGRICULTURAL CENSUS ORGANIZATION (1993), All Pakistan Report, Vol. 1. p. 87.
3. Adapted from GOVT. OF PAKISTAN, AGRICULTURAL CENSUS ORGANIZATION (1993), Punjab Provincial Report, Vol. II, Part-2, p. 7.
4. The author´s own survey.

According to the data presented in Table 6, the **percentage of larger farms is much higher** than that reported by the secondary data for the District Sargodha, which, anyway, was already higher than for the Punjab and Pakistan. The same applies to the smaller farms, but the other way round. The great majority of farms, i.e., 86 percent fall into the category of **economically viable holdings,** as less than 5 acres of land is perceived locally as being insufficient for the family´s subsistence. There is a great inequality in landholding, as more than half of the command area is owned by medium and large farms. The gap between the minimum and the maximum holding is quite large; the smallest farm holds only 2 acres, whereas the largest holds 63 acres. From Table 7, it is apparent that the watercourse, while having most of the farms in the range 5 - >25 acres, has a significant number of farms with more than 25 acres. Numerically, there are thirteen farms (26 percent) that have an acreage of more than 25 acres.

Table 7: Number and Percentage of Area under different Farm Size Groups at National and Regional Levels and on the Watercourse Surveyed

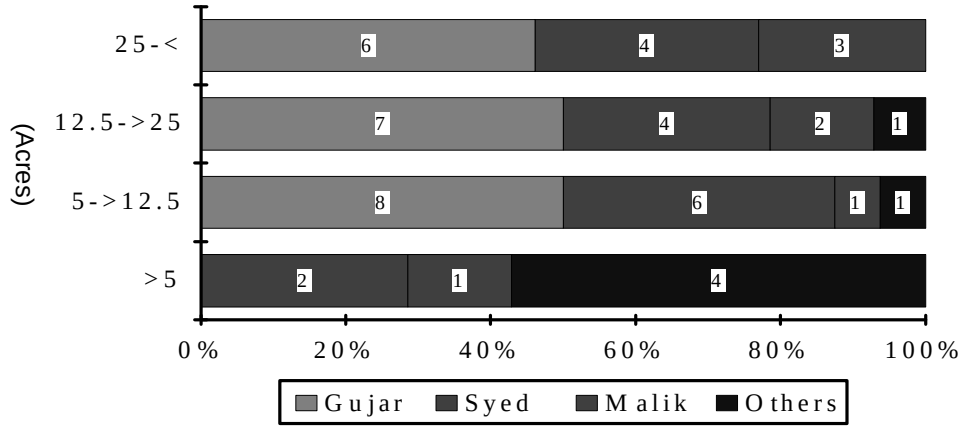
Farm Size Group (acres)	Pakistan[1]		Punjab[2]		Sargodha District[3]		Survey Watercourse[4]	
	m. acres[a]	%[b]	m. acres[a]	%[b]	,000 acres[a]	%[b]	n	%
> 5	5.3	11.2	3.0	11.0	65.0	6.6	17.3	2.0
5 - > 12.5	13.1	27.7	7.7	28.4	359.6	36.4	127.0	16.0
12.5 - > 25	10.2	21.6	6.6	24.0	236.4	24.0	222.3	28.0
25 <	18.7	39.5	9.8	36.2	325.2	33.0	427.8	54.0
Total	47.3	100	27.1	100	986.2	100	794.0	100

Notes: a. The figures presented in m. (million) and ,000 has been rounded up by the author
b. The author´s own calculations

Sources: 1. Adapted from GOVT. OF PAKISTAN, AGRICULTURAL CENSUS ORGANIZATION (1993), All Pakistan Report, Vol. 1, p. 7.
2. Adapted from GOVT. OF PAKISTAN, AGRICULTURAL CENSUS ORGANIZATION (1993), All Pakistan Report, Vol. 1. p. 191.
3. Adapted from GOVT. OF PAKISTAN, AGRICULTURAL CENSUS ORGANIZATION (1993), Punjab Provincial Report, Vol. II, Part-2, p. 74.
4. The author´s own survey.

The distribution of the total land on the watercourse among different caste groups on the watercourse has been sketched in Diagram 12.

Diagram 12: Farm and Farm sizes by Caste Groups



Source: The author´s own survey

It is obvious from Diagram 12 that the **gujar not only own the larger area on the watercourse, but that their farm size is also larger than others**. About 46 percent of the large farms with more than 25 acres are owned by the gujar only. The situation is almost the same in other farm size groups, except the smallest category of >5 acres, as none of the gujar falls into this category. In the land-holding groups ´small´ and ´medium,´ they own

50 percent of either group. The syed and the malik have their representation in all four categories of land-holding, although the frequency of appearance in different groups differs conspicuously. Of the sixteen farms owned by the syed, 50 percent are small farms and 25 percent fall into the category of medium sized farms, whereas most of the land owned by the malik belong to the medium and large groups of landholding, with a 2 and 3 farms respectively. The rest of the castes have most of their land in the smallest farm size category (66.66 percent) and are not represented in the larger group. The **average farm size owned by the gujar is about 20 acres**, by the syed 14 acres, by the malik 18.5 and by others 4.5 acres. As landholding is considered one of the main factors for determining the **socio-economic status** of a water user, the average size of landholding in different *´biraderi´* groups indicate clearly the prevailing hierarchy on the watercourse.

Landholding is as **unevenly distributed** among the various caste groups as its distribution along the watercourse. There is a total number of 10 farms at the head reach of the watercourse, of which 5, 1, 2 and 2 are very small, small, medium and large farms, respectively. The middle reach holds a total number of 12 farms which are situated along the watercourse and whose size is as follows:

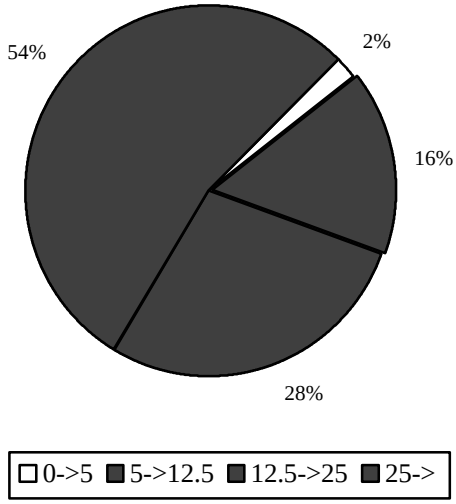
Small = 7, Medium = 2 and Large = 3.

The tail reach is the richest in respect of **farm number**, as 19 out of 50 farms lie in this section of the watercourse. Their further internal distribution is as follows: 2 of them constitute the very small farm size group whereas 6, 7 and 4 farms fall in the small, medium and large categories, respectively. It is important to note that, out of total 13 large farms, only four (30 percent) lie in the tail section. The distribution of farm size units along the watercourse confirms the general tendency of finding **more prosperous farmers closer to the head reach**. That is, they are clustered near the source of water and tend to dominate the head and middle of the watercourse. As a result, the farm size is positively correlated with the distance from the *mogha* and the public tube-well.

Due to **land fragmentation**, nine shareholders have their lands at more than one location on the watercourse. These nine farms belong to small (2), medium (3) and large (4) landholdings groups; none belongs to the very small. All the small and medium sized farms have their parcels at the middle and tail reaches of the watercourse, whereas one of the large farms also fall in this category. In other words, **six farms are fragmented** at middle and tail reaches. Of the remaining 3 farms, one is fragmented at all three reaches, while the other two are fragmented between head & middle and head & tail.

Another aspect relevant to landholding is the area occupied by each farm size group which depicts the distribution of total land in terms of **economic stratification or homogeneity** of shareholders. Most of the land is occupied by relatively larger farmers; this is contrary to the national average farm size (approximately 10 acres). Diagram 13 details the distribution of the command area with respect to farm size.

Diagram 13: Area Under Different Farm-size Groups (%)



Source: The author´s own survey

From Diagram 13, it is apparent that, although there are four farm sizes on the watercourse, about 54 percent (427.76 acres) of the area is occupied by **large farms** only. 54 percent of the command area is owned by thirteen farmers, who make up 26 percent of the total number of farmers. On the other hand, 46 percent of the command area is owned by 74 percent of the shareholders. The **inequality in landholding** is so great that seven farmers belonging to the category of very small farm-size own just 17.25 acres with an average of 2.46, acres whereas thirteen large farmers are own 427.76 acres, averaging 32.90 acres per head. The farm size groups medium and large account for 653.42 acres, whereas the remaining (140.58 acres) is owned by a number of 23 shareholders. The very small farms cover just 2 percent of the total command area of the watercourse, while small farms have a share of 16 percent in the total number of farms.

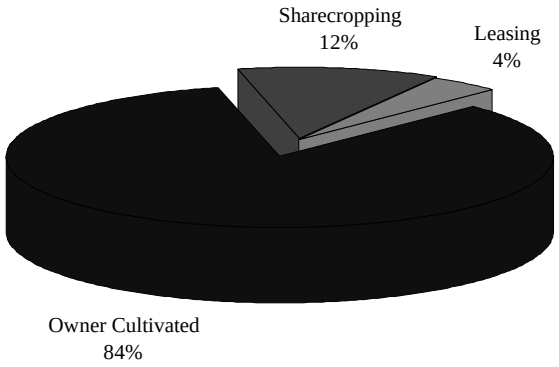
The landholding patterns characterize the watercourse as clearly clearly **dominated by larger farmers**, who, by virtue of their power/influence, are in a position to manipulate the improvement and maintenance activities to better serve their interests. It is expected, in regard to the above mentioned thesis that the initial watercourse improvement may be much more efficient than the long term O&M performance. Those sections of the watercourse where larger farmers are relatively more concentrated, i.e., head and middle of the watercourse, can secure a larger share of the rehabilitation activities.

4.2.2.4 Land Tenure

Water supply determines not only the cropping intensity but also the cropping patterns when a set pattern of crops has been found favorable for some specific tenure systems. A relevant example has been discussed by MANIG & KUHNEN, they are of the opinion that the cultivation of wheat in Pakistan is favorable for share-cropping, as it can be easily

controlled by the landowner (1986:35). Due to a **close link between technology and social relations in irrigation** (socio-technical system), the rehabilitation and maintenance of the system will definitely be affected by the existing tenure patterns, because the rights to use a parcel of land usually determines the water-rights. It is, therefore, necessary to examine land tenure patterns to find out how water users endowed with a different social status, determined by tenure patterns, participate in water management activities on the watercourse. Diagram 14 details the existing land tenure patterns of the watercourse studied.

Diagram 14: Land Tenure Patterns at the Watercourse



Source: The author´s own survey

The farm tenure pattern in Diagram 14 indicates that an overwhelming majority of farmers (84percent) cultivate their lands by themselves. This figure is very high in comparison to national and provincial (69 percent)[107] intensities. A small portion of the command area is cultivated by tenants whereas the number of contractors is very small or even negligible[108]. A small number of tenants and contractors suggests that an overwhelming majority of shareholders may be interested in improving the watercourse infrastructure from which they can profit for a long period of time. The majority of **owner-cultivators** makes the social structure at the watercourse homogeneous in terms of land tenure; this is considered to be a positive factor for collective actions. The owner-operators are usually more interested and, hence, are more concerned in the management of their channels. It is important, here, to mention that a great number of owner-cultivators is performing agricultural activities with the help of **permanently hired labor**. The big

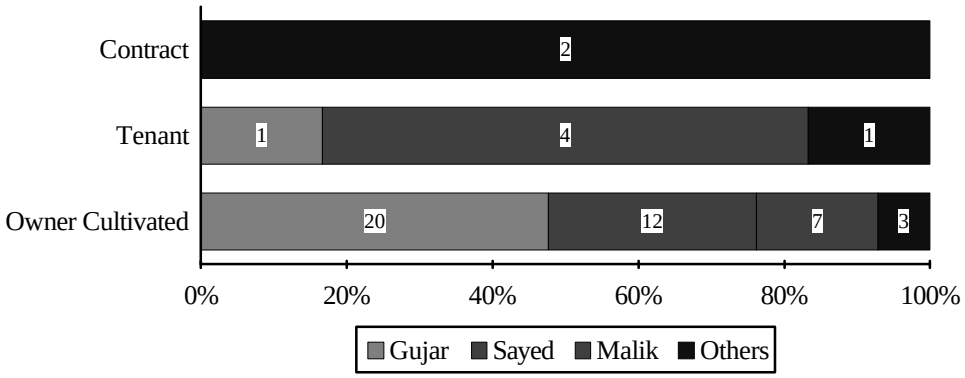
[107]Cf. GOVT. OF PAKISTAN, AGRICULTURAL CENSUS ORGANIZATION, 1990 Census of Agriculture, 1993, Vol. 1:3, 187.

[108]The other tenure categories like ´tenant´ and ´contractor´ cannot be compared with the tenure classification of the ´1990 Census of Agriculture´ as they do not coincide with that existing at the watercourse studied. The Census reports three main categories, i.e., owner, owner-cum-tenant and tenant, where sharecropping and leasing have been classified as sub-categories of owner-cum-tenant. At the watercourse investigated, there were also three categories, but with a different meaning. There sharecropping and leasing are dealt as independent tenure classes, instead of sub-category of owner-cum-tenant. Of significance is the fact that the owner-cum-tenant group does not exist at this watercourse. Moreover, the categorization followed in this study corresponds with that of HAYAMI & KIKUCHI who termed them as owner farming, sharecropping tenancy and leasehold tenancy (1981:29).

farmers usually employ labourers. Permanent labourers, i.e., servants, are supposed to do all kinds of work including agricultural, non-agricultural and domestic (BHATTI 1984:22). Hired labourers perform mostly those activities which require exhaustive muscle exercise or which are considered by the society to be of a low rank. This particular point is of vital importance for the operation and maintenance (O&M) activities of the watercourse which will be discussed later.

There is a **direct relationship** between the type of land tenure practiced by a farmer and his social status, as owner cultivators, in comparison to tenants and contractors, are in a better position to make the decisions and to implement them accordingly. Therefore, the **ascribed social status** has a great impact on the land tenure pattern and, ultimately, on the management of water at farm as well as at the watercourse level. Different caste groups, with different socio cultural and inherited characteristics, are practicing the above-mentioned forms of land tenure which are summarized in Diagram 15.

Diagram 15: Farm Tenure in Caste Groups



Source: The author´s own survey

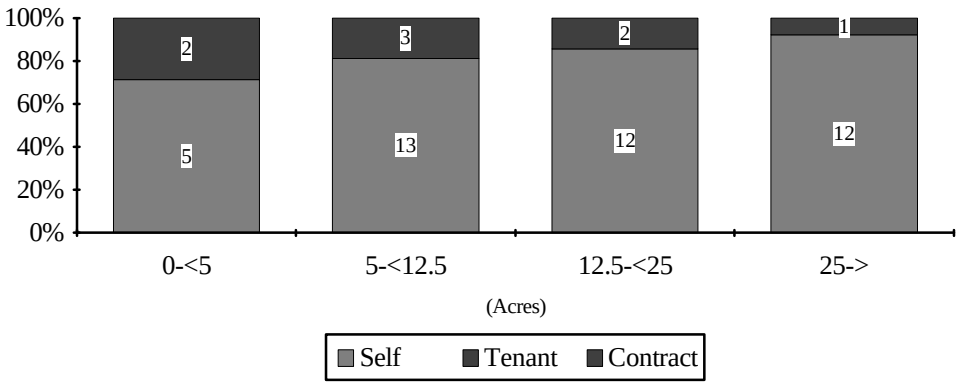
About **95 percent of the gujar cultivate their lands by themselves**. Out of twenty owner-cultivators, fifteen (75 percent) cultivate their lands with the help of servants, whereas only one gujar produces crops on his land through tenants. The syed practice two types of farm tenure: self-cultivation (75 percent) and sharecropping (25 percent). Owner-cultivators are further divided into two groups; pure owner-cultivators[109] and owner-cultivators with the help of servants. It is the malik who are 100 percent owner-cultivators, and all of them cultivate their land with the help of annually hired agricultural servants. In the group of ´other castes,´ all prevailing forms of tenure exist; three of them are purely owner-cultivator, two hold their lands on contractual terms, whereas one shares his produce with the tenant.

Several factors of irrigation water such as supply, equity, timing, etc., also have an impact on the land-tenure patterns, because the **patterns of artificial irrigation** exercise a considerable influence on land rights as well as on land use (MANIG 1995:8). A change in these factors may cause a change in land tenancy, as „a decrease in physical uncertainties due to assured water supplies may be upset by an increase in institutional uncertainties -

[109] Pure owner-cultivators refer to those who practice farming only with family labour.

e.g., in land tenure arrangements“ (HUPPERT 1980:374). In the past, relatively larger farmers used to have their lands cultivated by tenants or contractors. With the **partial mechanization** of agriculture on the watercourse, along with other factors, this trend has definitely declined to a reasonable degree. At present, a farm´s tenure pattern is mostly determined by **labor and management factors**. There is no doubt that the smallholders are always eager to get additional land on tenancy or contract basis, but their desire remains unsatisfied, because of the very small offer from the other side. Due to the progressive shrinking of landholdings in comparison to expanding needs, the logical tenure pattern which is coming forth is owner-cultivation. Diagram 16 shows the existing relationship between farm tenure and farm size at the watercourse.

Diagram 16: Farm Tenure and Farm-size



Source: The author´s own survey

Here owner cultivation is almost directly proportional to farm size. Only relatively small landholders have rented out their lands, mostly in cases where their holdings proved insufficient to provide their livelihood exclusively. The great majority of them support their living through non-agricultural income (KUHNEN 1989:515).

About 45 percent of the owner-cultivators on the watercourse participate with others in joint farming activities. **Joint farming** is usually a joint venture of two or more brothers and/or a father and his married sons. They share the income and expenses of the farm jointly. This joint farming system, on the one side, is a positive force for keeping the family holdings compact for economic purposes and, on the other, it slows down the process of fragmentation due to inheritance procedures. Moreover, this system is **highly appreciated socially and is a sign of a family´s internal solidarity and cohesiveness**.

A **significant change in tenure conditions** has occured at the watercourse since 1975. Two factors are of major importance in this respect: a) rehabilitation and improvement of the watercourse and, b) extensive cultivation of citrus fruit. The physical improvement of the watercourse proved a great relief for the labor required only for irrigation activities. Citrus, on the other side, demands less labor and is more profit-generating in comparison to traditional crops. For the performance of laborious agricultural activities and to meet the risks of shortage of labor in peak days of harvesting, there emerged a new form of tenure,

i.e., self-cultivation with servants hired on annual contracts. At present, about 64 percent of the 42 owner-cultivators are cultivating their lands with the help of hired servants.

As some of the respondents asserted, it is supposed that the **system of agricultural servants** was started as described by MERREY „ .... under the duress when people need money immediately“ (1982:14). Both the landlords as well as the servants stated that it is really difficult for any one to get out of this (vicious) circle once one is in it. **The wages the servants receive do not suffice to meet their needs**. As a result, they are, time and again, in need of cash and kind which are usually provided by the employer. The only way to repay the debt is to work for years and years, and sometimes the whole life long. According to BHATTI, permanent agricultural laborers had worked for landowners for a period ranging between 1 to 35 years (1984:119). In some cases, the debt is transferred to the next generations. Some of the servants breed cattle, usually on a shared basis with the employer which for the servant, is a hope to get rid of the debt, whereas for the employer, it is an opportunity to get his money back. The only way for an agricultural servant to finish/quit his services with a ´cruel´ landlord is to start with another ´merciful´ landlord, as he ´buys´ him from the former one. This happens mostly in the case of young, hardworking and industrious servants.

4.2.2.5 Cropping Pattern and Intensity

Due to the continuous supply of irrigation water and to the tropical weather, the lands of the watercourse investigated are **cultivated throughout the year**. Weather conditions, especially, are seldom a limiting factor to crop production in contrast to water supply. The cultivation calendar is divided into two major groups; ***rabi* and *kharif***. *Kharif* crops are those which are cultivated in the summer season, approximately from April to October, whereas *rabi* crops are cultivated from November to March and, hence, are designated as winter season crops. The dominant crops during *kharif* are sugarcane, citrus and fodder with a limited number of acres for cotton and rice crops, whereas, during *rabi*, wheat, citrus and fodder are the dominating crops. Citrus fruit is a round the year crop and is harvested in winter. The same applies to sugarcane, but farmers count it as *kharif* crop.

Following the improvement of the watercourse, **crop cultivation was intensified**. As the record shows, the Lower Jehlum Canal (LJC) was originally designed to irrigate 75 percent of the area per year (50 percent in winter, 25 percent in summer). The installation of the SCARP tube-well and the renovation of the watercourse brought about a considerable increase in water supply; this affected cropping intensity as well as yield in a positive manner[110]. Twelve small private tube-wells located along the watercourse; concentrated on middle and tail end, have allowed the farmers to maintain higher irrigation frequencies and cropping intensities than would otherwise have been possible. These tube-wells are providing a relatively greater control over the supply of water. **Presently the whole of the command area is double cropped**. Some of the fields are even producing three crops a year, increasing the cropping intensity up to **300 percent**. Almost 100 percent of the

[110]FREEMAN & SHINN also supprot the fact that tube-well water supply plays a vital role in determining the cropping patterns (1989:130)

acreage under citrus orchards is double cropped, mostly with wheat or fodder as second crop.

4.2.2.6 Education

The interest to investigate the water users´ education level was stimulated by a statement quoted by ESMAN & UPHOFF (1984:119) when, following UPHOFF (1979), they described the Report of the Commission on the Kandyan Peasantry for the Colonial Government of Ceylon. The report underlined the importance of literacy by making a connection between the education of society members and their **capability of managing their affairs by themselves on a long-term basis**.

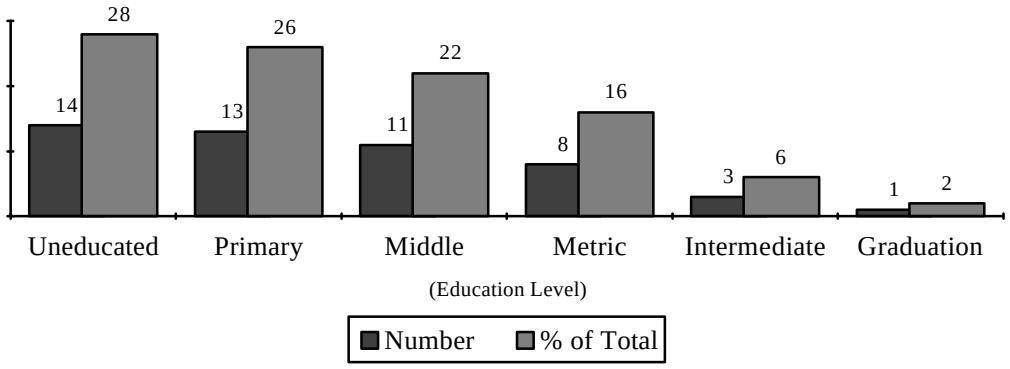
When the watercourse studied was analyzed in the light of above statement for Ceylon, it became known that a **better rate of education** helped the water users in securing the experiment-oriented program of the Mona project. A better level of communication with project officials and their foreign advisors, facilitated by some water users´ command of the English language, helped to modify the watercourse improvement plan to better suit the water users. The better level of education, however, did not contribute to the sustainability of the WUA, which, in the case of Ceylon, was different.

Education along with landholding is **a major determinant of social influence and power** at the watercourse. If one is willing to use one´s power, relatively large landholding combined with a relatively higher education provides the soundest base for exercising influence and power at village level, particularly. Education is also regarded as prerequisite for obtaining important, well paid jobs, although a network of good relations cannot be omitted altogether (KLENNERT 1988:233). Lately, education is being increasingly recognized as an important factor for **leadership** at the watercourse. The opinion is generally held that relatively higher educated people know the „art“ of conversation with officials and prove more successful in convincing them. The young but educated water users are allowed to argue and give advice, even in the presence of seniors. As the watercourse was rehabilitated under the close supervision of foreign and national experts, the better level of education played an important role when selecting the Executive Committee members, which, afterwards, proved beneficial in **direct communications** with foreign counterparts, especially. The local officials usually have **good contacts with educated water users, as they found them to be early acceptors regarding new ideas** of irrigation management. A strong connection between education and the perception of helpfulness of government services has been suggested (MIRZA & MERREY 1979:56). Due to increasing formalities in leadership role, the ability to read and write is becoming more a part and parcel of the leading potential. On the basis of above thesis, the water users at the watercourse studied are analyzed hereunder.

MIRZA & MERREY (1979:13) consider education, institutional services and mass media as factors helping water users to perceive the value of the watercourse improvement project as well as to cooperate in O&M activities. Now, education has become **a relevant variable with respect to influence and prestige,** as the education level of a person, family or *biraderi* is being adopted as a status symbol on the watercourse. Considering this fact, if

the farmers themselves are not educated, their younger generation is acquiring education. The level of education at the watercourse was found to be relatively better, perhaps because of schooling facilities right in the village. Diagram 17 presents the rate of education among the shareholders.

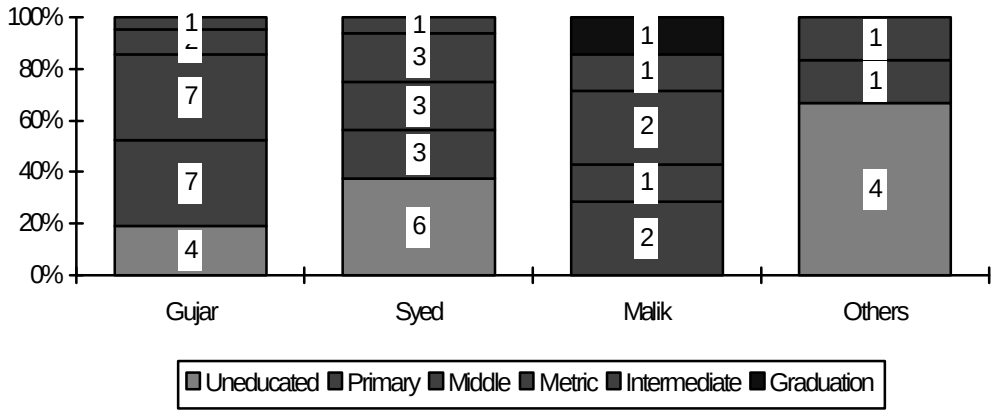
Diagram 17: Education-Rate among the Water Users



Notes: Primary - five, Middle - eight, Metric - ten and Intermediate - twelve years of schooling, respectively.
Source: The author´s own survey

Diagram 17 confirms the relatively better rate of education, since only 28 percent of the farmers are uneducated. The great majority of the shareholders (64 percent) have received school education, leaving a small number with a relatively higher education. A high number of educated farmers is an indicator of progressiveness. Like other social and economic factors, education is also **unevenly distributed** among the caste groups. Diagram 18 gives the details of inter and intra caste education.

Diagram 18: Education of Water Users in Caste Groups



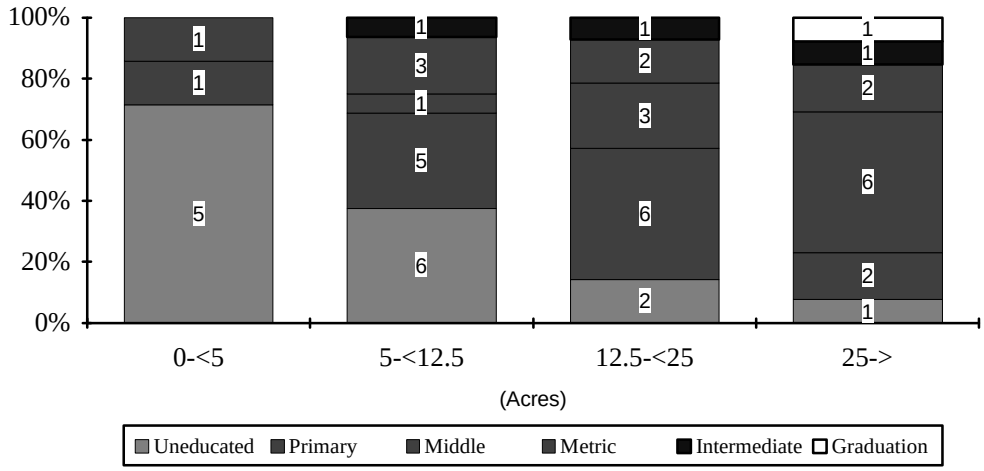
Notes: Primary - five, Middle - eight, Metric - ten and Intermediate - twelve years of schooling, respectively.
Source: The author´s own survey

As Diagram 18 shows, the malik in comparison to the gujar and the syed are more literate and none of them is uneducated. The rate of education in the ´other castes´ group is quite low, as 80 percent of them are uneducated. In the malik caste group, not only are all

members educated, but it also has a greater number of relatively high educated farmers. The only graduate farmer on the watercourse is a malik. In contrast to their being less in number and owning a smaller farm area, **the malik achieved a high social status** due to a relatively higher education and to their hospitality towards guests in comparison to other *´biraderi´* groups. As a result, they played a leading role in organizing the watercourse rehabilitation and improvement activities. They are regarded as the best communicators within and outside the village, and proved this time and again. The only water users and Executive Committee member who could freely **communicate with foreign experts** (in English) was a member of the malik *´biraderi.´* Along with other factors, education played an important role in the selection of two malik for the Executive Committee. Undoubtedly, some of the syed are also well educated and qualify through other **prerequisites for leadership**, but as a *´biraderi´* they are relatively passive in the social and political spheres. On probing into the reasons of the syeds´ inactiveness, it can be linked with their relative position which is affected by the internal structure of their group and **the costs of organization**. In any organization or developmental activity, the position of a group is basically determined by the answer to the question as to who has borne the **transaction costs** and who has **initiated as well as promoted the idea of collective action**. In this context, the syed *´biraderi´* played a passive role in the initial meetings as well as in follow-up activities. A relatively more educated syed even opposed the idea of rehabilitation, initially, as he was not content with the results promised by the experts of the project. Moreover, most of the educated syeds are not available for such honorary duties because of their off-farm activities such as small business and jobs.

As the larger landholders, the relatively better educated shareholders tend to dominate towards the head and middle of the watercourse. The great majority of farmers who has received an education equal to or above school level (Metric) is **concentrated at the head and middle reach** of the watercourse. Considering the concentration of large holdings and better education at the head and middle reaches, one may assume that a correlation exists between farm size and education. The information detailed in Diagram 19 is relevant.

Diagram 19: Relationship between Education and Farm-size



Notes: Primary - five, Middle - eight, Metric - ten and Intermediate - twelve years of schooling, respectively.
Source: The author´s own survey

It is apparent from Diagram 19 that **the rate of education increases with an increase in size of the landholding**. None but one of the farmers with more than 25 acres of land is uneducated, whereas the highly educated one also belongs to this class. About 71 percent of the farmers with very small holdings are uneducated, and only one of them has completed school education. 62.5 and 85.7 percent of the small and medium farmers are educated, respectively. On the basis of this data, the relatively larger farmers having received a high education seem to have a greater leadership potential.

The *biraderi* in rural life usually determines the **general trends** for acquiring individual as well as communal benefits and qualities. When the acquisition of education in relation to caste was analyzed, the results described in Table 8 were revealed.

Table 8: Castewise Distribution of Education Along the Watercourse

Gujar:

Location	Uneducated	Primary	Middle	Metric	Intermediate	Graduation	Sum
M	1	2	2	1	-	-	6
T	3	5	3	1	-	-	12
H+M	-	-	1	-	-	-	1
M+T	-	-	1	-	1	-	2
Sum	4	7	7	2	1	-	21

Syed:

H	-	-	1	-	-	-	1
M	1	1	1	2	1	-	6
T	2	1	1	1	-	-	5
M+T	3	1	-	-	-	-	4
Sum	6	3	3	3	1	-	16

Malik:

H	-	2	1	1	-	-	4
T	-	-	-	1	-	-	1
H+T	-	-	-	-	1	-	1
H+M+T	-	-	-	-	-	1	1
Sum	-	2	1	2	1	1	7

Others:

H	3	1	-	1	-	-	5
T	1	-	-	-	-	-	1
Sum	4	1	-	1	-	-	6

Notes: Primary - five, Middle - eight, Metric - ten and Intermediate - twelve years of schooling, respectively.
Source: The author´s own survey

A keen observation of Table 8 reveals that, out of 17 educated gujar, 14 (about 82 percent) are located at the middle and tail reaches of the watercourse. Similarly, of a total number of 10 educated syed, 80 percent have their lands at the middle and tail reaches. The malik varying from this pattern are mostly located at head (about 57 percent). Out of a total 36 educated farmers, about 53 percent have their **vested interests at the head and middle reaches** of the watercourse, as they either have their total land or at least a parcel at these locations.

While one third of the shareholders are either uneducated or have only finished the primary level, there are sufficient farmers with a high level of education to indicate that the watercourse has enough **potential leaders** and is overall more progressive than the average. The educated farmers are regarded as having more access to government services (MIRZA & MERREY 1979:56). Moreover, the concentration of potential leaders at the head and middle reaches, and partially at the tail of the watercourse is a positive indicator of a viable Water Users´ Association.

4.2.3 Summary

The watercourse can be fairly regarded as possessing a set of **heterogeneous characteristics**. There is no doubt that the natural conditions are equal for all the water users, but the results of their impact are highly divergent. In terms of socioeconomic conditions, the watercourse presents a set of some interesting characteristics of water users, which sometimes appear to be helping to mobilize their participation in water management activities, but, in some other contexts, they do not show any or rather a negative potential for collective action.

In the light of the above discussed factors, the watercourse has the following conspicuous characteristics which are relevant to the study:

- The lands on the watercourse are irrigated with **water supplied by the canal, the SCARP tube-well and several private tube-wells**. Due to organizational and operational deficiencies, both public sources remained unsuccessful to satisfy needs of the water users by supplying water at the appropriate time and in appropriate amounts. The increasing tendency to install private tube-wells can be attributed to an attempt to overcome water supply problems caused by the public sources.
- The **formal rotatory system for the distribution of water (*´warabandi´*)** is not strictly followed according to the ID rules. The *´warabandi´* has been readjusted, time and again, to overcome its rigidity and to produce an equitable and favorable mechanism.
- The water users compose a **socially heterogeneous group** on the basis of caste, *´biraderi´*, religious sects, ethnicity, etc.
- Although all of the water users got **land rights through the allotment scheme**, their socio-economic and geographical position differ from one another. The land owned individually as well as by a *´biraderi´* group determines the water users´ socio-economic status which may shape their roles in the Water Users´ Associations.
- The watercourse commands a **fairly larger area than the average in Pakistan**. A larger command area is regarded as a discouraging factor for participatory activities.
- The **average landholding size** equals 16 acres. There prevails a great inequality in landholding sizes ranging from two acres as the smallest to sixty-three as the largest. The inequality in landownership depicts an inequality in the water users´ socio-economic status and the resulting roles in the water management participatory activities.
- The great majority of water users are **owner-cultivators** and manage production activities by themselves. Some changes occurred in tenure patterns including owner cultivation with permanently hired labor; this affected irrigation management as well.

- Due to changes in the supply of water, **the cropping pattern as well as intensities** have undergone a series of changes. The other institutional and political factors in this context are equally valid.
- The water users are **relatively better educated** as 72 percent of them are literate. Education is a factor contributing to a water user´s power/influence, this helps in defining his role in the activities of the Water Users Association. The water users with higher education are considered suitable for leadership roles.
- The water users holding relatively larger farm areas and relatively more educated are **concentrated towards the head and middle reaches** of the watercourse command, and can, therefore, be graded as being partially suitable for the organized participatory activities of water management.

Now that it has been established that water management is strongly influenced by the physical and socio-economic characteristics of the watercourse, the analysis proceeds to examine the impact of these factors on the structure and functioning of jointly managed participatory activities for water management and organization of the Water Users Association at the watercourse level.

4.3 Structure and Functions of the Farmers´ Organization

As discussed in Chapter 2, the structure and functions of a farmers organization at the local level are always situation specific and are determined by the surrounding physical and socio-economic contingencies, so that a deep understanding of relevant characteristics of the organizers and those to be organised is necessary. This section, therefore, deals in detail with the **formation and functioning of the Water Users´ Association** at the watercourse. The aspects dealt with hereunder encompass the structuring of the WUA, the role of the Mona project in WUA´s organization, the methods and procedures followed, the members´ characteristics and the scope of their activities and the activities performed by the WUA.

4.3.1 Farmers Organization under Mona Project

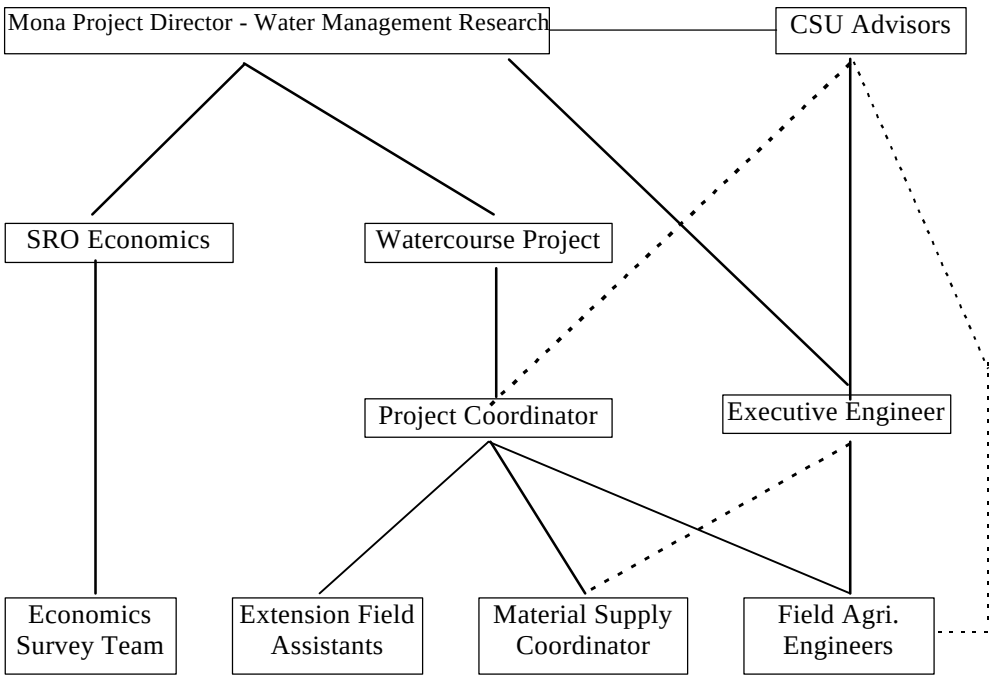
Regarding research and experimental activities of the Mona project, improvements at various watercourses in the area were made by contractors or government labor, **without farmers´ participation**; this caused a general understanding among farmers that it was government´s responsibility to maintain the watercourses as they had been improved by the government (KEMPER et al.. 1980:17). LOWDERMILK et al. narrate a relevant example of a watercourse where the brick and cement lining had been made on an experimental basis. There, the farmers hardly participated in decision making and in the actual construction and improvement activities. While reporting about the maintenance and cleaning situation, they observed that the farmers had not cleaned the lined portion in one year. When asked about the reason that why they had not maintained the watercourse, the water users replied that „the government built the watercourse and should maintain it“ (Vol. III,1978:81). Such incidents led the **Mona Reclamation Experimental Project** (MREP) officials and their counterpart, the Colorado State University (CSU), USA, to alter the **traditional strategy of farmers´ non-participation**. This was in accordance with the increasing tendency to view an irrigation system as a socio-technical process, in which human and physical elements are combined to make agriculture viable (KALSHOVEN 1989-a:1). It was decided, therefore, to involve farmers in the planning and construction of ´their´ watercourses, so as to emphasize the fact that farmers are the real owners of the watercourses (KEMPER et al. 1980:17). To implement this new strategy, the watercourse studied was judged to be the best to initiate the proposed activities (BOWERS et al. 1977:5). For a pilot watercourse improvement, the **objectives** set forth by the CSU and MREP were:

1. to design a watercourse which may serve the farmers efficiently and equitably;
2. to determine the amount of non-material inputs such as farmer´s labor, engineer´s time along with physical inputs like cement, bricks, sand and prefabricated control structures;
3. to observe the functioning of the WUA; how the leaders make decisions, how they implement them and to make the farmers realize that they are the real managers;

4. to train them for the future care and maintenance of the watercourse so that they can achieve long lasting benefits; and
5. to calculate the improvement and delivery efficiency results for future implications (KEMPER et al. 1980:50).

The **sociotechnical nature** of these objectives demanded a specific type of organizational arrangements through which they could be realized. To fulfill the task, some organizational arrangements[111]were made within the Mona staff. In order to conduct research and rehabilitation activities at the watercourse studied, the Mona project staff was organized and trained in two ways. First, an **action field staff** was delegated design and implementation activities. Secondly, a **research team** was deputed to document the process and to gather data measuring the benefits and costs of the program. To establish a good rapport with the farmers, a project coordinator was selected from the extension wing of the Mona staff, who, for motivating the WUs to join the program, was assisted by five Field Assistants (BOWERS et al. 1977:15). Such a strong motivation campaign cannot be generalized for other watercourses in Pakistan and can be regarded as an exceptional effort. The design, layout and supply of materials were the responsibility of agricultural engineers. The **socio-economic data was collected by the Economics Wing of the project** who were assisted by the extension field assistants. The organizational pattern of the officials concerned and of their Colorado State University advisors is illustrated in Diagram 20.

Diagram 20: Organogram of the Project Staff for the Watercourse Improvement



[111]In accordance with SAGARDOY et al. 1986:5, KIESER & KUBICEK 1977, MANIG 1994:246 and KAST & ROSENZWEIG 1974:214 who define the establishment of an organization to fulfill certain objectives. For further details, see the discussion on organization in Chapter 2.

Source: BOWERS et al. 1977:17

The approach adopted here for the implementation of the program was essentially through the farmers´ participation, for which a ´**Water Users´ Association**´ was proposed which will be organized through joint efforts of the project staff and the farmers. Along with watercourse improvement activities, the Mona project wants to assist the area farmers in adapting new agricultural technology. To introduce and to train the farmers to use them, the project will provide modern agricultural implements on an experimental basis.

Although one may consider that a farmer´s **main objective** when participating in an agricultural development program is to maximize his produce, one may dissect this broad objective into several specific targets. The farmers at the watercourse, in the same context, had a set of objectives which they want to realize through the assistance and guidance promised by the Mona project staff. These **objectives**, as identified by KEMPER et al., were:

1. to get all the authorized water from the canal for their watercourse;
2. to increase the water efficiency and delivery to their fields;
3. to improve the watercourse and to get the concrete control structures for the easy transportation of water: and
4. to control the loss of water and to irrigate the whole of the command area (1980:49-50).

After identifying the objectives of both sides, the next assignment is to explore their **compatibility** and the way in which they can be realized. These objectives were evaluated by KEMPER et al. as compatible (1980:17), with a few differences in the strategies for achieving them, not in their nature. All this exercise was planned, as mentioned earlier, to be undertaken through farmers´ participation and involvement in the program. For the realization of these objectives (both of farmers´ and of Mona staff), the organization of the WUA was considered a real solution. The WUA can provide a base-line for **collective action**, which is necessary to undertake the activities regarding irrigation water management and system as well (HAYAMI & KIKUCHI 1981:4). The WUA is supposed **to internalize the externalities** of irrigation water management at the watercourse level, which, for an individual water user, are difficult to do (ibid. 1981:12).

4.3.1.1 Integrated Organization Pattern: Water User´s Association

In connection with their research activities in the area, the Mona project staff was already known to the farmers at the watercourse, whereas some of them also developed friendly relationships[112]. At their **occasional meetings** with the Mona officials, the water users were well aware of the objectives of the Mona project and, hence, of the nature of their activities. Due to their **social network** with the area farmers, the water users used to obtain

[112]Role of ´the location´ (BEN-PORATH 1980:9) in identifying the partners which also reduces transaction costs.

information about the improvement activities of the Mona project at other watercourses[113]. Some of the water users happened to observe these activities and their subsequent results as well[114]. The improved infrastructure and the better control over the supplied water at these watercourses caused **a steady increase of interest** in such improvements[115]. At that time and in the past as well, some of the water users at this watercourse had been trying to improve their farm-ditches individually, so that they were always in search of developed techniques from which they could benefit[116].

The Mona project staff, on the other side, was looking for a watercourse to be improved through the **active participation of water users on a full-scale level**. The Mona Project activities, until that time, were concentrated upon the improvement of some sections or branches of the watercourses, so that they were unable to study an impact of their improvement activities on a full scale-level. According to the criteria set by them, the studied watercourse was also one of the potential candidates. Following their criteria, the watercourse was **selected as the best candidate for the proposed activities**.

The **initial contact** with the water users was initiated through the **Field Assistant** of the Mona project[117]. The Field Assistant, for the performance of his extension duties, was already in contact with the water users. His residence in the village helped him to intensify his contact and to initiate the motivation work. Moreover, the already existing relationships between some of the water users and the Mona staff helped in moving the concept of program from individual to *´biraderi´*, and finally to the watercourse level. The provision of new information about the ongoing improvements at various watercourses in the area also facilitated the atmosphere to start a motivation compaign. This information concentrated primarily on the benefits obtained from improvement efforts, highlighting the **better supply of water, easy management of newly developed control and check structures, saving of labor, reduction in conflicts**, etc.

After the selection of the watercourse, the important question was **how to start**. As an answer to this question and to start the proposed activities, it was decided to invite one of the progressive farmers to see the improvements undertaken by the project team at a nearby watercourse. The invited farmer had been trying different types of control structures at his field ditches, on his self initiative since long. In these attempts, he was never fully successful in controlling the **leakage**. The structures developed by him were either **too heavy to handle or the technology was too rudimentary** to give the desired results. When he saw the concrete structures developed and installed by the project team, he was very impressed. He spent a considerable time at the improved watercourse and handled these structures by himself. When the project team told him that they wanted to improve his watercourse too, he was very pleased. He assured the project authorities that the

[113]Transactions between mutually identified parties (BEN-PORATH 1980:1, NABLI & NUGENT 1989:1339). For further details, see Section 2.1.2.
[114]Information collection costs, see BEN-PORATH 1980:5
[115]For ´Advertisement,´ see BEN-PORATH 1980:5.
[116]For´set-up costs,´ see BEN-PORATH 1980:5.
[117]For contact building costs, see Section 2.1.2

farmers served by his watercourse would be interested in such improvements[118]. It was decided to hold a meeting with the shareholders of the invited farmer´s watercourse in which they would be informed of **the idea of farmers´ participation** in watercourse improvement and organization of the WUA. The concept of the WUA, in accordance with **institutional theory**, was introduced by the state to regulate relationships among the water users, on the one side, and between the ID/AD and the water users, on the other[119].

As a **first step**, the farmers with whom contact had already been established were approached and a **first dialogue took place**. At this first meeting, they were informed of the proposed plan to overcome water losses at their watercourse. Moreover, they were imparted the results of some recent improvements undertaken by the CSU and MREP jointly at different watercourses in the area. During the meeting, a visit to an improved watercourse was planned so as to allow the farmers to experience by themselves the benefits of the improvement program. **The factual loss of water of about 50 percent** at their watercourse and a visit of representatives of the water users to the improved watercourse proved to be the main convincing factors which chocked them into action.

After **informal personal relationships** had been established, the contact farmers were provided with information for canvassing the potential *´biraderi´* leaders and other water users. Although general information was spread through the Field Assistant and other Mona officials, the role of contact farmers remained dominating. As influential and powerful farmers, they utilized their personal and *´biraderi´* relationships, which due to their regular contact with co-farmers proved more successful. The campaign helped in building the **opinion of the water users**, on the one hand, and helped the potential leaders to gather the water users around them, on the other hand. It must be stressed, here, that **material interests** were the predominating reason in motivating the water users to join the program. The same strategy was followed in Malaysia, in Muda area, to get the farmers organized[120]. The contribution of government, both in material and technical services, was much larger than the limited contribution by the farmers. As a result, the **predominance of material interests** overcame common interests and with the termination of material help, caused an inefficiency in the functioning of the WUA. In this context, it can be argued that the WUA will again be active and ´alive,´ if material help from any source is granted.

The crucial task of organizing **Water Users´ Association** was handed over to the Senior Research Officer in Extension (MREP), who, for this purpose, was chosen as Project Coordinator too. The selection of an extension specialist for this post was in fact a **deviation from the general practice** of appointing an engineer. The most decisive factor for the selection was the extension officer´s good rapport with the farmers. The basic contact between farmers and extension staff was assumed mostly through the Field Assistant (MREP) who as a **mediator,** used to arrange meetings, deliver information and convey messages. Therefore, at farm level, the immediate contact person available to

[118]The confidence in his fellow water users was based on „trust in each other´s word“ (ARROW 1969:62). The absence of this trust might have caused the loss of this opportunity or would have raised the transaction costs substantially high.
[119]Cf. LÖFFLER 1992:41
[120]Cf. KALSHOVEN 1989-b:107f.

farmers was the Field Assistant. The **project coordinator** called a meeting of farmers through the Field Assistant for the organization of WUA. Of 35 shareholders[121], **only 17 (about 49 percent)** appeared to listen to him; they were considered to be as „the decision-making power of the watercourse“ [122] (BOWERS et al. 1977:19). Fifteen out of seventeen shareholders agreed to the proposed plan, while the remaining two, one from the malik and the other from the syed *´biraderi,´* were **suspicious** about the promised benefits and, therefore, refused to cooperate. Both of them were fairly large landholders and enjoy a lot of respect among fellow farmers. Their participation was considered by the project team as well as by the farmers to be crucial. In fact, both of them were in a position to convince the absent as well as the present farmers to vote against the program. Special consideration was paid to convincing them and to assuring their participation. The syed doubted the 50 percent loss of water as it was unbelievable for him that the watercourse was actually losing as much water as the team reported. He was convinced when asked about the difference of time in irrigating an acre at the head reach and at the tail reach. By comparing the difference of irrigation time at these two distant reaches, he realized the **potential for improvement** and decided to cooperate. The malik was still not satisfied and it was decided to adjourn the program until they were unanimous. It must be stressed, here, that the malik´s initial decision was not based on technical, as was of syed´s, but on social reasons. As the malik was not involved in the early negotiations nor in primary settings for the formation of the WUA thereafter, he was a late-joiner, and feared that he would not be considered for any active role in the program, which was definitely a set-back for his **power/influence** (KEMPER, et.al. 1980:49). Later, the farmers suggested to the team coordinator that this holdout could be resolved if the malik could be assigned some leading role in the program. So, following their suggestion, the project coordinator by nomoinated him as the **first member** of the Executive Committee of the WUA and he was thus satisfied. Moreover, he was requested to recommend other members for the proposed Executive Committee. The members recommended by him were unanimously supported by all other shareholders and, in that way, **the Executive Committee of the WUA was selected**. The main reason underlying the creation of this Executive Committee was to organize collective action[123].

The procedure adopted at the watercourse resembles the formation of early WUAs in the Upper Pampanga River Integrated Irrigation Systems (UPRIIS) in the Philippines. The WUAs in UPRIIS were **identified, but not organized**, by the water management technicians (WMTs). ROBINSON (1982)[124] suspects that most of the office bearers of the associations were also identified by the WMTs by naming them on the spot, instead of having them elected by the members. The development of farmers´ irrigation association in the Philippines was funded by the **Asian Development Bank** (ADB) (TAPAY 1989:28) this is similar to the strategy of promoting WUAs in Pakistan. Pakistan is also profiting from the help provided by international donors such as the World Bank and USAID.

[121] The number of shareholdres at the time of WUA organization in 1975 was 35, and presently 50.
[122] 51 percent was perceived as non-decision-making power.
[123]Cf. HAYAMI & KIKUCHI 1981:34f.
[124]Quoted by TAPAY 1989:28f

4.3.1.2 Membership

As the WUA was organized at the watercourse level, the right to use the watercourse for irrigation purposes was a pre-requisite for membership in the WUA. Membership in the WUA was exclusive to the farmers **within the command area of the *chak***[125]. Theoretically, all those who hold land rights on the watercourse were members of the WUA, but, practically those who hold rights to cultivate the land are the **functioning members**. The functioning members act mainly in two spheres; **a) financial demands; and b) physical labor**. In the case of tenancy, the financial sphere is covered by the landowner whereas the labor activities are performed by the tenant or contractor. The land use rights and water use rights are complementary and, with the acquisition of land rights, one automatically gains access to water (if available).

All the **fifty members of the WUA** of the studied watercourse are males who are heads of their respective households. For membership in the WUA, the water users did not sign any membership or contract forms. **No formality or ritual** was performed for the enrolment or membership of the water users. All the water users agreed verbally that they were members of the WUA and would obey the Executive Committee. Apart from that of owning some land in the command area of the watercourse, no other condition or prerequisite was linked with the qualification for membership. The rights and duties of the members were not clarified. What was asked of them and what the water users had promised, was that they would ´**help**´ the project officials and obey the Executive Committee during the improvement and rehabilitation process. All the shareholders at the watercourse were accepted as members without any criterion for **acceptance or rejection**, except the holding of land use rights.

The members are exempted from any **symbolic or real membership fee**. They neither paid any fee at the time the WUA was establishmed, nor did they pay any fee afterwards. When the WUA was formed, neither the national experts nor their foreign advisors paid any attention to the importance of a membership fee. It is assumed that a membership fee could have initiated resource mobilization and constituted a base for a joint bank of material contributions.

The **Water users´ associations Ordinance** defines membership in the following terms: „Every irrigator of a watercourse who is jointly responsible with others for the reconstruction, maintenance and improvement of a watercourse or jointly making use of the watercourse with others will be eligible to be a member of the Association, provided that no person who is less than eighteen years of age or has been adjudged by a competent court to be of unsound mind shall be eligible to be a member of the Association“ (GOVT. OF PUNJAB, 1981:16). The definition **excludes the non-farming sector** of the rural population. In other words, a homogeneous group, having at least collective interests and objectives for irrigation water, was sorted out as a base for the WUAs. The ordinance does not provide any information about the **membership of women**, either as a landowners or as a family-heads, especially in case of a husband´s death when the children are under

[125]The irrigators´ groups or the WUAs in the Philippines are also organized at the turnout level (TAPAY 1989:28).

eighteen years of age. No such situation has been experienced by the WUA as the water users reported. The farmers having their lands in the village (on some other watercourse) but not on the specific watercourse are not entitled to membership in that particular WUA either. A water user can be a **member of two or more WUAs simultaneously,** if he owns or cultivates land on more than one watercourse.

The **membership qualification** for a WUA is alike in Pakistan and the Philippines, where the membership is exclusive to farmers within the boundary of the irrigation system. The Philippine members pay a fee of 5 to 10 pesos annually (TAPAY 1989:33), whereas the water users of the studied watercourse are free of this obligation.

4.3.1.3 Selection of the Executive Committee

The Executive Committee at the watercourse was **selected in 1975**. Through dialogue with the farmers at the watercourse, most of them were convinced that they should improve their watercourse according to the guideline provided by the MREP and CSU field party. One of the two main holdouts, as described previously, was nominated as the first Executive Committee member, as his participation was considered to be essential both by project officials and the majority of the shareholders. To win his full support and interest, he was obliged to **nominate** further members. The three additional members recommended by him were **unanimously** backed by all the shareholders present. Of significance is the fact that, at the selection meeting, only 49 percent of the shareholders were present. All the four members for the Executive Committee were selected from gujar and malik *´biraderis´*, with an equal number of representatives from each. The Executive Committee supervised the reconstruction activities during the *´katcha´*[126] improvement of the watercourse first and later during the *´pukka´*[127] improvement too.

During a time span of about eighteen years, since the first selection of the Executive Committee, **the committee has not been revised formally or officially according to any pattern of representation**. There has not been second or third elections. The unanimously selected Executive Committee members are no more functional. The first nominated member, who was regarded as being essential for the success of the project, has died, and the other two gujar members are too old to perform their responsibilities actively or to respond immediately to new incentives and ideas. The deceased malik and the old gujar have „**automatically**" been replaced by their younger generation, but due to changes in the **patterns of authority and power** over time, in contrast to their elders, they do not enjoy full backing by the shareholders. In the case of the dead malik, no specific person of the family has been identified as his successor; different persons represent him on different occasions. His land and his house were inherited by his two sons. As the eldest son had died when the old malik was alive, the latter´s property and household is being managed by his grandsons. The heads of both households share the old malik´s responsibilities. On occasions, such as the **solution of disputes**, his younger son acts as his successor, whereas, in interactions with officials, particularly with Mona project officials, one of the grandsons

[126] *´Katcha´* improvement denotes the earthen improvement of the watercourse.
[127] Lining of the watercourse with bricks and cement is locally known as *´pukka´* improvement.

represents his grandfather. The same applies to the old gujar, who, according to the nature of the activity and their availability, is being represented by his three elder sons. Except one Executive Committee member, the other three are not by any means representative of the rest. One may conclude that, since its organization, no remarkable effort has been made regarding the WUA´s organizational aspects, rather, it has **deteriorated over time**.

For the **re-election/selection** of the Executive Committee neither the Mona project nor the shareholders themselves showed any enthusiasm. The Mona project is basically a research organization whose activities revolve around testing and discovering new techniques and methods for the effective and efficient management of irrigation water at field level. From its developmental activities at the watercourse, the Mona project may not be misunderstood as a ´**change agent.**´ Its major task is to develop new methods, to test them empirically and if they are found to be successful, recommend them to the government for replication. The same exercise was held at the watercourse studied. The reason why Mona project officials did not help the water users in reselecting or reelecting their Executive Committee and why they are not supporting the WUA at present regarding their **organizational issues** is because these activities are the responsibility of the Agriculture Department and of the **On-Farm Water Management** (OFWM) projects of the concerned provincial governments[128]. Moreover, they are of the opinion that this matter should now be handled by the farmers by themselves. The main reason on the part of shareholders is that the membership of the Executive Committee did not prove to be a **prestigious position** in the socio-cultural spheres of the village. The absence of any reward and/or power, on the one hand, and the abundance of duties, on the other, made these positions least attractive. As the members cannot take any sanctions against ´free-riders´[129], their honorary position has no meaningful ´honour.´ Moreover, they have to spend a lot of time and money (transaction costs) in fulfilling the demands of the honorary post which, according to other potential leaders, is not a ´**logical investment**´. Only the descendants of early members show some interest in future membership, as, to them, it is a sort of keep-up of the respect and power earned by their ancestors. They take it as a form of inheritance with an underlying fear of losing it to others, which can mean a setback to their power and influence in the village. Why the re-election/selection of the Executive Committee was not conducted can also be related to the scarcity of active leaders who are **acceptable to the majority** of the water users.

4.3.1.4 Characteristics of the Executive Committee Members

The Executive Committee members were the **potential leaders** on the watercourse who were already enjoying respect and influence among the shareholders. As in the Malaysian case discussed by KALSHOVEN (1989-b:107), they were identified, or more accurately phrased, **re-confirmed** as potential leaders by the project authorities. Two of them were informal heads of their respective *biraderi* groups and were considered by their fellows to be gifted with leadership qualities. Due to their respect and influence in the village, it was not easy for anyone to refuse them simply or hesitate in obeying them, especially when

[128]Based on personal communication with Mona staff.
[129]Cf. HAYAMI & KIKUCHI 1981:19

they demanded a financial or labor contribution for communal activities. During the watercourse improvement, both these elderly members proved most successful in **mobilizing labor** and using it efficiently[130]. It is important to mention, here, that three of the four members were relatively **old aged** water users. Their old age may have contributed to their having been selected, as older people are regarded as being wise and experienced. The respect paid to them as old people is substantiated by religion (KUHNEN 1988:8) and culture. The **main characteristics** of Executive Committee members are summarized hereunder.

Table 9: Main Characteristics of the Executive Committee Members at the Time of WUA Formation

Sr. No.	Caste	Age	Land holding	Education	Position at Watercourse	Personal Characteristics
1	Malik	85	55	Middle	H & T	Head of the malik *biraderi*; Ex Councillor; active socio-political figure; good contacts with local officials
2	Gujar	70	37.5	Primary	M	Head of gujar *biraderi*; active social figure
3	Malik	42	32	BA	H+M+T	Highly educated farmer at the watercourse; Chairman of the *Zakat* and Usher Committee; progressive and experiment oriented farmer; very good personal relations with MREP staff
4	Gujar	58	50	Primary	M	Head of a gujar kinship group; active social figure

Source: The author´s own survey

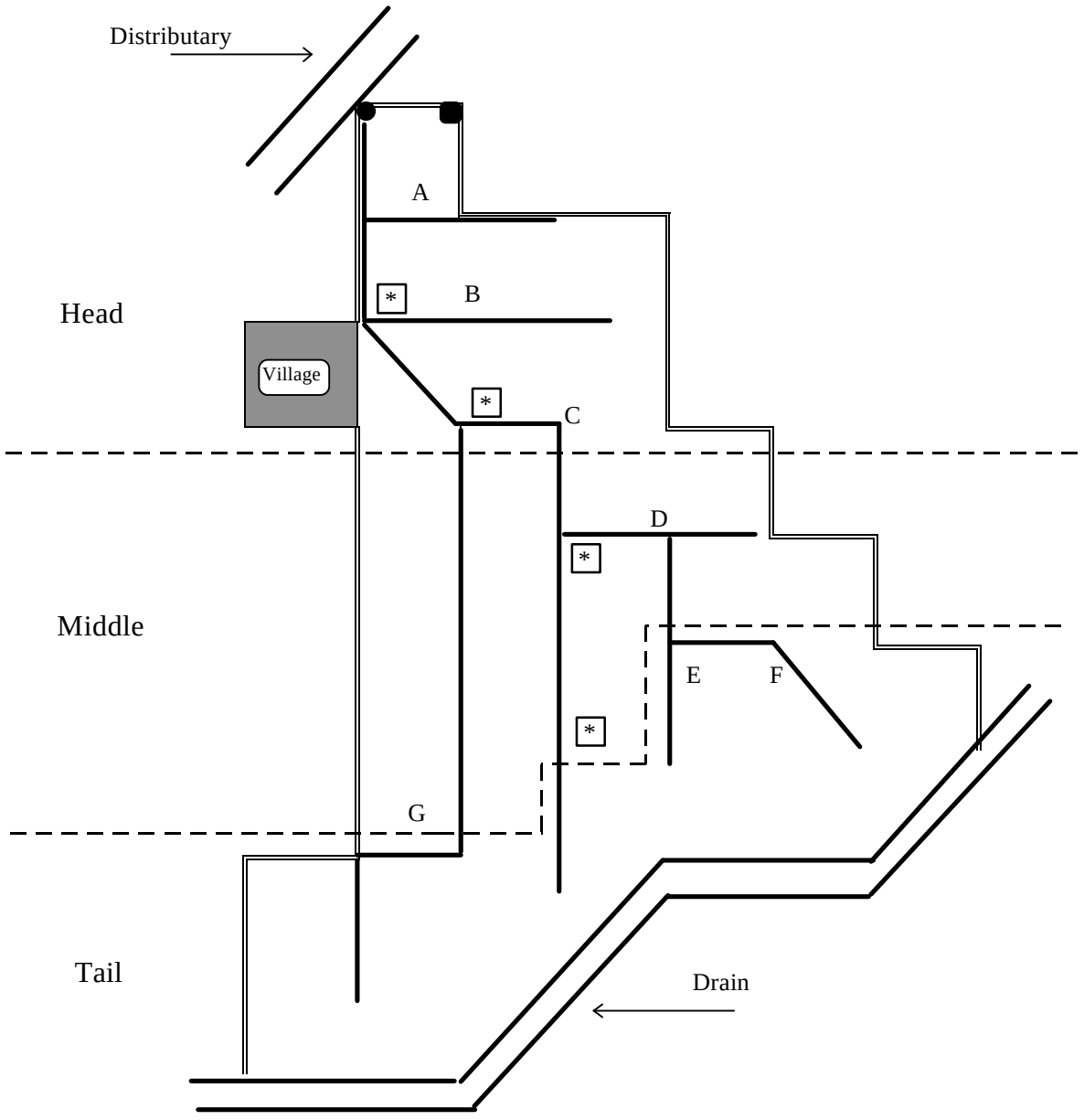
It should be noted that all the Executive Committee members belong to the **large landholding group** and are educated. The above-mentioned characteristics of the Executive Committee members are comparable with the characteristics of ´**modern village leaders**´ described by AFIFUDDIN (1978)[131] as educated, industrious and eloquent. All of them have their lands at the head and middle reaches of the watercourse. Only two of them have a parcel of their land at the tail reach of the watercourse.

While positioning a water user along the watercourse, the *´dera´* of the water user concerned is of significant importance in determining the location. The water users usually locate a water user with respect to the position of the *´dera´*. On the basis of this criterion, all the Executive Committee members are **head and middle reach farmers**. For a clear picture of their position along the watercourse, see Diagram 21. According to this data, the

[130]The discussion over BECKER´S (1976) model of altruistic behavior in HAYAMI & KIKUHCI (1981:16ff) is important in this connection.
[131]Cited by KALSHOVEN 1989-b:107

vested interests of Executive Committee members are concentrated at the head and middle reaches of the command area. All of them are self-cultivators with the help of servants.

Diagram 21: Location of the Executive Committee Members in the Command Area



Notes: ● = canal outlet, ■ = SCARP tube well, * = ´*Dera*´ Executive Committee member ,

- - - Dividing line, A, B, ..., M - Watercourse branches, == Boundary of command area

Source: Adapted from BOWERS et al. 1977:9.

Landholding and education have been identified as the main determinants of influence/power and, in the present case, their relevance is very valid. Regarding the members 1, 2 and 4, (according to Table 10), their social status, landholding and leading positions in their respective ´*biraderi*´/kinship groups played a vital role for their selection.

Apart from the landholding, in the case of member 3, his education and **fairly good relations with MREP officials** proved to be determining factors in getting him selected for membership on the Executive Committee. He is of good repute as a straightforward and progressive farmer. He is seldom involved in petty personal quarrels. As a recognition of his relatively impartial personality, he was made responsible for the ***Ushar* and *Zakat* committee**. He chairs the committee at village level.

Presently, the member denoted as 3 is relatively active and effective regarding O&M activities on the watercourse. Member 1 died some ten years ago and members 2 and 4 are too old to perform their role actively. Whenever repairs or the lining of the rest of the watercourse are needed, the shareholders approach member 3 and ask him to utilize his contacts with MREP officials regarding these matters.

4.3.1.5 Structure of the WUA

As discussed in Section 2.3.2, an organization, from the structural point of view, has always been differentiated according to its **formal or informal structure**. Which type of organization is preferable to the other definitely depends on the prevailing socioeconomic and physical contingencies.

The Executive Committee of the WUA unanimously agreed upon, comprised **four members**. Further specification of their positions as president, secretary, treasurer, etc. was not made. The selection of the Executive Committee members was made by following the **existing leadership patterns** where the already existing leadership was reconfirmed. All these members were potential leaders of their respective *biraderis*. The Executive Committee members enjoyed almost equal socioeconomic status at the watercourse and in the village as well. Within the perspective of the **game of *izzat* and the Punjabi social structure**, one may assume that this differentiation may have been intentionally avoided, as it would have originated some new issues of power and influence. None of the Executive Committee members possessed a fairly higher social status than the others, which could have facilitated their further stratification.

These four members were jointly responsible **for mobilizing the water users´ participation and for solving the problems** at the watercourse. In other words, these four members were the decision making power. They worked as a committee, since there did not exist any ´**division of duties**´ among them. According to their personal capabilities, however, they have been performing some specific activities. For example, one of the members is comparatively highly educated and is on good terms with project officials; therefore, he has been dealing with CSU and MREP officials more frequently than the others. On the other side, two of the members enjoyed a lot of respect and authority as *´biraderi´* leaders in their respective *´biraderis,´* particularly and in the village, generally; as a result they were more effective in solving disputes and mobilizing voluntary labor. Although there was not any **declared or formal hierarchy** among Executive Committee members, they were locally perceived as specialists for some specific activities. The

younger members performed mostly those activities which required more physical action, and the older ones did more mental exercise.

The WUA was organized according to the **integrated approach**. Although this approach is more useful when there are no dynamic social groups (GEBAUER 1980:28, SAGARDOY 1986:8), this does not match the social structure of the watercourse studied. Rather, the prevailing socioeconomic atmosphere is conducive to the **segregated approach,** as there exist some dynamic social groups in the form of *´biraderi´* groups. For the establishment of the WUA, neither of the two recommended approaches, i.e., the model approach and the training approach[132], was followed.

The structure of an organization describe its linkage at various levels; both **vertical and horizontal**. The structure of the studied WUA does not clearly define the **horizontal and vertical dimensions**. The role specification for different activities in the Executive Committee particularly is missing. The WUA misses a **horizontal dimension** altogether, as activities are not clearly differentiated, neither for the Executive Committee nor for the water users.

The WUA of the watercourse studied can safely be ranked as **without vertical and horizontal linkages** with other WUAs of the area. It has linkages with some government institutions of the local level administration and with the Mona project. These linkages are mostly based on the water users´ personal relationships, generally, and of the Executive Committee members, particularly. It may not be out of place if the author remarks that these linkages of Executive Committee members are **based on their personal influence and power instead of their portfolio**. Only the linkages with the Mona project are on an association basis where an ´**interaction and exchange of information and other resources**´ is taking place, not with the same regularity as in the past. The poor linkage may also be regarded as a major cause of the constantly deteriorating performance and effectivity of the WUA.

Although the functional structure of WUAs is basically **bottom-up**, its exercise at the watercourse is **top-down** where **organized participation** has been introduced by the state[133]. In this model of organization, the water users participate in **package program** at watercourse level, where planning and decisions are already made at higher levels of policy making (National, Provincial and Project levels). The Philippines´ model of water users´ organizations (WUOs), for example, follows strictly the bottom-up approach where WUO´s are organized by the water users themselves; they elect their officials in a democratic process, make decisions on design, planning, rehabilitation and O&M through members participation (TAPAY 1989:34).

[132]Discussed in Section 2.6.1.1
[133]For more details about the top-down and bottom-up approaches, see TAPAY 1989:40.

4.3.1.6 Functions of the WUA

Like every association and organization, the WUA also had to perform a set of activities. At the second meeting of the WUA, the organizing body, i.e., CSU and MREP officials, presented to the water users a list of **responsibilities and functions**, as follows:

1. Decisions about the watercourse improvement matters:
   a. identification of problematic zones of the watercourse to be improved first,
   b. installation points of check and convert structures, culverts, buffalo baths, etc.,
   c. collection of labor force and distribution of work. Organization of labor activities and keeping the farmers at work,
   d. report to Project Coordinator about non-participants, if any, and about any misunderstandings among farmers.
2. Decisions about the starting-time of various activities.
3. Selection of watercourse ´Numberdar´ , responsible for the distribution of work shares.
4. Decisions regarding the alternative course of water during improvements (BOWERS et al. 1977:20)

It seems appropriate to mention, here, that this set of functions was setup by the project officials, not by the farmers themselves. As is obvious from these functions, the WUA activities were limited just to the improvement and rehabilitation works, i. e., it was a **single purpose organization.**

Nothing was made clear concerning the sustainable viability and future responsibilities of the WUA. Anyhow, as these functions were **compatible** with the farmers´ interests, they were accomplished accordingly. Later, with the successive progress of the idea of WUA and its role for the process of watercourse improvement, the Government of Pakistan undertook many efforts to make it more effective. In this regard, the Water Users´ Associations Ordinance (1981) is the most conspicuous effort to provide a **legal coverage** to these associations. Unfortunately, just as in many parts of the world laws and codes related to irrigation water management are seldom obeyed, the same happened with this ordinance. Although this effort was a great hallmark in a more than a hundred years old traditional setup of rules and regulations, its peculiarity diluted to the stage of ineffectiveness due to **poor implementation and follow up**.

Many of the **rules and regulations** described in the Water Users´ Associations Ordinance (1981)[134] are presented in Table 10 with their ´de jure´ and ´de facto´ situation.

[134] Page references made here and those which follow refer to this edition.

Table 10: Water Users´ Association´s Regulations and their Practical Outcome

de jure Rules and Regulaions	*de facto* Operation
• In addition to any other functions which may be performed under its bye-laws, an Association may perform the following functions:	
(i) improve, rehabilitate, operate, reconstruct & maintain the watercourse;	(i) The WUA performs O&M activities only. The improvement, rehabilitation and reconstruction were made with the help of the Mona project.
(ii) improve sub-soil or surface water supply;	(ii) The WUA is not taking any measures for the improvement of water supply.
(iii) install, own, operate and maintain tubewells and lift pumps;	(iii) The WUA does not own tubewells and/or lift pumps.
(iv) upgrade and maintain farm ditches and field outlets;	(iv) The WUs maintain and upgrade farm ditches and field outlets.
(v) encourage adoption of improved on farm water use and management practices and other improved land and agricultural input practices;	(v) The WUA do not posses knowledge about improved farm water use and management practices. Non-water inputs are not managed by the WUA.
(vi) participate in programs to improve watercourses, land leveling and agronomic practices, and to lease, own, operate and maintain equipment, structures and other matters associated with improvement efforts;	(vi) The WUs participate in agricultural improvement programs. The WUA does not possess its own equipment.
(vii) arrange labor for emergency repair of watercourses; and	(vii) The emergencies are dealt with by the water users collectively.
(viii) remove obstructions in watercourses during realignment, operation and maintenance (p. 12).	(viii) The water users undertook necessary measures during rehabilitation, O&M.
• At least fifty-one percent of the total number of irrigators are members of the WUA (p. 7).	At the meeting in which the WUA was organized, only forty-nine percent of the irrigators were present.
• The members of the Managing Committee must be duly elected in accordance with the by-laws of the Association.	Instead of a Managing Committee, an Executive Committee was organized. The members were nominated and were unanimously confirmed by the irrigators.
• The Association is maintaining a Bank Account in a scheduled bank (p. 7).	The WUA of the watercourse keeps no Bank Account
• The WUA shall be registered under the Water Users´ Associations Ordinance (p. 7).	Neither has the WUA been registered nor has any written contract been made with any funding/organizing body.

Continued ....

• An Association shall keep and maintain up to date the following books and register; (i) Register of members; (ii) Cash accounts register; (iii) Store register; (iv) Minutes book for recording the proceedings of the general meeting; (v) Minutes book for recording the proceedings of the Managing Committee; and (vi) such other register and book as may from time to time be required by the Field Officer (p.13).	The WUA keeps none of the books and/or register mentioned at (i) through (vi).
• For every financial year ending 30th June, an Association shall prepare annual accounts and balance sheet showing; (a) the income and expenditure of the Association; (b) the receipt and consumption of materials; and (c) the assets and liabilities on 30th June of that year (p. 14).	No such annual accounts and balance sheet has ever been prepared.
• The Association shall be having a Managing Committee comprising not less than five and not more than nine members elected by the general body including following office bearers; (i) President (ii) Vice-president (iii) Secretary; and (iv) Treasurer	There exists no Managing Committee comprising the said number of members. There exists no specification of roles as President, Vice-president, Secretary and Treasurer.
• All the members of the Managing Committee and the office bearers shall be honorary. They shall hold office for a period of three years (p. 17).	The election of office bearers, known as Executive Committee, has never been exercised after a period of every three years. The WUA is 17/18 years old, and no election/selection/nomination has ever taken place after the first one.

Source: GOVT. OF PUNJAB 1981:7.17

The major emphasis of the ordinance was to provide **legal coverage** to WUAs so that the process of decentralization be made more effective. But an analysis of the ordinance shows that the situation has rather been reversed, as most of the legal and administrative powers have been centralized around the Field Officer. He has been described as the „**Godfather**" of the WUAs whose decision is final, who can sanction or cancel a WUA´s registration and

have a lot of other powers. Analytically, a **high degree of centralization** still remains in spite of transformations and involvement of farmers in the management of irrigation water. Rather, due to the WUA ordinance influencing the Irrigation Department, the farmers are adversely affected by the **sanctions and duties** imposed upon them, and this leads to a stronger centralization. Since Irrigation Department officials are not used historically to enforce the „Acts," the situation for water users did not become worse. The Irrigation Department officials have **accepted this „challenge" to show their physical efficiencies** (instead of institutional ones) as these suit them well in every respect, e. g., securing commissions, enhancing show-off and show of power.

The WUA performed some **horizontally differentiated activities** like the demolition of the old watercourse, removal of trees and bushes, preparation of bed of the new watercourse, construction of the new watercourse, installation of concrete structures, etc. The vertical dimension in identifying the activities, however, was missing. Even in the presence of the Executive Committee, the organizational hierarchy and the distribution of the responsibilities among the members involved was not clearly defined. Neither the Executive Committee members nor the water users were **delegated defined roles for different positions**. As a result, a clear authority structure and basic communication did not evolve. The single activity which differentiates the Executive Committee members from their associates was the mobilization of labor and distribution of work among them. It should be noted that the distribution of work was done according to **the Mona project official´s guideline**.

4.3.2 Scope of Activities of the WUA

According to available secondary data and the informants, the watercourse was **selected as the first pilot watercourse** for full scale improvement with the participation of farmers. For the first time in the history of Pakistan, the idea of a Water Users´ Association was experimented/exercised at this watercourse. Although the WUA established was of a **rudimentary** nature, and farmers had no previous experience of working under such formal organizations, especially at the farm level, they followed successfully the line-of-action presented to them. The management of irrigation water at farm level through farmers´ participation at the watercourse studied provides an insight into the tertiary level irrigation system that is comparable to the others in South Asia. The farmers are managing the system well, according to their knowledge, resources and needs. The **imported idea of formal participation** is being practiced by them only within the limits to which it has been **explained** to them or they have been **made to understanding**. The extent and range of the ways and means of their participation for their own development has never been fully explained to them. Their own knowledge based on past experience has not been fully turned to advantage.

In the case of **guided participation**, the way in which the association´s functions and objectives have been explained to future organizers is of vital importance. The process of convincing the water users and explaining the concept of a WUA satisfactorily level is of immense importance, because the future functioning of the association is mainly based on

the understanding of these factors. The WUA analyzed in this perspective reveals that the multistranded and multidimensional concept of the WUA was not thoroughly explained to the water users. Only some **selected functions and objectives** were brought to their knowledge. It must be stressed, here, that water users did efficiently what they were asked to do and followed the idea of the WUA to the extent they were taught and made to understand.

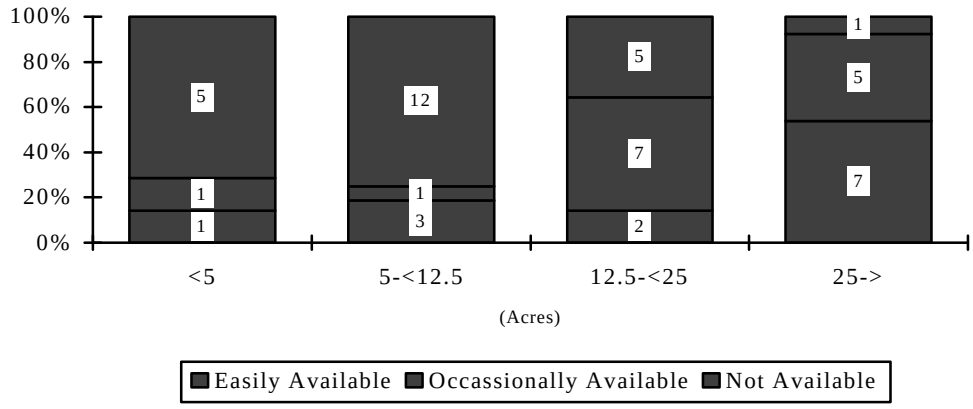
Along with watercourse improvement, the second point considered by the MREP as the basic requirement for successful surface irrigation was **land leveling**. Land leveling was regarded necessary for the uniform application of water over the field. To fulfill the purpose of leveling and to introduce the method of **precision land leveling**, the MREP has provided the facility of implements to the area farmers. In the beginning, the farmers used to get these implements directly from the Mona office, where they were kept. This provision was on an experimental basis, and farmers do not have to pay any rent. The only condition was that the needy farmer has to pick the tools from and return them to the MREP office. Moreover, any damage caused by the user should be repaired by him. Due to the **poor management and implementation of rules**, the farmers used to return the damaged implements without repairing them or delayed their return. To put the implements again in working condition, the MREP had to have them repaired, as a result of which their budget was overburdened.

After the organization of the WUA at the watercourse, these implements were shifted there. The **´library´ of farm implements**, as the farmers stated, consisted of land leveling tools like scrapers, levelers, etc., and other agricultural implements such as different ploughs, watercourse ditcher, drills and spray machines. The basic idea behind the provision of this machinery was to train the WUA members in organizing and managing the machinery jointly. It should be noted especially that the lending of these implements was basically managed by the Field Assistant (MREP) who resides in the village. Theoretically, this ´library´ belongs to the WUA but, practically, it was controlled by the project officials. All the matters regarding the implements, from store keeping to their lending, was regulated by the said Field Assistant. No **sub-committee** in the WUA was established for the management of this stock. The conditions of using these implements remained the same. Every user was obliged to return the implements in good condition to the store established at the residence of the Field Assistant. Due to the **absence of rules and regulations and the non-involvement of the WUA in their management**, most of the users did not fulfill their obligation.

The farmers were not trained in how to use these implements, so they used them according to their **indigenous knowledge**. As a result, most of the implements were out of order, and no one had them repaired. Most of the time, the Field Assistant had to collect the machinery from the farmer´s fields which were sometimes as far as twenty kilometers away. Due to managerial problems, the idea of ´joint machinery´ did not work well. The implements were taken back to the MREP headquarters and are now being lent directly there. Any one who wants to use these implements has to obtain written permission from Mona officials; this has made the procedure more complicated and bureaucratic.

Almost all of these implements are **tractor driven** and are **suitable for relatively larger farms**. As a result, the small landholders cannot profit from them adequately and are of the opinion that this facility is mostly benefiting the larger farmers. Moreover, by virtue of their influence and contacts, the larger farmers have an easier access to these implements. The responses of the farmers of the studied watercourse to a question about the **acquisition of agricultural implements**, are summarized hereunder in Diagram 22.

Diagram 22: Acquisition of Agricultural Implements from the Mona Project



Source: The author´s own survey

As already mentioned, it is the class of large farmers that is getting these implements easily, whereas about 82 percent of the small farmers do not have access to them. In the group with medium landholding, about 35 percent do not have any access to the implements, whereas about 50 percent and 14 percent have reported an occasional and easy access, respectively.

While narrating the reasons of **non-availability of implements**, an elderly farmer said that, in the past few years, the MREP has extended its activities to such areas where big landlords and members of provincial and national assemblies have their lands. Consequently, in the presence of such **influential and powerful landlords**, the chances of small farmers have decreased almost to zero. He was of the opinion that the activities of the MREP are now under the influence of those big landlords.

To keep in touch with recent information about agriculture and irrigation practices, **a library consisting of pamphlets, newsletters, magazines,** etc., was established under the WUA of the studied watercourse. Initially, this library was organized at the residence of the first member of the Executive Committee. Later on, it has been shifted to the residence of the MREP field assistant. He keeps some pamphlets and newsletters, which are only presented as a library whenever **the visit of an inspection team is expected**. Almost 70 percent of the farmers do not know about existence of the library. None of them reported about consulting any of the materials available there.

The multi-dimensional concept of Water Users´ Associations is confined just to **the partial O&M of only one agricultural input - Water**[135]. The importance of the WUA for the management of non-water inputs has neither been considered by the shareholders nor been explained by the organizing authorities. The inclusion of other matters like provision of high quality seeds, joint procurement of fertilizer, joint marketing of produce, pesticides, weedicides, etc., would have enhanced its realization by the community. As **the idea has been imposed by the government** and has already filtered down according to the interests and ease of the bureaucracy, all the features of the concept of the WUA have not been equally emphasized. The scope of WUA at this watercourse, at the first stage, was just limited to the improvement and renovation of the decades old water channel, which, due to many shortfalls in its infrastructure, was causing a great loss of scarce water. At the second stage, the WUA was made responsible for the O&M activities at the watercourse.

4.3.2.1 Rehabilitation and Improvement of the Watercourse

Before explaining the rehabilitation and improvement process, it may not be out of place to describe briefly the situation of the watercourse before the improvement, just to make the scene more visible.

4.3.2.1.1 Situation before Improvement

The **first construction of the watercourse** was according to the design laid out by the irrigation authorities in the early 1900´s, at the time when this village was settled. Over time, the management of the watercourse, for which they never received a piece of advice from any of the line agencies such as the Irrigation Department, the Department of Agriculture and other agricultural extension services, was entirely under the responsibility of the irrigators. The watercourse was reshaped, time and again, through additions and subtractions in its course and right of passage according to the needs. As it was ´no man´s land´ (SAGARDOY et al. 1986:42; CHAMBERS 1980:29), every one manipulated it to meet his needs best. The large landholders were more privileged in doing so in comparison to smallholders. As a result, the watercourse deteriorated to a point when it was losing **more than 50 percent of the water** entering through the *´mogha´* and the tube well. In other words, of the 2,600 acre feet/year of water supplied by the canal and the SCARP tube well at the head of the watercourse, about 1,200 acre feet/year was reaching the root zones of the crops[136]. The **main sources of water loss** comprised the following:

- **Major and minor junctions**, where the water was diverted to branch watercourses, were in poor condition due mainly to the regular borrowing of soil adjacent to the channel to divert water from one to another branch. The borrowing of soil has caused deep and extensive borrow pits along the watercourse. These pits were commonly full of water which had been extracted from the watercourse through regular seepage and occasional breakage. According to a study by KEMPER & AKRAM (1975)[137], they

[135]For details about functions of a WUA, see Section 2.6.1.2.
[136]A major part of the facts presented in this section is based on BOWERS et al. (1977)
[137]Cited by BOWERS et al. 1977:24

found that 40 percent of the losses from the watercourse was occurring within 300 feet of these junctions.

- The **extremely thin banks** of the watercourse were causing a loss of water through seepage and were damaging the crops in adjacent areas to the watercourse.
- The water users have built several **sub-branches parallel to the main channel** to reduce the number of *´nakkas´* from the watercourse as much as possible, because a greater number of *´nakkas´* was recognized by the ID to be causing a greater loss of water. The bank between the main and the parallel sub-branch was usually very thin, allowing a regular seepage from the main to the sub-branches. According to measurements by BOWERS et al. (1977), the areas with parallel branches were causing an average additional loss of almost more than 0,10 cusecs of water per 1000 feet of watercourse than those without parallel sub-branches.
- The farmers´ method of desilting and cleaning had destroyed the **profile and level of the watercourse,** causing a back-up in the water supply. In other words, water users were losing a substantial amount of water because the watercourse was at a higher level than the water level in the canal.
- The **uneven width of the watercourse**: too wide in some sections, and too narrow in other ones, had been affecting the velocity of the water. Due to an uneven flow and its dead storage at wider sections, the small farmers were the ones who were more disadvantaged. According to BOWERS et al., the watercourse in some sections was as wide as 35 feet.
- The **high rate of evapotranspiration**, particularly in hot summers, can also be added to the causes of loss of water.
- **Animals and agricultural equipment crossing the watercourse** also degraded the banks, causing frequent ruptures in such sections. Due to the lack of culverts, this degradation cannot be stopped. Trespassing was unavoidable to reach some isolated fields. There were at least fifty points along the watercourse where animals were watered and bathed.
- **Plant, insect and rodent populations** had made the watercourse banks porous, causing a higher rate of seepage out of the banks.
- **Overtopping** also used to cause loss of water.
- The **frequent breakage** of the watercourse banks, due mainly to poorly maintained infrastructure, also used to cause great losses of water.

As a combined result of all these causes of loss of water, about 3.12 to 3.24 percent of the water was lost in every 1000 feet of the watercourse. Such transportation losses were seriously affecting the tail enders. Before the improvement of the watercourse, the tail ends of the branches F and G were receiving about 44 percent and 34 percent of the water supply respectively.

Due to the installation of the **SCARP tube well** in the mid 1960´s, the amount of water supply was doubled. However, the **capacity of the watercourse** was not modified according to the increased amount of water flowing in it. No shortage of water was perceived after the installation of the tube well, therefore, it adversely affected the O&M activities performed jointly by the shareholders.

Due to the lack of any **technical advice regarding cleaning and maintenance**, the level of the watercourse was irregular. In various locations, it was either too narrow or too wide, causing overtopping and reducing the steady flow of water. At most of the major junctions and many of the minor junctions, the watercourse was in an extremely poor condition, causing **frequent leakage and breakage**. Due to borrowing of the soil, the neighbouring area of junctions was marked by deep and extensive borrow pits that caused regular seepage from watercourse into them. Due to the pressure of work and the fear of losing water during their turns, farmers used to take soil as close to the junction as possible. This narrowed the watercourse banks near the junctions; according to MREP officials, this was causing **40 percent of the total loss** from the watercourse (BOWERS et al. 1977:24). The informants reported that the task of diverting water from one channel to another used to be most difficult and time consuming. One has to cut the water to ones own fields and close its flow to the predecessor´s simultaneously. The farmer tries to utilize every drop of allotted water by not allowing it to flow further to the predecessor´s fields. This hectic work not only shatters one´s muscles, but the fear of losing water also affects one´s mind. A syed farmer, while diverting the water to his fields, became a victim of this activity. The water users reported that, due to the feeling of losing water and his partial failure in diverting it, his mental balance was badly shattered. He remained under shock for some days and had been talking to himself, „ Syed! close the water. Syed! close the water.“

The **field *´nakkas´*** from main branches of the watercourse are specified by the ID, and, to have an extra *´nakka´*, a special permission from the ID is required which, normally, is a **lengthy bureaucratic procedure**. To solve this problem, the farmers used to construct parallel sub-branches. These parallel sub-branches to the main channel used to be a major cause of loss of water. The existence of parallel branches does not mean that there were no illegal field *´nakkas´*, as this was a natural requirement to supply water to the **increasing number of fragmented landholdings**. Usually, the bank between the main and the parallel sub-branch was considerably thin, allowing a regular seepage of water from the main to the parallel sub-branch watercourses. Most of these sub-branches used to have **dead storage** sections, which needed to be filled first to allow the further flow of water. These parallel branches covered a considerable amount of land which, otherwise, as a part of the field, can be used for crop cultivation, hence, increasing the farmer´s income.

The **removal of sediments** from the watercourse used to be a serious problem. The situation at the head reach, as the main section of the watercourse where silt was deposited, was far worse. Due to **regular deposits of silt** at the banks, the banks were as much as 5 to 10 feet higher than the water level. At some points 2 to 3 farmers were needed to clean the sediments: one farmer used to collect it at the bed, hand it over to the farmer standing in the middle who, in turn, gave it to the third one who throws/spreads it on or near the bank.

According to elderly farmers, the removed sediment deposited on the banks had taken the shape of **small heaps**, making further cleanings a really difficult job. The regular deposit of sediments on the banks and its ultimate extension to the adjoining fields had been a constant problem for head farmers. As a result, either the farmers lose the use of that portion of land or have to spread it over the land surface and relevel their land. Due to regular deposits of sediment in the bed, the **level of the watercourse** was not compatible with the level of the *´mogha,´* causing a back-up of water in the watercourse. Ultimately, the farmers were not getting their actual water supply from the canal. To avoid the loss of water, the farmers used to clean the watercourse frequently.

To prohibit **leakage and theft** mainly, it was necessary to keep the whole of the watercourse up to the *´mogha´* under strict watch. The banks were covered with trees, bushes and wild grass, providing shelter to poisonous insects and snakes, and one was exposed to the danger of treading on them. The farmers having their turns of water at night used to prefer avoiding risks and sometimes had to suffer a considerable loss of water. The rat holes used to be another cause of water loss in the past.

Apart from these physical problems, the **old irregular watercourse** had been disturbing the **social atmosphere,** too. Some farmers had illegally benefited from the weaknesses of the system. At most, the major junctions and many of the field *nakkas* were the weakest points mostly misused for the purpose of theft. The common lame-excuse was „**automatic rupture**" or a breach caused by animals trespassing. The theft rate was high, and the thief used to hide behind the system´s weaknesses. With such a **poor infrastructure**, it was really difficult to accuse someone confidently of stealing the water, and this state of confusion caused many misunderstandings and a tense social atmosphere. To the victim, all the shareholders at that specific branch where his water had been stolen, were suspicious. The quarrels over water theft and watercourse breakage became more frequent.

For the management of **water from the *´mogha´* to one´s field,** at least 2 to 3 strong young men were required. One of them has to watch the watercourse constantly to avoid any breakage in the poorly maintained banks and to stop any intended theft, whereas the two others manage the water in the field and in the watercourse. This process involved **more labor and was time consuming**, especially for the tail enders. They have to watch a relatively greater length of the watercourse which increased the possibilities of losing of water. In the case of tail enders, if a breach happened at the head reach, it meant almost the loss of a complete turn. On the one side, they had to travel a long distance to be at the required point and, on the other, after repair, the watercourse had to be refilled to irrigate the fields. All of the shareholders, when recalling the past conditions of the watercourse, spoke of a „**bad time**".

4.3.2.1.2 Reconstruction and Improvement

As stated earlier, this watercourse falls into the area of the MRE Project that was looking for a potential watercourse to be improved on an experimental basis, according to specific criteria set by CSU and MREP officials. On the other side, the farmers of this watercourse, like many others, were very depressed due to the progressive deterioration of the

watercourse. The lack of maintenance combined with the **increasing pressure to raise production** multiplied their worries over time. The selection of the watercourse by the MREP in the hour of need was cordially welcomed by the shareholders. After fulfilling such prerequisites as the organization of the WUA and the selection of the Executive Committee, the process of improvement was started in **November 1975**.

It is significant that this watercourse experienced two waves of improvements, namely ***´katcha´*** **and** ***´pukka´*** **improvements**. The first one was earthen improvement, whereas, during the second one, a substantial length of the watercourse was lined with bricks and cement and with concrete slabs as well.

a). ***Katcha*** **Improvement**

Although the **plan of reconstruction** was prepared by the project officials, some changes were made according to the farmers´ demands and needs. To secure existence of the watercourse over a long time, the engineers insisted on keeping animals out of the channel. This requirement was not easy for the farmers to fulfill because, during the hot summer, their animals need to bathe and drink water from the watercourse. When engineers tried to make this a precondition for the improvement activities, the farmers reminded them that **Allah has said in the Holy Koran that „water is first for the man, second for the use by animals and third for use by crops.“** The project officials could not oppose this reference and, with the farmers´ help tried to seek an agreeable solution. Both parties agreed upon the construction of **buffalo baths**: special structures in the watercourse, where animals can drink and bathe.

The second alteration to the plan proposed by the farmers was the construction of a **sediment trap to facilitate the cleaning of the watercourse**, especially at the head reach. After on-site inspection, the project authorities designed a sediment trap adjacent to the *´mogha.´* According to estimates, about 70 percent of the sediment was expected to be trapped here. The proposed frequent cleaning of this trap can save a lot of time when cleaning the whole *´sarkari khal´*[138].

The proposed location for installing the **check structures and field outlets** was finalized after discussion with the farmers. This issue was of a critical nature, as every farmer wanted to have a check and field outlet structure as close to his field as possible. Some of them insisted on having their illegal *´nakkas´* approved. This matter was mainly handled by the Executive Committee members, and they proved successfull in satisfying their companions. Moreover, the Executive Committee also decided when to start the work. It was proposed to carry it out during the **time of annual canal closure,** in the months of November and December.

The acceptance of these proposals by the local and the foreign (CSU) experts enhanced the Executive Committee´s confidence, and they assumed their respective responsibilities with more enthusiasm. The **acceptance of proposals**, especially, was used by the Executive Committee members as a tool in moving their less ambitious shareholders. As per

[138]*Sarkari Khal* is the main portion of the watercourse which transports water to water users´ field outlets (*nakkas*). For further details, see AHMED & CHAUDHRY 1988:8.28.

agreement, technical guidance and material along with concrete structures were provided by the project, whereas the required labor and transportation of materials was the farmers´ responsibility. The **mobilization of labor**, **distribution of work and the quality-control** of their work was regulated by the Executive Committee. All of the available labor was not required each day; so it was divided into groups. Each Executive Committee member was made responsible of a specific number of shareholders, determined by the respective member´s influence and power among those farmers. It was the responsibility of the member concerned to pursue the **„allotted" farmer**, if he was not on the job at the agreed place and time. According to key informants, some of the farmers were literally pulled out of their beds by the Executive Committee members.

During the ***katcha* improvement**, the old watercourse was completely demolished to the ground level. The bushes and trees on the path of the watercourse were removed. The high sediment mounds were removed and a compacted bed for the new construction was prepared. The new banks were built with earth free of organic matter to avoid any future vegetation. The banks were built so **thick and wide** that one can even ride a bicycle or a motor-cycle over them. All the *nakkas*, check structure and culverts were installed as far as possible without leakage. The number of *´nakkas´* was reduced to those sanctioned ones only. Four buffalo baths were constructed at different locations of the watercourse.

When reporting about the **improvement activities**, one of the Executive Committee members told proudly that they had completed this work within a span of forty-four days, which, according to him, was a record. He further added that improvement work was completed about sixteen days **ahead of the proposed schedule** of two months. The fact that all the shareholders participated enthusiastically and sometimes had worked from dawn till sunset, even on holidays was also mentioned. The work was completed at a stretch, without any gap. During this action, the whole of the *sarkari khal* and main branches were improved and equipped with necessary concrete structures. The watercourse was realigned and constructed at its exact location, as demarcated by the ID.

b). *Pukka* Improvement

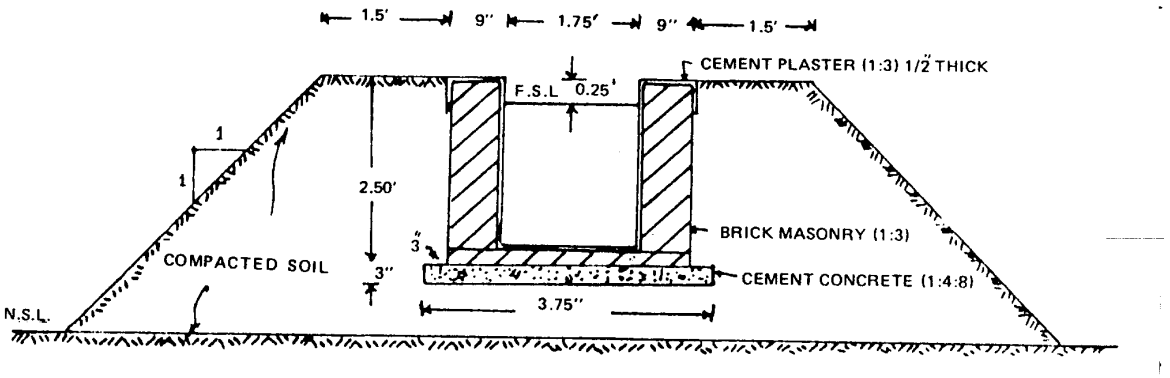
Over time, it was proved through observation and practice that *katcha*-improved watercourses need **continuous maintenance** in order to keep their efficiency, which, instead of reducing the workload proved the reverse. To ease the workload, the idea of lining was put forward by the MREP and CSU experts. In this connexion, the project authorities made some experimental improvements on some sections of the area watercourses. When these news reached the farmers of the studied watercourse, their natural reaction was to use the new technology. Accordingly, **an application for *pukka* improvement** was filed to the authorities. Keeping their **previous performance** in view, the MREP approved the lining of their watercourse. Following their experimental research, the MREP lined different sections of the watercourse by applying different designs. As a result, the lining activity progressed at several intervals. The terms and conditions between the farmers and the project authorities remained the same as they had been during the *katcha* improvement.

As the lining process was initiated, acres number 4 and 5 of the square 31 on the main branch were lined using the **conventional lining with brick masonry and concrete** (see Diagram 24-a). This section of the main branch passes through the **People´s Colony**[139], the eastern hamlet of the village, where the rate of watercourse degradation was comparatively higher. The houses are situated on both sides of the watercourse and trespassing by animals and human beings is very high, causing a high rate of water loss. Realizing these serious problems, it was lined with cement and bricks. During this activity, the bed and inner sides of the banks were lined.

Meanwhile, the MRE project developed another design known as **rectangular lining** to line the watercourse. To measure the benefits of this design, acres numbers 1, 2 and 3 of square 31 were lined. One acre of the main branch was constructed by making use of the **trapezoidal design**. The details of the designs of lining tested are shown in Diagram 23 a-c.

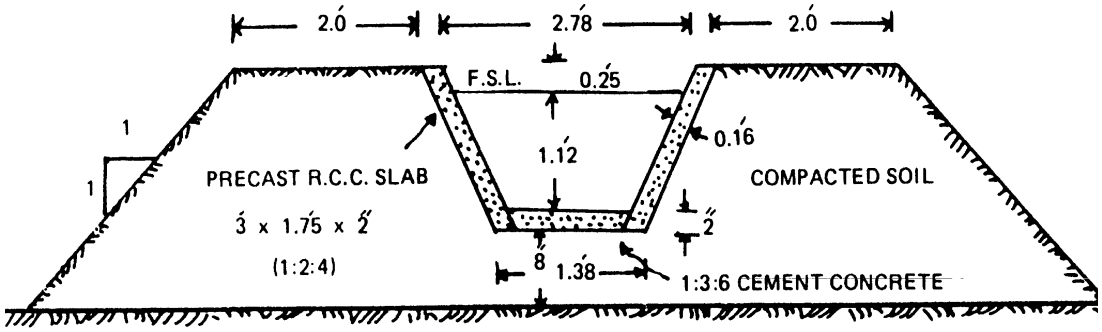
[139] This residential area was allotted to landless inhabitants of the village following the „five *marla* scheme" during the first regime of Mr. Bhutto´s Pakistan Peoples´ Party (PPP).

Diagram 23-a: Conventional Lining with Brick Masonry and Concrete



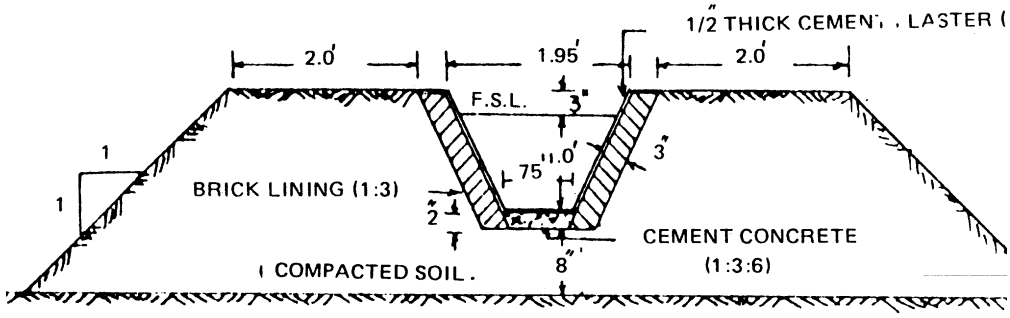
Source: MUNIR 1981:85

Diagram 23-b: The Rectangular Design



Source: MUNIR 1981:92

Diagram 23-c: The Trapezoidal Design



Source: MUNIR 1981:89

The process of **experimental lining** was continued at different intervals and, finally a length of about 39,5 acres of the main watercourse and branches was lined. The details of this lining are shown hereunder in Table 11:

Table 11: Details of the Lined Sections of the Watercourse

Sr. Nr.	Branch	Square Number	Acre(s)
1.	Main	31	2 acres
2.	Main	31	3 acres
3.	Main	30	1 acre
	C	35	1 acre
4.	Main	30	4 acres
5.	B	Complete	15 acres
	C	35	4 acres
6.	G	25 and 26	3.5 acres
7.	Main	32	5 acres

Source: The author´s own survey

During the lining of the watercourse, all the shareholders provided labor jointly. Although, only a specific number of farmers profited from the lining of some branches but the labor was provided by all the shareholders. This was, actually, in compliance with the **decision made at the time of WUA organization**, according to which the improvement of any section of the main watercourse and branches will be the joint responsibility of all the shareholders.

4.3.2.2 Impact of the Watercourse Rehabilitation

The **installation of improved concrete control and check structures** helped in stopping the borrowing of earth and degradation of the junctions of the watercourse which, in the past, had been unavoidable for the construction of the earthen dams. By installing improved *´nakkas´* and check structures at the junctions, there occurred an enormous ease and saving of labor intensive activities. It has also caused a complete elimination of borrow pits along the watercourse which used to be one of the major causes of loss of water. In the past, the activity of converting water at junctions required at least two strong men to work for an average of 20 to 30 minutes, as fast as they can. The **continuity of activity** was necessary to reduce the washing away of soil by the water. Sometimes, the water users have to manage some large pieces of sod-filled soil along with bushes and bundles of straws. After the improvement of the watercourse, one water user usually requires **5 to 10 minutes** to properly open and close a concrete *´nakka´*. This duration also includes the time required to pack the *´nakka´* with mud plaster, if necessary. The **number of check points was reduced** to as minimum a number as possible; this limited the possibilities of water loss at these points. Although every water user wanted to have the check structure immediately following his farm *´nakka´* from the watercourse so that he would not have to fill an extra section of the channel untill the next check structure downstream. This problem was solved when it was assured that the matter would be duly considered in the ***´warabandi´***.

Easy **sediment removal** after its accumulation in the sediment trap facilitated the labor activities and also caused a reduction in its deposits in the downstream sections. A danger to the profile and level of the watercourse is almost averted. Due to the **control over the causes of water loss**, the damage to crops has been practically eliminated. During the rehabilitation process, all trees along the watercourse were removed; this affected positively the yield of different crops. In the past, the crops under the shadow of the trees did not produce good yield. When the culverts were constructed, most suitable sections were selected. To keep the costs low and not to disturb the flow of water, the culverts were built in a limited number. Just after the rehabilitation and improvement, a farmer at the end of branch G reported a **63 percent increase in the availability of water**. Most of the farmers believed that the supply of water had doubled.

As there is a direct connexion between **cropping pattern and supply of water** (FREEMAN & SHINN 1989:110), the cropping pattern has undergone a series of changes with the fluctuations in the supply of water. Just after the rehabilitation of the watercourse, when canal and tube well functioned well, the farmers started to cultivate rice, but after few years they almost gave up its cultivation, due mainly to the high unreliability in the operation of the tube well. MANIG & KUHNEN are also of the same opinion, when they state that the low cropping intensity is a reaction to the **high risk of unavailability of sufficient water supply**. Therefore, the existing cropping patterns and intensities have been described by them as the main bottle-neck in utilizing the production potential in irrigated agriculture in Pakistan (1986:40). These cropping patterns are usually adjusted to the availability of water (MANIG 1995:8). The situation will remain constant as long as the **efficiency/performance of the irrigation system** is not improved, both at the main and the farm level.

Due primarily to **poor yields and a depressed market**, cotton has lost its worth as a cash crop and is being replaced by citrus. Cotton and rice are now cultivated by some farmers for the household consumption basically. Today, wheat, sugarcane and citrus are the major crops at the watercourse. The area under citrus is being expanded at a relatively rapid pace. After rehabilitation, there has been an increase of about 150 acres in the area covered by citrus orchards. The main reason of the steady increase in the area under citrus is that it is **one of the easiest and simplest crops to cultivate**. Unlike other cash crops it requires not only considerably less labor, but it is also very easy to market. It is sold directly to contractors, either at flowering or budding. After the fixation of the price for the entire orchard, the farmer´s responsibility is only to irrigate the orchard and spray it, if required. The area under wheat does not show great fluctuations, due not to its importance as staple food only, but also due to the **social value** attached to its production for the household´s consumption. It is held to be disgraceful for a farmer to buy wheat for **household consumption**, although he may earn more by cultivating other cash crops. It is a generally accepted and extensively practiced value among the farming community that a good grower never buys wheat grains for consumption by his family. A water user stated emotionally in this context, „I do not acknowledge him a farmer who cannot grow wheat

for annual consumption by his family.“ The **very good yields of wheat** are, however, another factor for its regular cultivation.

The area under sugarcane is also declining progressively, due mainly to some **institutional and organizational problems**. The watercourse is in the mill-area of a sugar plant at Bhalwal and, therefore, according to the **Federal Sugar Act (1947),** the farmers must market at least 80percent of their sugarcane at the mill. This legal privilege is being continuously exploited by the mill authorities, as they deal with the sugarcane grown in mill area as a reserve to be bought in the end, when they do not get any more supply from out-of-mill-area. The first preference for out-of-mill-area sugarcane penalizes the mill area farmers, as they are not allowed to harvest their crop until the mill is willing to accept it; this causes deliberate delays in getting the land free for the next crop. The transportation of sugarcane to the mill is another tedious job, and the situation becomes more worse when farmers have to wait for 24-48 hours in a queue outside the mill. To get payments from the mill is another **time-consuming, lengthy bureaucratic procedure**. All this has made sugarcane a troublesome crop that is usually not worth the effort. Sugarcane definitely has the potential to be a good cash crop, but due to the discouraging behavior of the mill authorities, the farmers are not interested in increasing its area of cultivation. Moreover, in comparison to citrus, sugarcane is more labour consuming, needs more water, occupies the fields for the whole year for itself, exhausts the soil more than any other crop (BHATTI 1984:59) and is difficult to market. The decrease in the area of sugarcane cultivation can also be attributed to the **widespread advantages of citrus cultivation.**

With a better supply of water, the cropping intensity has increased over time. A large area of the watercourse command is **double cropped**, whereas some of the water users are growing **three crops** a year.

Even after eighteen years, they narrate proudly that their watercourse was the first one selected for organizing of the Water Users´ Association, and they rehabilitated their water channel on an experimental basis by reconfirming their repute as **cooperative farmers of the area**. They organized their labor activities by themselves through the Executive Committee and participated not only in implementation but in decision making as well. They realize the fruits of their participation as they remodeled some of the decisions made by the project team and added some new ideas to suit them best.

The improvement of the watercourse has **increased the irrigated area** in one turn from 15 to 30 percent, as reported by the water-users. To a question about handling the system, almost all the respondents reported an enormous ease in handling the recently installed check and convert structures. According to them, presently, only one person, whether young or old, can manage the water from the *´mogha´* to the fields. In the past, under normal conditions, this task was performed by at least two to three strong young men. To prohibit leakage and theft mainly, it was necessary to keep the whole watercourse up to the *´mogha´* under strict observation. The banks were covered with a wild growth of trees, bushes and grass, making it a difficult task to keep it in a good and clean condition. This wild growth provided shelter to poisonous insects as well as being a cause of loss of the water. No one can take the risk to walk over them, especially at night. In **the improvement**

process, the old watercourse was leveled to the ground and a new watercourse was constructed following the guideline provided by the project team. The new banks were constructed so strongly and were so thick that one can ride a bicycle and motor-cycle over them. As a result, some of the shareholders watch their turn by riding over the banks. The opening and closing of a check structure, diversion of the water from one branch to another and to the fields can be done easily; this **saves a lot of time and labor**. Moreover, the loss of water which used to occur during this activity has also been stoped.

The old, poorly maintained watercourse was **a regular danger to the social atmosphere** of the village, causing misunderstandings and ultimately leading to disputes. Such disputes over water, after the rehabilitation and renovation of the watercourse, have decreased to a minimum. As the main watercourse and some of the branches are partially lined, but completely earthen improved, cut, check and convert structures are properly installed, there is no chance of automatic rupture and theft. „The thief cannot hide himself behind weaknesses of the system, as this used to be the case in the past; this has ruled out the possibility of theft," commented an elderly water user.

Due to **changes in the supply of water**, the cropping pattern and intensity have experienced a series of changes. The farmers have given up growing some of the crops and replaced them with others due to a set of reasons described before. In this regard, the supply of water has played a vital role. Most of the farmer were found to be **dissatisfied with the functioning of the SCARP tube well and with its operator** as well[140]. Regarding the tube well operator´s attitude towards his duties, a great majority of the water users graded it as unsatisfactory. The water users told that since the tube well operators have organized their unions at regional as well as national levels, their performance has further decreased. They have built some ´**pressure groups**´ in the form of their unions, which safeguard them in every circumstance. The fear and authority of an immediate boss has been almost neutralized due to the unions. To be on ´good terms´ with the tube well operator has also become a necessity of the day, which the water users try to secure through payments in kind (´***Faslana***´). Most of the time, the tube well operator is not available at the site, as he resides in the nearby town. Along with his absence, he may choose to place a burden on farmers by not operating a full pumping period. This ´**exercise of willpower**´ is an outcome of the **technical and institutional shortfalls in the system**. The excuses very frequently offered include scarcity and shutdown of the electricity and some technical fault in the machinery. Like some irrigation officials, the operator has also become an important figure in the supply of water and has splitt the water users into two visible groups: one cherishing and favoring the operator´s activities and functions, the other criticizing and unsatisfied with his performance. Regardless of these groupings, the author, during his stay in the village, seldom saw the operator at the tube well. He used to come for a few hours there, in the span of time which suits him well. In his absence, if the tube well stops functioning temporarily for any reason, the water users re-start it by themselves. This activity is very dangerous due to high voltage of electricity, on the one

[140]See Section 4.2.1.3

hand, and is damaging the starting system of the tube well due to unawareness on the part of water users, on the other.

The water is distributed according to the **pre-existing *´warabandi´*** which has **neither been changed nor modified**. Most of the farmers were satisfied with this system of water distribution. Anyhow, those who are affected due to closure of the tube well in their turns are strongly demanding a modification of this schedule. The **split of managerial activities** between the ID and the WAPDA is making the situation complex.

4.3.3 Summary

The essential **features of the WUA** are summarized as:

- All the shareholders at the watercourse are members of the WUA. For **membership** in the WUA, the water users do not have to fulfill any extra conditions or formalities except having land in the command area of the watercourse. The water users do not pay any membership fee.
- The **Executive Committee** for the execution of improvement works was selected by the Mona project with the unanimous consent of all the members. All the members of the Executive Committee were potential leaders of their respective caste and *´biraderi´* units. The already existing patterns of leadership were confirmed.
- The organization model of the WUA is **similar to the truncated-craft model**[141].
- Although the social structure of the water users is favorable for a segregated approach[142], the activities of the WUA were managed in an integrated way; from the top to the bottom[143].
- Neither of the two approaches was used when the WUA was organized,[144] however, one may find **some similarities to the training approach**.
- The structure of the WUA does not explain the **horizontal nor the vertical dimensions** of the organization.
- The WUA can be clearly labeled as **a specialized water management organization**. Further, it follows the third classification of this organization model, i. e., water is managed under the mixed control of government and of the water users[145].
- The participation form corresponds to the **organized or introduced** type which by its nature, is ranked as top-down.
- The participation of the water users was mobilized **through selected water users as organizers**[146].

[141]See Section 2.2.4.5
[142]See Section 2.2.2.1
[143]See Section 2.2.2.2
[144]See Section 2.6.1.1
[145]See Section 2.4.3.3
[146]See Section 2.5.3.3

- The scope of the WUA activities revolves mainly around the management of irrigation water.
- After the infrastructure of the watercourse had been improved, there occured an improvement in the physical, social and economic situations. The improvement activities of the watercourse were completed in two phases, namely; *´katcha´* and *´pukka´* improvement.

The WUA studied is an association with a single purpose organization, without vertical dimension but some horizontal identification of activities, strictly top-down approach in planning, designing, decision making and implementation; the water users´ decision to participate was voluntary, but the participatory activities were guided. All these characteristics combined with the socio-economic features of the community exerted a great impact on the water users´ participatory behavior. The next section deals with the analytical effect of these factors on water users´ participation in the WUA, particularly, and in other communal activities, generally.

4.4 The Significance of Community Participation

As stated earlier[147], the watercourse studied dates back to the early 1900´s and has been managed by the farmers on a **self-help basis,** without any external guidance and assistance. Right from the time of settlement, the watercourse had a multi-caste social organization with a variety of individual and ´*biraderi*´ vested interests. For the persuasion of these interests, referred to as evident as well as hidden goals (MANIG 1994:251), the farmers had organized themselves into different **transitory and/or sustainable groups** in which cooperation and conflict were reported to be simultaneous. On occasions, they joined hands with their counterparts, whereas, in some other instances, they had refused and even opposed each other. Opposition occured mostly in situations when individual and hidden interests/goals played an important role (ibid. 1994:251). According to the reported **historical pattern of cooperation/conflict**, the farmers at the watercourse can be rated as being relatively cooperative, especially for communal activities. A list of very conspicuous cooperative activities, along with others, include school building, road construction, village sanitary program, establishment of cooperative society and mosque construction and maintenance. The successful cooperation in previous **community projects** suggests that the community has the prerequisites for successful cooperation on watercourse projects and also provides the community with an encouraging, positive previous experience. In the absence of such experiences, things may not develop in the desired direction or even develop the other way round.

On the basis of such activities, it may not be assumed that the said community is free of conflict, because, on such occasions as local bodies elections, religious rituals and the installation of some public goods, they proved conflictive among themselves. As in other societies, **conflict is omnipresent,** here too, and cannot be eliminated from social life.

The **cooperation or conflict,** here is always determined by the nature and usage of the activity or good concerned, along with the history of cooperation/conflict between those involved in similar activities. The main reason of their participation in water management activities is the nature of the task, where everyone is expected to profit from the system´s improvement and from the absence of any serious conflict among the water users in the past. The share of benefit can differ according to some **situation specific elements**, but it cannot be denied to anyone. Moreover, an individual cannot perform the required activities of water management successfully, as these demand collective action. Another factor is the communal nature of the watercourse as a collective good which does not belong to an individual or ´*biraderi*´.

4.4.1 The Process of Water Users´ Participation

Participation, as described in theoretical settings, is not limited to one aspect or activity of the program, but is a **continuous process**. It starts with or perhaps before the planning of a program (participation in concept development, for example) and lasts even after the completion of the program (O&M and other activities necessary for sustainability).

[147]For details see Section 4.2.

Therefore, real participation means the people´s involvement in **planning**, **decision-making**, **implementation and sharing of benefits**.

4.4.1.1 Participation in Meetings

The participation of the WUA members in meetings is used here as a **barometer** which indicates the extent of their internal communication and coordination. The WUA at the watercourse do not have any fixed time-table of meetings which are called „**according to need.**" The meetings are called and held according to the traditional pattern in the village which dates back to the pre-WUA time. One day before the proposed meeting, an **announcement** is made through the loud speaker at the mosque, and the place and time of the meeting are made known. The announcement is usually made by the *Imam masjid*, as he holds the keys of the loud speaking system. He is requested to have the announcement made either by one of the Executive Committee members or by the water user who is going to organize the activity on the proposed day. The **time and place of the meeting** have been fixed since long; the place is always the head of the watercourse, i.e., the *´mogha.´* There was not any change in the **pattern of meeting,** even after the establishment of the WUA, as matters are discussed in *´panchayat´* (an informal assembly of village elders, mostly *´biraderi´* heads, to resolve disputes and settle problems at the local level) style. Only during the period of renovation and rehabilitation were some meetings held to discuss the matters regarding purely the improvement of the watercourse. It is important to mention that, during these meetings a representative of the MRE Project was always present.

At present, WUA meetings are held only according to need or in the case of an emergency. About **40 percent of the members participate in these meetings;** this can be ranked as being better than the rate of participation in the Muda area in Malaysia, as reported by KALSHOVEN (1989-b:109), but lower than the Philippines´, where the members´ participation rate is as high as 79percent (TAPAY 1989:34). The problems regarding the watercourse are not the only topic of these meetings, but other communal problems such as village sanitation, maintenance of roads, etc., are also discussed. There is **no fixed agenda** for these meetings, and no fresh information regarding irrigation matters are supplied to farmers. There is not only no regular **flow of information** from irrigation agencies to the WUA, but there is also no feed-back mechanism to the officials which could help them to solve the problems concerned. At these meetings, very few members voice their opinions; most of them are mere listeners or generally obey the suggestions/decisions made by some influential farmers or *´biraderi´* heads. Because of the voluntary participation in these meetings, there is no check on the non-participants. The WUA does not have any formal by-laws or rules and regulations applying to their meetings and ultimately to their activities so that they can **reward** the participants and **punish** the non-participants. There is no written record of these meetings which may be used as a reference in the future. How often are the meetings called, how many members participate, on which occasions they meet, what is the nature and agenda of these meetings, cannot be found in black and white.

Anyhow, on the basis of their memory, the water users reported a frequency of 2 to 4 meetings in a year.

4.4.1.2 Participation in Decision-making

As stated earlier, the watercourse was improved according to the **top-down** approach, especially regarding the decisions about its planning. The strategy for improving the watercourse was decided at higher government levels, without any participation by the farmers. Right from *katcha* improvement to its lining, all the policy and engineering matters were decided at the MREP headquarters. During the implementation, however, most of the decisions were made by the **farmers´ representatives**. Such decisions regarding mobilization of labor, work plan, distribution of work among workers, etc., were in fact difficult, if not impossible, for the project officials to comply with. To overcome this problem, the WUA was delegated partial **decision-making powers**, which, in the long run, affected its abilities to undertake those functions which were previously performed by the Mona project. The failure to conduct the subsequent election of Executive Committee members can be viewed as a relevant example. Moreover, other essential measures such as raising **communal funds** for future improvements and repairs, etc., which can make the WUA viable, are never considered by the water users. The ability to make new decisions regarding O&M activities, the multifunctional concept of the WUA, etc., was not properly polished and propagated; this contributed to make the WUA inefficient.

The number of participants as well as the participating persons are not constant; the number keeps fluctuating around the general percentage, whereas a small percentage of the persons also keeps changing. There are several reasons for the lesser number of participants in the meetings and, thus, in the decision-making process. The most common include engagements in agricultural activities, representation by *´biraderi´* leaders, underestimation of one´s value of participation and , therefore, of voice and opinion.

The decision-making process is **dominated by the *´biraderi´* elders** who are members of the Executive Committee as well. The opinions and recommendations of the general water users are heard and paid due attention. The final decision, however, is made by the *´biraderi´* elders/heads[148].

4.4.1.3 Participation in Implementation

The implementation of decisions concerning various matters at the watercourse level is mainly the **responsibility of the Executive Committee**. The Executive Committee members or heads of the *´biraderi*s´ usually function as **managers** of the implementation activities; they manage the materials required and organize the labor. No case, in which Executive Committee members or *´biraderi´* heads had participated in actual labor activities has been reported. The general water users participate as laborers and follow the directives of the Executive Committee. For collecting the labor force, the Executive Committee members approached each and every water user personally. Every member of

[148]The elderly *´biraderi´* members are usually heads of the their *´biraderi*s´.

the Executive Committee was to approach specific water users selected on the basis of personal and *´biraderi´* realtions. For this, each member made the best use of his personal influence and power, based primarily on his alliances with **certain groups with vested interests**[149]. If any farmer has a genuine excuse for being unable to participate, he is obliged to provide an alternative for himself. Providing an alternative was mostly managed by the Executive Committee, a laborer is hired for the absent shareholder who has to pay him afterwards. Not a single incidence of such payments not being effected has been reported. Some delays had definitely occurred due to several reasons, such as unavailability of the water user concerned, lack of cash for payment, etc.

During the rehabilitation phase, the Executive Committee members were responsible for the **allocation of work** among the shareholders. The work to be finished within a specific period of time was allotted through measurements. Each farmer or group of farmers was allotted several *´karam´*[150] of watercourse to be worked upon. One or two Executive Committee members used to measure the section of the channel concerned which was further divided among the workers accordingly. The workers followed the instructions of the Executive Committee which, in turn, was guided by the project authorities.

4.4.1.4 Participation in Operation and Maintenance

After the construction of the watercourse by the WUA and the project officials, the farmers were fully responsible for its operation and maintenance. To fulfill this task, they were not provided with any **organizational and technical assistance**, either by the Mona project or by any of the Extension agencies. They are organizing and maintaining the system according to their **traditional patterns and previous experience** which dates back to pre-rehabilitation times. There did not occur any change in the organization and nature of these activities. One can single out the O&M activities which are being regularly performed by the water users in **collective action**.

Following the improvement of the watercourse, the main problem that remained unsolved was that of making some arrangements to keep the watercourse infrastructure in order. As a solution to this problem, the Mona project team and their advisors suggested that the water users should hire a ***´khal chowkidar´***[151]. This was in order to keep up the *´katcha´* improvement. Following the suggestion, a *´khal chowkidar´* was hired by the water users on an annual wage basis. His job was to look after the watercourse, do some minor repairs when necessary, keep animals away from the channel, report to the Executive Committee any cases of misconduct, watch the check structures to avoid any intended theft or damage, etc. He was responsible to keep the sediment-trap under observation and to inform the water users when sediment deposits had reached a level and had to be cleaned. To inform the Executive Committee when the watercourse required a cleaning, was also his responsibility. As a compensation for his services he received one *´maund´*[152] of wheat per square of land per annum. Moreover, he was allowed to cut all the grass from the banks of

[149] See HAYAMI & KIKUCHI 1981:37.
[150] *´Karam´* is a local unit of length which is equal to 5.5 feet.
[151] The punjabi denomination for the watercourse watchman.
[152] A local unit of weight measurement, which is equal to 37.32 Kilogram.

the main channel and its branches. This reward was insufficient to feed his family, so that he bought a milk buffalo to earn an additional income. As a result, most of his time was spent in buffalo keeping, and his attention was diverted from watching the watercourse. Most of the shareholders were not satisfied with his performance so that he was relieved of his duties.

After the dismissal of the *´khal chowkidar´*, all the **O&M activities** were performed by the farmers, right from the watch to the maintenance. Normally, every irrigator keeps an eye on the condition of the watercourse, especially on sediment deposits, vegetation growth and water flow. Because of the **lack of a plan for O&M activities**, the cleaning and maintenance of the watercourse is only done when the farmers feel a need for it. According to the traditional pattern, the shareholders are informed about the cleaning of watercourse along with the meeting time and place through the loud speaker at the mosque. This announcement is usually made a day before the work begins. Usually, the time to start the cleaning activity is early in the morning and the meeting place is the *´mogha.´* The cleaning work is done on the day of the *warabandi*, when head farmers have their turns, so that a large portion of the watercourse is not being used for transporting water. At the decided time of the day, all the shareholders gather at the *mogha*. Almost **94 percent of the farmers regularly participate** in the cleaning activity. **One laborer per square** of land is the minimum participation quota. Small holders with landholdings smaller than a square provide their labor **on a rotatory basis**. The length of watercourse to be cleaned by every shareholder is directly proportional to the land owned, i.e., the holder of every two squares of land has to clean eight *´karam´* of the watercourse. The distribution is made by two elderly shareholders. At present this function is performed by one gujar and one syed. It should especially be noted that both farmers are not members of the Executive Committee; therefore, no role is played by the Executive Committee members in this activity. Right from the establishment of the WUA, there did not exist any committee to control and regulate the O&M activities. The supervising water users are not permanent organizers but keep on changing as their **personal interests** in this activity change, on the one side, and due to mistrust by the counterparts, on the other.

The **regular cleaning** of the *´sarkari khal´* is performed jointly by all the shareholders **four to five times a year**, whereas the cleaning and maintenance of individual ditches is the responsibility of the farmers concerned. The number of **non-participants** is almost negligible. If someone is unable to participate in the activity, he provides an alternative for himself or this is arranged by the supervising farmer(s). The absent water user pays the wages to the laborer directly or to the supervisors, in case these have paid the laborer. According to key informants, no one deliberately skips the cleaning activity, unless he has a genuine reason.

Determined by the commonly practiced **tenure patterns**, most of the shareholders sent their servants to perform the O&M activities. There is no permanent individual or group of individuals who is responsible for the day-to-day minor reshaping of the channel and check structures to prevent blockages, etc.; this causes serious problems due to over topping, etc. Minor repaires are, anyhow, done by individual farmers during their turn of water, not

basically for system maintenance but for ensuring a steady flow of water to their fields. For any necessary repairs or improvements, the water users do not have any **common fund**. Some of the water users (about 40 percent) mentioned the **collection of funds according to need,** but failed to provide any evidence of such an activity. Due to mishandling, some of the check structures, especially the concrete orifices, have been partially damaged and need repair or replacement. Since there are no joint funds for such purposes, they are causing a loss of water. The farmers expect that this repair and/or replacement will be financed by the MRE project.

Of great importance is the fact that there was **no formal commissioning and hand over** of the development work to indicate the end of the MREP´s phase and the beginning of the operations managed by the farmers. Even up to now some farmers believe that repair and maintenance required in the future will be financed by the MRE project.

4.4.2 Motivation for Participation

The empirical analysis reveals three different motives of participation in the WUA:

Participation itself is considered a goal by the lower income strata. Some economically weak and insecure farm holders participate in such an association to build a **security network**. The highly stratified community in the study area limits the mobility of lower income groups. Participation offers them a chance to interact directly with the upper strata. Although this group knows the extent of benefits they may achieve after these have been distributed among the highly influential upper strata, and are usually not very hopeful of getting all the benefits mentioned in the objectives of WUA, yet they participate in the labour activities to refresh their contacts with local influential groups and officials concerned. The **socio-economic dependencies** of this group compel them to remain before the eyes of such people and to seek any chance of offering favours to them and try to create a sphere of exchange and expectation with them.

Better-off income groups consider **participation as a means to an end**. Such farmers see in participation a way to maximize ultimate **economic benefits**. They are least interested in holding meetings and exchanging views with lower income groups, but this is seen as a prerequisite for having such developmental projects granted for their village. Since they are well aware of their power and influence which play a decisive role in directing benefits towards them, they usually show great enthusiasm. In addition, such leading groups maintain their commanding position even in the WUA and satisfy their **desire for leadership**.

Another category of farmers perceives participation **neither as a goal nor as a means to an end;** they are usually self-contented middle class farmers, who consider their resources sufficient to feed their families and, therefore, remain passive in the context of new innovations. This category does not participate or at least does not intend to participate in normal circumstances until stimulated or compelled to do this. Participatory behaviour, in their case, is usually the result of **social pressure**, since they always try to conform to the

traditional feature of rural community; they may be motivated by the notions of *´biraderi´* solidarity and *biraderi´*s name.

4.4.3 The Participant

From the sociological viewpoint, participation is perceived as a human behaviour which varies from individual to individual, depending upon the norms of the environment he has to conform to. The main factors directly or indirectly influencing this behaviour will be discussed in the following chapter; this section deals exclusively with the framework of this behaviour. The participant cannot be seen in **isolation** as he is always a component of a larger network. The individuals not only differ from one another in their personal make-up, but face a different set of circumstances which shape their decision-making and subsequent actions.

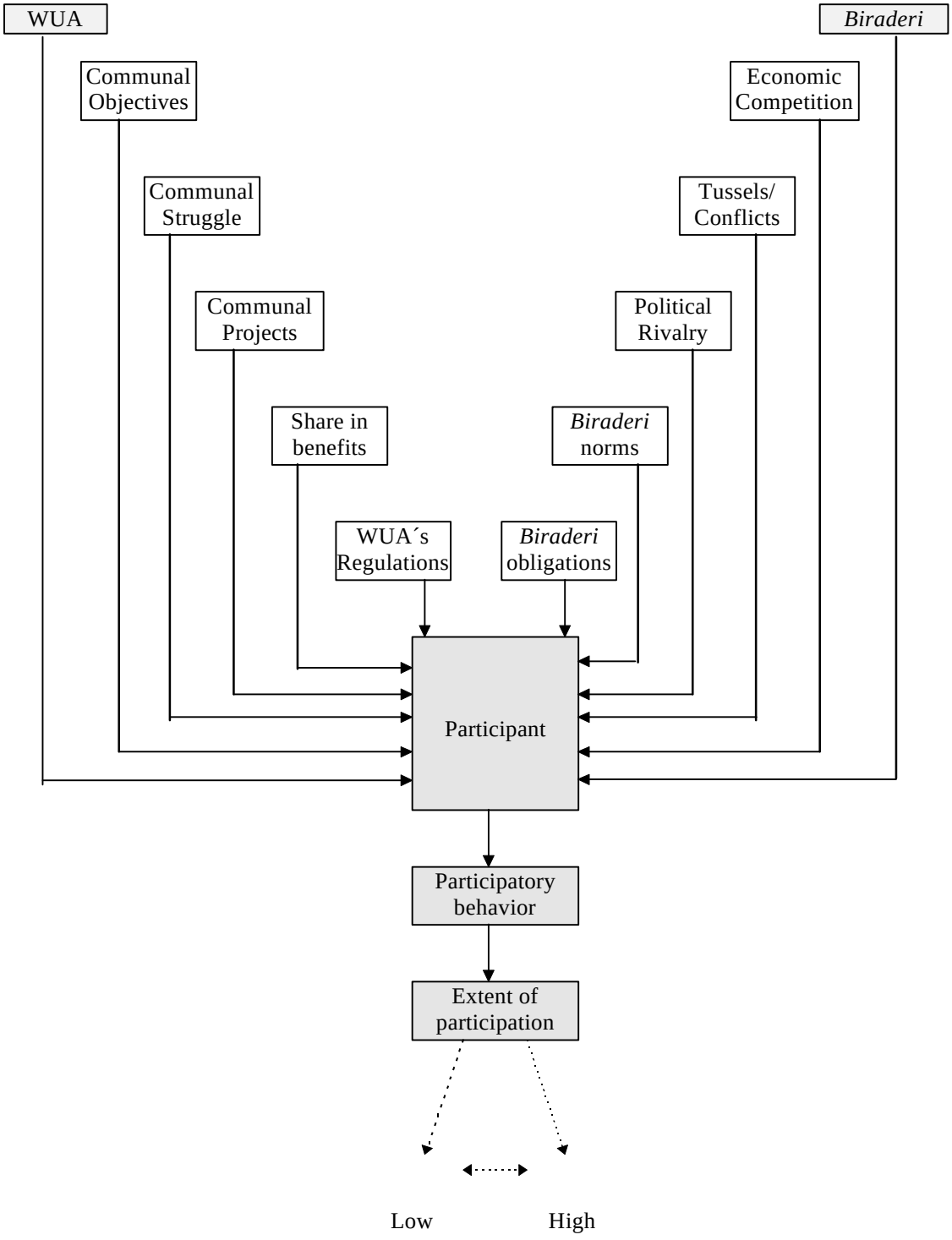
The **empirical results** prove the following main aspects of the traditional rural society in the study area as being decisive in shaping an individual's participatory behaviour.

- An individual moves between the **heterogeneity of an inter*biraderi* network and the homogeneity of a WUA**. An atmosphere of economic competition, an endless desire to maximize *biraderi*'s honour and consequent tussles, conflicts and political rivalry compel all *´biraderi´* members to think only of the betterment of their own *´biraderi´*. This notion does not encourage communal objectives, joint ventures, and share in benefits. In contrast, the WUA claims a homogeneity of ideas and action among its members. Mutual feeling is generally considered to be a prerequisite for the formation and the functional stability of any association. This situation usually causes in the participant an **inner conflict** as to whether to conform to the claims of *´biraderi´* obligations or to WUA's regulations.
- The population is **classified in different strata** depending upon caste, *´biraderi´* and economic position. A difference in such basic characteristics causes further differences of education and exposure, which usually results in an **asymmetry of information and social contacts**. A lack of basic prerequisites results in a lack of access to some other important resources such as credit, inputs, advisory services, etc. The rigidity in the behaviour of some WUA members is a result of the lack of exposure and information about the significance of such an association and of the benefits that other WUAs have brought in sorrounding villages. Those who possess such basic knowledge, pick up the idea very soon and hold leading positions when similar programmes are implemented.

The participant is usually more inclined towards ***´biraderi´*** **norms** which are a source of every possible support in uncertainties. The **membership norms** of *´biraderi´* are usually more rigid and represent a sort of prerequisite for accepting an individual. A deviant behaviour may have consequences and may endanger one's membership in such a group and is usually subject to social control. A greater inclination of a WUA's participant towards *´biraderi´* norms is also the result of an individual's socialization to conform to this group. Every individual possesses a set of characteristics which is unconsciously

designed by **values and cognition** of the society, and the actions of individuals may easily be differentiated on the basis of these characteristics.

Diagram 24: The Inner Conflict of a Participant



Source: The author´s own sketch

4.4.4 Structural Analysis of Forms of Participation

Off the regular participants, about 75 percent consider participation to be a **moral duty** which everyone should perform[153], whereas the remaining 25 percent are occasional and keep on changing. The **regular participants** are mostly those farmers who are either relatives or have close social relations with the Executive Committee members, and those who have their farms relatively closer to the village[154]. Such participants do not serve the cause of the WUA, rather, they strengthen their *´biraderi´* and multi purpose social ties, which are crucial to achieve other **complementary goals**. Acquiring information and voicing their opinions are seldom an incentive for the majority of the participants[155]. Such participants are there to maintain **the bond of obligation** (BEN-PORATH 1980:16). According to KHAN & KHAN, a great majority of water users can be termed as **fair-weather participants** (1973:3). Most of the small farmers do not have any influence on the decisions made; as a result they feel discouraged to participate in such meetings in the future[156]. During the decision-making process, the role of Executive Committee members predominates. According to informants, usually **5-8 influential farmers** made most of the decisions. The rest of the shareholders abide by their decisions[157]. The decision-making farmers are mostly heads of their respective lineage or caste groups, who have gained decision-making power through **horizontal friendship and vertical loyalty ties** (BEN-PORATH 1980:7). These ties are mature and are strengthened through mutual social interactions, at various levels, on different occasions.

The main cause for the poor participation of farmers in the decision-making process is that it is basically **regulated by traditional patterns** of abiding by the decisions made by the *´biraderi´* elders[158]. Young and small farmers are of the opinion that their old, experienced and wise counterparts are in a better position, in comparison to them, to make the right decisions, and fall into the category of traditional participation. This aspect corresponds to that described by HAYAMI & KIKUCHI, where **traditional customs and moral principles influence rural institutions** (1981:217). Although the decisions are made by a limited number of shareholders, there has been scarcely any attempt by the others to disobey them. Rather, a great majority was found to be satisfied with these decisions. The main reason of this satisfaction was that the shareholders generally feel that their objectives are well realized through the WUA[159]. In permanently settled villages with committees making decisions throughout the year, as in the studied one, the participation is **biased in favor** of the older, richer, male members of the community[160].

Such a pattern of participation in decision-making has **negative consequences** for the efficiency and importance of the WUA. The great majority do not feel any change in their

[153]Referred to by BEN-PORATH as „generalized honesty“ (1980:13).
[154]Cf. with ´contextual morality´ discussed by BEN-PORATH (1980:5).
[155]See Section 2.1.3.
[156]See ´exit behavior´ in NABLI & NUGENT 1989:1338
[157]Passive but opportunistic behavior; see Section 2.1.3.
[158]See HAYAMI & KIKUCHI 1981:16
[159]Cf. ´altruism´ discussed by HAYAMI & KIKUCHI (1981:16f), following BECKER (1974; 1976).
[160]See ROE & FORTMANN (1982), cited by ESMAN & UPHOFF (1984:145).

traditionally prescribed roles, even after the establishment of the WUA. In the absence of role specification, the younger and small farm holding water users hardly find any room for their enthusiasm and ideas. Due to their inactivity, the decisions thus made generally do not represent their opinions and views; this affects their interest in the **organized participatory activities** for water management.

To **mobilize the water users´ participation**, each member of the Executive Committee made the best use of his personal influence and power, based primarily on his alliances with certain groups with vested interests (HAYAMI & KIKUCHI 1981:37). This task proved difficult, especially in the absence of some rules and regulations on the strength of which someone can be rewarded or punished[161]. The basic tools commonly used by the Executive Committee members for **implementing decisions** were to request and/or to threaten non-participants[162]; this was usually determined by the situation. According to Executive Committee members, the most effective method they experienced was **social pressure**. In such cases, the water users were approached through their *´biraderi´* elders, relatives, close friends and larger landholders, who on the basis of their personal relations proved mostly successful in convincing them to participate in collective actions. On occasions, a group of shareholders visited the non-participating water user. The method adopted for convincing him was usually based on request and humble attitude, and the benefits for all, the question of *izzat* of the shareholders and the village, etc., were used as pleading arguments. Such **induced participation** can be divided into two categories. One category of induced participation occurred when the water users participated in the program in response to **demands made by the Mona project** which were formulated in the set of prerequisites of the rehabilitation program. The second category was the result of **social pressure** exerted by the **Executive Committee** and the *´biraderi´* leaders for mobilizing the water users´ participation.

Within this context, the participation of water users in improvement and rehabilitation activities was presented, both by the Executive Committee members and the Mona project officials, in the form of a ´**challenge**´. While convincing and motivating the water users, the Mona project officials conducted an effective campaign with regard to their selection as cooperative and progressive farmers of the area. Time and again, they were made to realize this factor, which put them under a certain social pressure. The same issue was highlighted and extended further by the Executive Committee members, within a different perspective. They requested their fellows, sometimes on the base of the trust which the Mona project bestowed upon them and mostly in the name of their **collective *izzat***. The interpersonal and *´biraderi´* ties were also effectively utilized to move the water users. All these efforts built a reasonable social pressure which was used to get the services of an effective labor, on the one hand, and to incite the less ambitious water users to participate in collective action, on the other hand. Some of them stated that they performed this activity, along with other reasons, because they considerd it **a challenge to their reputation and *izzat***, which

[161]Such conditions have been regarded by JANVRY et al. (1989:364); HAYAMI & KIKUCHI (1981:34); OSTROM (1990:6) and NABLI & NUGENT (1989:1338) as being conducive to ´free-riding´.
[162]Cf. the discussion on power and influence in the Section 3.3 and the footnote there (BACHRA & BARATZ 1970:17ff).

proved helpful when organizing collective action[163]. The other norms and values of the society such as cooperative norms, teachings of brotherhood, unity and mutual help which are directed by the **cultural and religious patterns** also contributed in this regard. As the norms and values of a society function as a filter to limit the alternatives (MANIG 1991:18), the ´weapon´ of norms and values was effectively used by the Mona project officials and the Executive Committee members to mobilize the participation of the water users right from the start of the program to its completion.

The implementation of decisions requires an involvement of about 100 percent on the part of the shareholders, this, in itself, is a difficult task or, rather, an illusion. To regulate it, the **traditional patterns of control**, according to which „ in *´biraderi´* no one is inferior and before court no one is superior," proved to be the most successfull[164]. In accordance with this Punjabi expression, the Executive Committee members approached each shareholder personally to secure his participation in the real work: **implementation**. If any farmer has a genuine excuse for being unable to participate, he is obliged to provide an alternative for himself. The participation of the water users in meetings and implementation as a result of the above-mentioned efforts can be categorized as **traditional participation**. Even in the absence of rules and sanctions, the water users participated in the meetings and improvement activities according to their traditions and cultural patterns. A great majority of the regular participants (about 75 percent) attend the meetings to fulfill their traditional and moral duties.

To regulate the O&M activities at the watercourse, **norms and values** were effectively used to enhance the number of participants. In this context, the water users sticking more to norms and values (mostly smaller and older farmers) restricted the alternatives for themselves. The norms and values of **cooperation and mutual help** existing since long were highlighted and emphasized in such a way that they acted as enforcing and policing agents and caused **normative participation**.

Most of the plans were designed at regional headquarters without consulting the water users and were imposed on them in the expectations that they would be followed blindly. As a result, the water users ignored the schedules of irrigation managers and continued with their traditional patterns of agricultural practices[165]. The water users of the investigated watercourse are practicing O&M according to their **previously-existing traditional patterns**. As a remedy to the problem, the example of the Philippines is relevant, as the groups of water users, there, have a working committee for O&M activities (TAPAY 1989:33).

The **rewards and sanctions** associated with membership and performance and non-performance of membership roles structure the way in which members will participate in a collective action. Moreover, the incentives (rewards and sanctions) reflect the degree of control that an organization can have over the participants. The free entry and exit, on

[163]"....progress comes in response to a challenge, which must be enough to elicit collective action ...." (ESMAN & UPHOFF 1984:127).
[164]For more details, see *´community and societal norms´* discussed by ESMAN & UPHOHH 1984:121-122.
[165]See KALSHOVEN 1989-a:4.

voluntary basis, have been regarded by ESMAN & UPHOFF to create a positive attitude towards the organization. To control the free-rider effect, some sort of **discipline enforcement** is, however, necessary (1984:155). AKHTER HAMEED KHAN, pioneer of the **Comila Rural Development model** in Bangladesh, is also in favor of some discipline which is necessary to make small farmer groups effective and viable (OWENS & SHAW 1972:93f). About half of the local organizations of ESMAN & UPHOFF´s sample showed poor performance when the members´ participation was on a **purely voluntaristic basis**. The other half which secured high performance scores (very good or outstanding) had adopted a **quasi-voluntary participation approach**[166](1984:156).

With respect to the **compelled participation** of non-participants in collective work, three different approaches have been stated:

a) The non-participant has to pay an amount of Rs. 50 per half ´*murabah*´ of land; with the money sweets are purchased and distributed among the participants.
b) A laborer who is paid by the non-participant is engaged to do the work.
c) No monetary punishment, rather verbal punishment.

When answering the question as to who had set the above-mentioned rules, a great majority of the water users (about 80 percent) reported that they were **mutually decided by the shareholders** at the watercourse. 10 percent reported that they **inherited** them from their forefathers, whereas another 10 percent was unable to locate the source. 22 percent of the water users was of the view that category (a) is in practice, whereas 14 percent and 64 percent reported the application of (b) and (c), respectively. Regarding category (a), no one could provide any **practical example** which may confirm its implementation. It is worth mentioning, that even in the absence of formal rules and regulations, the number of „**free riders**" has been reported to be very small. The great majority of the water users (about 90 percent) emphasized that there should be a reward/sanction mechanism, which, according to them, is necessary to promote participation.

For the cause of group action, **the small caste groups have usually controlled their actions to the degree of self-denial of their own way of participation**. By doing so, they reduced the risks of individual survival. They do not pose themselves externally as individuals who are self-responsible, entitled to make decisions and ready to participate in external groups. While substantiating this behavior, they state that, being members of the water users´ group, they abide by the decisions, rules, sanctions and rights prescribed by the group leaders as „ It is good to behave accordingly as this is necessary for the stability and solidarity of the group." This group of water users participated in the meetings, but did not voice their opinions and suggestions, and can be categorized as **passive participants**.

The number of **voluntary participants** is very small at the watercourse. The Executive Committee members and the ´*biraderi*´ heads fall in to this category. Although they also have some specific interests, such as economic gains through improved infrastructure,

[166]Purely voluntary membership has been defined by ESMAN & UPHOFF where there are no restrictions on entry or exit whereas quasi voluntary membership refers that mode where free entry is accompanied by some obligations which it is necessary to observe if one wants to remain a member of the organization (1984:156).

satisfaction of the main desire, demonstration of power/influence, apparently, their behavior shows very well a voluntaristic spirit.

The occasions of **spontaneous participation** were greater in the pre-rehabilitation time, due mainly to the poor condition of the watercourse. The most common occasion when spontaneous participation used to occur was the repair of the suddenly broken watercourse during any water users´ turn of water supply. The persons in the vicinity used to participate in the activity in whatever capacity. After the improvement of the watercourse banks and the installation of control and check structures, such incidents did not happen. Therefore, there occurred **a substantial decrease** in occasions to demonstrate spontaneous participatory behavior. The same happened in other agricultural activities such as sowing, harvesting, threshing, etc., since the farmers now have a better control achieved mainly through the partial mechanization of the cultivation processes.

According to a careful calculation, **less than 40 percent** of the shareholders clean and maintain the watercourse by themselves; the rest of the farmers get their share done by servants. This factor affects the quality of work in a negative way.

When considering the **two dimensions of participation** (physical and intellectual)[167], one can observe that, for water users´ participation in water management, the physical dimension was more stressed than the intellectual and political one. The water users participated more in social and physical activities, whereas will formation, conception of idea, and patterns of decision-making were not regulated so as to provide **a stable base** for future activities of water management and other agriculture development programs.

4.4.5 Summary

The water users at the watercourse have **a long history** of positive participatory relationships, shaped mainly through their involvement in various community development programs. The existence of a coopertaive atmosphere facilitated their participation in water management activities afterwards. The absence of any serious conflicts among them can also be identified as **a helping factor** for the organization of collective actions.

For the improvement and rehabilitation of the watercourse, the water users participated in four capacities:

a) participation in meetings,
b) participation in decision-making,
c) participation in implementation, and
d) participation in operation and maintenance.

The participation of the water users in the above-listed activities was determined by their **objectives and motives**. As a result, the extent of participation in these activities varied according to the individual as well as group motivation. The participant, being an integral part of the village social structure, is influenced by a set of factors ranging from **socio-economic to socio-political, traditional and normative factors**. Therefore, the nature and

[167]For further detials, see MÜLLER 1996-b.

extent of participation is shaped accordingly. The behavior of the great majority of the participants is basically regulated by the regulatory patterns of their basic institutions. Since they are a heterogeneous group under the socio-economic aspect, the impact of regulatory and organizational principles and rules differed from person to person. The divergence of effects of the basic institutions shaped their participatory behavior, exhibiting a great variety in its nature: from traditional, normative, voluntaristic, spontaneous to induced and compelled participation.

The characteristics determining the **water users´ participatory behavior** cannot be considered as having grown naturally over time, but are influenced and thereby shaped by a set of factors. These factors consist of some sources of internal and external influence which range from history of the irrigation system, natural environment, socio-economic conditions to the political and administrative patterns. The next section encompasses an analytical discussion of these factors.

4.5 Factors Influencing Farmers´ Participation in the Management of Irrigation Water

It is a well accepted fact that the management of irrigation water is **a situation-oriented phenomenon,** as there did not exist any blue print of structure or functions meeting the requirements of all the systems. The same applies to the factors influencing farmers´ participation in Water Users´ Associations. Community participation being regarded as an unpredictable phenomenon, as here one see it and there one do not, is primarily influenced by **a chain of multi-dimensional factors**. An outline of these factors, however, can be drawn, and by taking it as a base, individual cases can be analyzed. The contents of this outline are general and even if they do not meet all the contingencies of some specific systems, they remain valid. Within this context, the factors discussed may not apply only to the case studied, particularly, and to Pakistan, generally, but to other WUAs in the region as well.

In accordance with the contingency or the situation-specific approach in modern organization and management theory, the participation of farmers in WUA is **conditioned by the situation** in which the system operates. Their participation is pushed and pulled in different directions determined by their incentives as well as constraints, regulated by a series of sources which extend from the social organization of the watercourse to the central administration of the main system, and foreign donors (in case of any investment assistance by them).

On the basis of the empirical knowledge of present study, **the series of factors can be classified** into the following categories:

1. Physical factors,
2. Socio-economic factors,
3. Socio-cultural factors, and
4. Socio-political factors.

The analysis of each factor demands a separate chapter by itself, but, for the present purpose of this study, it will suffice to review some of the most relevant issues affecting the extent and nature of farmers´ participation in the WUA. This will definitely help to sweep the generalizations causing **ignorance of the contextual contingencies**. There exists some skepticism among development specialists about the feasibility of participatory approaches, as there exists no basis for describing the amounts or limits of farmers´ participation based on deductive rules; the experience from empirical research is analyzed hereunder with respect to the users´ involvement.

4.5.1 Physical Factors

Physical factors like soil, topography, climate, size of the irrigation system, etc., are **inhibiting or accelerating agents** for farmers´ participation in the proposed WUAs. These factors cannot be dealt with independently, as they are duly affected by socio-cultural and political factors, rather more by economic factors. A **definite practical dichotomy** cannot

be found between physical and economic factors, as both are interactive. But, for the purpose of farmers´ participation in WUAs, these factors are deliberately discussed in their own right, since they are complex variables.

The physical and environmental factors **provided by nature and sometimes arranged by men** for their own ease play an important role in activities that demand participation. For example, weather conditions can facilitate or hinder O&M operations for the participants. Considering such factors, COHEN & UPHOFF have also suggested that there can be some difference in the degree of participation between arid and irrigated areas in Pakistan (1977:147).

4.5.1.1 Locational Bias

The watercourse studied falls in the irrigated zone of Pakistan with a **leveled topography** which, physically is conducive to participation. Due to ***„chakbandi,"***[168] the participants are not scattered over the command area, but are rather densely agglomerated; this facilitates their **internal communication as well as accessibility**. Although the command area is relatively larger than that of other watercourses in Punjab, this is compensated by the density of the residence pattern. Moreover, a metal road crosses the command area vertically, and this facilitates the accessibility even to the distant fields.

The position of a farm not only affect its **production** with regard to its location within the outlet command area but also is duly effected by outlet position on minor, minor position on distributary and distributary position on canal (WADE 1982-c:174). The **spatial factors** do affect the participation of water users, as the prevailing conditions and expected benefits have different results in different locations. Likewise, the spatial allocation of the local system organizers, the Executive Committee members in the case of the studied watercourse, affects the distribution of benefits along the system. They are regarded here as **potential pockets of interest**. If these powerful and influential farmers are concentrated at the head of the watercourse, the communal organization for irrigation (e.g., the WUA) would not evolve at all or would not function well. The head farmers are privileged, as they receive a greater supply of water in comparison to the tail enders due to spatial advantages such as proximity to the source of water, less transportation losses due to seepage, leakage, etc., less evapotranspiration[169] and so on. The basic objective when establishing these organizations is to **eliminate of such differences by supplying water equitably** to all, since, „benefits for farmers at the tail of a watercourse may clearly disadvantage those towards the head, ..." (LOWDERMILK et al. 1978 Vol. IV:192), causing a rational disinterest of head water users for such communal organizations. If the selected leaders have their land at the tailreach or if it is equally distributed along the watercourse, communal participation is more likely to emerge and be effective. According to SPARLING, the tail farmers on some watercourses in the Punjab receive less than 40 percent of the water received by farmers at the head reach on a per acre basis (1990:199).

[168]The gross area of land fixed for irrigation from one outlet, i.e., the area commanded by a watercourse.
[169]Evapotranspiration represents the total water lost by a cropped surface through the conversion of liquid water into a gas (HATTFIELD & FUCHS 1990:33).

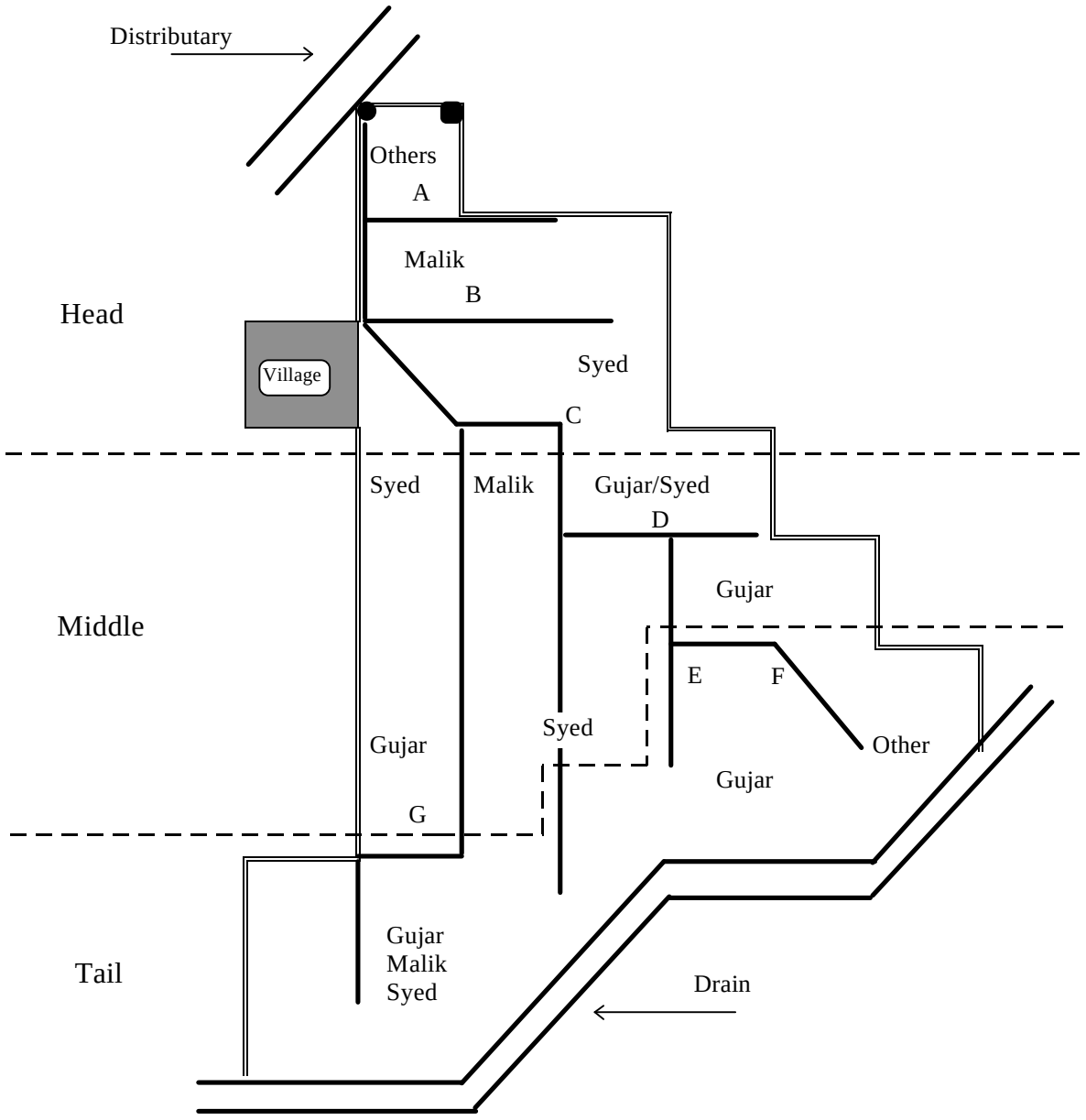
Therefore, the analysis of local spatial factors helps to determine water management problems.

The Executive Committee members have most of their land either **at the head or middle reach** of the watercourse. Only two members (the maliks) have about 24 to 34 percent of their total land at the tail reach, which, according to other water users, is not a sufficient amount to cause real incentive or interest for the tail reach. Both gujar members are exclusively middle reach farmers. The malik members have their ´deras´ at the head reach, hence, are regarded by the other water users as head reach farmers. Whenever a problem occurred in the location **serving large landowners**, it was solved more rapidly, as they were able to mobilize participation for the necessary maintenance activities, as discretely reported by some small landowners. The location of a farm along the watercourse determines a water user´s **incentive to participate** in the WUA, as, with a difference in the location, benefits between upstream and downstream water users differ considerably. As the main aim of the WUA is to reduce these differentials, the active participation of downstream water users is a prerequisite. Active participation means their involvement in **decision-making,** particularly.

As a result of this **locational centralization of power and influence**, more renovation and rehabilitation activities took place at the head and middle reaches of the watercourse. The completely renovated branches, namely M and B, are at the head reach. The Branch B irrigates the land of an Executive Committee member who is regarded as the farmer entertaining most contacts with Mona project officials. Such **differentials in distribution of the benefits** definitely cause a disturbance in the social atmosphere and affects future participation adversely.

Diagram 25 shows the concentration of caste groups at different branches of the watercourse.

Diagram 25: Concentration of Caste Groups at the Watercourse



Notes: ● = Canal Outlet, ■ = SCARP Tube well, - - - Dividing line, A, B, ..., M - Watercourse Branches,

== Boundary of the Command Area

Source: Adapted from BOWERS et al. 1977:9.

Table 12 gives a detailed description of the **relationship between caste groups and watercourse branches**. Although the **main branch** is numerically dominated by ´others´ (59,53 percent), due to their belonging to different castes and lesser numerical strength as individual caste groups, they leave enough room for the malik to dominate. **Branch A** is fairly dominated by the malik, as 50 percent of the total land, there, is owned by them. **Branch B** serves exclusively a malik, member of the Executive Committee. The head

reach of the watercourse is composed of these three branches and is overwhelmingly dominated by the malik caste group. Both malik members of the Executive Committee have their ´*dera*´ situated there, which makes it the main domain of their interests. The **concentration of renovation and rehabilitation activities** on this section confirms the malik´s contacts in and outside the community.

Table 12: Land Concentration of Caste Groups at Various Branches (in acres)

Branch Code	Branch Name	Gujar	Syed	Malik	Others	Total
M	Main	0 (00)*/	0 (00)	17 (40,47)	25 (59,53)	42
A	Santalin Wali	12,5 (16,67)	25 (33,33)	37,5 (50,00)	0 (00)	75
B	Qabrastan Wali	0 (00)	0 (00)	25 (100)	0 (00)	25
C	Mehloan Wali	112,5 (50)	100 (44,44)	12,5 (05,56)	0 (00)	225
D	Qureshian Wali	75 (75)	25 (25)	0 (00)	0 (00)	100
E	Mehran Wali	50 (100)	0 (00)	0 (00)	0 (00)	50
F	Sabowalian Wali	68 (77,71)	12,5 (14,29)	0 (00)	7 (8)	87,5
G	Adhian Wali	100 (50)	62,5 (31,25)	37,5 (18,75)	0 (00)	200
	Total	418,0	225,0	129,5	32,0	804,5

*/ Percentage of the total land at a particular branch.

Source: The author´s own survey

The Mehloan Wali **branch (C)** transports water to the middle and tail reaches. It is a multi-caste branch where the lion´s share of the command area is owned by the Mehlo gujar. Since they own 50 percent of the cultivated area, this branch was named after them. **Land dominance** of a group, however, is not always the reason to name a branch. Sometimes, as in the case of **branch D**, identification is ruled by some peculiarity of that branch. The gujar on this branch, who predominate as far as their number and landholding sre concerned are spread all over the command area, whereas the Qureshi are relatively concentrated there, which suffices to call it the Qureshian Wali branch. A small area of branch C, adjacent to the *dera* of a younger malik Executive Committee member, is lined, while the rest of this branch and branch D are only earthen improved. The Adhian Wali branch, near the junction of the middle and tail reaches, is lined on a legth of about 4.5 acres.

There exists a direct relationship between the **location of the effective and influential WUA members** and the area lined. The youngest Executive Committee member, the malik, who is rated by fellow farmers as being most effective with Mona officials, has secured maximum benefits by getting those portions lined which serve him and his ´*biraderi*´ group. This is also an outcome of the **locational diversity** due to the relatively

large number of branches which has split the water users into several **working as well as interest groups**. This split has affected mostly the individual branches. The main branch, on the contrary, is considered and handled as a joint property. Therefore, as a result of joint cleaning and maintenance by all the shareholders, the main branch is in a better condition than the others. All the branch watercourses shoot off from the main branch and, consequently, are supplied by the main branch, so that its maintenance affects the supply to all other branches. Due to its central importance as main connecting and transporting section of the watercourse, its maintenance is paid more importance. Another factor which favors its maintenance is that, due to its having been lined, it requires relatively less time and labor.

The existence of improved infrastructure available to a community has usually been reported as **a barrier** to their active participation in indigenous local organizations. Several cases from the Philippines analyzed by ESMAN & UPHOFF support this view (1984:111-112). The same was found in the studied community, where the water users were more enthusiastic and ambitious regarding collective actions for the management of their water resources than they are reported to be at present. This version was highlighted by some elderly water users. They criticized their youth, saying that they have become lazy due to the availability of new facilities of the improved infrastructure. While recalling ´their time´, they reported that, as young farmers, they had worked very hard.

4.5.1.2 Size and Structure

The size of a local level organization is a relevant factor to be discussed, as it definitely influences its structure. Some[170] are in favor of a **small size**, whereas others[171] argue for **larger organizations,** since these suit some particular activities providing an advantage of economies of scale. Mention has to be made that the terms ´small´ and ´large´ for local organizations are themselves ambiguous; in Indonesia, the WUAs having 10-15 members are defined as small (DUEWEL 1984)[172], whereas the „Small Agricultural Units“ of Taiwan farmers´ associations have 150-200 members (STAVIS 1974-a)[173].

When discussing the size of a WUA, UPHOFF suggested that the **size of the lowest level of operation** should be the size of the base-level of farmers (1986:130). For this, he has put a limit of 50 to 100 acres. When the upper limit is achieved or exceeded, the WUA is usually **subdivided into small informal groups** that operate distinctly from others within the area. The same was found true for the watercourse studied. One can identify such subdivisions based either on *´biraderi´* affiliations or on the branch of the watercourse serving a particular group of water users. This is usually corresponds to the physical features of the system from which that group is profiting. The existence of such subdivisions demand a change in structure of the WUA, that would allow the **formation of base level groups** whose size is determined by the operators themselves. The water users

[170]A long list includes HUNTER 1976, TENDLER 1976, BUIJIS 1982, GOLLADAY 1983, and DOHERTY & JODHA 1979 (cited by ESMAN & UPHOFF 1984:146-147).
[171]For example, JOHNSTON & CLARK 1982:182.
[172]Cited by ESMAN & UPHOFF 1984:147.
[173]Cited by ESMAN & UPHOFF 1984:147-48.

will definitely prefer the size which they regard as most suitable to achieve efficient cooperation, conflict management, communication and their specific objectives.

The organization of the WUA is directly affected by its **size**. The larger the number of shareholders on the watercourse, the more difficult it will be to organize them. There were only thirty-four shareholders at the watercourse when the WUA was organized; presently they have reached the number of **fifty**. The organizational structure was basically designed to organize a smaller number, whereas the organizational structure has not been remodeled despite demographic and socio-economic changes. The number of shareholders has almost doubled, but their representation on the Executive Committee has not been increased, rather, it has shrunk over time. The farmers admitted the fact that „**free-riding**" has become a relatively more frequent practice now than it used to be during and just after the renovation period. Due to **changes in power and influence sequence**, it is difficult for the old Executive Committee to organize all the shareholders. When asked for a possible solution, some suggested the reorganization of the Executive Committee, and others wished an increase in the number of Executive Committee members.

Many irrigation developments have affected the **small landholders**, particularly in terms of land tenure patterns, and have mostly negatively affected their ´**terms of trade**´ with their counterparts who have relatively large holdings. Due to their disadvantaged socio-economic position in their social organization, they are not receiving their due share of benefits. It happens sometimes that **a change induced from ´outside´** is premature in relation to the adoption of economic changes, especially among weak population groups (like small landoweners, tenants, agricultural laborers and landless population). The effect can be that the new development institutions bring more benefits to the **already better-off** population groups, whereas the poor groups can hardly utilize the offered services and sometimes even suffer damages due to their being integrated into large systems (MANIG 1988:4-5) such as the irrigation systems. The already better-off group of water users at the watercourse benefited more from the rehabilitation program, as they got their sections of the water channel lined at the early stage of project launching. The small water users are still longing for the lining of their sections. The reduction in the supply of water through ***´warabandi´*** in the SCARP tube well´s functioning has affected the poor groups because they received a lion´s share of the reduced water supply. Most of the decisions are made by larger landholders who, being potential leaders, **twist the outcome of the benefits** in their favor. The lining of branch B, frequently referred to, can also be a relevant example here.

The prevailing land tenure patterns have a definite impact on the **formation of organizational bodies,** through which those benefits which are individually difficult to achieve can be realized. Land tenure patterns determine the **status** of the actual shareholder, on the one side, and subsequently his/her role, on the other. Land tenure pattern is the barometer which may adequately be used to assess the extent of the participants´ roles in an irrigation system. This may indicate the durability and limits of the shareholders´ interests in the management of the system.

4.5.1.3 Adequacy of Water Supply

The main objective of farmers´ participation in the WUA was to get an **adequate and reliable supply of water** at ´the appropriate time, in appropriate amount and to the appropriate localities´ (MANIG 1994:250). In case of **abundance of water** (which is very rare), the farmers have little incentive to undertake the efforts of management and organizational activities. If the situation is the reverse in the case of **scarcity and unreliability of supply** from the main source, and there is hardly any perceived improvement through collective action, again participation offers little payoff. This suggests a „**curvilinear relationship**" between participation and supply of water, with a negligible incentive at either extreme of scarcity or excess. When explaining this relationship, UPHOFF et al. have described it as an inverted ´U´ (1986:84). This suggests that the willingness of water users to invest in participation will be low at either extremes of water supply. In accordance with UPHOFF´S thesis (1986), the results obtained by the author´s empirical findings confirmed that the optimal participation of water users is attainable when the availability of water ranges at middle level[174].

During the field research, it was noticed that the inadequacy and unreliability of water supply is **hampering the water users´ participation** in future undertakings. A great majority of the farmers complained about the uncertainty and unreliability of water supply from both sources. Some of them were even more skeptic about the functioning of the SCARP tube well. It is a fact that the SCARP tube well has completed its estimated life, due to which mechanical problems occur very often. The general scarcity of electric power all over the country is affecting rural areas more, hence, making the situation worse. A ***´warabandi´*** **in SCARP tube well operation** is being practiced to cope with the limitations of electricity supply, which, due to poor organization, is causing regular loss to a particular group of farmers. The inefficiency of the tube well operator, due primarily to the loose departmental check over him, is making the situation more problematic. All these factors, when combined, cause **frustration and depression** and this ultimately affects the farmer´s level and intensity of participation.

Only **a perceived scarcity of water** may be regarded as a general tendency on the part of the farmers to complain about the shortage of water, especially when research is being conducted on irrigation problems. The water users are receiving 5.45 cusecs of water for a cultivated command area of 804.5 acres, which is much more than the general supply of water, amounting about one cusec for 350 acres (LOWDERMILK et al. 1978 Vol. II:32). Only a small number of the water users admitted that the water supply suffices their demand, only when they get it regularly in the sanctioned amount.

Since the WUA is just confined to the management of available water at the watercourse level, the water users cannot influence the **main system supply** in either way. Although

[174]The WUAs easily initiated by the government are unlikely to sustain, unless the great majority of water users in the watercourse command area are confronted with some degree of water stress. Until the time when the water supply is greater in relation to crop water requirements, the need for a collective action will be underrated. A scarcity of water, on the other hand, will also negatively influence WUA´s activities, and it will be difficult to organize concerted action. Only a ´relative water supply´ can make a WUA sustainable (WADE 1982-c:176).

the idea of the WUA was to encourage farmer´s participation at canal level management as well, but this has never been realized, at least not in the case of the WUA studied.

4.5.1.4 Water Control

The amount of water supplied to the watercourse command area is not equally available to all water users. The analysis of water supply in terms of water control[175] suggested that the **location of a water user in the command area is a dominant factor**. The distance from the *mogha* and the SCARP tube well can be used, here, as the yard-stick to measure a user´s control over water. Other factors such as landholding, education, caste/*biraderi* affiliations, etc., cannot be meaningfully advanced as the rival hypothesis to location in explaining water control differences among the water users (FREEMAN 1989:88). **The less a user has the control of supplied water, the greater will be the incentive to participate in the WUA**. The tail water users are the least beneficiaries in this regard. Although the sanctioned supply of water (5.45 cusecs) in relation to the cultivated command area (804.5 acres) permits to label this as a **water-rich watercourse**, even then the water users located at the tail received less water than their counterparts at the head of the system. It must be made clear, here, that water users are not getting their sanctioned quantity of water. The sanctioned water seems to be in surplus only in relation to the command area, but it is rare that the water users get a full supply. Therefore, when relatively more water has been approved, it is not being supplied in the required amounts and, therefore, the water users complain about the **unreliability and scarcity of water-supply**. They said that if they could regularly be supplied their sanctioned water only, there would not be any water deficiency. In short, the greater the distance from the source(s), the lesser water supply and control are.

As a result of the poor water control, many water users at the tail reach had **no trust in the public sources of water supply**, hence, are irrigating their crops with the help of private tube wells. Due to the installation of tube wells, the water users have gained a partial control of water. According to key informants, these tube wells have been installed in the recent past. When speaking about the history of private tube wells, they said that, before the rehabilitation of the watercourse, there were only two private tube wells in the command area, which after the rehabilitation of the watercourse, were closed as a result of a better supply and control of water. Over time, the **SCARP tube well** water supply proved unreliable and has caused a significant decrease in water control, especially for the tail farmers. Consequently, they have installed a number of new tube wells along with restorating the old ones. The presence of one tube well at head and four at middle reach of the command area suggests that, although the head/middle water users received water in excess of their *de jure* share, the timing and unreliability is affecting them too.

[175]Water control has been defined by LOWDERMILK as „ ... the ability of farmers to plan adequately and in time for cropping decisions by having the required volumes of water available at the appropriate times and places for crop needs plus increments sufficient for leaching requirements and evaporation losses“ (1990:155).

As the Diagram 8 shows[176], the **concentration of private tube wells at the tail reach** of the watercourse (about 58 percent) confirms their lesser control of public water. The water users are aware of the cost of private tube well water and admit that it is considerably higher than that of canal water; even then, they were supportive because they are relatively certain to obtain the water for which they have invested. Therefore, through the **conjunctive use of public and private water**, the water users have managed to overcome the generally poor control provided by the public systems only. Moreover, several studies[177] show that the more timely irrigation with the help of private tube wells has resulted in higher cropping intensities, greater use of fertilizers, higher production and increased income per unit of cultivated land.

The main reason of tail enders joining the WUA was the **promised benefits** of better supply and control of water. Just after the renovation, they achieved a relatively better control of water, because the SCARP tube well and canal water supply was adequate. Afterwards, the social and technical problems along with the scarcity of electricity made the SCARP tube well an unreliable and unpredictable source of water. Thus, the benefits gained through the rehabilitation of the watercourse were **neutralized** by the poor supply of water. Now, the tail enders find themselves in a situation which is even worse than before. They undoubtedly possess better check and control structures, but are not supplied water regularly to be checked and controlled.

Right from the time of establishment, the WUA has been **´hijacked´ by a group of influential water users** who, as Executive Committee members, are the decision making force at the watercourse. When this influential group is further dissected, one finds that the malik who exploited the donated resources to optimize water supply to their fields predominate. The discrimination in distribution of the benefits is well realized by the majority of the least advantaged tail enders, but due to the **lack of leadership potential and contacts** with Mona project officials, even after joining the WUA, they could not get their due share of the benefits. A large section of the watercourse at the tail reach is not lined; this has been stated as a reason of water losses by the so-called **Water Management Specialists** who believe that, when the whole of the watercourse will be lined, the tail enders will be supplied their due share. Being constantly under the influence of this illusion, they do not realize the fact that, even after lining, they will not have access to the controlling factors of water supply, especially those which are administered by the main system managers.

4.5.2 Socio-economic Factors

The issue of **economic contributions** (especially in cash) from the water users is getting momentum as time passes. Such contributions have basically two implications with regard to farmers´ participation. First, it can **hinder farmers´ participation** in water management activities, especially that of small landholders. In the village studied, which is still partially

[176]See Section 4.2.1.3
[177]Some of them are referred to by LOWDERMILK (1990:156) as LOWDERMILK 1972, LOWDERMILK et al. 1978, MOORTI 1970 and JOHNSON 1986.

practicing economy in kind, cash contributions have never been appreciated, rather, non-material contributions in the form of labor were mostly welcomed. In a World Bank irrigation rehabilitation project, Pakistani farmers contributed $ 7,6 million worth of labor in a $ 42 million program, which is about 18 percent of the total costs (LOWDERMILK 1985:2). Secondly, such contributions are considered helpful for the **sustainability of the system**. Through economic contributions, a sense of partnership between the water users and the agency can be strengthened. As a result, they see themselves as real partners and become more responsive to innovative opportunities. The water users feel themselves more attached and committed to the rehabilitation activities and later to the O&M operations as well.

In the case of the watercourse studied, **the water users contributed in the form of labor only**; this enhanced the number of participants but adversely affected the sustainability of participation. They did not contribute in kind or cash, which sets a limit to their feelings of attachment and commitment. As a result, the infrastructure is deteriorating as time passes, and the farmers are not adopting required measures for its maintenance. They are still of the mind that the required maintenance will be undertaken by the Mona project. Such expectations are actually a direct outcome of a ´**charity recipient mentality**´ which is based on an overuse of ´**the spoon feeding**´ practice. In this regard, SCHMIDT & KROPP are of the opinion that this attitude can be overcome through contributions made by the local population, both in the form of labor and monetary inputs (1987:1).

Along with other factors, landholding itself, being the **main source of economic activity,** affects farmers´ participation in a decisive way. Its effect is positive when a majority of the landholders are owner-cultivators. When a substantial number of farmers is only part-time farmers engaged in other income generating activities, their interest in the organization and management of the irrigation system may be less than that of the **full-time farmers**. The situation will be the same if the number of small landowners is substantially high. As the cultivation of small farms cannot satisfy their needs, they take up **off-farm employment** as main occupation or as a sideline (KUHNEN 1988:7). Their involvement in other activities may hinder their participation in certain O&M practices. This thesis has been confirmed by the empirical findings, as the **part-time farmers** have far less knowledge about the renovation as well as O&M activities. Whenever they were questioned about any specific activity, their answer was either insufficient or they did not know anything at all. The reason of their poor knowledge is that they have not participated in the activity by themselves. As a matter of fact, the number of such farmers is limited[178].

Another relevant factor which affects water users´ participation is the **direction and extent of the water use**. When irrigation water has some non-agricultural usage, a conflict of interests can arise between potential users. The use of water for purposes other than agriculture can be witnessed in irrigation districts of the USA and of Hungary (SAGARDOY et al. 1986:32). The non-agricultural usage of water may include hydropower generation, transportation, navigation, drinking and sanitation, industrial usage, etc. Some **conflicts over allocation**, **distribution, management, investment**, etc.,

[178]For more details, see 4.2.2.3.

are inevitable. A potential of conflict at the watercourse studied, due to this reason, does not exist. The entire supply of the water is used for agricultural purposes; this favors the farmers´ active participation in management of the system, as it serves their economic benefits only.

Whether the group of water users is **economically homogeneous or heterogeneous**[179], whether it is constituted mostly of landowners or tenants, will definitely affect the ease or difficulty in organizing participatory activities on certain occasions because „social solidarity is based on economic solidarity" (SCHULZE-DELITZSCH 1853)[180]. The fact that a majority of the water users belong to the landowners´ class at the watercourse provides a **similar economic base** for participatory activities. This base, however, is affected by the differences in size of the holdings. The watercourse can be viewed as being oriented towards the cultivation of cash crops with almost the same cropping patterns, thus, providing similarities in their individual as well as group objectives for the management of irrigation water. The available infrastructure is also a supporting factor for their participatory actions.

The **general economic conditions of the beneficiaries** of a development project are somehow linked with their participation and the overall success of the scheme. The impact of resource endowment is of a mixed nature[181]. While analyzing the case studied, one may safely say that the water users are **endowed with relatively better economic resources** in terms of highly fertile land, highly paid cash crops, better infrastructure, etc. The soil and climate are highly suitable for the cultivation of citrus fruit which repays many times more than other cash crops such as sugar-cane and wheat. The farmers reported that a citrus orchard of ½ square land generates more income than 1 - 1½ square of land in other irrigated areas of the Punjab.
The higher level of income can be visualized in their *´pukka´* houses furnished with good living facilities. The possession of **motorized agricultural implements** also add to the evidence of their being well-off. That which strikes considerably is their **tendency not to**

[179]The economic differentiation among participants of a development project has a both-way-cut effect. In simple words, it has been argued that more economic differentiation leads towards differentiation of occupational and social roles - division of labor- which contributes to the establishment and sustainability of self help organizations. On the other side, it has been viewed as a cause of diluting the community solidarity which weakens societal norms/values and interpersonal relationships, causing a hindrance for voluntary efforts (ESMAN & UPHOFF 1984:112f). CHARLICK (1984) supported the later view; less economic diversification favors cooperative activities (quoted by ESMAN & UPHOFF 1984:113). JOHNSTON & CLARK (1982:168) are of the opinion that an equal distribution of assets, particularly land, will increase the effectivity of the participatory development approaches. Whereas, GOW et al. (1979 vol. I:232) found unequal distribution of assets and income helping to enhance the leadership (and problem solving) potential. ESMAN & UPHOFF also advocated that some degree of inequality in income distribution can contribute to the performance of local groups (1984:114).
[180]Cited by MÜLLER 1994:844
[181]HYDEN (1970; quoted by ESMAN & UPHOFF 1984:110) on the basis of his study in Kenya connects the failure of some cooperative activities with poverty and low agricultural potential. FERNANDO (1977) also shares the same results which he concluded after studying some cases in Sri Lanka (quoted by ESMAN & UPHOFF 1984:110). LEWIS (1971) and ADELMAN & DALTON (1971), on the other hand, have reported different results. LEWIS is of the opinion that success of the Zanjera irrigation associations in the northern Philippines can be attributed to the poor resource endowment of the farmers in terms of difficult living conditions and hardships in obtaining the water. ADELMAN & DALTON suggest a positive response to self help activities in poorer communities of India.

invest in improvements to the irrigation infrastructure. They spend money for private tube wells, but not for the improvement of the jointly owned watercourse. The basic reasons of this disinterest, according to the author´s analysis, are: a) the nature of the watercourse as a collective good which, being **everybody´s property, is nobody´s property**[182], and b) the Mona project has raised their expectations of such **chances of free-swing**, as provided by the project, even if on an experimental basis. Although, due to good prices of the citrus crop, the landowners are earning relatively more than in other agricultural regions in the Punjab, this does not mean that all the farmers at the watercourse secure their living from farm income exclusively. There are some farm families who cannot live from agriculture alone[183].

4.5.3 Socio-cultural Factors

The farmers in the modern world are tied to the overall society, so are effected by a number of factors which are not limited to methods and means of agricultural production only but also originate outside the agriculture (KUHNEN 1988:1). None of these factors is immutable but are constantly influenced by their respective environment causing a continuous process of change in them. As there did not exist a fixed list of influincing factors, some most important socio-cultural factors based on the empirical findings are discussed hereunder.

The most conspicous socio-cultural contributing factors include belonging to a specific caste and *´biraderi´*, ownership of agricultural land, education level, ascribed and achieved power and influence and the ability to help and give advise the others. All these factors have overlapping characteristics, so produce a joint effect, where individual contribution of different factors is identifiable. In the following sub-sections, these factors are dealt separately in their own way. Due to their strong interlinkage with one another, it is possible to draw a definite boundary among them.

4.5.3.1 Status on the Basis of Caste and Biraderi

In the village, the participation as well as non-participation in an organization or a scheme is decided **at caste and *biraderi* level**. The decisions made by caste and *biraderi* elders are still regarded and respected. On the basis of this fact, the participation of the old malik was regarded to be important to confirm the participation of his *biraderi* fellows. ***´Biraderi´*** **solidarity** plays a decisive role in such situations where the non-consideration of one member may mean the non-participation of the whole group. The interpersonal bonds which structured the malik *´biraderi´* are usually more prone to self-help programs than the tribal principles of group formation (ESMAN & UPHOFF 1984:121). The *´biraderi´* groups that demonstrated a high degree of solidaritycarried more weight in communal affairs[184]. *´Biraderi´* solidarity is regarded by the water users more in the sense of **group**

[182]Cf. GORDON 1954:124.
[183]Cf. KUHNEN 1988:6.
[184]A high degree of solidarity has been defined by INAYATULLAH as involving homogeneity of belief, uniformity of status, flexibility of social structure, predisposition to collective action, extensive external exposure and an activist orientation to nature (1972:268). Following this group of characteristics, one may

loyalty. This factor became more important at the watercourse as there exists a **multi-caste social organization**[185]. Some village level studies in Punjab agree that single-*biraderi* watercourses tend to be more successful at watercourse maintenance than multi-*biraderi* watercourses (MIRZA & MERREY 1979:11). This cannot be regarded as a hard-and-fast rule, but only a tendency. It is, however, the pattern of **social relations between the caste groups** which determines their participation in cooperative activities. The watercourse even having a multi-caste social structure, is regarded as a relatively maintained watercourse in the area and had been evaluated by the Mona project as a relatively cooperative one. No doubt this maintenance is not up to the mark and has not succeeded even to overcome transportation losses.

The **obligations within the *´biraderi´* network** typically carry more weight in the individual farmer´s decision-making than the obligations of any other social network. This social group, along with other common socioeconomic activities concentrating on group´s security and solidarity, is an **important and viable social unit** for the management of irrigation water (LOWDERMILK et al. 1978 Vol. II:103). The social status of the water users is determined by several factors such as economic position, occupation, caste and education. The hierarchical order of castes cannot be clearly determined (KLENNERT 1988:229), as it depends on several factors that differ from area to area and even from village to village. Some factors like origin, numerical strength, economic status, occupation, education, network of internal and external socioeconomic relations, leadership, etc., determine the social status and, thus, the hierarchy of the castes (ibid. 1988:229). Due to **out-migration from agriculture**, the values of rural society are changing (KUHNEN 1988:8); this also influenced the hierarchy of the caste system. For example, when the people migrated from a village to a town or city, they usually camouflaged the fact that they belong to a lower caste and pretended that they belong to higher castes, mostly when a significant change occurred in their economic position, too. The **ascribed and/or inherited social status** of the water users and, thus, of their groups: the *´biraderis´*, have a great influence on the water management activities at the watercourse level.

The **general attitude of the *´biraderi´* elders** played a key role for the acceptance of a new idea. The presence of some progressive elders in caste groups has favored the atmosphere for multi-caste cooperation. The absence of any serious conflict, as was the case on the watercourse, also facilitated the participatory actions. The common place of origin of the majority of the shareholders helped to organize the participatory activities by providing

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have an environment where participatory approaches will function well. When this term is used within the perspective of the community studied, it does not correspond to the cluster of characteristics stated by INAYATULLAH, rather, it refers to a general atmosphere of group adherence, mutual help and cooperation.

[185]The patterns of social organization in which a Malay farmer finds himself are in sharp contrast with the rural regulatory network of Pakistan´s Punjab. In Malay rural communities, there exists virtually no corporate entities functioning as intermediaries between the farmer´s household and the state. The village is regarded as a place of residence only, not as a social unit with a feeling of belonging. The patterns of social organization are primarily shaped by dyadic relationships between individuals and households (KALSHOVEN 1989-b:111). Malay villages are characterized as loosely structured or less institutionalized societies (DAANE 1982), supportive of relationships of a strongly individualistic nature. These characteristics do not prevail in the community studied.

them the same cultural background. The majority of the shareholders, being settlers in the village, helped them to avoid any further **social stratification**. Even in the presence of some individual petty differences, the social atmosphere is favorable for water management activities.

SIEBEL & MASSING (1974)[186] on the basis of their experience in Liberia, are of the opinion that cooperative activities will show better results if the **indigenous social structure** is organized along segmentary instead of hierarchical patterns. Such a generalization is not valid, at least for Pakistan and India, where cooperative activities did not show good results (definitely with some exceptions), even in the presence of a social system based on caste/*´biraderi´* relations which possesses both **segmentary as well as hierarchical characteristics**. The same was found at the watercourse studied.

The participatory practices in rural communities are influenced by **differentials in caste structure and *biraderi* norms**. This diverts attention to socio-cultural variables in the context of participation in the WUA. The past as well as the prevailing cooperation/conflict pattern between different caste and *biraderi* groups determined farmers´ participation in water management activities. The mutual interaction of the water users and their social groups have a direct influence on their participation in jointly managed activities. The nature and extent of these interactions along with its exercise determined the degree of participation. Where water users interactions were based on lineage or caste groupings, the participatory activities limited themselves to these spheres; they constitute the **first arena of transactions** as described by BROMLEY & CHAVAS (1989:727)[187]. On the contrary, where such relations did not observe these boundaries and are based rather on dyadic interactions, collective actions are difficult to organize[188]. The village community studied by the author is characterized by a multifaceted and multidimensional nature of relationships based on family, lineage, caste and *´biraderi´* ties, strong corporate units in the form of caste/*´biraderi´*, religious sects and ethnicity, a society oriented highly towards norms and values, practicing cultural traditions regulated by institutions of caste and *´biraderi´*. Such factors providing homogeneous characteristics to different groups may help to evolve the participation and, ultimately, the organization of collective actions[189].

[186]Cited by ESMAN & UPHOFF 1984:104.
[187]For more details, see Section 2.1.2.
[188]This relationship can be well understood by comparing the examples of Malay village social organization with that studied by the author. The main characteristics of a village community in Malaysian identified by DAANE (1982; qouted by KALSHOVEN 1989-b:113) include dyadic relationships among farmers, absence of corporate entities in the form of lineage or caste groups and loosely structured or less institutionalized societies. Such characteristics indicate for an atmosphere supportive for strongly individualistic behavior, so participation in collective actions will be difficult to organize.
[189]From a list of such social characteristics, one may not be misguided that the water users do not pursue their individual interests. The behavior of the malik Executive Committee member, particularly, can well be understood in the background of ´asymmetry of informatios´ (NABLI & NUGENT 1989:1337). The inequality of information possessed by the water users provided a base for opportunistic behavior on the part of the malik who was equipped with relatively better information and contacts. The role of the malik can be similarized with a middleman who maximizes his profit due to better knowledge and access to the resources than the others.

The location and structure of social groups - whether **scattered or concentrated, homogenous or heterogeneous**[190] - has a great effect on the possibilities and consequences of the water users participation. Inter- and intra-group relations signalize participation. The **cultural norms and values** are conducive or inhibitive for the proposed participation. Some considerations of the defined roles of male, female, sex, age, etc., are also relevant. The existence of good social relations and, thereby, interactions between shareholders belonging to different caste groups had a positive effect on their collective behavior. The situation may have been the reverse. It must be stressed, here, that the multiple relations through which caste or *´biraderi´* members at the watercourse are linked do not negate one another, „ .... but rather in many cases even overlap, superimpose and determine one another ....“ (HERBON 1994:102).

Besides, however, there are some communal interests which, due to **certain hidden objectives,** are pursued with a different degree of forcefulness. In such situations, the individuals as well as social groups opposed each other, as happened in the case of the **installation of a public telephone** in the village. As the place of installation represented an individual and hidden goal, it caused a tussle between two active members of the malik and gujar *´biraderis´*. Both of them were keenly desirous to have the telephone installed in their respective *´dara*/*baithak´*[191].The installation of public or collective goods within one´s circle of influence or on one´s land or near one´s house is a sign of prestige in rural areas. This does not only enhance the sense of **centrality of power/influence**, but also increases chances to **centrifuge social gatherings**. To have some villagers at one´s *´dara*/*baithak´* is considered a as sign of one´s influence and social activeness. The concepts of ´living and dead *dara*/*baithak´* have a certain weight for a *biraderi´*s social life. While explaining these concepts, the key informants stated that, to have a ´living *dara*/*baithak´*, the respective family has to care for visitors, have to entertain them and that there should always be someone to attend visitors, otherwise it will not be alive for a long time.

At the start, a young malik (grandson of the elderly member of the Executive Committee) had the public telephone sanctioned by **mobilizing his personal and *´biraderi´* contacts** with the area member of the Parliament. As he was a supporter of the said member during the general elections, he obtained this sanction as a ´reward´ for his services. The malik wanted the phone to be installed in a room adjacent to his *´dara´*. Undoubtedly, this would have benefited the whole village, but, due to its installation at the malik´s *´dara,´* the power and influence, locally referred to as *izzat*, of the other faction, the gujar, was at stake, as the informants reported. The gujar strongly opposed this installation. To solve the problem, at a **village level meeting,** it was decided that it would be installed in a common place.

[190]According to ESMAN & UPHOFF socially homogeneous communities are helpful in promoting unity and cooperation whereas social heterogeneity make the division and conflict to flourish (1984:116). The results obtained by KING (1981; quoted by ESMAN & UPHOFF 1984:117) based on six case studies in northern Nigeria can, however, be regarded as an exception where heterogeneous community developed the most successful cooperatives.

[191] A place of gatherings for male members of the *´biraderi´* located mostly in front of the house of the *´biraderi´* head. There, meetings are conducted to discuss communal issues, and guests are entertained. Usually, *´dara´* and *´baithak´* are regarded as being synonymous, *´dara´*, however, is an open place, whereas *´baithak´* is the rudimentary form of a drawing room.

According to the unanimous decision, the Bank situated in middle of the residential area was the proposed place. The Bank officials, due to security problems, rejected this proposal. Meanwhile, the Federal Government had been dissolved and all the decisions/sanctions made by the Federal Ministers were either canceled or paralyzed. Consequently, the sanctioned telephone was also canceled. In the period of the Care-taker Government, this matter was again pursued by the malik and, after a hard struggle, he got it resanctioned. The Care-taker Government lasted for a very short period and after the elections, it handed over the government to the winner political party. After the new elections, the Member of Parliament elected this time was supported by the gujar. With the help of this powerful and influential associate, the head of the gujar *biraderi* was granted the permission to install the telephone in his ´*baithak*.´ For that purpose, a telephone pole was installed in front of his house.

The installation of the telephone became a matter of *izzat* for both struggling parties. The **game of *izzat***, according to MERREY (1986-b:38), is played like **a zero-sum game,** in which one acquires *izzat* only at the other´s expense. According to informants, the malik´s *izzat* was now at stake, so that they put all their efforts and contacts into action to stop the installation at the new place. Their efforts proved ´fruitful´ and the installation was once again canceled. Afterwards, a long series of disputes over the removal of the telephone pole started; the malik were in favor of its removal, while the gujar were struggling for the status quo. Till the author´s departure, the problem of the pole had not been solved. According to informants, this situation was a real interpretation of the Punjabi saying: „**My neighbors wall must fall, even if it falls on me.**"

Despite such personal and ´*biraderi*´ tussles, the general atmosphere at the watercourse, especially for water management, can be ranked as cooperative. The great majority of the shareholders at watercourse have a **rational approach towards joint benefits**. Moreover, since they are an agricultural community, all depends so much on the watercourse that serves them that they cooperate to keep the system working. As to the WUA, most of them regard it as an organization through which they can approach towards their vested interests. The absence of any serious dispute over water also facilitated the cooperative atmosphere. The watercourse has a **history of cooperative activities** in the form of joint maintenance of the water channel and mutual help in the hours of need. This cooperation was, however, mostly spontaneous. The farmers have a long experience of participatory activities in the form of collective cleaning and maintenance of the watercourse. Moreover, the specific cooperative activities enlisted before indicate a positive history of participatory activities.

4.5.3.2 Status on the Basis of Landholding

In farming communities the status of a water user is basically determined by the land use rights, which one has on his disposal[192]. The size of landholding is the basic yard-stick to determine one´s power and influence. A keen observation of **national as well as regional power and influence patterns** strongly suggest that there is a direct, strong and positive

[192] Compare with KUHNEN 1988:1

correlation between the size of landholding and the amount of power/influence[193]. This relationship has also been strongly supported by the literature on village studies in Pakistan (LOWDERMILK et al. 1978 Vol. II:105). As a result, a sound knowledge of landholding patterns helps considerably to understand the village community.

With regard to the improvement activities at the watercourse, landholding generally affected the WUA under **two aspects:** difference in the **amount or quality** of land and in the **cultivator´s status**. This has produced the following results:

1. The provision of labor for renovation and rehabilitation came from smaller landholders, while decision-making rested with the large ones.
2. The landowners are potential decision makers which endanger the tenants´ and contractors´ position in any resolution of conflict.

The large landowners at the watercourse were found to be satisfied with **the existing situation of water management**. As they own large parcels of land, they are able to produce enough to support their living. The small farmers, on the other hand, insisted on the further lining and rehabilitation of the watercourse. The difference in the size of landholdings affects the degree of participation in collective actions. Most of the large landowners do not participate in O&M activities personally and have their share of work done by servants. Their **lack of interest** affects negatively the quality of the O&M.

The rural community of the WUA studied is clearly divided into **landowning and landless classes**. This status determines primarily ones role in the WUA. Moreover, the form of tenure practiced affects the willingness and ability of a water user to participate in the WUA. For example, a tenant with **an insecure claim to land use** is usually less willing in comparison to owner of the land to invest or contribute, both labor and capital for the improvement of irrigation system. Moreover, a tenant or contractor has less access to credit facilities which due to non availability of land for pledge or security limits his investment possibilities.

Where landholdings are quite unequally distributed, the manner in which farmers participate in irrigation management is influenced by the resulting power/influence differentials. The difference in intensity and extent of power definitely turns **flow of the benefits** in favor of those who are relatively active. The class which profits more in such cases, by virtue of its power and influence, is usually that of the large landowners. At the watercourse studied, the concentration of benefits in the form of lined sections can easily be observed where large farms are situated. Moreover, the large farmers are profiting more from the weaknesses of the system than the smaller ones. The ´**settling of matters**´ with local officials of the ID and of the revenue department is mostly an affair of the large farmers. They secure **illegal benefits** through their contacts and by bribing the officials concerned.

[193] According to BACHRACH & BARATZ (1970:17-38), power is the ability to invoke the threat of sanctions upon another person and/or group of persons in order to secure their compliance. Influence, on the other hand, has to do with securing compliance without employing the threat of sanctions but through the use of techniques of logical or moral persuasion.

Since land is the main source of **economic security**, the more land an individual or a *´biraderi´* owns, the more resources that individual or *´biraderi´* has which compel the others to play a dependent role. The extent of landholding usually determines the **income level** of the holder which, in turn, extends or limits the capacity to spend on the occasions which enhance or decrease power and influence. To build up the contacts within and outside the *´biraderi´* and with officials particularly, one´s repute of hospitality is of primary importance. These contacts helped the large farmers to be considered for a leading role in the WUA. Since they held decisive positions in the WUA, the large farmers **negotiated, settled and implemented** all the developmental activities.

The **rate of participation** in different activities, especially of O&M, is influenced by the different **farm sizes**. Sanctions against large farmers are usually difficult to enforce; therefore, the tendency of free-riding is usually greater among large farmers at the watercourse. Considering the landholding pattern, one may assume that the larger farmers are, by virtue of their holdings, the **dominant group** at the watercourse and enjoy all the benefits discussed above. The reviewed literature[194] also confirms the thesis that the size of the landholding affects the quality of maintenance of a water channel, which is definitely the result of the water users´ joint activity, for which their participation and cooperation are necessary. It is assumed, in the literature, that a greater percentage of **small but economically viable holdings**[195] will cause a better maintenance of a watercourse. It is also assumed that operators of small but economically viable holdings have more incentives and interest in water management activities, in comparison to very small and larger farmers. It is argumented that the holders of very small farms are usually engaged in **supplementary off-farm income-generating activities** (KUHNEN 1989:515), therefore, they may not have time or see little gain in such efforts. Larger farmers, on the other hand, get the work done by servants or tenants who have little incentive to work effectively. Moreover, larger farmers tend more often to violate the sanctions of village level management (LOWDERMILK et al. 1978 Vol. IV:136-140) and have „**other means**“ of securing extra illegal water, so that they are usually regarded as being less interested in watercourse improvement and maintenance activities.

The water users characterized by greater inequality in landholdings are usually found efficient in carrying out the improvement activities, but failed to organize participatory activities for maintenance on a long-term basis. The maintenance activities performed by the water users are inadequate or of lower intensity and frequency. The Executive Committee cosisted of large famers proved successful to coerce the small farmers into initial activities of improvement and reconstruction, but, in the long run, such policing proved difficult to maintain. According to LOWDERMILK et al. (1978 Vol. IV:226), the smaller water users under such conditions feel great disincentives to organizational commitment and participation.

[194]See, for example, MIRZA & MERREY 1979:9f.
[195]A small but economically viable holding is defined by MIRZA & MERREY (1979:10) as having an acreage between 6.5 and 25 acres.

4.5.3.3 Status on the Basis of Education

Education along with landholding is **a major determinant of social influence and power** at the watercourse. If one is willing to use one´s power, a relatively larger landholding combined with relatively higher education provides the soundest base for exercising influence and power at village level, particularly. In the recent past education is being increasingly recognized as an important factor for village leadership. It is the water users´ general opinion that relatively higher educated people know the „**art**" of conversing with officials and prove more successful in convincing them. Due to increasing formalities in the leadership role, the ability to read and write is becoming more and more **a part and parcel of the leading potential**.

Along with other factors, education played an important role in getting the two maliks selected for the **Executive Committee**. The malik, although they own less land than the gujar and the syed, place a strong emphasis on education. Their past and present experience in this regard proved an accelerating force for their youth. They enjoyed a higher status, more power and influence in the community affairs due to their relatively better education. They are considered better spokesmen at village level, and they duly utilize this to build their contacts with government officials. They have more connections with development officers and entertain them in a better way. Through such social activities they strengthen their leadership position and ultimately have **a store-house of useful social capital**. As the of watercourse was improved, they used this capital in an opportune way and got those sections of the watercourse lined which serves their purpose better. For the solution of problems at community level, they are usually ahead of others. Through discussions with potential leaders in the village, one gets the impression that they know the formula that ´**power gravitates to those who solve the problems**´.

Undoubtedly, some of the syed are also well educated and satisfy other prerequisites for leadership, but, as a ´*biraderi*,´ they are **relatively passive** in the socio-cultural spheres. An elderly syed argumented their passiveness as, „the local politics is a dirty game where nothing is definite, where one´s *izzat* is always in danger, therefore, as they are the descendants of the Holy Prophet, it is against their status to indulge in such affairs". Most of the educated syeds are not available for such honorary duties because of their off-farm activities like small business and jobs.

4.5.3.4 Status on the Basis of Power/Influence and Leadership

The power and influence of a water user and/or *biraderi* can be rated from the most fundamental factor which determines social behavior in a formal or informal organization and around which most of the water users´ **social and economic activities** revolve. The word *izzat* is the most suitable expression for power and influence. There is always a continuous struggle for the accumulation of power and influence, as, over time, it proved the **most effective weapon to move things in the desired direction**, either in or outside the particular social group. For the formation and regulation of the WUA, the role of power and influence as a limited good is of vital importance. The role of the water users in the WUA is determined by their acquired or ascribed *izzat.* As the game of *izzat* is played in a

social organization of farmers, it is definitely influenced by some relevant factors. The strongest social indicators found at the watercourse studied are **land ownership and education**.

When an interest group is large, as in the case of the water users at the watercourse, leaders who have proportionately **greater individual interests** than the others may be required to initiate and organize a collective action (SPARLING 1990:206). The available literature and experiences in the Punjab confirmed that the larger landowners usually have more prestige, power and influence than those with smaller holdings (MIRZA & MERREY 1979:10, MERREY 1980:206, MERREY 1986:6, LOWDERMILK et al. 1975:47). Some other factors such as good linkages with officials and local politicians, caste hierarchy, ability to give advice and settle disputes, and spiritual attainments enhance one´s power and influence.

The power and influence patterns prevailing at the watercourse played a visible role, right from **identification** of the watercourse for pilot project, its **selection**, through WUA´s **organization**, Executive Committee **formation**, **implementation** to **distribution** of the benefits. The contacts of the powerful and influential farmers played a significant role in representing the watercourse outwards and highlighting water users´ characteristics. They used their influence on the water users for securing their support to fulfill the required prerequisites of the project authorities. They secured honorable voluntary posts as organizers and coordinators on the Executive Committee. They made an **effective demonstration** of their power and influence to the project authorities and in the surrounding villages by mobilizing the labor and successfully completing the construction.

The **stability of the social system** at the watercourse is endangered by the larger farmers (usually more powerful and influential) who usually violate the collective convention and rules, at least more often than the smaller landholders. This malpractice can be easily observed on some opportune occasions such as the lining of the watercourse sections and the installation of the public telephone, where individual hidden motives dominated over communal or collective benefits. Such examples limit the continuous flow of social interactions and, therefore, damage the guarantees which the social system used to provide. Such a situation is **shattering the water users´ mutual confidence and altruism** and is generating an atmosphere of fear of counterparts not abiding by the traditional rules[196].

The WUA, until now, has just **reinforced the existing patterns of power/influence**, leaving little room for identifying the new potential leaders. As a result, the smallholders are being neglected, although the idea of the WUA was to promote and protect the interests of small farmers.

Participation evolves wherever people decide to share or devote their thoughts, time and energy for a collective cause or for achieving an objective. This participation **is patronized by organization** which gives it a recognizable productive structure. The nature of incentives and objectives work as accelerating agents to make this participation sustainable. The degree of coordination and effectiveness is, however, determined by

[196]For more details, see Section 2.1.

leadership which gives it a particular direction. For village communities, the **role of leadership** is of basic interest as they are ruled by caste, *biraderi* and household leaders[197]. For the purpose of water management, the effectiveness of the WUA and sustainability of the participation was heavily dependent on the **quality of leadership**. As the structure of an organization, the best leadership in itself cannot promise the desired results; however, an incapable leadership is a guarantee that participation will not be sustainable.

Although the village community finds itself in a **transitional phase**, even then, the *biraderi*, caste and household elders are still respected as leaders of the social units concerned. This role becomes more visible when these social units act outwardly. In the case of the WUA studied, the existing leadership at the watercourse was duly regarded. According to informants, if the old malik had not been considered for **membership on the Executive Committee**, the organization of the WUA would have been really difficult, if not impossible. Usually, all social groups are duly considered for social tasks. The syed were not recommended for leadership because of their passive role in the **socio-political sphere** of the watercourse, particularly, and in the village, generally, which may be regarded as an exception. As a normal practice in the area (and elsewhere in the Punjab), every caste group holding a reasonable size of land and number of members is duly considered for the role of leaders, even if this may not involve nay function.

In this connection, the **concentration of potential leaders** along the watercourse is another relevant factor, which on the one hand can influence the mobilization of participation and, on the other, **distribution of the benefits**. If the leadership evolves from the tail and middle of the command area, participation can be more coordinated and effective. Through their acquired and/or ascribed leadership role, the influential and powerful water users are more in a position to direct the flow of benefits towards them. An evidence of such an example is the complete lining of branch ´B´ which serves the land of an Executive Committee member only, who is regarded by the other shareholders as the person entertaining most contacts with the Mona staff.

During the organization of the WUA, the **existing traditional leadership** was confirmed by the shareholders unanimous agreement. The **mobilization of new leadership and talent** was partially considered by selecting a ´non-political´ but committed farmer. The new addition proved to be the most responsible and dutiful member of the Executive Committee and, occasionally, he did the real organizational work. Due to his special skills and strong commitment, he proved very efficient, and this motivated relatively indifferent shareholders. The other three Executive Committee members were either tied in political networks in and outside the community or were satisfied with the status quo, thus allowing room to look for new leaders.

[197]The qualities of a rural leader mentioned by EGLAR are equally valid in this respect. According to her, a leader „ ... should have authority; he must be generous with his time and money; he should get along well with his *biraderi*s, the members of his patrilineage, for on their unity depends his power; he must have many friends, maintain good relationships with the people and have connections in official circles; he should act in every situation in accordance with his status, that is, he should be dignified and should be able to make decisions“ (1960:29-30).

Over time, due to some changes, like the death of one Executive Committee member and the advanced age of the other two, the existing effectiveness and commitment of the WUA were no longer admirable. Therefore, new potential leaders were required. In the light of past experience, those water users were to be selected who seemed to ensure accountability. Moreover, the personal charisma along with the leaders´ internal and external contacts should be duly regarded. Both factors played an important role for the mobilization of participation at the WUA level.

Factionalism, like other environmental variables, imparted a positive as well as negative impact on participatory activities of the water users. At times, it helped the formation of interest groups for the accomplishment of communal activities, but at other occassions it influenced the participatory activities negatively. For water management participatory activities, the factionalism proved helpful as leaders of the factions motivated their faction members to join the program to demonstrate their power and influence[198]. Like the village in which this study was conducted, one of the **two Indian villages** studied by WADE (1982-a) was split into two strong factions. The enmity between the two factional leaders, as between the malik and the gujar, prevented them from executing several community-based welfare projects. The water users of the two factions in the Indian village solved their conflicts with the help of an **arbitrator** from a neighboring village, whereas the two factions at the watercourse studied made an explicit mutual agreement, according to which they will work jointly for irrigation water management at watercourse level. This agreement, however, does not encompass other communal activities. This situation depicts that the **transactions over water** did not enable them to undertake other collective actions in the same way. Instead, new agreements according to the nature of the forthcoming activities are required which are always settled **under the influence of the faction leaders´ hidden individual objectives**.

Although most of the water users realize that the younger malik has earned more than his just share of the common benefits provided by the rehabilitation program; even then, they expect and ask him to promote their intention of having the rest of the watercourse lined by the Mona project. This is actually an outcome of **an asymmetry of information and the heterogeneity of the agrarian and social structure of the village**, intensified by the heterogeneous rights of use which enabled the individuals of high social status to constitute groups of clients around themselves. In an atmosphere of specific dependence, such groups of clients or followers remain intact „ ... even if the client´s position becomes irksome because of dependence, incapacity, adaptation and resignation“ (MÜLLER 1996-a).

The **better-off water users** in terms of economic, social and political aspects tend to assume more activities than the others, even if the objective possibilities are the same for everyone. This is why the intellectually flexible, better educated, economically powerful,

[198]MEEHAN (1978:104) and LOWDERMILK et al. (1978 II:103ff) see the factionalism as serious problem and major predictor of organizational ineffectiveness. A review of present examples where cooperation and participation were fostered and actively followed even in the midst of factionalized atmosphere. The example of an Indian village by WADE (1982), of a Nepali community by WILLIAMSON (1982) and of a village in North Yemen by SWANSON & HEBERT (1982) tell the stories of successful cooperative activities in faction ridden communities.

urban-oriented, ethnically and politically predominant water users and ´*biraderi*s´ showed a greater readiness to adopt new forms of participation offered from outside, especially when these braught them advantages too. Possibly, they will not only for the first time, but also for a long time, be the only ones to have a share of such opportunities relevant to development while deriving **personal advantages**. The lower strata are thus disadvantaged. This is substantiated by experiences made in the whole world with the leading stratum in agrarian societies[199].

4.5.4 Socio-political Factors

Opinion is mixed about the efficiency of participatory collective actions evaluated on the basis of political support by the government concerned. MEISTER (1969)[200] suggests that the local organizations will function best in areas that have been **neglected by the government**, whereas CHARLICK (1984) supports the opposite opinion to MEISTER´s. On the basis of the case study conducted by the author, it can be safely stated that, at the watercourse, the organization of **the WUA was initiated and promoted (to some extent) by the Mona project officials:** an organ of the government. It is important to note, in this context, that on the day the government officials quitted their activities and support, the performance and effectivity of the WUA started to decline. It must also be realized that bureaucratic paternalism inhibited[201] the effective development of the WUA. The views expressed by MÜLLER in this context are relevant, as they reflect the case of the WUA studied[202].

The political factors involved in generating farmers´ participation at national level require a basic change in themselves. The approach used here is still too top-down. The participation of beneficiaries is confined just to the **lowest levels of the irrigation system** and, due to the non-existence of any organized communicative system, the farmers´ interests have not been duly regarded. The WUA studied and many others in the area, and elsewhere in Pakistan, are basically **engineered by the project teams**, whereas a healthy system always emerges from the indigenous people[203]. The idea of the WUA did not come forth as a result of the water users´ felt needs, but was imported from outside. The idea is being adopted in the country in accordance with ´**planning by slogans**´ as the patterns of ´*warabandi*´ are being adopted in new irrigation schemes in India[204]. For an effective and beneficial participation those, WUAs that are **organized by, and for the water users** proved successful. The example of decentralized management of the large-scale irrigation system in the Philippines can provide some guideline. Such a decentralization allows the participation of farmers in system design, management and control over water. Moreover, the key to the participation process and democratic control is decentralization (KHAN &

[199]Cf. MÜLLER 1996-a.
[200]Cited by ESMAN & UPHOFF 1984:122.
[201]This version is also supported by HUNTER (1976:197F).
[202]According to him: „Eventual self-help plans are hindered or even suppressed, ..., when thoughtlessly planned external financial aid is granted as a component of the strategical procedure (officialization). Cooperation usually fails when such external aid is stopped“ (MÜLLER 1994:842).
[203]Cf. GAMER 1976.
[204]For details of the Indian case, see WADE 1982-c:106.

BHATTI 1994:244). **Decentralization**, commonly known as participatory approach, is made through a policy of bureaucratic reorientation and promotion and building of irrigation organizations (TAPAY 1989:16).

The reason, why the WUA is not as active as it was in the past, is that the Mona project failed to increase the water users´ interest as the program progressed chronologically. The degree of utilization of **indigenous resources and knowledge**, as compared to project resources, did not increase after the renovation phase to the O&M activities. It appears, therefore, that the control of the project did not devolve in favor of the WUA and, consequently, the role of the WUA became neither clear nor defined. Hence, the participation of water users in early stages of the program may be observed more clearly, whereas, in operation and maintenance it has not keeping the previous pace, which is very important for the continued success of the project. One cannot deny the fact that participation exists but its quality is still not by any means appreciable, rather discouraging. Therefore, **the WUA with an almost lacking participation at present is, in itself a dead component**[205].

According to CHAMBERS (1980)[206], irrigation officials are usually reluctant to find opportunities of involving water users, as they consider themselves to be most competent in matters of irrigation management. The **general bias against farmers as being non-cooperative, non-responsive, conflict oriented**, etc. (KALSHOVEN 1989-a:4) is not limited to Pakistan only. The attitude of the ID along with other support organizations is not conducive to the establishment of WUAs. The regional as well as the national political circles are too passive regarding farmers´ organizations. The loose control over water management agencies has led them to indulge in **corruption**. The payment of bribes in the form of *´faslana´* or grain gifts to irrigation officials is very common[207]. The mechanisms to control corruption have failed over time, as public officials developed mechanisms of corruption which are not easy to identify and prove. Just as it is not possible to assertain whether fish moving under water are drinking or not drinking water, it is not possible to assertain whether government servants take money for themselves (SHAMASASTRY 1967:71).

The **agricultural policies** devised are confirming and intensifying the already existing **economic dualism**. Moreover, modern agricultural policy often acts in the interests of the larger cultivators, thus increasing the inequality to the disadvantage of the smallholder (KUHNEN 1988:6).

[205]The case of Malaysia analyzed by KALSHOVEN is not different from that of the watercourse studied. Most of the developmental activities in Malaysia have been initiated and organized by the state bureaucracy, whereas the active interest and participation of farmers always lagged far behind. The introduction of Farmers´ Organizations is an typical example of an officially imposed scheme, in which the organizational units are managed by government officials (1989-b:99).
[206]Quoted by KALSHOVEN 1989-a:4
[207]A similar situation in India has been reported by WADE 1982-b103.

4.5.4.1 Objectives of Water Management

In the drama of water management, two actors are regarded as the scene setters, i.e., **the water users and the irrigation agency** (or government). Both of these have their own objectives, which may or may not be congruent. The farmers are more concerned with a reliable, equitable and timely supply of water, whereas the agency or government, along with these objectives, is more concerned with its acquisition, distribution and conveyance through a well maintained main system. The point where there is a **compatibility between water users´ and government´s objectives** is that the water users have greater incentives for participation.

Although the objectives themselves are often interrelated and cannot be ranked according to some fixed priority, the relevant literature (e.g., UPHOFF 1986:19ff) presents some sets of broad as well as specific objectives which, for the present study, are identified as follows:

Optimal participation is the foremost objective of both the government and the farmers with a difference of emphasis from the aggregate to the specific level of production, respectively. Likewise, the area of emphasis and interest is shifted when the government is drawing satisfaction from the **performance of the irrigation system**, in terms of gross production which, on the part of farmers, may not be acceptable. There may be different opinions in terms of cropping pattern and intensity, e.g., government favoring cash crops, but the farmer´s first priority may be consumption/subsistence crops. As long as, the path leading to optimal production is not agreed upon, the mobilization of farmers´ participation will remain doubtful. In this context, the gap between prices of inputs and outputs is also be another influencing factor.

With **a shift in cropping pattern** from subsistence to cash crops, the interest of the farmers at the watercourse in the management of water at farm level has increased. The main cash crop, citrus, although it requires less labor in comparison to other crops, demands a steady supply of water, especially during some crucial stages like flowering. To meet this demand, there was an increase in collective actions regarding water management. The **vested interests** of the shareholders directed them to keep the watercourse maintained and the installations in a better condition. The farmers realize by themselves that, after the renovation of the watercourse and its collective maintenance, the transportation of water has become more reliable. The point emphasized, here, is that even this positive experience did not help them to maintain their optimal participation, which can basically be regarded as a function of the inadequate organization of the WUA. The structure of the WUA which has deteriorated over time, proved unable to sustain farmers´ participation and its management.

Conflict reduction is usually the field of farmers´ concern, although government is also eager to promote this as it paves the way towards launching new schemes of rural development. As is evident from the historical perspective of the watercourse, farmers showed some **aversion to conflict**, although MERREY (1986b:38) and BHATTY (1979) described some who have a disposition for conflict. It has been reported with a great

confidence by the shareholders that conflicts over water have been reduced to a degree which, according to them, is negligible. In the past, conflicts over water did exist, but no serious blow had ever occurred. In the WUA, they have got an organization at watercourse level which helps them in resolving their individual as well as *biraderi* conflicts. The WUA is more popular among the farmers as a **conflict resolving body** than a water managing participative organization. They regard water management at farm level more as an individual issue than conflict solving. Such payoff has induced the farmers to undertake participatory actions to achieve a more reliable supply of water at farm level, in case they are getting it from supply sources. The **limitation of conflict chances** through improved infrastructure, on the one hand, and their resolution (if any happens) through the WUA, on the other, has enhanced their mutual confidence and this paved the way for participation

The **mobilization of resources** through farmers´ participation in irrigation projects has been one of the major targets of the government. This included material as well as non-material resources, mostly in the form of labor contributions, provision of materials and sometimes cash contributions as well. The Mona project motivated the farmers to organize and participate in design and construction activities to share the costs of improvement in the form of labor. The farmers, on the other hand, participated in the program to mobilize government´s resources in the form of technical advice, material and check structures. A **compatibility of the objectives** of resource mobilization in the form of vested interests on both sides motivated the farmers to participate in renovation activities financed by the government. This yielded them an improved infrastructure of the watercourse and, consequently, a better management of the available water.

Over time, **no change occurred** in mobilization of the water users´ resources. Labor appeared to be the most extensively mobilized resource, right from rehabilitation/construction to the operation and maintenance of the watercourse. Neither in the past nor at present have money and materials been mobilized as important resources. **Labor can be categorically singled out as a temporary (during the rehabilitation) as well as ongoing (during O&M operations) activity**. The best example of labor mobilization was reported during the first earthen improvement of the watercourse, when 34 water users contributed about 12,000 hours of voluntary labor (HUSSAIN et al. 1976:i). It should be mentioned specially that the mobilized labor was well managed and, therefore, produced the expected benefits.

It is usually assumed that water users resist **cash contributions**. This, however, is determined by their mode of income which, in turn, depends upon the cropping pattern, i.e., cash or subsistence crops. With regard to their main cash crop, citrus, when they were asked about cash contributions, a great majority (about 70percent) was found to be willing to contribute in cash, provided that the money would be used to improve the supply of water and would not be misused.

The objective of **system sustainability** does not show any clear evidence as an area of interest, both for the government and the farmers. It represents **a deferred benefit** which is often overlooked. Neither the project officials, nor the farmers made any arrangements which are necessary for the sustainable performance of the watercourse. Initially, a *´khal*

chowkidar´ was hired, but due to poor planning and his undefined role, he proved a failure. The WUA does not have resources, either mobilized by the water users themselves or provided by the project authorities, which can help in sustaining the improvements over a long period of time.

Communication is a socio-political and organizational activity, which, according to CHAMBERS, is „so universal that one does not see it" (cited in UPHOFF 1986:50). For a **coordinated participation**, communication at either end of the irrigation system is of fundamental importance. There exist no formal permanent arrangement for the two-way flow of information between the Mona project and the WUA. This purpose, however, is served by some contact persons only in an informal and personal way which, on the one hand, is **too weak** and, on the other, full of **colored and filtered information**. These contacts do not communicate the water users´ general objectives and/or problems collectively, they rather serve some specific interests on either sides. The **inadequate communication** is exacting costs as a result of discoordination in all irrigation activities. According to a micro level study in Pakistan, about 70 to 80 percent of the farmers did not know the dates when to maintain and repair their watercourse, nor even the dates when the water supply in their canal would terminate (LOWDERMILK 1985:6-7). The inadequate communication at either end is reducing the possibilities for farmers´ cooperative and participatory operations. While criticizing the unpredictability of the main system, the farmers argued that, due to many deficiencies above the *´mogha,´* they cannot draw optimal benefits from their cooperative activities. They complained that the ID did not abide by the scheduled charter of annual canal closures, whereas some emergencies in the peak periods of water utilization make the situation worse. Their participatory activities will only be fruitful if they are **timely informed** about the regular as well as incidental changes, so that they can also schedule their activities accordingly.

In the light of above discussion, one may argue that farmers´ participation can be effectively mobilized and sustainably used where it favors the achievement of the objectives which they themselves set and value. If the government or irrigation agency is desirous to promote their own objectives, some **compensating benefits and/or coercion** become a necessity. In this case, the duration of participation is usually determined by the period of coercion or compensating benefits. For a sustainable and effective participation of farmers, some incentives in the form of immediate benefits, however, have proved more successful. Above all, to get farmers to participate in the jointly managed irrigation system in Pakistan, a congruence of objectives between water users and system managers is of crucial importance.

4.5.5.2 Role Specialization

To participate in a WUA like the studied one, **no specific specialization** is required (except the knowledge of agricultural practices which the water users already possess); this eliminates any expected hesitation. The farmers are supposed to manage the existing system, however, in an organized formal way. The **absence of role specialization** influences the number of participants positively at the watercourse level but, on the other

hand, is inversely affecting their consideration for any role in the main system. The Executive Committee members have some poorly defined roles to play, for which they are not formally trained; hence they are performing their roles in the same traditional manner as they used to do before the organization of the WUA. To make farmers´ participation more effective, some role specialization is necessary. It will help them to make the system efficient, increase the output through division of labor, enhance expertise, perform the tasks that need some special skill or experience and sometimes to raise their status.

Another dimension of role specialization concerns the **non-water inputs**. For optimal production, although water is the most important input, it will be highly effective when combined with other inputs such as fertilizer, pesticides, high yielding varieties of seed, etc. The participation level of farmers at the studied watercourse would have been much higher if some of the water users had been assigned the management of non-water inputs. In the case of a **collective purchase of inputs and joint marketing of the produce**, the occasions of participation could have been enhanced. Thus, not only can the potential of farmers for special skills be identified but it would have been more supportive for the sustainability of the WUA.

The basic concept of the role provides a base to **the institutions and social structure** (like WUA). As the roles help one to predict the actions and reactions of others, they definitely are important for the emergence of social patterns and social organizations. The concept of role itself is composed of two elements: **role expectations (the institutional dimension) and role performance (the structural dimension)** (COWARD 1980:18). A role can be a cluster of expectations associated with a given function. Moreover, a role may have some actual patterns of action associated with it (ibid. 1980:18). On the basis of role identification and specification, some patterns of social organization in a particular irrigation system may be considered, even in the absence of formal irrigation associations.

A certain „lack of close correspondence between the ´ideal´ and the ´actual´ in many and pervasive contexts of social behavior[208]“ is **one of the important factors for change** in either institutional or social structural patterns. Sometimes, an attempt is made to introduce the ideal social behavior through some ´new´ patterns of social behavior, in which the recently identified or modified role is equipped with some new structural dimensions. If this role is carefully designed and consequently works successfully, the chances of a new set-up of role performance are greater; it will lead not only to a social change but to this role becoming important as well. In the case of the watercourse studied, the recently designed roles of the Executive Committee members did not bring **anything new** which may be preferred to the actual role of these potential leaders. The new roles of these members were almost identical to their previous roles as informal community leaders. They, themselves, and the other water users did not find any lacking correspondence between the ideal (new) and the actual (traditional) roles, and, therefore, failed to cause a change in the institutional and/or social structural patterns. **The unpopularity of the WUA can also be attributed to the absence of novelty**. The honorary office of the Executive Committee is not being perceived as honorable as it could have been, if it were provided

[208]MOORE (1965) quoted by COWARD 1980:18.

with some structural and regulatory dimensions. This factor also hindered the revival of the EC according to some democratic patterns. The absence of general role specialization in the WUA caused an **inactivity in its functions and deterioration in its dynamic potential**.

4.5.5 Summary

Like the environmental factors, the impact of influencing factors is not constant as these factors themselves are subject to change. In the light of above discussion, these factors can be summarized as under.

- The **physical environment** provided by nature and created by men play an important role in allowing or hindering activities demanding the participation of different actors responsible for irrigation management. Within the physical environment, the location of a water user in the irrigation system influences his decision to participate or not. The location of a water user also affects his/her share in the benefits of a program or scheme. The locational centralization of power and influence is also a relevant factor which directed the flow of benefits in some specific direction. In the case of the watercourse, the benefits in the form of watercourse lining were concentrated in the locations where effective and influential water users have their lands.
- The size of the group of water users influence the **structure of the Water Users´ Associations**. With a steady increase in the number of the water users, without necessary changes in the organizational patterns, the WUA failed to coordinate activities of the overtime new established interest groups.
- The extreme ends of **water supply**, i.e., abundance and scarcity, have negative effect on water users participatory activities. The main objective of the water users participation in the WUA was to get a regular and reliable supply of water at the right time, place and amount.
- Due to **poor control** of supplied water, the water users have lost their confidence in the public sources. To over come the problem, most of the water users are making a heavy use of private tube wells.
- The water users contributed in the from of **physical labor** only as no cash or material contributions were demanded by the project managers. This caused a lack in the sense of partnership and is influencing the sustainability of the system badly. The diversity of **economic factors**, like economic homogeneity/heterogeneity, landholding, full-time Vs: part-time farmers, cultivation of cash crops and income variations among water users have also diverse effects on their participation in water management program.
- The irrigation system management, being a socio-technical affair, is highly influenced by the prevailing **socio-cultural patterns** of the water users. The social interactions and relationships between different groups of the water users, based on caste, *´biraderi´*, factions, and sect, shape the nature and extent of their participatory activities. In the background of this atmosphere, the water users decide either to participate in a proposed activity or not. The **cultural norms and traditions** shaping the concept of *izzat*,

´biraderi´ solidarity, factional loyalty, mutual help and cooperation facilitate the collective actions but do act as barriers to participation also. The **status of the water user**, shaped basically by caste belongings, landholding and education, determines his position in the rural social set-up which further defines his role within and outside the community.

- The presence of a **dynamic leadership** facilitated organization of the WUA and coordination of specific activities of the water users. The caste and *´biraderi´* heads are potential leaders and are time and again confirmed for political, social, economic and religious leading roles.
- There exists a mixed opinion about the success of local collective actions supported by the concerned **political structure**. Due to a non-concerned and disinterested political atmosphere at the national level regarding water management problems at the watercourse, the approach did not succeed to acquire a certain degree of decentralization of irrigation management. As a result, the idea of Water Users´ Associations did not devolve in favor of the water users.
- The **objectives** of the Mona project and the water users can be evaluated compatible as main objective of the water users to get a reliable supply of water and reduction of water losses through improved infrastructure was similar to the Mona projects target. Regarding other objectives like conflict resolution, resource mobilization, sustainability and communication, there existed a certain degree of congruence between the water users and the project managers, although with a difference of vision, approach and intensity.
- For entry in the WUA, no **specific specialization** was set as a pre-requisite for membership, so favored the rate of participation positively. The non-development of specialized roles within the WUA is causing a state of confusion and unaccountability. Moreover, role specialization for the management of non-water inputs was not considered, which may otherwise had made this forum even more effective and continuous.

5. Conclusions and Recommendations

5.1 The Empirical Results in the Perspective of Research Theses

The study analyses the organization and management of irrigation water through **Water Users´ Association** at tertiary level in a Punjabi village in Pakistan. The focus of the study is on the farmers´ collective participatory activities which they undertook for the management of irrigation water at the watercourse level. The discussion revolves around the hypotheses presented in Section 1.5.

The **socio-economic regulatory patterns** are playing a dominating role in determining the direction and extent of participatory activities of the WUA. The basic institutions such as family, caste and *´biraderi´* are the primary social units where decisions regarding participation in collective actions are made. Such institutions control not only the activities of water management but all other socio-economic activities also revolve around them. Some changes definitely occurred in these institutions due basically to education, population growth, increase in expectations, changes in demand, government interventions and technological changes (MANIG 1992:88), but their importance is still crucial. While explaining the prevailing situation, one may claim that these institutions are in a **transitory phase,** in which behavioral changes are more visible in internal affairs of the family, caste and *´biraderi´* members than in the external ones. The **internal behavioral patterns** have become relatively more flexible and egalitarian, whereas, during interactions with the external institutions of a similar nature, some deliberate solidarity and loyalty are shown (**demonstration effect**). The water users participate in water management activities on the basis of the approval accorded by these basic institutions. For the regulation of joint activities of irrigation management, the so-called heads of the families, caste and *´biraderi´* groups are followed accordingly. The **general validity and functionality** of these institutions have weakened over time (BHATTI 1984:65), in the sense that instead of obeying group heads blindly, one may argue and request an explanation, too. The exercise of such democratic behavior is usually avoided publicly with the underlying fear that this may endanger the reputation and impression of that particular social unit. As a result, **group members are frequently being consulted internally**. In some situations, if the head or leader of the group has to make some spontaneous decisions, these are usually followed by the group members. This cannot, however, be taken as a rule, because one may find some examples of deviation. Generally, a caste or *´biraderi´* group joins or walks out of a communal activity **as a group**. In view of this fact, the Mona project approached the *´biraderi´* heads at the initial stage. The Executive Committee was also composed of the potential leaders of the *´biraderi*s´ who helped not only in organizing the WUA but also in implementing the program accordingly.

The **multifunctional traditional institutions** based on face-to-face relations, norms and values are the **main regulatory patterns** in the village life. Even in the presence of some new formal institutions like Union Councils, *Zakat* and Ushr Committees, Cooperative Societies, and Water Users´ Associations, the importance of caste and *´biraderi´*

institutions has not changed. Rather, the new institutions are also based, in one way or another, on these multifunctional institutions, reconfirming their validity and importance. While organizing the WUA, these institutions played a central role as heads, and the leaders of these institutions were selected as officials for the Executive Committee. In the case of the WUA experiment, one can easily observe the **dominance of caste and *´biraderi´* social units**. The regulatory patterns established by these institutions proved relatively durable and constant, as the WUA functioned in a formal way designed by the project staff only during the rehabilitation phase, but had returned to the traditional informal patterns in practice since long.

The social organization of the water users based on **relatively stable and well regulated institutions** of caste, *´biraderi´*, factions, etc., proved too strong, cohesive and dominating to give any room to a new institution like the WUA. In other words, the cooperatively informally organized WUA proved weak and fragile against the already existing well established socio-economic institutions. While analyzing causes of failure of the WUA, one may argue that the **participatory approach proved fragile** against the already existing integrated local participatory groups of caste, *´biraderi´*, neighborhood, friendship and factional groups. It is assumed that the solidarity and loyalty relationships of the water users to the **autochthonous institutions** were stronger as they promoted physical survival more vigorously, than the WUA. The WUA could not overcome the **weaknesses of the traditional institutions** and their effects on water management, but rather partially confirmed the existing patterns of bias and favors. The stronger and influential profited more from the watercourse improvement program, even through the WUA.

The WUA does not have **strong political backing** at the regional and national levels and is not endowed with any institutional and regulatory powers. In **the absence of legal protection** or support, the WUA could not produce a sufficient influence regarding its regulation and functioning. The WUA **could not produce anything ´new´** and, consequently, was not recognized as development or economic institution, not only by the ID, but among the water users as well. In the last eighteen years of its existence, the water users could not recall among other socio-economic benefits, except the improvement of the infrastructure and the related physical benefits. The water users are **still missing a forum or platform** to represent their interests outwardly. Such factors are also negatively affecting the water users´ participation in the WUA. Moreover, the rehabilitation program including the establishment of the WUA failed to overcome the geographical inequalities in the sense that tail enders earned less benefits as compared to head and middle reach water users. The water users enjoying better socio-economic conditions remained dominant right from planning to implementation and till the benefits were achieved.

In short, **the first hypothesis has been supported by the empirical findings**, as the socio-cultural institutions like family, cate and *´biraderi´* are not only still valid, but are also regulating the behavioral patterns of the water users regarding their participation in the Water Users´ Association and their subsequent roles.

In terms of **physical and technical features of the irrigation system**, even after the rehabilitation of the watercourse, such differentials are **still disadvantaging the already**

disadvantaged users at the tail reach. There occurred some improvements in terms of better structures for checking and controlling the water, but problems like transportation losses, evapotranspiration, seepage, theft of water and so on are still affecting the tail enders more than the other users. The WUA **failed to establish a justified distribution and transportation system;** the physical and technical differences in spatial terms are equally valid.

The WUA **could not fulfill the expectation** of a ´plausible remedial action´ to reduce the locational differences within the watercourse command area[209]. The tail enders received some benefits from the infrastructural improvements but other problems of transportation, distance from the source of water, lead time, theft, etc., still require a solution. The rehabilitation activities had concentrated at the head and middle reaches and, therefore, **could not overcome the geographical bias**, even after the organization of the WUA.

The formation of the Water Users´ Association **could not overcome physical bias**, although it facilitated the water users in terms of technical assistance by providing them improved infrastructure, equipped with concrete control and check structures. There is no doubt that relatively homogeneous atmosphere in terms of social, technical, economic and political aspects facilitated the organization of the Water Users´ Association, but deficiencies in structure and functions of the Water Users´ Association could not make it a sustainable institution. Therefore, **the second hypothesis is partially supported by the empirical results**.

It is a unanimously admitted fact by all the water users that they **substantially profited from the rehabilitation program** through the provision of improved infrastructure which produced a positive effect on their social atmosphere. Through the improvement and rehabilitation of the infrastructure of the watercourse, the water users have benefited from the physical and technical aid provided by the state organ. Like many other irrigation projects in the country, **the social aspect** in this case also was not as adequately addressed as planned by the CSU particularly. The WUA did not prove attractive for the water users, as it failed to prove its supremacy over other social institutions, on the one hand, and could not manage the agricultural activities in a more organized way, on the other. There are several reasons for this failure. The concept of WUAs in Pakistan is adopted in accordance with **planning by slogans**. The water users were not imparted regular cooperative education to make them realize the importance of collective actions. The WUA was **organized in haste** and two or three superficial meetings with some of the water users were considered to be enough. The main message delivered and received by the water users during these meetings, as narrated by the key informants, was that their watercourse could be improved and rehabilitated, if they cooperated with the project officials. Due to problems with the infrastructure of the watercourse, which had deteriorating for decades, it was hard to refuse this offer. The formation of the WUA was **conveyed to and conceived by the farmers as a formality** to be fulfilled to secure physical and technical help. The objectives of the WUA were just limited to the improvement and rehabilitation of the various branches of the watercourse. No clear plan for future activities was designed.

[209]See Section 4.2.2.2.

Moreover, the unclear and confusing charter of duties and roles could not help the water users to introduce a more defined concept of the WUA. Any mentionable new activity, which the water users had not performed before establishment of the WUA, has seldom been introduced. Even at present, one could not find any new activity which could be attributed to the WUA. The only continuous activity being performed by the water users collectively is the O&M of the watercourse. The O&M activity is also limited to the cleaning of the watercourse only, whereas, for the repair and maintenance of the banks, control and check structures, no specific procedure can be identified.

While formulating the approach for water users´ participation in irrigation management, it seems that **it was taken for granted** that the target groups would accept and adopt the externally elaborated development concept with the conventional subordination. Undoubtedly, the project officials **succeeded in arousing a participatory behavior** by indicating objectives, providing incentives and prescribing actions, whereby this behavior proved **colonialist**[210] and unsuccessful for long periods of time. The type of participation achieved in the last three decades in many national and international development projects corresponds to the above-mentioned situation. While criticizing this approach, MÜLLER arrived at the following conclusion: „Responsible and critical participation involving an increasing competence and judgment capacity, growing self responsibility and self-administration in the train of development tasks cannot be reached with the formal concept of participation.“[211]

The Water Users´ Associations in Pakistan may be characterized as a **social movement instead of an institution**. They have not gained the characteristic of a lasting or permanent social regulation, hence, cannot be termed institutions. On the contrary, they showed more the characteristics of a social movement, associated with spontaneity, newness, change and instability[212]. The partial acceptance and organization of the Water Users´ Associations by the farmers may be viewed as a protest against **unjust social conditions**, at the macro as well as at the micro level. Moreover, the WUA at the watercourse is **more like a self-help group than an association** in which services (in the form of labor input) are preferred to monetary investments; more emphasis is laid on collective than on individual membership; it aims at sharing common instead of individual earnings, involves multiple offices and roles which are multistranded and keep on rotating among the water users. Although a certain concentration of functions and roles in the hands of some large landowners has been observed, this has not been adopted as a rule[213]. As a result, one can safely state that the water users are more organized in informal social traditional institutions than in some formal pattern such as the Water Users´ Association. So, they, even after some institution-building efforts, are still **unorganized for the management of production resources**, **which supports the third thesis of the study**.

[210]See MÜLLER 1996-a.
[211]Cf. MÜLLER 1996-a.
[212]Cf. SCHMALE 1993:6.
[213]Cf. MÜLLER 1996-a.

The participation achieved through the WUA, in which **static and numerical aspects** remained dominating, can be fairly characterized as being of a **quantitative nature**[214]. The qualitative dimension of participation, dealing mainly with the intellectual and psychological aspects of the socio-political behavior, was recessive throughout the exercise. There was only a very small group of water users (the Executive Committee) which exercised and practiced some ´political´ participation, i.e., took part in **advisory and decision making processes**[215], however, after satisfying their specific personal objectives, they became almost passive. The tail water users still have some problems to be dealt with adequately, but, due to the lack of dynamic leadership in that location, they failed to organize **collective moves**. They are still under the illusion that the ´activist´ of the past times will come forth to help them. It is the qualitative dimension of participation which gives birth to the multidimensional complementary relationships between the participants and paves the way for future interactions; in the case of the WUA studied, these relationships are not yet institutionalized.

Although **some efforts have been made to organize the farmers,** most of them failed. The most conspicuous examples are Cooperative Societies and Water Users´ Associations. Both efforts were **promoted and sponsored under the organizational and financial aspects by the state** which attempted to establish those institutions with the help of the rural elite; the large farmers. As a result, they are dominating these institutions not only in organizational spheres, but are also drawing most of the benefits. In reality, such institutions are **hijacked by the powerful and influential interest groups** of the rural community[216]. According to empirical findings, most of the water users were not members of a Cooperative Society and have never profited from this program. In the WUA, although it comprises all the water users on the watercourse as its members, the decision making, planning and implementation of developmental activities are dominated by a small number of large farmers. The same applies to the **acquisition of benefits**; a large share of the rehabilitation activities is concentrated on sections of the watercourse serving the influential water users.

Most of the **efforts to establish institutions** have been designed in the light of the **integrated rural development approach** which does not coincide with the prevailing socioeconomic and cultural conditions of the rural areas. The preconditions for integrated approach are:

- absence of dynamic social groups, and
- a certain degree of homogeneity in socio-economic conditions.

Whereas, the structure of the integrated organization is:

- top to bottom, and
- provision of needs through centralized management.

[214]See various articles and publications of MÜLLER where he has dealt explicitly with qualitative and quantitative aspects of participation, e.g. 1996-a, 1994.
[215]For details see MÜLLER 1980:22f
[216]Cf. BERGER 1986:478.

The above-mentioned prerequisites and structure **do not match with the existing social and administrative patterns** for Pakistan. While formulating the approach, either the concept of integrated rural development or the basic elements of sociocultural patterns were wrongly perceived. The rural communities are coined with **dynamic social groups** as caste, *´biraderi´* groups and are highly stratified in economic, social and political spheres. Moreover, the nature of dynamic social groups and the degree of heterogeneity in socio-economic and cultural patterns differ from area to area and region to region, so that a **segregated approach,** instead of an integrated one, can provide the desired results. Some experiences in different areas of Pakistan through bottom to top approach, as by **the Agha Khan Rural Support Program** (AKRSP) in Gilgit and Chitral and by the **Akhtar Hameed Khan in the Korangi Project** in Karachi, have showed positive results in institution building and developmental activities.

The functioning of the WUA can be graded as poor as it does not perform according to any set of functions discussed in Section 2.6.1.2. When one analyses the WUA in the light of these functions, one can fairly state that the WUA is **partially active in intra-organizational functions**. Expressed more clearly, the WUA is settling disputes between the water users effectively, whereas, it acts its role of solving disputes between the water users and the ID passively. During the rehabilitation phase, the goals were set by the project authorities; afterwards the WUA did not perform any activity for which it would have determined its objectives. The **mobilization and management of resources** (the second function of the local organization) are not assumed by the WUA. The same applies to service functions and extra organizational functions.

To establish Farmers´ Associations or , more specifically, Water Users´ Associations, the **water users need the services of well-trained and committed farm-level advisers**. LOWDERMILK et al. on the basis of their experience, are of the opinion that, given a proper approach to build up credibility with farmers and the technical competence to deliver goods, the Punjabi water users will organize themselves for collective actions (1975:47). What they need is a set of actual incentives and dedicated professionals who must have a sound understanding of the socio-economic patterns of the target groups. The approach of **community organizers** utilized in the Philippines is equally valid, if not essential, for rural institution building in the Punjab and in Pakistan.

The water users were **not provided proper guidance** to build up their opinion about the importance and utility of the WUA, therefore, the sustainability of the WUA was effected negatively. The water users were imparted **neither cooperative education nor training** to undertake various activities to make the WUA a viable entity. It is a pity that the role of social organizers and institution builders has never been paid any attention. Although the success of WUAs in other developing countries advocate the importance of community organizers, in Pakistan, this is not put into practice. It is still considered that the Field Assistants can perform this function well; this is definitely a wrong perception which has, time and again, been confirmed by experience. The Field Assistants, are not meant for this activity; neither their training nor their education level fulfills the demands of the role of a community organizer. For institution building, **the importance of highly educated and**

well trained community organizers does not need any underlining. As this approach also matches the rural mentality, according to which farmers like to follow the practical example of progressive co-farmers instead of the preachings of the extension agents, the validity of this approach becomes more transparent. The rural community trusts more the **development agents** who lived in the villages than the visiting officials. Therefore, those are expected to achieve more positive results than the conventional approach in use. Some (REUSS et al. 1979:417) are of the opinion that the only cause of poor maintenance of the watercourses is that water users are not formally organized through any institutional mechanism.

The atmosphere for collective actions is not as unfavorable as described by MERREY in his various publications. One may find a few more examples similar to those confronted by MERREY, but one can find several examples of successful cooperation as the one studied by the author. The great majority of the rural population being illiterate, there is no doubt that it takes more time and efforts to organize them. **They are illiterate, but not by any means ignorant**. The institutions of caste and *´biraderi´* do not stratify the individuals only, but provide a relatively strong base for cohesion and homogeneity, too. The fault does not lie with the nature or structure of the basic institutions, but in the strategies and policies, their structure and implementation. While interacting with agricultural communities, it is important to consider that the nature of relationships in these communities is experiencing a change, in the course of which old **institutionalized relations are now being replaced by contractual relations**. The old patterns, under which work and loyalty were exchanged for wage and patronage, are dying out (KUHNEN 1988:5). The mutual personal relations of the water users are adopting a contractual nature which can be attributed to ´an increasing polarization of interests´ (ibid. 1988:5).

With an **increase in complexity and situation specificity**, the active participation and cooperation of the water users for the success of an irrigation system has become more important than ever. As the state alone cannot manage irrigation water at all levels of the system, the involvement of the water users offer a possible solution. To make the water users participation more meaningful and effective, **the most recommended method** is the establishment of Water Users´ Associations. The involvement of the water users can produce **a double-edge effect**, i. e., on the one side, the water management system could be made more efficient through the water users´ material and non-material contributions and, on the other side, it will help to controll the increasing corruption and the illegal means of obtaining extra water. Through a **federation of the WUAs at the canal or distributary level**, the water users can exert a certain pressure and voice their problems. Unluckily, the failure of the concept of WUA could not bring about changes at the farm as well as at the canal level. There occurred no significant change in the system management both at macro and micro levels, not even in the presence of so-called WUAs. The pre-existing roles and functions of the water users and of the irrigation bureaucracy remained unchanged.

Why is the WUA not functioning well? Why could it not fill the gap of farmers´ representation at the regional and national levels? Why could it not get footings in the rural

set-up of the country? The answers to these questions have been discussed in detail in Chapters 3 and 4. To conclude, a repetition of these factors would not seem superfluous but would rather illustrate the importance of the problem. The repetition, however, will be avoided.

The objective of a self-help group or collective action is always of a **socio-economic nature**. Where this elements fails or is not planned on sustainable grounds, the existence or continuity of such actions will not be guaranteed. One of the main reasons of the failure of the concept of WUA was that this idea was not backed by some **stable and continuous economic objectives**. The activities of the WUA are just limited to the improvement and rehabilitation of the watercourses which, definitely, cannot continue for a longer period of time.

There are several examples discussed in literature which confirm that the water users respond positively to **adequate incentives and interventions** (LOWDERMILK 1986:444). This is also confirmed by the empirical results of the present study, to which the water users contributed actively in the rehabilitation phase of the program. Due to future on-going functions and economic incentives not being determined, the water users do not know what to do further. A possible solution for the sustained incentives would be to adapt the **multifunctional approach**, instead of concentrating on water input only. Therefore, **the hypothese regarding functioning of the Water Users´ Association is supported by the empirical findings**.

The **socio-economic status** of the individual water users and their social groups exercise influence in determining their roles in collective actions for water management. The water users enjoying a higher socio-economic status are playing the roles of potential leaders in all matters, right from planning to implementation and the acquisition of benefits. Because of its strong base, the political power always gravitates towards them; „economic power leads to political power“ (KUHNEN 1988:6). The water users with large landholdings and better education are usually the contact persons both for the project organizers and the water users. Being powerful and influential in both sectors, i.e., with the state agents and the co-farmers, the large landowners are in a position to effect the participatory activities through their **patron-client relationships** with the small landholders, on the one hand, and as potential representatives of the water users with the project officials, on the other hand. The participation of such influential people is necessary not only to launch the development programs in rural areas, but leading positions also have to be reserved for them. A **strong network of personalized relationships** of the large landowners at both ends, makes their participation a necessity. This dependency causes their role to be of central importance; in most cases, it is misused to secure more benefits for themselves. Although, in declarations, the target group has usually been the small landholders, the large farmers could almost always secure the lion´s share of the supportive measures (KUHNEN 1989:520). So, **the above discussion supports the hypothese**, mentioned as the last one in section 1.6.

As a silver lining to the above discussion, the main characteristics of the WUA can be identified as: The **organization structure followed is extremely top-down**, both at the

main system and in the WUAs. The WUA studied was organized following integrated approach, although the socio-economic patterns of the water users are suitable for segregated approach. Moreover, the organization structure **missed horizontal and vertical dimensions**, making the roles of different participants unclear. The role of the state remained dominant in establishing the WUA which effected readiness of the water users to undertake different responsibilities in the WUA. The different activities during the improvement and the rehabilitation phases were performed under close supervision of the project authorities and over time were **not devolved to the water users**. Alongwith deficiency of training, the water users were not informed about the future activities and the concerned duties. The unclarity of functions has caused **a state of confusion.** Nobody feels himself answerable for any particular activity. The very loose structure without any regulatory and enforcing patterns contributed to inefficiency of the WUA.

5.2 The Analysis of the WUA in Perspective of the FAO Model

As discussed in Section 2.6.1.3, **the model presented by FAO** is not an ideal one, but, in the absence of a generally accepted structure of Water Users´ Associations, it serves the purpose for explaining and generally understanding the concept. In view of its general validity, it can provide a general base for comparison with the organization structure in the study area. The model adopted for the WUA under study is analyzed and evaluated hereunder in the light of the FAO´s model.

5.2.1 Comparative Analysis of the Structure

On the basis of developmental experience gained through transnational activities for the establishment of the WUAs, the FAO presented a model, which definitely cannot be claimed to be ideal, but can, however, be **used for a comparative analysis**. The claim of the presenter that this model can be followed for evaluation and planning exercise (SAGARDOY et al. 1986:1), allows the author to analyze the WUA studied in its light.

According to the model prescribed by the FAO (1982:14f)[217], **the General Assembly** (GA) is composed of all members of a WUA. Being the highest authority in the WUA, its main function is to select a **Board of Directors** (BOD) and to prove or disprove the plans of management. In the WUA studied, no such GA was established, so that the functions to be performed by it do not come into question. The main objective of the BOD is to set the targets for the WUA activities. In the case of the WUA studied, the responsibility of setting targets was assumed by the project authorities, who **´dictated´ the specific targets to the water users**. The determination of the authority pattern and the delegation of tasks were also performed by the project managers. No specific codes and rules and regulations were established, as the gulf was automatically filled by the traditional norms and values of the said community. Instead of a BOD, **an Executive Committee** consisting of four influential and powerful water users was nominated. The project officials assessed and approval the budget. The extent of physical improvements was predetermined by the project authorities. As most of the activities to be performed by the GA were undertaken by the project

[217]See also Section 2.6.1.3.

authorities, it can safely be stated that **the role of the GA was performed by the project officials**.

As mentioned earlier, no Board of Directors was selected for the WUA studied, so that the approvals made by the GA were not supervised. As an Executive Committee was nominated, instead of the BOD, it used to perform and supervise the activities recommended by the project authorities. There did not exist any **Management Office** (MO) so that its functions such as record keeping, holding elections, organizing and convening meetings and collecting fees and funds were not being undertaken by anyone.

For the implementation of actual tasks, an Executive Committee was nominated with the consent of the water users. This can be singled out as **the only structural feature** which corresponds to the model presented by the FAO. The committee was responsible for all possible activities regarding the rehabilitation and improvement of the watercourse. The **most conspicuous activities** performed by the Executive Committee included: planning of the activities, mobilization of the labor force, organization of the labor activities, settlement of disputes, communication with project officials, recommendations and advice for any change in the pre-planned rehabilitation program and transportation of materials such as cement, bricks and concrete structures. Of the three responsibilities of the Executing Units described in the FAO model, the EC performed operation and administration well. Regarding the third responsibility, i. e., maintenance, the WUA did not succeed in **regulating some sustainable mechanism** to accomplish it. This failure is due partially to the water users´ lack of experience and training and partially to the deficient realization of the importance of maintenance. This aspect was not paid any attention during the implementation phase. Neither did the project officials provide the water users with any guideline, nor did the water users try to establish any procedure based on their own initiative and resources. A state of confusion regarding maintenance still prevails where water users expect maintenance to be done by the project officials and project officials are of the opinion that the water users must do it by themselves.

The recommended **Judicial Section** (JS) was not paid any consideration either. No particular set-up for rewarding the participants and punishing the non-participants or free-riders is identifiable. No one has been made responsible for the JS. Generally, **a set of moderators** is organized for the solution of a particular problem; after the settlement of the dispute, it is dissolved.

5.2.2 Comparative Analysis of the Functions

As stated earlier, the functions of the WUA were limited to the rehabilitation and improvement activities only. For the performance of these functions, there was no fixed division of labor. The **general functions of a WUA** identified by the FAO (1982), RADOSEVICH (1977), UPHOFF (1979), SAGARDOY et al. (1986) and KNOTH (1989) do not find any application in the case of the WUA studied. A brief comparison of these general functions with the case study is presented as follows:

- The water users participated in the local decision making process **with a different level of intensity and opportunity**. The nature and extent of participation also differed for different water users, as they are basically determined by the socio-economic status.
- The WUA is performing **the role of a mediator** more effectively among the water users than between the water users and the ID.
- The WUA is not playing any role for the **distribution, delivery, application and removal of water**.
- **Communication** between the water users and the ID is very poor, so that the two-way flow of information, i. e., top-down and bottom-up is inadequate.
- The WUA failed to be recognized as **potential representative of the water users** in the circle of local level officials. It also failed to present in an organized manner the problems and needs of the water users to the officials concerned. The WUA is neither representing the water users outwardly nor does it have internal legitimacy and encounter acceptance by the water users.
- The **collective actions** for the management of irrigation water are restricted to the joint cleaning of the watercourse. Labor only is pooled for collective activities.
- The WUA does not hold **a bank of pooled resources**, either mobilized or granted.
- In some restricted activities such as cleaning the watercourse, the WUA is profiting from the advantage of ´**economies of scale**´.

With reference to the WUA studied, the **functions enlisted by LOWDERMILK et al.** are also not being exactly performed[218]. The WUA does not construct and maintain the improved watercourse, but only cleans it regularly. The linkage to sources of irrigation and agricultural knowledge have not been built up to obtain up-to-date information. However, the water users have achieved a relatively better control over the timing and amount of water as compared to the past.

When we analyze the functions of the WUA with reference to **the set presented by COWARD** (1980:7), the results are not very satisfactory. Although the WUA actively took part in the completion and rehabilitation of the infrastructure, maintenance activities are, by any means, sub standard. The WUA is not allowed to collect irrigation fees from the group members because the bye-laws of revenue collection do not permit it. As well the WUA does not have any influence on the mechanism of water distribution; the disputes over the follow up of the distribution pattern are, however, partially settled by the Executive Committee. It must be made clear that the mediating role performed by the Executive Committee members is determined by their socio-economic status as potential leaders of caste/´*biraderi*´ groups, and not by their office only. The planting and harvesting of crops is the water users´ individual concern and the WUA performs no coordinating role.

Another **set of functions presented by WADE** also shows some anomaly with those found in the study area[219]. Some of the functions identified by WADE are being partially

[218]See Section 2.6.1.2.
[219]See Section 2.6.1.2.

fulfilled by the studied WUA, however, functions such as overseeing the distribution of water, collection of water fees and maintenance of drains are not being performed at all. The same applies to the **functions identified by ESMAN & UPHOFF** (1984:72-73).

5.3 Recommendations

The analysis of the influencing factors of the farmers´ participation in irrigation water management has clearly defined that the establishment of Water Users´ Associations and their development for the **transfer of management activities from the irrigation bureaucracy to the water users** is not only important but also necessary to increase the efficiency of the system. It must be stressed here that, to make the WUAs viable and productive, a significant **change in the behavior** of all concerned is highly desirous. „It is difficult to say whether any watercourse improvement program in Pakistan will be successful until it becomes a farmer´s program. The government should consider the importance of formal grass-roots organizations to achieve its goals in water management" (LOWDERMILK et al. 1978 Vol. I:73). It is important to note that organizational design remains inert unless farmers are activated to give shape and life to the proposed design of the WUA. Moreover, the necessity of **cooperative education and opinion-making** about the cause and utility of such local level organizations must be given priority. The approach adopted to build rural development institutions needs some immediate and drastic modifications. Some of the most relevant and crucial recommendations in this connexion are presented hereunder.

The irrigation water management through **farmers´ active participation at all levels** of the system in the country can be singled out as one of the most important, but badly neglected, prerequisites for increasing in agricultural production, and, hence, agricultural development in Pakistan. To increase the food production the importance of effective water management does not need any underlining. Irrigated agriculture is being practiced on about 14 million hectares, and is thus accountable for a significant share of the grain production in the country. An **adequate and reliable supply** of water is essential for crop production in the arid and semi arid climate of Pakistan, therefore, the **effective management** of water is necessary not only to enhance the output of every unit of water available, but also to overcome the abuses of **waterlogging and salinity**. The analysis of the action research program in the Philippines by VALERA & WICKHAM (1976) is equally valid for Pakistan. According to them: „In traditionally managed systems there is little benefit to be realized from intensive on-farm development as long as the supply of water in the distribution canal is unsuitable and unpredictable"[220].

The most neglected section of the agrarian structure in the country is that of the **small producers** who are facing the worse of both worlds. That is, due to the **domination of the feudals** in the sociopolitical and socioeconomic spheres, their interests are not being protected through some policies elaborated for them and they themselves are so **stratified and unorganized** that they cannot safeguard their interests by themselves. Along with the legal protection of the small and marginal farmers from the negative structural

[220] Cited by CHAMBERS 1980-b:25

consequences of the **feudalism-oriented agricultural policy**, it is necessary to integrate them into the process of development and modernization. If the production potential of the relatively large group of small farmers could be optimized by being provided the necessary institutional services, they can prove far more effective in accelerating the economic development of the country. An organization of the farmers through proper guidance will help them to overcome the social, cultural, economic and political hurdles in which they are clutched.

About 70 percent of the population is earning directly or indirectly part or the whole of their income from the agricultural sector. The increase in production due to the better management of water will definitely **increase the income-earning possibilities** in all relevant fields of agriculture. It will intensify the already existing activities concerned with agriculture, causing an increase in the **income level and standard of living** of all those concerned. Moreover, the higher income will increase the application of necessary inputs such as seeds of HYVs, fertilizer, insecticides and pesticides per unit of land. The intensification of cultivation through a better supply of water will also intensify the utilization of agricultural machinery. An increase in agricultural production is necessary for the water users´ **economic and social development**, and will have a far-reaching impact on rural development in Pakistan. As a result, the increased per unit productivity of labor, land and water will strengthen the man-land-water relationship. A better income through increased production will provide a **greater social security** to the small landowners particularly. „Reform of irrigation management, making for greater involvement of and responsibility for users, is imperative not just for financial reasons but for realizing the full potential of irrigated agriculture“ (VAIDYANATHAN 1994:2965). When we analyze the case of Pakistan in the light of the present and several other empirical studies, we arrive at the result that the actual target, as mentioned by VAIDYANATHAN, is not as emphasized as that of financial aspects.

Farmers´ participation in water management will reduce water losses due to O&M of a better quality. A great amount of water could be saved to irrigate new lands and/or to intensify the cultivation on already irrigated farms. Waterlogging and salinity could be reduced by controlling huge losses of water. The **rehabilitation of waterlogged and saline lands** will provide income-generating possibilities to the farmers whose lands have lost their productivity due to these problems. This will cause an increase in national production, too.

The **management of irrigation water** demands collective actions. The water users can secure the benefits which they are not able to achieve individually. Collectively, the water users can manage the watercourse better than if they do it individually. The improved watercourse will make the transportation and application of water much easier than in the deteriorated infrastructure. A lot of **time and labor can be saved** which can be more productively used in other agricultural or non-agricultural activities. Due to availability of extra time, some **non-agricultural income-generating sources** along with the agricultural ones can be tapped. The establishment of WUAs can help to reduce the effects of

economic inequality, which is answerable for the inequalities in the distribution of benefits between the large and the small farmers.

The **prevailing political instability in the country** is also affecting development programs negatively. Due to frequent changes at the central political arena, the efforts of community development through institution-building, along with others, are seriously effected. The fact that in the last eight years, **seven federal governments, including the elected and the interim**, have administered the country, is alarming. The changes at the central level trickled down to the local levels and caused changes in the priorities of the local administration. A frequent introduction of new policies and priorities, definitely through paralyzing the old programs, has caused mistrust about the government policies and schemes. A high frequency of transfers of the officials is causing a poor follow-up of the development programs.

The lower level officials like *´patwarí´*, *´pansal nawees´*, overseer and tube well operator exploit the water users by causing some specific problems in the supply and distribution of water. This **corruption** is not limited to a village or a region but is a **national dilemma**. Through the establishment of water users´ groups, such abuses can be controlled, if not eliminated, to a significant extent. In this regard, **a Federation of the WUAs** at every canal or distributary command is expected to be more effective than an individual WUA at the watercourse level. The federation of the WUAs, since it is composed of a large number of representatives from all the individual WUAs of a larger geographical area, is expected to exert greater social pressure on the irrigation administration. The Pakistani farmers are badly in need of such **pressure groups to voice, promote, develop and protect their rights**. Through the **´Canal WUA,´** the water users can better make their voice heard at the regional as well as at national levels. Such an arrangement will make it easier both for the water users and the ID to deal with each other, as the ID does not have to deal with a large number of WUAs, and the water users do not have to pursue their objectives individually either.

The importance of water and non-water inputs to optimize production in the irrigated agriculture, particularly, is increasing day-by-day. Both, the timing and the amount of inputs are equally important for a climate like that of Pakistan. The access to such essentials differ for different farm groups, i. e., **the small growers are facing more problems** in securing them as compared to the large farmers. The WUAs concentrating on the **´multidimentionality´** can provide a possible solution through the joint purchase of inputs and, therefore, in eliminating the farm-size differentials in this context. Moreover, through demands in bulk, they can attract the input suppliers who, for comparatively larger orders, are ready to supply inputs at the farmers´ door-steps. This arrangement can be helpful for obtaining the advise of experts from different input-producing enterprises as to their proper application. Some of these enterprises are even desirous to arrange demonstration activities for large groups of farmers[221].

[221]Based on personal communication with the agricultural input sellers in the area.

The importance of the WUA is equally valid to **fight against relatively more widend poverty and underemployment** in the rural areas. The existing level of production can be increased by intensifying the cultivation, definitely based on a better water supply assured through WUAs,. The intensified agriculture will consume more labor force and will reduce underemployment and even unemployment as well. As a logical result, this process will help to **eliminate poverty**.

The unequal development of various social groups and regions in the country is resulting in a **regional disparity** and is **harming the national solidarity**. It has caused a **dualism in the economy**. Agriculture, over time, has been divided into different socio-economic sectors with their own characteristics. So, in this state of affairs „... different parts of what is traditionally called ´agriculture´ require different policies. With agricultural policy alone, one does not meet the whole variety of circumstances“ (KUHNEN 1989:519). As a possible solution to this problem, KUHNEN has stressed a **regional development policy instead of an agricultural policy**. By regional development policy, he means the promotion of agricultural as well as non-agricultural activities and their basis (ibid. 1989:519). The WUAs can help to overcome this problem by adapting **an equitable distribution pattern** in favor of the disadvantaged individuals and groups. The new set-up can be conceived by the advantaged groups as a threat to their supremacy; therefore, a substantial opposition is also expected.

Although a great majority of the water users was found to be satisfied with the ***´pukka warabandi´***, the expert reports, especially of IIMI[222], are alarming. These reports hardly criticized the rigidity and inflexibility of the distribution mechanism in its operations and insensitivity to crop water demands and their future consequences. As the study concentrated upon the **activities and scope of the Water Users´ Associations**, it does not allow any recommendations for basic reforms in the *´warabandi´* system. However, the empirical knowledge diverts attention to the following:

a) The rigidity and inflexibility of water use must be revised so as to allow water users, whenever necessary and wherever possible, to **exchange and trade the water within the command area**.

b) The *´warabandi´* system should be **rephrased to provide more control** over water.

c) Attention must be paid to physical and natural conditions specific to **land utilization and water application**.

d) The locational bias is affecting tail enders more than the farmers at other reaches. The water turns should be calculated more accurately by paying special attention to the **problems specific to the location**. The main causes of water loss such as transport losses through seepage, leakage, evapotranspiration, time allowances for filling the empty, dry watercourse and distance from the source of water can be some relevant points of consideration.

[222]The most relevant include MERREY 1986-c, 1990, BANDARAGODA & BADRUDDIN 1992, BANDARAGODA & SAEED UR REHMAN 1995.

e) The functioning of the public tube well must be made compatible with canal water. There exists a **dualism in the *´warabandi´* of canal and the SCARP tube well** which must be removed to make the joint effect of both sources more profitable.
f) The WUAs must be delegated some **institutional and regulatory powers** to distribute the water and thereafter to control its application.

While organizing the WUAs, the **representation of the tail enders as well as small growers** must be proportionately fixed, for example, as a certain percentage of the total. Their representation should not be symbolic but must be delegated some specific roles in activities affecting them directly, e.g., O&M of the watercourse. In the case of multibranch watercourses, the **representation of each branch** of water users in the WUA could help to overcome the problem of benefit distribution and, thereby, of locational bias.

Instead of reconfirming the existing leadership, **new potential must be tapped**, wherever and whenever possible. For the role of leadership in the WUA, progressive farmers should be preferred to political figures. Moreover, the practicing farmers can contribute more practical knowledge and wisdom regarding watercourse maintenance, water transportation, water application and so on than absentee or non-practicing farmers.

As observed in the theoretical settings for the present study, it is a fact that no universal model of WUA exists which may satisfy all contingencies of all the irrigation systems in Pakistan. However, in the light of the empirical results, **some characteristics are proposed** hereunder which must be duly considered for the organization of a WUA. Although they apply more generally to the Punjab, as dictated by the case study, their validity for other provinces of Pakistan cannot be excluded. For **the structure of a WUA**, the following criterion could lead to sustainability and effective functionality:

a) For the organization of WUAs in the Punjab, **the segregated approach seems more promising** than the integrated one. The presence of dynamic social groups also favor the application of this approach. Different social groups can be delegated different activities or some interest groups based on the watercourse branches as geographical and social units can be identified to work under the coordinating body of the WUA officials. Such a structure can help to promote a healthy competition between various groups. To perform a task within the water users´ own social group, they can be supported and advantaged by the already existing homogeneous atmosphere based on personal multistranded relations. Moreover, the already existing hierarchy in the groups will divide activities accordingly. Being bottom-up in its approach, **it coincides with the local patterns** of the social groups where the influence and strength of a caste or *´biraderi´* group strongly depends on the number of followers and supporters of the same group.
b) Of the two basic approaches for the establishment of local level organizations, **the training approach** carries more weight in the perspective of the experiences and sociocultural atmosphere of rural Punjab. Two factors are convincing: Firstly, the past and present experiences of **institution building** in the Punjab have shown that, wherever the model approach was adopted, the program remained an affair of the

agency concerned. The end-beneficiaries did not participate enthusiastically as these were mostly package programs concentrating on guided participation. Moreover, the project officials were hesitant to devolve activities in favor of the target groups, whereas the recipients were also reluctant to accept duties for which they were not fully trained. Secondly, the target groups usually **misunderstood such efforts, as government schemes** and did not participate actively. In contrast, the training approach has shown some successful results, of which the **AKRSP model and the Korangi project** are the most conspicuous. This approach develops at the initial stages of the project the opinion that the target groups are the real managers and owners of the project. To manage it, they are given technical assistance by the state. After they have become autonomous, this assistance is withdrawn. Moreover, a pre-knowledge of irrigated agriculture by the water users supports this approach.

c) **The horizontal as well as the vertical dimensions of the WUA must be clearly formulated**. The existence of both dimensions is desirous to achieve a better interaction and exchange of information. More specifically, the vertical linkage will help to improve the interaction between the water users and the WUA officials, and between the canal WUA and the watercourse WUAs, whereas the horizontal linkage will promote the connections among the WUAs. The WUA studied can be clearly labeled as an unlinked association whose performance and recognition in the farming community as well as in the official circles were considered to be.

d) **The structure of the WUAs should be formulated in accordance with the bottom-up approach**. Such a structure is expected to produce better results, as it is based on the self-initiative of the water users. The importance of motivation and identification of problems with the assistance of **community organizers**, however, is equally valid. The community organizers can play a central role for the sustainability of the WUAs by imparting them cooperative and organizational knowledge.

e) **The structure of the WUA should be as simple as possible**. Thereby, the office of the WUA should comprise a president, a secretary, a treasurer and a store-keeper with a clear demarcation of their respective roles. The president, for example, will look after all the activities of the WUA and deal with the internal and external environment. The secretary will record all the activities and will also keep a record of meetings, decisions, water distribution schedules, etc. The treasurer will manage the financial matters, including bank account and income and expenditures of the WUA. The store-keeper, likewise, will be responsible for the storage and will look after material and implements.

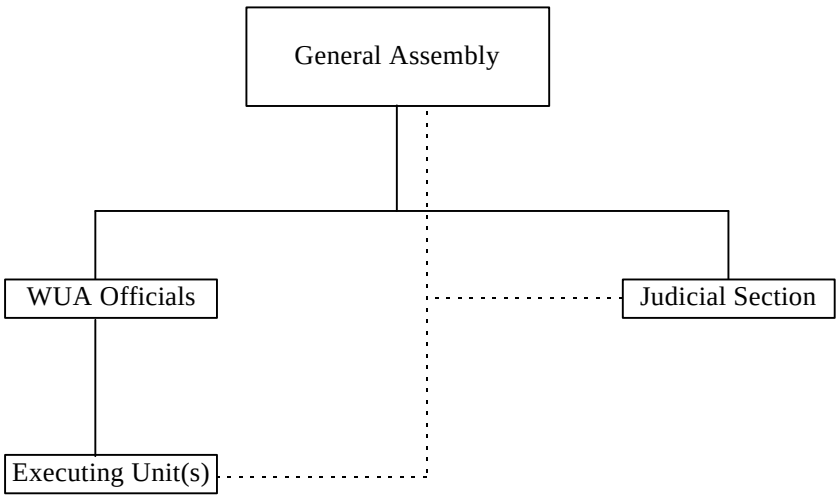
f) At a watercourse in the Punjab, there is generally a limited number of dynamic leaders as compared to the village. Therefore, **a shower of offices in the form of GA, BOD, MO, EU and JS may cause some complications** in understanding the structure of the WUA which, for the rural people, may be somewhat complex. Moreover, an enormous increase in the number of the offices within the WUA may cause some undervaluation of these voluntary positions and can cause an overlap in the functions and roles. Keeping these points in view, the **recommended structure of the WUA** includes the

General Assembly, the office bearers of the WUA, the Executing Unit(s) and the Judicial Section. (See Diagram 26).

g) **The Executing Unit(s) is/are of a central importance** in the WUA, so its/their establishment is highly recommended. The activities of this unit comprise improvement, maintenance, operation and administration of the watercourse. Instead of establishing another unit for O&M activities, after completion of the improvement work, the EU responsible for construction can continue the organization of O&M activities. In every WUA, a group of water users responsible for specific activities must be identified according to their personal qualifications and their compatibility with the nature of the task. The members of the EU should preferably be other water users than the officials of the WUA. Moreover, depending upon the objectives of the WUA, a few other EUs for individual activities should be established; they should be able to perform functions such as communal procurement of inputs, marketing, purchase or renting of agricultural implements and their maintenance, etc.

h) **The Judicial Section must be composed of relatively impartial and honest water users**, endowed with moral courage to settle disputes and cause the others to abide. Against the background of knowledge of rural Punjab, the *´biraderi´* leaders are suitable for this function. It is important to add that the procedure of decision making in the WUA must follow democratic patterns, in which the participation of a large number of water users is important. The disputes and problems should be discussed at the General Assembly; this would provide a chance to every individual or social group to voice his/their opinion.

Diagram 26: Proposed Organizational Structure of a WUA



Source: Author´s own outline

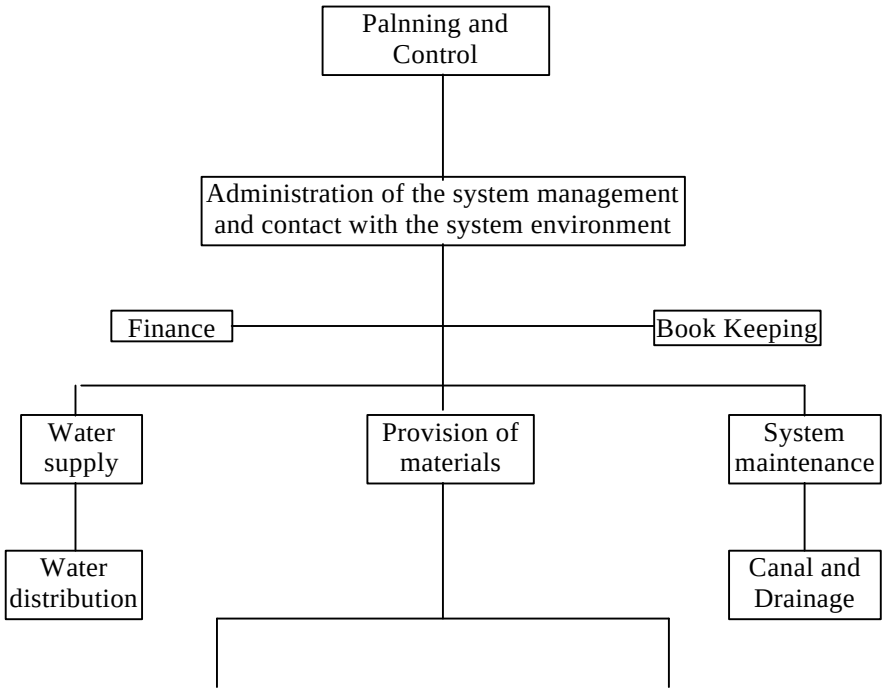
Like the structure of the WUA, the functions are also determined by the water users´ objectives. The set of objectives is mostly situation specific and determined by the physical and social features of the particular irrigation system. However, along with the situational

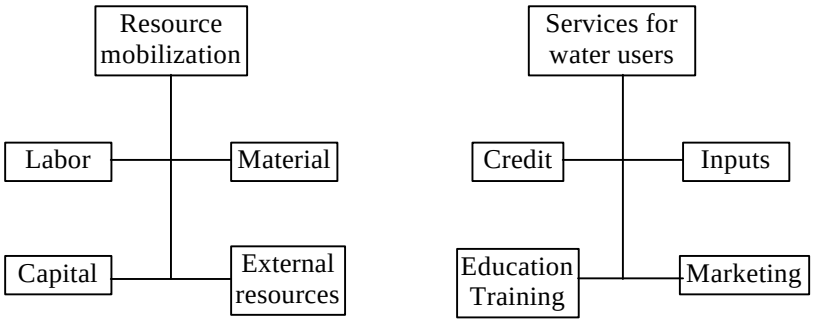
functions decided by every WUA, **some general functions**, which a WUA should undertake, are the following:

- Instead of concentrating on one input only, the WUA should adopt **a multifunctional approach,** ranging from management of water to non-water inputs. The water users should determine their objective by themselves according to their felt needs.
- Regular imparting of **cooperative education** to the WUA members.
- **Training** the water users for the management and field applications of water.
- **Improvement** of the watercourse infrastructure.
- **Settlement of disputes** among and between the water users and between the water users and the ID, respectively. To achieve a better level of communication in both spheres is also one of the important functions of the WUA.
- **Mobilization of material and non-material resources** to meet the needs and emergencies.
- The WUA should be handed over the responsibility of **collecting water-charges**.
- There must be some **membership fee**, which the water users can decide for themselves. It will undoubtedly contribute to mobilize resource, but it will also have a positive symbolic effect on the water users´ participatory behavior.
- The offices of the WUA must be **revised** after a specific period, e.g., after every two years. To control the monopoly of the large farmers, a member should be forbidden to be an official in the WUA for more than two terms consecutively.
- The activities of the WUA should be formulated in much a way as to **maximize the water users´ material and non material participation**.

The summary of a WUA´s functions is presented in Diagram 27.

Diagram 27: Schematic Planning of the Proposed Functions of a WUA





Source: Adapted from ILLO & VOLANTE 1984:102

The participation of the water users is **cost effective, time saving, knowledge and wisdom contributing, effective for sustainability and O&M operations** and to **check and control irrigation authorities**. Through their participation and strong voice, the water users can exert a certain social pressure on their environment, both internal and external. Unluckily, in Pakistan, the water users do not have a strong voice and countervailing power to make irrigation and other relevant state organs accountable (LOWDERMILK 1986:436). This state-of-art is basically due to the absence of strong farmers´ organizations or associations such as the WUAs at the regional and national levels.

It is true that little room is available for participatory approaches of development against the background of the historical developmental process, where ´from top to the bottom´ and the ´bottom to top´ approaches constantly confront each other. The **sociocultural patterns of rural institutions** are suitable for ´from below´ development, whereas the political and administrative elites are eager to control all development activities ´from above´[223].

Almost century-old rules and regulations need immediate modifications to fit the present contingencies of the water users and, hence, of water. The modified set of regulations must consider the social as well as the physical problems of the irrigation system. When formulating such a document, the participation of all relevant actors, ranging from the water users to the ID, from the engineers to the social scientist, from the agronomists to the hydrologists and so on, must be ensured.

While functioning as a **conflict-solving institution**, the WUA can relax the social atmosphere at the watercourse and, thus, in the rural communities. Therefore, besides serving the economic cause, the WUA can also be helpful for the social development in the rural areas. The gap and misconceptions between the water users and the ID about each other can be filled and removed, respectively. A better level of communication can be achieved through the mediatory efforts of the WUA.

The WUA can help in **identifying and evolving new leadership** based on the representatives of the practicing farmers. This may reduce the monopoly of the large landlords, who are usually absentee landlords or are not practically involved in agricultural activities, since the practical knowledge and wisdom of such leadership may not be

[223]Cf. RIEKEN 1994:401.

beneficial for the management of water. Such an arrangement can pave the way for the small and marginal farmers to represent and, therefore, to protect their rights and interests.

The **inequalities in the distribution and control** of water can be overcome through the establishment and effective functioning of the WUA. It could be helpful in reducing the inequalities both at the main system and at the watercourse levels. At the main level, the WUA can be helpful in acquiring just and reliable supply of water, whereas, at the watercourse level it can cause a rightful and accurate distribution of the shares of every water user. It is necessary to overcome the inequalities in the supply and distribution of water, as they are also causing inequalities in the crop production of farms at different locations within the same command area, leading to social unrest among the water users.

Through improved domestic agricultural production, the problem of foodstuff import can be partially solved. It can help **to stabilize the balance of payments and bring about an increase in foreign currency reserves**. Through the increased domestic production, the economic and political dependence upon foreign countries caused by an unbalance in import-export relations, can be reduced.

The successful examples of rural support programs in the country through an **active involvement of the Non-Governmantal Organizations** (NGOs) can be replicated for the sustainable development of the WUAs.

6. Summary

The main objective of the discussion on the **basic theoretical concepts** such as institutions, transaction costs, organization, participation and management was to formulate a framework to discuss, analyse and evaluate the socioeconomic data collected during the field work.

Historically, farmers played a central role in the construction, management and operation of the irrigation networks. Although the historians are divided regarding their opinion about the **emergence and development of states and hydraulic cultures**, it is an undeniable fact that the irrigated agriculture contributed substantially to the social and economic development and stability of the human society.

As it is a communal concern, the management of irrigation water has always been influenced by the **prevailing socio-economic institutions** of water users. Regardless of their behavioral or rules perspective, the institutions provide collective conventions and rules to regulate the socio-economic interactions among individuals and their groups. The importance of the existing socio-economic regulatory patterns becomes more visible when production sources such as water are managed through collective actions assumed by the community. It does not matter whether the institutions are dealt with in their behavioral or rules perspective, their importance as regulating patterns and rules remains the same.

Irrigation water, being a collective good, demands **collective actions** for its management. The relevance of the concept of collective action for the management of irrigation water is of central importance, as it is necessary to internalize those production externalities which for an individual water user, are difficult to accomplish.

Like other economic activities, the management of irrigation water is tied to some specific **transaction costs**. Considering the qualitative nature of the study, no attempt has been made to measure the transaction costs involved in water management, as these are difficult to measure. Instead, emphasis has been put on the importance and dynamic of transaction costs which have a direct impact on the acquisition and distribution of benefits.

The concept of organization occupies a central place as it provides the theoretical base for the study. Organization provides the **stable structural framework** to carry out the current functions in order to realize the goals and objectives of the individuals and/or their groups in an organized manner. The organizational theory and organization design have, in the recent past, moved towards the **contingency theory of structure and process**. Shaped by different contingencies and their mutual interaction, there appeared a great variety of organization models. The existance of several organization models does not mean that they negate each other, since, under a set of specific contingencies, one model can prove more efficient than another. The utilization of different organization models in different situations verifies the legitimity of various organization structures.

Irrigation organizations, regardless of the structural model being followed, are mainly established to manage water efficiently and effectively. The structure of a particular irrigation organization, however, is mainly determined by the set of objectives it follows.

The absence of an ideal from of irrigation organization leaves enough room to practice different models, ranging from integrated to multipurpose and specialised management organizations, where the importance of **target groups or end beneficiaries´ participation** is being more and more realized.

To make the system more stable and productive, **participation demands the incorporation of local community** to a considerable degree. Therefore, the degree of participation is always determined by the concrete situation, as the contingency approach also explains. WUs´ participation or involvement means WUs playing an active role not only in decision-making regarding planning, implementing, operating, maintaining and evaluating the irrigation system, but taking an active part in designing the programs to improve the productivity, equity and effectiveness of the system. Hence, participation does not mean „to take part" (*teilnehmen*) only, but „to have part" (*teilhaben*) also.

The concept of organized participation of the water users has led to the idea of **Water Users´ Association**, which, over time, has been identified as the most suitable mechanism for the solution of most, if not all, problems the water users around the world are facing. Even in the absence of an agreed structural model and a set of functions, the validity and importance of the Water Users´ Association for the organized participatory activities of water users has not decreased. Some guidelines in this context have tried to fill the gap, which, after reformulation according to the specific situations, can serve as structural and functional models.

The farmers, since they are an **integrated part of the agrarian structure,** are equally influenced by the socio-economic and socio-political atmosphere surrounding them. It is not always the internal environment of the agrarian sector which influences their decisions to participate in irrigation system management; some external factors, usually controlled by the state and the political administration, are equally effective.

The concepts of organization and participation are directly linked with the management of irrigation water. An interplay of these concepts provides **structural as well as functional dimensions** to the phenomenon of water management. Their relevance becomes tangible when one is concerned with a formal method of irrigation water management through the participation of all concerned. The establishment of a relationship among the concepts of organization, participation and management is necessary to understand the relevance of Water Users´ Associations for the better management of irrigation water.

In Pakistan, about two-thirds of the total population live in rural areas and earn all or a major part of their income directly or indirectly from activities related to agriculture. In spite of the fact that **agriculture is the back-bone of Pakistan´s economy**, its share in the country´s GDP is continuously decreasing. The dualism of agrarian economy is causing an unbalance in the overall economic structure and is intensifying regional disparities and social polarization. The shaky agricultural economy was stabilized during the wave of „Green Revolution," but its effects have diluted over time. The results produced by the „Green Revolution" have, however, not always been appreciated, as the „Green Revolution" has not launched an actual development of agriculture but only raised

production to a higher level. Moreover, it has intensified the dependence of developing countries on industrial countries for the acquisition of new necessary inputs like hybrid seeds, chemical fertilizer, insecticides and pesticides.

Due to extensive, instead of intensive farming, **the natural as well as human resources are being underused** causing agricultural production per unit to be far lower than its potential. The same is the case with the management and utilization of the irrigation water which has caused serious problems, low production, loss of water, waterlogging and salinity being some of the most prominent ones. Although the total supply of irrigation water at farm gate has massively increased over time, even then the system could not produce the expected results of water in terms of increase in the per unit production. The inefficient and inflexible management of irrigation water is causing a substantial loss of water, both at the main system and the farm levels.

The **irrigation system** in the Indus Basin has been managed by following different institutional patterns, where the top-down approach always predominated. The end beneficiaries, the water users, have never been considered important for playing an effective role in the management of the system. Instead, noninterference with the local problems of the water users has been strictly followed as a rule. The water users were expected to manage water on their own at the tertiary level, which they did by following their specific conventional cultural patterns of behavior. Along with **institutional shortcomings** in the main system such as insensitive and inflexible patterns of water distribution; inequitable, unpredictable and uncertain supply of water; non-guidance and poor extension services, etc., the water users are constrained by an adequate knowledge of water applications, inadequate water quantities and other necessary inputs and agricultural know-how. All this combined is affecting their decisions regarding cropping patterns and intensities which, in turn, is causing a substantial decrease in production as compared to its potential. This degraded situation also leads to a **substantial loss of water through seepage, leakage, breakage, transport losses, over/under irrigation** and so on. The actual significance of these shortfalls at the main system as well as at the farm level has always been underestimated.

In the early 1970´s, the actual losses measured through empirical investigations shocked the irrigation managers and put them into action to develop and adopt measures to control the causes of heavy water losses. Accordingly, some programs and projects were envisaged to improve the continuously deteriorating situation of water management. In this connexion, the importance of **water users´ participation in system management** was realized and dealt with accordingly. The Mona Reclamation Experimental Project, a sub-unit of the Water and Power Development Authority (WAPDA), was initiated and deputized to handle the problems of water management at farm level, particularly. The Mona project developed new techniques and technology which, after empirical testing, are being replicated in other areas of the country. The rehabilitation and lining of the watercourse studied is also an outcome of the Mona project´s research and test activities. Along with the technical and physical improvement of water channels, the Mona project emphasized the **establishment of Water Users´ Associations** at watercourse level so as to

make these efforts more effective and sustainable. The importance of water users´ participation in the management of the irrigation system was, for the first time in the country´s history, advocated, promoted and tested by the Mona project. The watercourse studied is the first pilot watercourse selected for such efforts on an experimental basis.

A more than a century old set of rules and regulations known as the **Canal and Drainage Act** has equipped the ID with judicial and institutional powers. A poor follow-up of the Act by the ID as well as by the farmers created a situation of ´partial lawlessness´ in irrigation regulating affairs, which, like many other factors, is also contributing to the misuse and mismanagement of water. Rather, due to the influence they exercise on the ID through the Water Users´ Associations, the farmers are adversely affected by the sanctions and duties imposed upon them through the WUAs Ordinance, and this leads to a greater centralization of the already centralized system.

The **rigid and inflexible system of *´warabandi´*** is not being accordingly implemented by the ID and, therefore, is not being strictly followed by the water users as well. The great majority of the water users is modifying the regulated *´warabandi´* system into a non-regulated system through buying, selling, trading, using water out of specific commands and so on.

The **socio-political framework** of Pakistani water users is characterized by caste system, *´biraderi´* networks, socioeconomic status defined by land holding and education primarily, power and influence, concept of *izzat*, a set of norms and values based on traditional patterns of behavior and religious teachings and, last but not least, leadership patterns. All these factors influence the water management activities of the water users in one way or another. The concepts of **caste and *´biraderi´*** are ones exercising the greatest influence, as they provide a basis for the social stratification/organization of the rural population. As time passes and due to socio-economic as well as socio-political changes, caste and *´biraderi´* ties are weakened, but their validity for collective actions, particularly, still prevails. The formal and informal organizations of water management are mostly determined and established according to the nature and extent of caste and *´biraderi´* interactions.

It is not the water users´ social behavior only which counts, **the behavior and performance of irrigation officials** is equally critical for irrigation management practices. It is sad, but true, that the general behavior of the irrigation officials in the country does not support the involvement of the water users in management activities regarding irrigation water. There exists a wide gap between the irrigation officials and the water users as far as understanding, communication, respect, tolerance and acceptance are concerned.

In the empirical part, the organized collective activities of the water users in the management of irrigation water have been discussed in the perspective of their **socio-economic contingencies**. The acquired results based on empirical data were obtained mainly through questionnaires and interviews supplemented by observations and secondary data. The data represents the socio-economic realities of all the water users at

the watercourse studied. The data collected is the outcome of a regular stay of nine months among the water users.

The individual sections of the empirical chapter comprise the **water users´ socio-economic environment, their collective actions for improving and rehabilitating the watercourse as well as forming the Water Users´ Association, and factors affecting the water users´ participation in water management activities.** The prevailing institutions of water users, in which they are integrated, exert a certain influence on their behavior. The societal norms and values are also relevant in shaping their day-to-day behavior which, in turn, shapes their collective behavior. The tension between individual and collective behavior has a far reaching impact on their collective actions as a two-way-cut-effect, i. e., facilitating as well as hindering their readiness to participate in communal activities. The basic institutions structuring rural life in the form of family and *´biraderi´* groups control almost all the social and economic activities of the water users.

The management of irrigation water at the watercourse studied is being carried out under the **institutional and sociopolitical framework**. The watercourse studied is regarded as a sub-system of the main system; therefore, its characteristics have a direct impact on the management of water at the watercourse. The watercourse possesses a set of **heterogeneous characteristics**. Undoubtedly, the natural conditions are the same for all the water users, but the results of their impact are highly divergent. In terms of socioeconomic conditions, the watercourse presents a set of some interesting characteristics of water users which appear sometimes to be helping to mobilize their participation in water management activities, but, in some other contexts they do not show any or rather a negative potential for collective action. Regarding their social structure, they are stratified in terms of caste and *´biraderi´*, political factions, religious sects, ethnicity and so on. It must be stressed that all these **stratifying elements also provide a base for integration, cohesion and solidarity**, which shows the potential for both sides, i.e., participation as well as non-participation in water management activities.

The lands at the watercourse are irrigated by **water supplied by the canal, by the SCARP tube well and several private tube wells**. Due to organizational and operational deficiencies, both public sources remained unsuccessful in satisfying the needs of the water users at the appropriate time and in appropriate amounts. The increasing tendency to install private tube wells can be attributed to an attempt to overcome the problems of water supply caused by the public sources. The formal rotatory system for the distribution of water (*´warabandi´*) is not strictly followed according to the ID rules. The *´warabandi´* is being frequently readjusted, to overcome its rigidity and to elaborate an equitable and favorable mechanism of water distribution.

Although all of the water users obtained **land rights through the allotment scheme**, their socio-economic and geographical position is different from one another. The land owned individually as well as by a *´biraderi´* group determines the socio-economic status of the water users and this shaped their roles in the Water Users´ Associations.

The **watercourse commands a fairly larger area** than the average one in Pakistan. A larger command area is regarded as a discouraging factor for participatory activities. There prevails a great inequality in landholding sizes ranging from two acres as the smallest to sixty-three as the largest. The water users´ holding relatively larger farm areas and relatively better educated are concentrated towards the head and the middle of the watercourse command. The inequality in land ownership depicts an inequality in the water users´ socio-economic status and the resulting roles in the water management participatory activities.

The great majority of the water users are **owner-cultivators** and manage production activities by themselves. There occurred some changes in tenure patterns including owner-cultivation with the permanently hired labor which also effected irrigation management. Most of the water management activities are performed by permanently hired laborers; this affects the quality of the work negatively. Cropping intensities and patterns are directly controlled by the supply of water. Due to changes in the supply of water, the cropping pattern as well as intensities have undergone a series of changes. The other institutional and political factors in this context are equally valid.

The improvement of the watercourse can fairly be singled out as the longest activity, both in operation and duration, in which the water users in an organization actively participated. It would not be wrong to state that the WUA was basically organized for this function only. The long duration provided them a chance to work in an organized manner for developing their own resources. This not only increased their sense of ownership but also made them realize that „*sarkari khal*“ belongs to them. For the first time, they organized themselves in a formal organization, i. e., Water Users´ Associations, assisted by local and foreign experts, for the management of a source of production: water. The participation of the water users was mobilized **by selecting water users as organizers**. The scope of the WUA activities revolves mainly around the management of irrigation water. After the infrastructure of the watercourse had been improved, there occured an improvement in the physical, social and economic situations. The improvement activities on the watercourse were completed in two phases, namely, *´katcha´* and *´pukka.´*

All the shareholders at the watercourse are members of the WUA. The **Executive Committee** for the execution of the improvement work was selected by the Mona project with the unanimous consent of all the members. All the Executive Committee members were potential leaders of their respective caste and *´biraderi´* units. The already existing patterns of leadership were confirmed.

In the improvement and rehabilitation of the watercourse, the water users participated in four capacities, i. e., participation in meetings, participation in decision making, participation in implementation, and participation in operation and maintenance. The participation of the water users in the above-listed activities was determined by their **objectives and motives**. As a result, the extent of participation in these activities varied according to the individual as well as group motivation. The participant, as an integral part of the village social structure, is influenced by a set of factors ranging from socio-economic to socio-political, traditional and normative factors. Thus, the nature and extent

of participation is shaped accordingly. The behavior of the great majority of the participants is mainly determined by the **regulatory patterns of their basic institutions**. As the group is socio-economically heterogeneous, the impact of regulatory and organizational principles and rules differed from person to person. The divergence of effects of the basic institutions shaped their participatory behavior, whose nature varied greatly: from traditional, normative, voluntaristic, spontaneous to induced and compelled participation.

The characteristics determining the **water users´ participatory behavior** cannot be considered as having grown naturally over time, but are influenced and thereby shaped by a set of factors. These factors consist of some sources of internal and external influence which range from the history of the irrigation system, natural environment, socio-economic conditions to the political and administrative patterns.

As the farmers in the modern world are tied to the overall society, they are therefore affected by a number of factors which are not limited to methods and means of agricultural production only, but also originate outside agriculture. None of these factors is immutable; they are constantly influenced by their respective environment, which causes a continuous process of change in them. In other words, like the environmental factors, the impact of influencing factors is not constant, as these factors themselves are subject to change.

The watercourse has **a long history of cooperative activities** ranging from construction to improvement, operation and maintenance. The history consists of fluctuations in the process of participatory actions, written usually by a set of evident as well as hidden goals of the participants - the water users - both at the individual as well as group levels. Along with irrigation related activities, the water users undertook some other communal tasks like school building, mosque establishment, village sanitary program and so on, which shed light on their cooperative behavior.

The water users should not be misunderstood as being a homogeneous and cooperative group only when **conflicts and contradictions of interests and opinions** do not occur. Rather, conflict and stratification are omnipresent, here too, as is the case in other communities. Usually, the nature and usage, and end benefits of an activity or commodity play a decisive role in determining the cooperation and participation of the end beneficiaries. The historical evidences collected during the field work speak, however, for a generally cooperative atmosphere, at least for the management of irrigation water at the watercourse level. The absence of any serious conflict over water also confirms this thesis.

The **physical environment provided by nature and created by men** play an important role in allowing or hindering activities demanding the participation of different actors responsible for irrigation management. Within the physical environment, the location of a water user in the irrigation system influences his decision to participate or not. The location of a water user also affects his/her share in the benefits of a program or scheme. The locational centralization of power and influence is also a relevant factor which may direct the flow of benefits in some specific direction. In the case of the watercourse, the benefits

in the form of watercourse lining concentrated on the locations where effective and influential water users have their lands.

The size of the group of water users influences the structure of the Water Users´ Associations. The larger groups are not only difficult to manage but are relatively prone to split into smaller interest sub-groups, causing problems of coordination, on the one hand, and the problem of free-riding, on the other. At the time of organization of the WUA, the group of water users was relatively small and thus facilitated not only the formation process of the WUA, but also proved favorable for decision-making, implementation and coordination of several activities. In the meantime, the number of water users has increased to a reasonable extent to cause their division into smaller interest groups, causing problems for collective actions.

The abundance and scarcity of water are regarded as negative factors for the water users´ participatory activities. The medium level range of water supply is presumed to be conducive to attaining an optimal participation by the water users. Moreover, a regular and reliable supply of water at the required time and place and in the required amount is the main factor which motivates water users to participate in the management of irrigation water.

Water control is inversely proportional to distance from the source of water (canal, tube well). The tail enders, therefore, are a disadvantaged group in this respect. As the main aim of the water users´ participation in the improvement and rehabilitation program was to reduce these differences and to get a better control over supplied water, they worked with great enthusiasm during the initial phases of the program. As the time passed, the infrastructure has deteriorated and the water supplying sources do not function well either; the water users have partially lost the previous improvement in the control over water. To overcome the problem, the tail enders, especially, are making **an extensive use of private tube wells**.

The water users contributed in the form of physical labor only, as **no cash or material contributions** were demanded by the project managers. This caused a lack of partnership and is badly influencing the sustainability of the system. The water users do not have a strong feeling of owning the system, although the contribution in the form of labor only enhanced the number of participants but did not result in the **sustainable participation** of the water users. The diversity of economic factors, like economic homogeneity/ heterogeneity, landholding, full time vs part time farmers, cultivation of cash crops and income variations among water users also have diverse effects on their participation in the water management program.

The irrigation system management, since it is a **socio-technical concern**, is greatly influenced by the water users prevailing socio-cultural patterns. The social interactions and relationships between different groups of water users, based on caste, *´biraderi´*, factions, and sect, shape the nature and extent of their participatory activities. Various social institutions provide a base for inter and intra group interactions and shape a general atmosphere where cooperation and conflict exist side by side. Against the background of

this atmosphere, the water users decide either to participate in a proposed activity or not. The cultural norms and traditions shaping the concept of *izzat*, *´biraderi´* solidarity, factional loyalty, mutual help and cooperation facilitate the collective actions but also act as barriers to participation. Such concepts are important to initiate an activity and to perform the on-going activities. The concept of *izzat* is the most fundamental element which **determines the social behavior of an individual and of a group as well**. The status of the water user, shaped basically by the caste to which he belongs, landholding and education, determines his position in the rural social set-up which further defines his role within and outside the community. Regarding water management activities particularly, the owner-cultivator has a higher status than the tenant and contractor. The owner cultivators with relatively more land and education have a greater potential of leadership, decision making, and of playing an active role in the WUA.

The presence of a **dynamic leadership** facilitates the organization of the WUA and the coordination of specific activities of the water users. In traditional communities, like the studied one, the caste and *´biraderi´* heads are usually potential leaders who have, time and again, been confirmed for assuning political, social, economic and religious leading roles. Undoubtedly, the existing rural social patterns of behavior are experiencing a change from traditional to a more egalitarian patterns of social interactions; even then the traditional norms and values are still respected and practically observed. The rural society is in **a phase of transition** where the traditional set-up is being slowly replaced by a nameless set-up of traditions and norms whose features are still not clear, therefore causing a state of confusion.

Due to an inconcerned and disinterested **political atmosphere** at the national level regarding water management problems at the watercourse, the approach did not succeed in decentralizing irrigation management to a certain degree. As a result, the idea of Water Users´ Associations did not devolve in favor of the water users. Neither the political leaders nor the irrigation bureaucracy showed an adequate degree of interest in promoting the Water Users´ Associations; therefore, wherever the WUAs exist, if they exist at all, their performance is not outstanding. The existing bureaucratic system needs some reorientation because, at present, it is fostering centralized decision making and a top-down approach which is not suitable for the establishment of farmers organizations.

Last but not least is the factor of **role specialization**, which details different participants for different activities. For membership in the WUA, no specific condition was required; this positively favored the rate of participation. The non-development of specialized roles within the WUA is, however, causing a state of confusion and unaccountability. Moreover, role specialization for the management of non-water inputs was not considered either. This might otherwise have made this forum even more effective and sustainable.

The last chapter of the study concludes the discussion, where the empirical results are analysed in the light of the study hypotheses. It is important to mention that all the hypotheses have been supported by the study results with an exception regarding the second hypotheses, which has been partially supported. In this Chapter, a detailed analysis of the studied WUA in perspective of the FAO model has been made. On the basis of

theoretical and empirical findings, some recommendations to improve the dynamic, efficiency and effectivity of the Water Users´ Associations in Pakistan´s Punjab has been made in the end of the chapter. These recommendations have mainly concentrated on structural and functional aspects of the Water Users´ Associations.

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2nd examiner: Prof. Dr. Dr. habil. Winfried Manig

Date of oral examination: 6 Feb. 1997

And we made every living thing of water (Al-Koran 21:30)

Dedicated to the farmers;
the real irrigation managers.