

Crop cultivation and grazing are important activities in the pachad area. The soils comprise rich alluvial soils of a high fertility and good moisture holding ability. However, shortage of water and insufficient irrigation facilities limit effective use of land in the pachad area.

Land use of the pachad depends on water availability, topography, soil type, transportation, etc., and Fig.-3.1 shows land use in the Mithawan pachad.

Flood irrigation by hill torrent flows is the dominant cropping system in the piedmont plain and pachad. Cottons are cultivated in the tube-well irrigated areas dotted in the midfan and in the pump irrigated farms along the canal in the fan edge. The areas without water sources are used for grazing land.

The acreage under cultivation varies every year depending on the amount of available water. The areas for crop cultivation are measured by;

- (1) cultivable area where it is able to cultivate as far as flood is available can be three Cultivated area,
- (2) the areas being ready to cultivate where the intake facilities are prepared to take flows into the land, and
- (3) the areas where crops are harvested.

Cultivable area is measured about 24,000 ha by a satellite image, while the government document which prepared long time ago shows cultivable area 30,252 ha.

The areas prepared cultivation measured 10,880ha in 1992, 11,960 ha in 1993 and 13,600 ha in 1994, while harvested areas were 2,129 ha (20 % of prepared area) in 1992, 1,954 ha (16 %) in 1993 and 5,979 ha (44 %) in 1994 by the government survey for taxation.

By examining the Russian satellite image covering the pachad area of the Mithawan hill torrent together with field investigation, land use of the pachad area was identified, as given in Table-3.1.

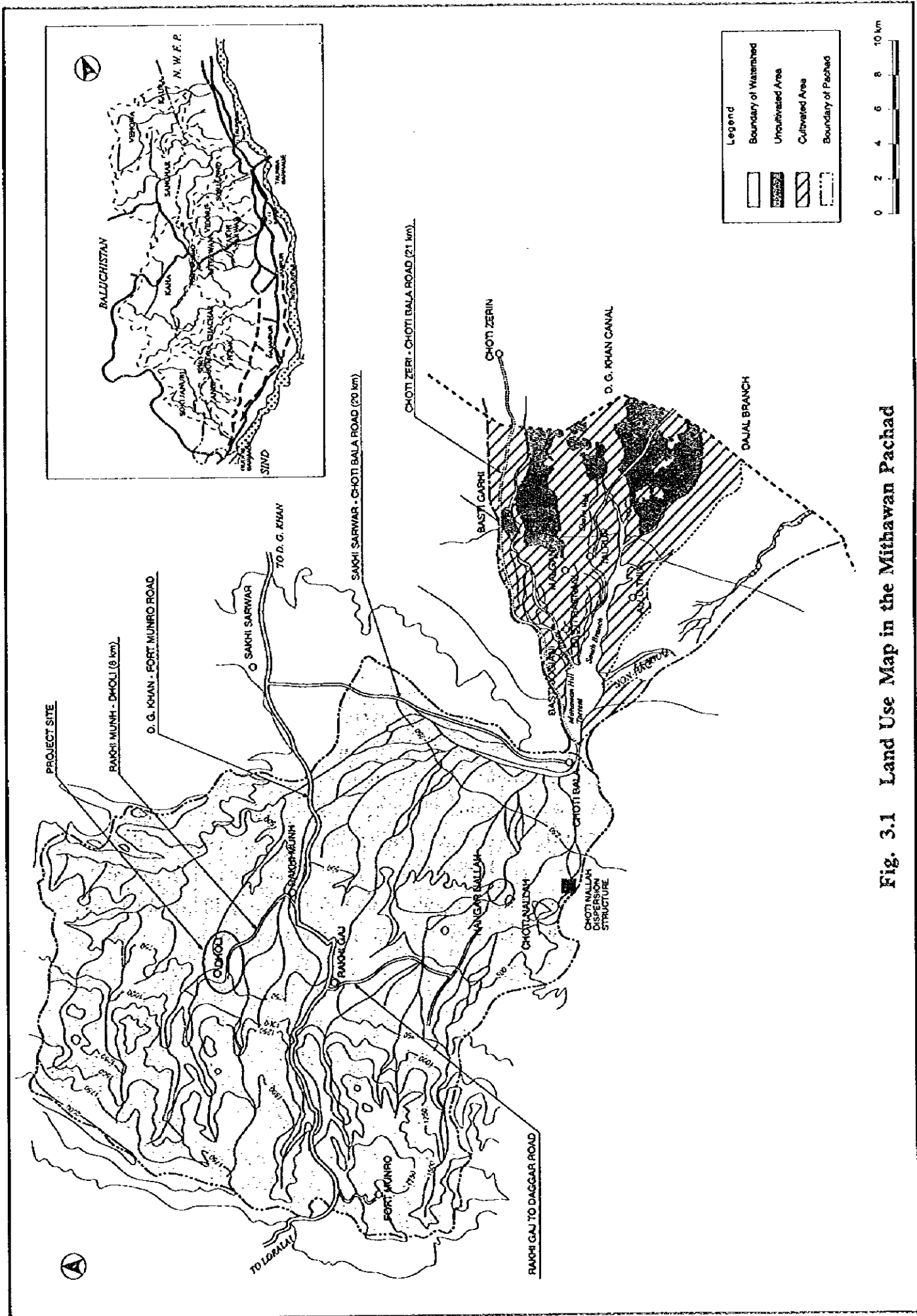


Fig. 3.1 Land Use Map in the Mithawan Pachad

Table-3.1 LAND USE OF PACHAD AREA OF MITHAWAN HILL TORRENT

Branch	Major Wah	Area by Land Use (ha)				Total
		Currently Cultivated Area under Flood Irrigation	Previously Cultivated but not Currently Used	Lift Irrigation Area	Watercourse and Wasteland	
Northern Branch	Talha Wah *	2,112	464	210	676	3,462
	Sharti Wah		1,314	43	793	2,150
	Sub-total	2,112	1,778	253	1,469	5,612
Southern Branch	Dalail Wah **	938			32	970
	Siraj Wah	2,262	2,590	455	1,476	6,783
	Sub-total	3,200	2,590	455	1,508	7,753
Genehar Branch (Escape)	Bakker Wah	1,247	564	125	3,522	5,458
	Genehar Wah	50	830		4,650	5,530
	Sub-total	1,297	1,394	125	8,172	10,988
Grand Total	6,609	5,762	833	11,149	24,353	

\* Behu Wah and Moldi Wah are included.

\*\* Chalgri Wah and Khandu Wah are included

The pachad area of the Mithawan hill torrent covers about 24,000 ha in total, out of which 6,600 ha is currently cultivated under flood irrigation. Another 5,800 ha of land was found previously cultivated but not currently in use since water intake became impossible mainly due to the degradation of wah beds and the change of water courses. About 4,000 ha out of the latter previously cultivated area supposed to be available for cultivation. The total 10,600 ha of both the currently cultivated area and a part of the abandoned area is regarded as a potentially arable area. Strip-shaped lift irrigation areas occupy about 800 ha along the D.G.Khan Canal and the Dajal Branch.

Crop production in the pachad is based on the flood irrigation, which is regulated through conventional rules and water rights. Actual status and operation of the flood irrigation has studied.

#### 4.1 Water Rights

Water rights go together with land rights and are determined on the basis of land ownership. The water rights are fixed under Water Rights Act of 1906, and the principle of "Saropa-paina" or upstream riparian rights and downstream riparian rights is followed. This law, basically provides that the upstream users will always have the priority rights over downstream users. The Mithawan command area is divided between the Haqooq (right to flood water use) areas and Ghair-haqooq (no right to flood waters) areas. The Ghair-haqooq get water when it is in excess of the haqooq area needs. Leaving aside some small upstream wahi outlets, the main Mithawan flood waters are equally divided between the northenders (Shomali) and southenders (Janubi), while the natural land gradient ensures that excess and unblocked waters escape south to the non-haqooq areas.

The main wah or natural channel branching out of Mithawan and conveying waters to the Shomali is Talha wah, while Siraj wah carries water to Janubi areas. Although the Shomali and Janubi farmers have equal share in the flood waters, the kamara or labor contribution for the common works at the apex area must, by tradition, be performed on the basis of 2/5th by the Shomalis and 3/5th by the Janubis. Such a kamara contribution is probably based, again, on the natural gradient as a result of which those in the south always benefit from the natural gravitational flow towards them. The northenders always have priority rights over the Janubis, so that small floods can benefit them alone.

Each of the three wabs or main distributories has a series of gandha structures built on it by the land owners kamaras on each side. According to saropa-paina rule, during each flood incidence those with the uppermost gandha on the wah have the right to divert water into their wabs and irrigate their lands to maximum saturation. Only after they have filled their fields, do the kamara members themselves breach the gandha so that water flows to the next gandha, which would likewise be breached after the adjoining fields have been satisfactorily saturated. The gandhas constructed on sub-wabs (wabs) are filled and breached following the same general rules. As said, those upstream in the

wah and wahi system will always have the priority right after each flood incidence. Generally there are no complaints about overuse by the head gandha farmers, although the tail enders, many times, end up having no water at all reaching them during the entire season.

## **4.2 The Kamara Rodkohl Water Management System**

### **4.2.1 Organizaition**

Most of the irrigation systems in the country are run by the government as in canal irrigated areas of the country. The kamara or water user associations in Dera Ghazi Khan hill torrent fan areas are some of the very instances of farmer cooperative management of their irrigation systems in Pakistan. Here, each land owner benefiting from a particular water conveying system (gandha, wah) is required to be a member of the respective kamara or water user association. The contribution to the kamara work is normally based on the number of bunds or embankments that a person owns. This system is called band bahr/wahr, and the contribution is the same whether the bund or basin is as big as 20 acres or as small as quarter of an acre. The sardar or mokadam, who also heads the kamara, has traditionally been exempt from contributing for his share. The rules are straightforward. The share holder must contribute to all flood-water-conveyance-related embankment construction work, and either come himself or send a substitute, or, in some cases, make a monetary contribution. If he fails to come or contribute, he is fined, normally equal to four times the value of the work that he has missed.

The basic features of the kamara system are as follows:

#### **(1) Composition and Leadership:**

Falling under Legahri tuman territory, the land in Mithawan hill torrent fan area was, in the beginning common sub tribal or sectional land. This common tribal land, in each case, was divided among its component subsections and clans. Therefore, all villages in the Mithawan hill torrent command area are normally inhabited by people of the same tribal sectional or clan group. Village Jogiani, for instance, is almost entirely inhabited by families belonging to Jogiani section of Leghari tribe; such is also the case with Hasanani, Malghani and Birmani villages. The kamara membership is composed of all the land owners whose flood irrigated lands fall under the command of the water-

conveying system for which a kamara is formed. The leader or mokadam leads the tribal section in all important matters including water-use kamaras, although he must consult with clan and family heads (Safed Rish/wadera/Mazan) as well. When sardars and tumandars resided in the area and were part of the people's day-to-day life, they played, at a higher level, the same role as a mokadam plays today. The mokadam's position is hereditary like the sardar's, but if he is not capable of running the affairs of the section competently, he can be replaced, normally by a close relative.

## (2) Origin and History:

Diverting perennial or flood waters for irrigation purposes has probably been practiced by man since he first took to agriculture. In the alluvial fan or Pachad areas along the foothills of the Suleman mountains, the inhabitants always built some form of structures to block and divert hill torrent floods for irrigation and raising of crops. When people in Pachad were diverting flood waters their neighbors to the east were diverting Indus river waters into inundation canals for the same purpose; and in neighboring Balochistan to the west, the farmers were constructing gandhas or embankments on hill torrents. While gandha construction on hill torrents is popular among the farmers of Kachhi, diverting of perennial waters (kaurjo in Balochi) is widely practiced in Makran area of Balochistan. Since most of the tribes living in Pachad as well as riverine areas of DGK originally immigrated from Makran and Kachhi areas of Balochistan, they might have brought some water-use related ideas with them.

Farmers in DGK have a long and well established history of cooperative ownership and management of their water resources. The District Gazetteer of Dera Ghazi Khan mentions cases of wahs or inundation canals from Indus excavated by Baloch tribes and their leaders in the entire DGK area. Here are some examples: (a) In 1880s Massu Khan, the chief of Nutkani tribe in Sanghar (Taunsa) excavated the Massuwah canal at his own expense. All these canals were excavated by the tribesmen under their sardars and were managed by them for many years before they were handed over to the British government who managed them. Although the government manages the majority of the irrigation canals, there exist community-managed irrigation systems in all regions of Pakistan. As far as the rodkahi (hill torrents) are concerned, scores of them throughout the DGK District (and elsewhere) continue to be harnessed and managed by various communities under their local leadership and, mostly, with their own resources.

### (3) Strengths of the Kamara System:

The strength of the kamara system lies in the fact that these water users associations have become an essential ingredient of local culture and value systems. As far as is known, cooperative action under the kamara system has always been there. The people are convinced that flood waters can be managed only under some form of cooperative activity. During the survey, many people, elders in particular, proudly related stories of thousands of men and pairs of bullocks getting together and constructing multiple gandhas over the beds of hill torrents. Older people say it was considered honorable and a tribal duty to participate in these activities, and committing a "nagha" (miss) was considered shameful. There is a general praise for the last of the great Leghari tumandars who successfully led these kamara activities and people lamented the fact that such great events and get together no longer take place.

Although the whole tribe does not get together as frequently as they before, to construct the main structures at the apex, other kamaras have continued working successfully until today. At the main distribution points beneficiary tribal and sectional kamaras cooperate with each other to construct and repair the gandhas or embankments. Downstream farmers or beneficiaries from each of the wahs or sub-distributories must work cooperatively to construct structures and be sure that their due share of water is being diverted to their respective channels. Still further down, each wahi or water course requires a series of gandhas or "wakhras" by groups of farmers. The gandhas serve from a few to a few dozen farmers who must work cooperatively in a kamara to construct and breach these structures as and when so required.

### (4) Weaknesses of the Kamara System:

The success of kamara system lies in tribal and group solidarity, where members of the group are expected to follow the customary and traditional rules of cooperation, and to abide by the decisions of the tribal leadership. Those not cooperating according to the tribal rules face ostracism, family shame and various punitive sanctions. Traditionally, there were strong disincentives and people were raised to believe that the costs of non-cooperation were high. Things like being invited on important tribal occasions, for marriage and other ceremonies, offering daughters in marriage, offering help when faced with famine, drought and other natural hazards meant a lot to an individual living in a tribal environment. Ostracism meant that none of these privileges could be availed.

But, there is a general weakening of the traditional institutional systems and arrangements in the area as everywhere else. Such weaknesses come from increased and

growing contacts with the outside world and diminished need for tribal solidarity. These are also due to commercialization and economic integration of these previously subsistence-oriented areas into the national economic mainstream. Once the community ceases to function as a moral imperative, that is, once competition among its members for control of productive resources becomes dominant, problems associated with the common ownership of resources or what is referred to as the "tragedy of the commons" arise.

If an individual farmer decides not to participate in the kamara, the costs of this non-cooperation are borne by all other members of the community. In earlier times of the tribal solidarity, those committing such "naghas" were punished and fined there and then. These days the free riders must be reported to the government cod kahi department, and we were told that the action against them is not prompt and many times the cases are not even reported for fear of annoying individuals or groups. This shows weakening of the traditional institutional systems and lack of the complete group solidarity that is so important for the success of such institutions as the kamara system.

#### **4.2.2 Kamara Capacities with respect to Specific Functions**

##### **(1) Leadership, Cooperation, and Dispute Settlement:**

The leadership of kamaras is in place and their performance, by and large, has been satisfactory. The leadership at the local village level rests with the mokadam and his council of elders. The capacity to take immediate decisions and prompt action, when required, is there. Keeping the necessary funds and other resources like tractors, at hand for gandha repairs enables the leaders to act decisively and promptly.

##### **(2) Coping With Emergencies and Taking Prompt Action:**

On the basis of past experience, people's coping with emergency and sudden flood situations can be divided into two categories:

###### **(i) In case of high floods (over 15,000 CUSEC),**

The kamaras as they stand now have difficulty taking immediate and prompt action. In some cases even after years have passed no decision and action regarding repair of common structures has been taken.



Two events during the last two decades or so have not been responded to effectively and promptly. First, in case of Hudwali, it remained without a dam for some years before the soil conservation department was approached to construct it for the Mithawan area people. Yet, it goes to the local people's credit that during all those years, they were actively seeking outside help, and when the soil conservation department agreed to construct Hudwali, the kamaras contributed a portion of the costs. An embankment now stands with a part of it washed out; no action seems to be imminent at this time by the various kamaras. We were told that the reason that nothing was being done has to do with people's perception that some government agency or outsiders will do it for them. Another reason advanced was that most of the people and the leaders were not convinced that the partial demolition of the hudwali dam was causing much harm to them. Some thought that the water escaping through the demolished Hudwali was excess water and of no value to them. Such was the feeling even before JICA involvement in the Mithawan and Choti Nala projects. Still another reason seems to be the people's inability to pay for larger projects, as most of them live under conditions of abject poverty. As noted elsewhere, such was not the case until a few decades ago and until the time that the tumandar himself was the coordinator of the main riverbed kamara activities.

#### (ii) Small Flood

On the other hand, the people and their kamaras have been very effective when it comes to managing mid-level and small floods (less than 15,000 CUSECs). Over the main wahs like Talha and Siraj, both irrigating land of groups of tribal sections and requiring 2-6 or more kamaras of different sub tribal groups to work jointly and cooperatively, people have done so successfully. The mokadams provide effective leadership to their own people and are able to cooperate with mokadams of other kamaras.

#### (3) Monitoring:

Our interviews and observations showed that people did have ways and systems to monitor and determine at least some type of damage, particularly in the structures. People can detect the beginning of damage and report it to those supposed to make decisions. When they see signs of unfavorable change, immediate remedial measures are taken. Once such reports are received, the mokadam in consultation with his council of elders decides when to take action. Not only are the people mobilized at short notice,

but normally some funds and equipment are always kept ready for immediate utilization. The kamaras do have the capacity to monitor the gandhas and other structures and take necessary action to reduce the risk of further damage.

On 13/7/96 we had a meeting with the Talpur sardar and his mokadams. We were told that two days ago their men detected some damage in their main wah gandha, through which water could escape to non-haqooq area. Within the day they managed two tractors which will take 100 hours to complete the work. The Talpur sardar also told us that in their case they had a community chest of 20,000 rupees set aside for purposes of constructing and maintaining gandhas and other structures over the main torrent bed and on their wahs and branches. Once this money is expended more will be contributed by the community from two Talpur villages and used for further emergency and routine work.

During our field trips we routinely saw scouts (called rakha) from various kamaras keeping a vigil on the hill torrent, and on their wahs for possible damage. Those with water rights on the wah have chaukidars keeping a continuous vigil on the river and on their own wah structures for any possible damage for about two months from 15th of July to 15th of September.

As far as damage in the branch or wah bed e.g., degradation and aggradation, is concerned, it cannot be said with certainty whether the people clearly understand or realize the severity of the matter when such signs begin to appear. For instance, Sharti reportedly showed signs of degradation for years before the big flood of 1976 caused sever and hard-to-restore degradation and scouring. Talha, the main north branch of Mithawan, is now showing similar signs of degradation and the people did not seem to be very much concerned, although requests to help construct stronger gandhas on Talha were obviously related to the problem.

#### (4) Forecasting:

In an area where life directly depends on rainfall and flood waters, people have devised ways and means to forecast rains and floods. Local knowledge and experience tells that gusty winds from south (Dakani) in summer continuing for 24 hours indicate that it will rain within the next 24 hours. Basham, or northerly winds, also bring rain the local people can easily distinguish them.

It takes a flood approximately three hours to reach from the mountain slopes to the Pachad command area, so the area people keep a continuous watch on the mountains

and can tell by looking whether it is raining in the Mithawan catchment area, how heavy the rainfall is, and how high and intense the resulting floods might be.

There is an old Baloch way of forecasting future events by reading the scapula of a sacrificed goat or sheep. This practice called "bardast", has specialists who can tell about future events falling within the coming week or so. The bardast readers claim that they can always predict with accuracy when, where, and how heavy it will rain.

The villagers seem to be less capable of predicting or forecasting possible torrent or wash bed adverse alterations or course changes. Thus, forecasting technical damages in the hill torrent or wash bed and initiating action does not seem to be a strong characteristic of the local kamaras.

#### **4.3 Feasibility of Expansion of Kamara Activities**

The Mithawan apex area is near Choti Bala, about 2 kilometers downstream from Darra from which it emerges, and is also the location where the main river Mithawan fans out in different directions. Here at Hudwali a gandha or an embankment must be constructed to guide the flood waters away from those without rights (ghair-haqooq) to those with rights (Haqooq). This operation was traditionally planned, implemented, and supervised by none other than the Leghari tumandar or the ruler of the territory. After the expiry of the tumandari system in 1950s, people continued constructing gandhas over the hill torrent bed. The existing partially washed out dam at Hudwali was constructed by the soil conservation department with contributions from the local kamaras.

At this location traditionally, at least once a year, all the command area farmers were summoned with their bullocks and plows to construct earthen dams to guide the flood waters towards the haqooq area fields. The command area was then far bigger because the DGK irrigation canal now supplying water from Indus was constructed only in 1958. For the Mithawan fan area people the golden era, still remembered, was when Nawab Jamal Khan Leghari, the grandfather of the present sardar and the president of Pakistan, sardar Farooq Leghari was the tumandar and sovereign ruler of all Leghari territories including these. The Nawab, in consultation with mokadams, would decide about the date and location of the gandhas or dams to be constructed on the main Mithawan river bed. He would then require all the share holders and beneficiary farmers in the command area to present themselves alongwith their bullocks and equipment on a fixed day to construct a series of gandhas. Normally as many as seven gandhas were constructed in the approximate location where Hudwali stands today. The

men and pairs of bullocks harnessed would many times exceed a thousand, and in most situations the Nawab would himself be present throughout the work to ensure that the job was performed satisfactorily. Those who committed a "nagha" (not showing up at the call of the Nawab), would be severely punished and would pay fines valued at least four times the original work. Although the tumandar or sardar was exempt from this contribution as he managed and supervised the work, it is said that Nawab Jamal Khan would normally prefer to contribute his own share to the common work. In other words, in those days the tumandar or sardar was the coordinator of all kamaras in the Mithawan Hill Torrent fan area.

It appears that these days the main problem faced by the people of the area is the lack of the leadership and a coordinating force at the higher level. The kamaras are effective at their own sub tribal or sectional level, but cooperation as well as coordination of kamara activities for the good of the Mithawan area as a whole is weak. There seems to be an urgent need for a kamara Coordination Committee which would represent the interests of all the farmers of the Mithawan area. We specifically asked villager's opinions about the formation of a coordination committee of the kamaras to, more or less, revive the role of tumandar in older times. People were not sure whether such a committee would work, but all agreed that there was an urgent need for a high level coordinating body.

Although the tumandari system ceased to be a viable system, around the time of independence 50 years ago, some of the important functions were continued until about 1960. Since then there has been no coordinating personality, yet the gandha at Hudwali was constructed a few times through the combined efforts of all the second level kamaras, which were headed by the sectional heads, the mokadams. Even the present Hudwali, Chitri, and Bhattiwala bunds were constructed with part contributions from the benefiting kamaras. It is believed that the abolition of the tumandari system has somewhat slowed down, but not eliminated the need, the functions, and indispensability of a high level coordinating kamara in the area."

## ***Report on Social Soundness Analysis***

**THE MITHAWAN HILL TORRENT  
PILOT PROJECT:  
SOCIAL SOUNDNESS ANALYSIS**

by

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**Prepared for Nippon Giken, Inc.**

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# THE MITHAWAN HILL TORRENT PILOT PROJECT: SOCIAL SOUNDNESS ANALYSIS

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This report is the result of a social soundness study carried out in the Mithawan hill torrent fan areas at the foot of the Suleman mountain ranges in Dera Ghazi Khan District (DGK), Pakistan, during the months of July and August, 1996. The author worked under contract with the Institute for Development Anthropology (IDA), Binghamton, New York, and Nippon Giken, Inc. who were contracted by the Japan International Cooperation Agency (JICA) for this assignment. Guidance and assistance in the preparation and completion of the report was provided by Professor Michael Horowitz of IDA, Mr. Masayuki Watanabe of JICA, Mr. Yuichi Kishi of Nippon Giken Inc., Mr. Qasim Saeed of Nippon Giken Inc., and most of all by the mokadams and individuals of Tuman Leghari in the Mithawan command area. All their valuable assistance is highly appreciated.

## THE PROBLEM AND THE PROJECT

The Mithawan hill torrent, used for flood irrigation and with a command area of over 46,000 acres, has three main problems associated with it. First, the hill torrent bed is composed of fine sand particles, and the consequent scouring and change of course increases losses and uncertainty for the farmers. Second, in the absence of a reliable dispersion or regulating structure, high and even medium floods cause huge losses to unprotected villages and farms in the Mithawan area. Third, unchecked floods often reach the neighboring DGK canal and cause damage due to inundation, direct attack, and overtopping of the system. To overcome these problems, JICA has agreed to consider the Government of Pakistan request to finance the construction of a main dispersion structure at the Mithawan hill torrent.

A physical irrigation-related structure, no matter how technically sound and economically feasible, cannot succeed unless it is compatible with the social value systems and capacities of the people for whose benefit it is being constructed. The social soundness analysis of Mithawan Hill Torrent Pilot Project is being carried out to better understand the local agricultural population's social value systems and capacities. The study will specifically cover the following:

1. The existing social systems and structures will have important bearing and impact on project success and sustainability. Therefore, the relevant aspects of the existing sociocultural

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<sup>1</sup> The views and interpretations presented herein are those of the author and should not be attributed to the Japanese International Cooperation Agency, Nippon Giken Inc., the Institute for Development Anthropology, or to any individual acting on their behalf.

environment will be studied. Such an environment includes, among other things, cultural practices, customs and traditions, tribal social organization, and leadership patterns.

2. The compatibility of the project with the sociocultural environment, with particular reference to its sustainability, needs to be ascertained. The Project's general sociocultural feasibility, that is, whether people will successfully operate and maintain the system and whether they will undertake similar projects over numerous neighboring hill torrents, will be determined on the basis of the information on the sociocultural environment, on personal observations and interviews with the area people, and on the history of this and neighboring areas' performance under similar physical circumstances and socioeconomic conditions.

3. The social impact or distribution of benefits and burdens arising from economic development projects are normally different among different groups. The main reason for such differences lies in the fact that different groups have varying access to resources and to the ownership of means of production. This should particularly be true of the Mithawan area with a semitribal and feudal background. Such equitable or inequitable distribution of project benefits will be looked into and analyzed.

4. The people throughout the DGK hill torrent fan area have, for centuries, managed their flood irrigation systems through their own water user associations called "kamara." In the immediate vicinity of the proposed project area, a recently constructed Choti dispersion system funded by JICA and Kaha system funded by ADB are also being managed by such traditional kamaras. The general feeling among those knowledgeable about the kamara system is that it may be effective for small-to-medium floods (from 10,000 to 15,000 CUSECS), but incapable of managing floods over 15,000 CUSECS. Through observations, interviews, and comparisons, this report will assess the farmers' capacities with regard to kamaras and other collective action, past and present performance of kamaras, and potential for their continuation and expansion.

## A. INTRODUCTION

### 1. The Socioeconomic Environment.

#### (i) The Area

The Dera Ghazi Khan District (recently divided into two Districts) is the westernmost and only trans-Indus district of Punjab, with over 2 million people on 9400 square kilometers. The District has a unique geographical and cultural position in Pakistan, because here not only the boundaries of all the four provinces, but also all cultures and languages of Pakistan come together. Its western boundary with Balochistan, along the Suleman mountain ranges and inhabited by eight major Baloch tribes or tumans, stretches from the Frontier province in the north to Sindh in the south. Its eastern boundary, demarcated by the Indus river, separates it from the heartland of Punjab.

The DGK canal, fed by the Indus river at Taunsa Barrage northeast of Dera Ghazi Khan town, was constructed in 1958 and along with its branches flows north to south, parallel to both the Suleman mountain ranges and the Indus river, bifurcating the old DGK district in two. The canal



is designed to irrigate land lying toward the east and on its left bank; thus the lands between the DGK canal and river Indus are canal irrigated lands. All piedmont fan area lands, called Pachad, lying to the west of the DGK canal and up to the foothills of the Suleman mountains are hill torrent flood irrigated lands.

The Mithawan hill torrent is one of the 13 major hill torrents in the Dera Ghazi Khan District, which are spread over the entire 400 kilometer length of the District and flood irrigate a piedmont fan area of 0.8 million hectares. All the hill torrents, except two, have their catchments on the eastern slopes of the Suleman mountain ranges on the Punjab-Balochistan border. The Mithawan hill torrent has a catchment area of 800 square kilometers, and forms on the eastern slopes of the Suleman mountain ranges. The gross command area under Mithawan has been reported as 18,908.6 Ha (46,726 acres), out of which the area actually cultivated during 1994 was 13,598.9 Ha (33,605 acres).

The rainfall averages about 250 mm (10 inches) over the high slopes of the Suleman mountains where the hill torrents rise. Direct rainfall in the Pachad area is reported to be very low, between 50 and 75 mm. The soils, composed mainly of local piedmont alluvium of the Suleman mountain ranges and derived from sedimentary rocks, are rich as highly fertile silt is transported down each year by hill torrents to the fan areas. Most cultivation is done in summer, and the main crops raised are sorghum and millet. With the less frequent winter rains, wheat, gram, and mustard crops are raised.

The early history of the area is not known. In 1469 A.D., Sultan Hussain Langa, the ruler of Multan, appointed one Malik Sohrab Dodai Baloch as his representative in areas west of the Indus river, which included today's Dera Ghazi Khan and Dera Ismail Khan, the latter now lying in Northwest Frontier Province. Both the cities were named after rulers from this tribe. During the ensuing centuries, this trans-Indus territory was invaded and controlled by different rulers including Moghuls of Delhi and Abdalis of Afghanistan. In 1819 Ranjit Singh defeated the Afghan governor of Derajat and occupied the trans-Indus plains. In 1821 the Nawab of Bahawalpur, taking advantage of the prevailing anarchy and finding various Baloch chiefs of the area at each other's throats, defeated Leghari, Khosa, Gorchani, and other Baloch Tribes, and conquered the entire region for the Sikhs. In 1857 the British defeated the Sikhs and acquired Dera Ghazi Khan for its own sake and as a stepping stone to conquer Balochistan to the west.

#### (ii) The People

The people living in the Mithawan Hill Torrent command area are predominantly of Baloch origin belonging to the Leghari tribe, and have, at some stage, descended from the high slopes of the Suleman mountains immediately to the west. This area, in fact, is the easternmost frontier of the Baloch tribes, whose settlements start 1500 kilometers to the west from near Kirman in Iran. The Baloch have historically been a nomadic pastoral people who lived in the Middle East and Central Asia before migrating to and settling down in various regions of present day Pakistan.

At the time of the Muslim invasion of India in the 7th century A.D., according to most historians, the Baloch tribes lived in the mountains of Makran and Kirman, while Afghans or Pushtuns lived in the mountains of Suleman. Most Baloch tribes now living in eastern Balochistan along the Suleman mountain ranges and in the adjacent plains of Sibi-Kachhi and Dera Ghazi Khan were part of the legendary forty-four tribes (Bolak) of the Baloch who moved eastward from Kirman and Makran during the 16th century, led by Mir Chakar Khan Rind and Mir Goahram Khan Lashari. After first settling down in Kach Gandawa areas and fighting inter-tribal wars, various Baloch tribes spread in all directions. The mountain ranges occupied by the eight Baloch tumans of Dera Ghazi Khan as well as those occupied by the Marri, Khetran, and Bugti tribes in neighboring Balochistan were inhabited by some Afghan/Pushtun tribes before them, as mentioned. Today, the Baloch tribes occupying the Suleman mountains and hill torrent fan areas to the east are, from south to north, Mazari, Lund, Drishak, Gorchani, Leghari, Khosa, Buzdar, and Kaisarani.

Although most people in Mithawan speak both the Saraiki and Balochi languages, the number of people speaking each of the two languages as mother tongue is roughly equal. Under the tumandari system, the entire area lay in Leghari tuman territory, so that all the tribes living in the area accepted the Leghari tumandar's overlordship or sardari. There are some minor tribes of non-Baloch origin spread throughout the area. These tribes, called Jadgal by the Baloch, are probably the original inhabitants of this area. The main sections and or subtribes living in the Mithawan area are Talpur, Jogiani, Hasanani, Birmani, Buzdar, Chandia, Malghani, and Mirziani.

### (iii) Social Organization and Value Systems

The Baloch in this general area are organized in Tribes (tuman), which are divided in sections (Qaum/Raj); sections are divided into clans (Bolak/Thala/Phali); and Phalis or Thalas into extended family groups (Halk/Tabbar/Khandan). If a section, clan, or family of a tribe lives in another tribe's territory, it is customary to consider it a component of the tribe or tuman whose territory it inhabits. Thus, although not all groups living in Mithawan originally belonged to the Leghari tribe, all of them are now regarded as part of the Leghari tuman. Jogiani, Hasanani, Birmani, Malghani, Buzdar, Ahmedani and others consider themselves as sections of Leghari.

Despite the ethnic variations that have developed among the Baloch over the centuries, they all share the belief in an adherence to the "Balochi," the traditional tribal code of behavior and ethics. The Baloch value systems and their customs and traditions revolve around this code, which includes the following:

(a) Mehmandari: The tradition of Mehmandari or hospitality requires Baloch to be always hospitable, and serve food to guests and strangers even if that means that one's own family and children remain without food. Hospitality is regarded by Baloch as the greatest of all virtues.

(b) Mardeeg: Mardeeg requires a Baloch to be brave and steadfast in facing hardship and in defending his honor. Honor derives from certain features of the Baloch code particularly

regarding the protection of one's family and property, as well as family and tribal dignity. Traditionally the sardar has been the standard bearer of Baloch values and therefore his tribesmen looked up to him and tried to emulate his ways and actions. The sardar, on the other hand, tried to be a model Baloch with all characteristics cherished by Baloch. The Dera Ghazi Khan District Gazetteer (A.H. Diack, 1898, first published by the British Indian government, present copy by: Sang-E-Meel Publications, 25 Shakra-E- Pakistan, Lahore 2) refers to an account of Nawab Imam Bakhsh Khan, the chief of the Mazari tribe, as a true characterization of a typical Baloch sardar, "He is brave, truthful, just, generous, hospitable; dignified in his bearing: of kindly and sympathetic ways: gentle in disposition; but in purpose and action strong as iron." In fact, the entire concept of Balochi revolves around the concept of manhood (mardeeg) and the greatest compliment for a Baloch is, "He is a man (marde int)."

(c) Ber: A Baloch must take revenge (Ber) for the killing of a relative or fellow tribesman and for other insults. The Ber is Balochi for Islamic 'Qasas,' and as in the case of the latter, the perpetrator can be forgiven by the victim's father, brother, or other close relatives.

(d) Siali: Siali, akin to the Pushtun Tarboorwali, has two important aspects, each with different implications. First, there is a saying among Baloch that a Baloch's worst enemy is always another Baloch, and within clan or family, a close relative like a first or second cousin normally turns out to be the worst enemy. Such rivalry centers for the most part around land and leadership and is the cause of considerable conflict in Baloch society. The land inheritance system is such that brothers and cousins are very likely to have fields in close proximity. Second, a Baloch does not consider everybody his fighting equal; a Baloch will never fight against a woman or a minor, or a non-Baloch called Jadgal. None of these is an equal rival or "sial or matt." Fighting with an unequal rival is considered to be below a Baloch's dignity.

(e) Lajj/Ghairat: A woman has a special place in Baloch society. On the one hand she is shown the greatest respect by all Baloch. At times of war a woman as well as children are considered sacred and never harmed, and murders are pardoned if a woman from the perpetrator's family goes to victim's family and asks their forgiveness. On the other hand, a woman is instantly killed if found committing adultery or "siahkari." The preservation of the chastity of women and the honor of the family is one of the most important elements of Balochi.

(f) Bahoti: The tradition of Bahoti requires that a Baloch must always protect those who enter his home or territory to seek protection. Bahoti must be allowed even to one's worst enemy, and be given even at the cost of one's own life.

#### (iv) Leadership and Conflict Resolution

From the advent of British rule in this area in the middle of the nineteenth century until 1950, the entire Pachad areas of Dera Ghazi Khan, along with the adjacent tribal mountainous areas, were ruled under a system called "tumandari." The tumandari system is a form of the sardari system, which has been more popular among the eastern Baloch living along the Suleman mountain ranges. Tuman is a word of Turkish origin, literally meaning ten, but in Balochi

language it has come to mean "a tribe." Originally not every Baloch tribe, but only those tribes whose numbers exceeded ten thousand and who had their own tribal territory were called tuman, and their leader or sardar was called tumandar. Until 1950, in the entire old DGK district there were eight Baloch tribes, their tribal territories covering the entire Suleman mountain and foothill alluvial fan areas from the border of Sindh in the south to that of Northwest Frontier Province in the north. The tumans were some sort of internally sovereign tribal kingdoms, and had a status separate from both Balochistan and Punjab. In 1950 when the tumandars were given the option of joining either Balochistan or Punjab, all the tumandars opted for Punjab. Since then the area is being gradually integrated into the socioeconomic and political mainstream of the Punjab province.

The tumandar ruled his tuman or tribe with the help of his sectional heads called "mokadam" and following the tribal customs and traditions. The Baloch value systems and code of honor were strictly adhered to, and the tumandar himself was not above the tribal law. For all important matters involving the interests of the tribe, the tumandar was obliged to follow and adhere to the wishes of the tribe as expressed by its mokadams. The position of tumandar has always been hereditary, but there are many instances in Baloch history when incompetent tumandars were bypassed or removed and replaced.

A salient feature of the tumandari system has been the council of elders or "Jirga system." The Jirga system, which has also been followed at different times by major Baloch and Pushtun tribes elsewhere in Balochistan and the Northwest Frontier Province, resembles the Islamic Majlis-i-Shoora system, with the difference that a combination of Islamic and tribal laws, not necessarily contradictory, are followed. Under the system, all important decisions concerning the tribe, whether internal sectional conflicts or war and peace matters with other tribes and the government are taken by the council of elders headed by the tumandar.

Each mokadam was a member of tumandar's jirga, an advisor to the tumandar, and an autonomous ruler within his own subtribal territory. Within the subtribe and its territory, the mokadam played the same role of leadership as the tumandar or sardar did for the entire tribe or tuman. For matters pertaining to the subtribe alone, the mokadam had his own council of elders or heads of clans that constituted the decisionmaking or conflict resolving body. Under the Baloch hierarchical system, these leaders, called Safed Rish and Mazan, would similarly be council of elders for the lower level jirga system. The word "jirga" has a tribal connotation and the word in more common use in Pachtun, these days, is a more direct Balochi or Saraiki translation of "a get together of elders." But the purpose and functions remain the same.

Since the sardar does not, these days, involve himself in day-to-day tribal matters, the mokadams and the Mazan/Safed Rish are considered to be the most relevant local tribal leaders in the area. As noted later in the report, in the Mithawan area the local subtribal or sectional groups form water user associations or "kamara" under the leadership of their mokadams. If disputes arise among the kamara members or between kamaras, various mokadams get together and settle the disputes. This settling of disputes is done through a procedure where the section or party considered at fault takes along a few elders and mokadams to the house of the aggrieved party

in order to settle the dispute and ask for forgiveness. This system, called "Merh" or "Marka," is akin to and based on the concept of the old jirga system and is the most common method of settling disputes these days.

Although the tumandar or sardar is still important and respected by the people in general, he is not involved in people's day-to-day lives, and does not perform the traditional sardari or tumandari functions. During our interviews in the Mithawan villages, we asked the question whether in their lifetimes they have themselves taken or heard of anybody else taking their water-related disputes to the Leghari sardar. The answer, in all cases, was negative and the main reason advanced, in most cases, was that such matters were too unimportant to be taken to the sardar. If they cannot settle disputes through the Merh/Marka system, they go to the regular government court system. There is a department of rodkohi in the office of the Deputy Commissioner of the District, which has three levels of officialdom. The collector rodkohi at the top has magisterial powers which he delegates to the Tehsildar rodkohi under him. The cases reported to the department are investigated by a Darogha under Tehsildar, and then decided by the Tehsildar or the Collector.

## 2. Land Ownership, Income Levels, and Land Tenure Systems

### (i) Land Ownership

The following description of land ownership patterns in the District Gazetteer (1893-97) pertains to the Mithawan and the rest of the Pachad areas, "In the Pachad wide tracts belong to the members of the same tribe...Pachad villages are held by families belonging to one tribe." This pattern of land ownership generally has continued, with little change, to this day. Originally all land falling within a tribe's territory was owned in common by the entire tribe. Later, when tribe population increased, the common land was divided among the main sections of the tribe, and in turn subdivided among its clans. The main divisions of Leghari are Aliani, Hadiani, Bangulani, and Haibatani, each of which today has been divided into many sections and clans. The normal system of formation of Baloch tribes would make us believe that the entire tribe of Leghari has descended from one father Leghar, and his four sons, Alian, Hade, Bangul, and Haibat. At some stage, the entire tribal common lands, including mountain grazing lands and the Pachad cultivable lands, were divided among these sections, which continued to be subdivided among clans and families.

Generally in the division of tribal common lands the principles of inheritance followed are those provided in the Islamic law (Sharia) of inheritance, as applied to individuals. Sharia requires that a man's land and other property after his death be equally divided among all his sons. Although Sharia also specifies that daughters inherit shares half those of their brothers, Baloch in this area traditionally do not give any share to girls.

Villages and settlements, as well as their customs and practices concerning land ownership and water rights, are all clan based. Thus, Jogiani in the Mithawan fan area is not just a village, it is a mini tribal territory, most of whose lands are owned by the Jogiani clan of Legharis. Most

people in the village and surrounding settlements belong to the same Jogiani clan, who inherited the lands surrounding Jogiani village from their forefathers; their great great grandfather's name was, of course, Jogi. This same system is prevalent throughout the area. Normally the mokadam has the largest holdings, with others having parcels whose size is a function of inheritance. Two brothers will divide their father's land equally among them, but, say, one brother has only one son and the second has ten; thus the second brother's sons each will have a land holding equal to only 1/10th of the first brother's son. The differences in land holdings are, thus, normally based in the inheritance system.

The land holding records obtained from the Tehsildar Rod Kohi's office (July 1996) show an average holding size as follows:

Mauza/Chak	Total Land (Acres)	Average Owners (Number)	Holding (Acres)
Jogiani	3,501	2,049	1.71
Hasanai	7,155	2,445	2.93
Talpur	4,272	1,845	2.32
Buzdar	6,577	2,240	2.94
Birmanai	7,033	2,055	3.42
Kama	4,807	1,608	2.99
Chandia	3,589	465	7.72
Jalluhar	9,781	4,185	2.34
Bhakar Wah East	6,387	3,630	1.76
Bhakar Wah West	21,350	4,650	4.59
Total	74,452	25,172	

Average land holding in the ten Mauzas: 3.27 acres (1.3 Ha).

The figures show the total acreage, not the area under cultivation, the size of which varies greatly from year to year depending on rainfall and flood incidence. Even if we assume that the total area is also the cultivated area, the average land ownership is extremely small in the Mithawan area. The highest average holding is in Mauza Chandia, which lies at the tail end of Talha Wah (Shomali). The lowest average holding is in the Jogiani area, which is at the head and gets the first priority right over Talha waters in addition to some other minor wahs. But the entire area land holding is below the subsistence level, and it appears impossible that even in the highest average land holding area a family can live on the income from the farm alone.

## (ii) Income Levels

The following costs of production, yields, and income per hectare in the Mithawan area have been estimated by Mr. Mohammad Qasim Saeed of Nippon Giken at Dera Ghazi Khan.

### (a) Costs of Production

<u>Operation</u>	<u>Costs (in Rupees) per Hectare</u>
Land preparation	500
Personal bund/embankment constr. and repair	900
Common gandha construction contribution	700
Seeds	300
Family labor	1,600
Total average costs of production per ha per season	4,000

### (b) Total Income with 200 percent cropping intensity and under 100 percent favorable rain and flood conditions

<u>Crop</u>	<u>Average yield</u>	<u>Price/kg</u>	<u>Total Income</u>
Sorghum	1.1 tons	6	6,600
Millet	1.1 tons	5	5,500
Wheat	2.4 tons	6	14,400
Gram	1.2 tons	14	16,800
Mustard	1.8 tons	14	25,200

### (c) Net income/ha per annum when sorghum and wheat are grown (200 percent cropping intensity and a 50 percent favorable rain and flood conditions

<u>Income</u>			<u>Costs</u>	<u>Net Income</u>
Sorghum	Wheat	Total		
3,300	7,200	10,500	8,000	2,500

Net income with an average holding of 1.3 Ha = 3,250

A family income of 3,250 is very low even by Pakistani standards. But even this income may be overstated, because these estimates assume that an average Mithawan farmer, at least half of the time, is lucky enough to have a rainfall and flood incidence at the appropriate time, that the gandhas and structures are not breached, and that the farmer's fields are filled with the required amount of flood water. The probability of all these things happening during both seasons of a particular year is very small indeed.

To see how fast things are moving in the Pachad, a little comparison may be of interest. The DGK District Gazetteer (1893-97) refers to one Mr. Fryer who had at that time estimated that

a man would be considered rich if he held 40 embankments/bunds/basins in the Pachad or 200 acres of sailaba land. A man holding 20 embankments or 100 acres would be considered middle class or moderately rich. He had further estimated that the minimum required to support an average size family would be two embankments or ten acres. Today, the average holding size in these areas of Pachad (3.27 acres) is less than a third of the size considered necessary for subsistence 100 years ago. The necessities of life have increased, and per unit production levels have probably remained the same.

People supplement their incomes in at least four ways. First, along with their own farms, they also sharecrop a fellow villager's land, and often also raise a few sheep and goats and a cow or two. All these activities together enable a family to make ends meet. Second, a large number of people from the area have migrated to the nearby Sindh, the canal irrigated areas, where they work as share croppers. Third, family members, including females, work as seasonal labor, also mainly in the canal irrigated areas. There is high demand for labor at the wheat harvest time in early summer and at the cotton picking season in October. Fourth, male members migrate to industrial cities of Pakistan and to the Arab Middle Eastern countries, and work mainly as unskilled manual labor.

### (iii) Land Tenure Systems

There are three main categories of land tenure systems in Mithawan:

- (i) Owner occupied: the owner himself farms his own land.
- (ii) Tenant occupied: the tenant has no land of his own but farms a landlord's land on a sharecropping basis.
- (iii) Owner-cum-tenant occupied: the farmer owns and cultivates his own land; in addition to his own land he farms some land owned by others, normally on a sharecropping basis.

The sharecropping arrangements may vary slightly but the most popular system over all the Pachad flood-irrigated areas is the 50:50 arrangement. The tenant bears costs for all the inputs including his own labor, and gets 50 percent of the produce at harvest. A large number of residents including small land holders temporarily migrate to the canal-irrigated areas a few miles away and enter into sharecropping arrangements with the local landlords. In the canal irrigated areas the sharecropping arrangements are radically different from those in the flood irrigated areas. The tenant bears costs of all inputs including seeds, plow (bullocks or tractor) and labor, the owner bearing only nominal water charges/fees, and the tenant gets only 1/6 or 1/7th of the produce. The farmers can get far more favorable terms of tenancy if they go across the river to Muzaffargarh and Multan districts, but that would be too far away from their own areas and they may not be able to return in time if it rains and the flood waters reach their fields.



### 3. Irrigation Systems and Water Rights

#### (i) Irrigation Systems in the Pachad Area

Rainfall in the area averages around 10 inches, most of it falling during summer monsoons between mid-July and mid-September. The main systems of irrigation in Pachad are as follows:

##### (a) Barani

Bunds or embankments are made by the farmers so that direct rainfall and moisture is trapped and retained in these bunds. Grasses, fodder crops like sorghum, and legumes like gram are raised if enough moisture is available.

##### (b) Tubewells

Although the water levels are low at over 300 feet, a growing number of tubewells are now being installed. Because of relatively high profitability, cotton is the main crop grown in tubewell irrigated areas. Although electricity is being gradually introduced in the area, so far most of the tubewells seem to be powered by diesel fueled engines.

##### (c) Sailaba or Flood Irrigation

In Sailaba or flood irrigated farming, the farmers construct bunds or embankments around the fields and divert flood waters from hill torrents through a system of gandhas or obstructions constructed across the main hill torrent branches and sub-branches, wahis or water courses, so that flood waters finally irrigate their fields. Flood waters flow from field to field, and when the soil profile is considered saturated, the obstruction or gandha on the water course is breached to release the water into another field. Because of uncertainty and low frequency of floods, the fluctuations in their quantity, and the primitive methods of diverting and guiding them over the fields, considerable erosion and bund breaches are common. A large part of the production cost in flood agriculture consists in continually repairing and reconstructing bunds.

#### (ii) Water Rights

The Baloch always preferred mountains over plains, and after living on them for centuries and increasing their populations, some of their sections or clans came down to the plains. They parceled out the lands they acquired according to their sections, the sections in turn dividing them among their sub-sections, clans, and finally families, as mentioned. Water rights go together with land rights and are determined on the basis of land ownership. The water rights are fixed under the Water Rights Act of 1906, and the principle of "Saropa-paina" or upstream riparian rights and downstream riparian rights is followed. This law, basically, provides that the upstream users will always have the priority rights over downstream users. The Mithawan Command area is divided between the Haqooq (right to flood water use) areas and Ghair-haqooq (no right to flood waters) areas. The Ghair-haqooq get water when it is in excess of the haqooq

area needs. Leaving aside some small upstream wahi outlets, the main Mithawan flood waters are equally divided between the northenders (Shomali) and southenders (Janubi), while the natural land gradient ensures that excess and unblocked waters escape south to the non-haqooq areas. The main wah or natural channel branching out of Mithawan and conveying waters to the Shomali is Talha Wah, while Siraj Wah carries flood waters to Janubi areas.

Although the Shomali and Janubi farmers have equal share in the flood waters, the kamara or labor contribution for the common works at the apex area must, by tradition, be performed on the basis of 2/5th by the Shomalis and 3/5th by the Janubis. Such a kamara contribution is probably based, again, on the natural gradient as a result of which those in the south always benefit from the natural gravitational flow toward them.

The villages having water rights over the Shomali are: Jogiani (Mauza Jogiani), Birmani, Jalalani, Ramdani, and Malghani (mauza Birmani) in the head area and Chak Kama, Chak Chandia, and Chak Jalluhar in the tail area. The villages and chaks having water rights over the Janubi are Hasanani (mauza Hasanani), Talpur upper and lower (mauza Talpur), Basti Ahmedani, and Sher Mohammad Buzdar (mauza Buzdar). Ganehar Branch is the escape carrying excess waters only; the branch further divides into Ganehar wah and Bhakar Wah.

The northenders always have priority rights over the Janubis, so that small floods can benefit them alone. Each of the three wabs or main distributories has a series of gandha structures built on it by the land owners' kamaras on each side. According to saropa-paina rule, during each flood incidence those with the uppermost gandha on the wah have the right to divert water into their wabs and irrigate their lands to maximum saturation. Only after they have filled their fields, do the kamara members themselves breach the gandha so that water flows to the next gandha, which would likewise be breached after the adjoining fields have been satisfactorily saturated. The gandhas constructed on sub-wabs (wabs) are filled and breached following the same general rules. As said, those upstream in the wah and wahi system will always have the priority right after each flood incidence. Generally there are no complaints about overuse by the head gandha farmers, although the tail enders, many times, end up having no water at all reaching them during the entire season.

A system followed in the neighboring Kachhi District of Balochistan where flood irrigation of the Pachad type is practiced, seems to be more fair and equitable. There, head gandha beneficiaries have priority during the first flood incidence of the season, but the beneficiaries of the second flood incidence start from where the first had ended. In this way the head gandha users get their second turn only after all with use rights, including those at the tail, have received irrigation. The branch wabs or wabs follow the same rule.

## B. DISTRIBUTION OF PROJECT BENEFITS/SPREAD EFFECTS

### 1. Project Direct Benefits

The project's direct effects on farm employment will largely arise from the provision of additional and more reliable water supplies and an improved and greater use of inputs, which together are expected to increase labor utilization, reducing the need to rely on uncertain and often remote work opportunities. Most of the increased employment would be in the form of increased on-farm activities for family labor. Moreover, the medium and large farmers would hire additional labor, mostly underemployed rural workers. More specifically, the following direct benefits will be achieved.

(i) Given that many of the tenants who migrated to the irrigated areas are employed as landless laborers, it is expected that once there is more reliable and certain flood water, they will return to the project area. The study time coincided with the beginning of the annual monsoon and expected flood season, therefore we were able to come across many residents who had temporarily returned to the area to take care of their breached bunds and gandhas. Here the tribal and family bonds are strong; the desire to be reunited with families and tribesmen will be a powerful attraction to return. We were also able to meet some people who were presently working in the Middle East and indicated that with better irrigation facilities they will return to farm their lands. Such people with saved resources could invest in land, making it more productive.

(ii) The flood water dispersion will be more regulated, guided, and controlled; thus there will be less flood damage to the villages, farms, and crops in the area.

(iii) The flood water dispersion will be more equitable to all villages and tribal sections according to their originally allocated and normally equitable rights.

(iv) The flood water dispersion will be more according to need and requirements of the local farmers. In case of high floods, excess water will be guided to non-right areas; thus providing protection to the rights area villages and farms, at the same time increasing the total area under cultivation in the area as a whole.

(v) The DG Khan canal is attacked, from time to time, by the Mithawan hill torrent floods, and serious damage is done in the absence of any check or dam structure on Mithawan. The construction of a structure will benefit the canal area farmers, lessen irrigation department maintenance costs, and thus benefit the entire area economy.

(vi) JICA-supported FAO activities will result in increased afforestation, less erosion and fertility loss, and a stabilized watershed/catchment area of Mithawan. Such a conservation of natural resources will have the direct effect of improving the living conditions for the Baloch tribesmen, at the same time accruing benefits for the entire region and the country.

## 2. Project Indirect Benefits

(i) With relatively higher incomes, the local demand for goods and services will increase, so businesses will flourish. On the other hand, demand for agricultural inputs, e.g., fertilizer, seeds, and farm power, will increase, again encouraging new businesses and new employment opportunities in the area.

(ii) The construction of a useful structure on a hill torrent, and an effective management system, will have a positive social and psychological impact on the people having similar dependence upon and problems with the hill torrent water regulation and use. Not only other donor organizations and government departments will be attracted to the general hill torrent fan development work, but the people may themselves get together and improve their water use and management practices to improve their incomes and living standards.

## 3. Project Adverse Effects

The project may make access to productive resources more unequal, promote the concentration of land in the hands of a few farmers, and encourage labor replacing mechanization. This in fact may lead to higher unemployment and higher rates of migration out of the area. In this regard, some of the points to be considered are:

(i) Although no obvious or stated adverse effects were seen or heard, certain groups or individuals may be adversely effected. One such group is some villages in the no-right area who presently end up having more flood water than the right areas. This has always been the case in the absence of a main bund where Hudwali presently stands. Breaches in the embankments at Hudwali are perceived to be in their interest. However, this is more a perceived than actual disadvantage to the non-haqooq areas, because the proposed dispersion structure will ensure that in case of high and even medium floods, the non-haqooq areas will get surplus but sufficient water for their fields. Unless thoroughly explained to the haqooq area farmers, they would probably also consider the structure allowing surplus water to the non-haqooq areas to be against their interests. In both cases the farmers need to be convinced that the structure will serve their best interests.

(ii) It is possible that the land prices in the area will go up. If the past experience is any guide, higher prices encourage small and poorer farmers to sell their lands to wealthier and larger farmers. Larger and consolidated holdings may be a desirable outcome from an economic point of view but not good from a social point of view, as this may result in increased inequality in a thus far more or less equal and egalitarian society. The tribal and clan solidarity protects its poor by discouraging its members from selling land particularly to outsiders. But such tribal solidarity gives in under the pressure of modern economic forces.

## C. SOCIOCULTURAL FEASIBILITY

### (i) Sociocultural Feasibility

The project improves upon an existing irrigation system. It makes the dispersion of flood waters to farmer fields more reliable and thus enhances the likelihood of more area being put under cultivation, for higher yields and higher incomes. These benefits are well understood by the farmers and their leaders. There is no doubt that the project is socially feasible.

The lineage-orientation of settlements and land ownership ensures that better irrigation facilities will have no impact on the existing social organization and power relations.

The project does not intend to change the existing social structures, organizations, or leadership, since the already existing section/clan leadership can easily handle the management of water. The successful implementation of the project will require strengthening and expanding the role of existing kamaras or water user associations. With some help from JICA and the Punjab Irrigation and Power Department, and with some training programs this objective can be achieved.

During interviews it was determined that there is no conflict between the JICA perception of benefits and beneficiaries and those of the recipients of benefits.

### (ii) Possible Obstacles

Some of the largest villages and better irrigated farms at present lie in the Ganehar branch (escape) irrigated by Ganehar Wah and Bhakkar wah in the non-haqooq area. The DGK area including Pachad, in general, has a higher gradient to the northwest and a lower gradient to the southeast charting the course for the Indus river. The bulk of Mithawan flood discharge gushes into the non-haqooq areas to the southeast, in the absence of blocking and guiding structures. Prior to the building of structures at Hudwali, earthen dams were constructed in about the same place for the purpose of blocking the natural hill torrent flow to the non-haqooq areas. Because the Hudwali structure has not been effective for many years, the land owners in the non-haqooq area might have taken undue benefits from the situation. Any opposition to the project and thus any obstacles could be raised by the farmers of this non-haqooq area.

For this purpose we interviewed some area elders and mokadams. Most of the area people thought that the water rights should be amended and the large number of farmers in the non-haqooq area be allowed their rightful share in the Mithawan hill torrent waters. Unlike the general prevailing feeling that the people of the non-haqooq areas have haqooq (rights) over other hill torrent waters, we were told that those falling under Ganehar and Bhakarwah have no rights over any other hill torrent waters. When we explained that we were in no position to amend the water rights and that they should approach the appropriate government authorities in this connection, they agreed to follow that path. Also when we explained that the dispersion structures when constructed will have provisions to allow surplus waters into their lands, they

seemed to understand this. There does not seem to be any significant opposition to the construction of a dispersion structure, and we have no fear of any obstacles being raised against the project.

#### D. RODKOHI WATER MANAGEMENT, LOCAL KAMARA WATER USER ASSOCIATIONS, AND FEASIBILITY OF EXPANSION AND MODERNIZATION

##### 1. The Kamara Rodkahi Water Management System

The kamara or water user associations in Dera Ghazi Khan hill torrent fan areas are some of the very few instances of farmer cooperative management of their irrigation systems in Pakistan. Most of the irrigation systems in the country are either run by the government as in canal irrigated areas of the country or run by private individuals as in the case of tubewells, open surface wells, and persian wheels. Here, each land owner benefiting from a particular water conveying system (gandha, wah) is required to be a member of the respective kamara or water user association. The contribution to the kamara work is normally based on the number of bunds or embankments that a person owns. This system is called band bahr/wahr, and the contribution is the same whether the bund or basin is as big as 20 acres or as small as a quarter of an acre. The sardar or mokadam, who also heads the kamara, has traditionally been exempt from contributing his share. The rules are straightforward. The share holder must contribute to all flood-water-conveyance-related embankment construction work, and either come himself or send a substitute, or, in some cases, make a monetary contribution. If he fails to come or contribute, he is fined, normally equal to four times the value of the work that he has missed. As a rule, since the job to be performed cannot be postponed, the non-complier's share of work is instantly "auctioned" and undertaken by the lowest bidder while the collective work is still in progress. The substituting person ends up receiving more than a normal day's remuneration, while the remaining fine money is expended on administrative matters. The annual per band/basin contributions for the common cause kamaras in Mithawan, averaged on the basis of all the responses during the survey, comes to Rs. 100.

The basic features of the kamara system are as follows:

##### (i) Composition and Leadership

Falling under Leghari tuman territory, the land in the Mithawan hill torrent fan area was, in the beginning, common subtribal or sectional land. This common tribal land, in each case, was divided among its component subsections and clans. Therefore, all villages in the Mithawan hill torrent command area are normally inhabited by people of the same tribal sectional or clan group. Village Jogiani, for instance, is almost entirely inhabited by families belonging to the Jogiani section of the Leghari tribe; such is also the case with Hasanani, Malghani and Birmani villages. The kamara membership is composed of all the land owners whose flood irrigated lands fall under the command of the water-conveying system for which a kamara is formed. The

leader or mokadam leads the tribal section in all important matters including water-use kamaras, although he must consult with clan and family heads (Safed Rish/wadera/Mazan) as well. When sardars and tumandars resided in the area and were part of the people's day-to-day life, they played, at a higher level, the same role as a mokadam plays today. The mokadam's position is hereditary like the sardar's, but if he is not capable of running the affairs of the section competently, he can be replaced, normally by a close relative.

## (ii) Origin and History

Diverting perennial or flood waters for irrigation purposes has probably been practiced by man since he first took to agriculture. In the alluvial fan or Pachad areas along the foothills of the Suleman mountains, the inhabitants always built some form of structures to block and divert hill torrent floods for irrigation and raising of crops. When people in Pachad were diverting flood waters their neighbors to the east were diverting Indus river waters into inundation canals for the same purpose; and in neighboring Balochistan to the west, the farmers were constructing gandhas or embankments on hill torrents. While gandha construction on hill torrents is popular among the farmers of Kachhi, diverting of perennial waters (kaurjo in Balochi) is widely practiced in the Makran area of Balochistan. Since most of the tribes living in Pachad as well as riverine areas of DGK originally immigrated from Makran and Kachhi areas of Balochistan, they might have brought some water-use related ideas with them.

Farmers in DGK have a long and well established history of cooperative ownership and management of their water resources. The District Gazetteer of Dera Ghazi Khan mentions cases of wahs or inundation canals from the Indus excavated by Baloch tribes and their leaders in the entire DGK area. Here are some examples: (a) In the 1880s Massu Khan, the chief of Nutkani tribe in Sanghar (Taunsa), excavated the Massuwah canal at his own expense. (b) Fazl Ali, chief of Sori Lund, excavated a canal named Fazlwah from the Indus to the Lund tribe country in 1850s, which improved the living conditions of his tribe. (c) Also in 1850s, Nawab Jamal Khan Leghari excavated and extended the Manka canal to Choti from the Indus. All these canals were excavated by the tribesmen under their sardars and were managed by them for many years before they were handed over to the British government who managed them. Although the government manages the majority of the irrigation canals, there exist community-managed irrigation systems in all regions of Pakistan. As far as the rodkahi (hill torrents) are concerned, scores of them throughout the DGK District (and elsewhere) continue to be harnessed and managed by various communities under their local leadership and, mostly, with their own resources.

## (iii) Strengths of the Kamara System

The strength of the kamara system lies in the fact that these water user associations have become an essential ingredient of local culture and value systems. As far as is known, cooperative action under the kamara system has always been there. The people are convinced that flood waters can be managed only under some form of cooperative activity. During the survey, many people, elders in particular, proudly related stories of thousands of men and pairs of bullocks getting

together and constructing multiple gandhas over the beds of hill torrents. Older people say it was considered honorable and a tribal duty to participate in these activities, and committing a "nagha" (miss) was considered shameful. There is general praise for the last of the great Leghari tumandars who successfully led these kamara activities, and people lamented the fact that such great events and get togethers no longer take place.

Although the whole tribe does not get together as frequently as before, to construct the main structures at the apex, other kamaras have continued working successfully until today. At the main distribution points beneficiary tribal and sectional kamaras cooperate with each other to construct and repair the gandhas or embankments. Downstream farmers or beneficiaries from each of the wahs or sub-distributories must work cooperatively to construct structures and be sure that their due share of water is being diverted to their respective channels. Still further down, each wahi or water course requires a series of gandhas or "wakhras" by groups of farmers. The gandhas serve from a few to a few dozen farmers who must work cooperatively in a kamara to construct and breach these structures as and when required.

A main reason for closer cooperation is that most of the settlements and villages are inhabited by people of a section, sub-section, or clan of the same dominant tribe, Leghari. The land and water rights are also distributed accordingly, so that each distributory or wah flood irrigates a particular tribal section's lands, who have a kamara with membership drawn from the same tribal section, and a kamara leadership also belonging to and approved by the same section. The tribal or sectional solidarity ensures continuation of kamaras and prompt settlement of disputes as and when they arise.

The above reality also means that the kamara need not be formed or organized from scratch, since the tribal section or clan is already organized and has a recognized leadership. Furthermore, since the residents of a given kamara are related to other kamara residents as all are part of the Leghari tribe, coordination among kamaras is not as difficult as it would be among unrelated people. The tribal leadership and system of conflict resolution that have existed for centuries are still in place.

#### (iv) Weaknesses of the Kamara System

The success of the kamara system lies in tribal and group solidarity, where members of the group are expected to follow the customary and traditional rules of cooperation, and to abide by the decisions of the tribal leadership. Those not cooperating according to the tribal rules face ostracism, family shame, and various punitive sanctions. Traditionally, these were strong disincentives and people were raised to believe that the costs of non-cooperation were high. Things like being invited to important tribal occasions, for marriage and other ceremonies, offering daughters in marriage, offering help when faced with famine, drought, and other natural hazards meant a lot to an individual living in a tribal environment. Ostracism meant that none of these privileges could be availed.



But, there is a general weakening of the traditional institutional systems and arrangements in this area as everywhere else. Such weaknesses come from increased and growing contacts with the outside world and a diminished need for tribal solidarity. These are also due to commercialization and the economic integration of these previously subsistence-oriented areas into the national economic mainstream. Once the community ceases to function as a moral imperative, that is, once competition among its members for control of productive resources becomes dominant, problems associated with the common ownership of resources or what is referred to as the "tragedy of the commons" arise.

If an individual farmer decides not to participate in the kamara, the costs of this non-cooperation are borne by all other members of the community. In earlier times of tribal solidarity, those committing such "naghas" were punished and fined there and then. These days the free riders must be reported to the government Rod Kohi department, and we were told that the action against them is not prompt and many times the cases are not even reported for fear of annoying individuals or groups. This shows a weakening of the traditional institutional system and lack of the complete group solidarity that is so important for the success of such institutions as the kamara system.

## 2. Kamara Capacities with Respect to Specific Functions

### (i) Leadership, Cooperation, and Dispute Settlement

The leadership of kamaras is in place and their performance, by and large, has been satisfactory. The leadership at the local village level rests with the mokadam and his council of elders. The capacity to take immediate decisions and prompt action, when required, is there. Keeping the necessary funds and other resources like tractors at hand for gandha repairs enables the leaders to act decisively and promptly.

Conflicts between two community or kamara members are eventually decided by the local leadership themselves. A number of such cases were mentioned. A few years back there was a water-related conflict between the Jogiani and the Birmani sections. In this case first they went to the regular court system, but then eventually settled the dispute through a "Merh" or "Marka" of sectional mokadams. The cooperation between the kamaras is an ongoing process. We were told by the Talpur sardar that last year the Talpur kamara and Hasanani kamara, both of which have rights over Janubi Siaraj wah, got together and built an earthen small dam between the Hudwali and the Siraj wah so that their joint share of water was not wasted to the non-haqooq areas.

### (ii) Coping With Emergencies and Taking Prompt Action

On the basis of past experience, people's coping with emergency and sudden flood situations can be divided into two categories. (a) In case of high floods (over 15,000 CUSEC), the kamaras as they stand now have difficulty taking immediate and prompt action. In some cases even after years have passed no decision and action regarding repair of common structures has been taken.

Two events during the last two decades or so have not been responded to effectively and promptly. First, in the case of Hudwali, it remained without a dam for some years before the soil conservation department was approached to construct it for the Mithawan area people. Yet, it goes to the local people's credit that during all those years, they were actively seeking outside help, and when the soil conservation department agreed to construct at Hudwali, the kamaras contributed a portion of the costs. An embankment now stands with a part of it washed out; no action seems to be imminent at this time by the various kamaras. We were told that the reason that nothing was being done has to do with people's perception that some government agency or outsiders will do it for them. Another reason advanced was that most of the people and the leaders were not convinced that the partial demolition of the Hudwali dam was causing much harm to them. Some thought that the water escaping through the demolished hudwali was excess water and of no value to them. Such was the feeling even before JICA involvement in the Mithawan and Choti Nala projects. Still another reason seems to be the people's inability to pay for larger projects, as most of them live under conditions of abject poverty. As noted elsewhere, such was not the case until a few decades ago and until the time that the tumandar himself was the coordinator of the main riverbed kamara activities.

(b) On the other hand, the people and their kamaras have been very effective when it comes to managing mid-level and small floods (less than 15,000 CUSECs). Over the main wahs like Talha and Siraj, both irrigating land of groups of tribal sections and requiring 2-6 or more kamaras of different subtribal groups to work jointly and cooperatively, people have done so successfully. The mokadams provide effective leadership to their own people and are able to cooperate with mokadams of other kamaras.

On 13/7/96 we had a meeting with the Talpur sardar and his mokadams. We were told that two days ago their men detected some damage in their main wah gandha, through which water could escape to a non-haqooq area. Within the day they managed two tractors, which will take 100 hours to complete the work. The Talpur sardar also told us that in their case they had a community chest of 20,000 rupees set aside for purposes of constructing and maintaining gandhas and other structures over the main torrent bed and on their wahs and branches. Once this money is expended more will be contributed by the community from two Talpur villages and used for further emergency and routine work.

### (iii) Monitoring

Our interviews and observations showed that people did have ways and systems to monitor and determine at least some type of damage, particularly in the structures. People can detect the beginning of damage and report it to those supposed to make decisions. When they see signs of unfavorable change, immediate remedial measures are taken. Once such reports are received, the mokadam in consultation with his council of elders decides when to take action. Not only are the people mobilized at short notice, but normally some funds and equipment are always kept ready for immediate utilization. The kamaras do have the capacity to monitor the gandhas and other structures and take necessary action to reduce the risk of further damage.

During our field trips we routinely saw scouts (called rakha) from various kamaras keeping a vigil on the hill torrent and on their wahs for possible damage. Those with water rights on the wah have chaukidars keeping a continuous vigil on the river and on their own wah structures for any possible damage for about two months from the 15th of July to the 15th of September.

As far as damage in the branch or wah bed, e.g., degradation and aggradation, is concerned, it cannot be said with certainty whether the people clearly understand or realize the severity of the matter when such signs begin to appear. For instance, Sharti reportedly showed signs of degradation for years before the big flood of 1976 caused severe and hard-to-restore degradation and scouring. Talha, the main north branch of Mithawan, is now showing similar signs of degradation, and the people did not seem to be very much concerned, although requests to help construct stronger gandhas on Talha were obviously related to the problem.

#### (iv) Forecasting

In an area where life directly depends on rainfall and flood waters, people have devised ways to forecast rains and floods. Local knowledge and experience tells that gusty winds from south (Dakani) in summer continuing for 24 hours indicate that it will rain within the next 24 hours. Basham, or northerly winds, also bring rain, and the local people can easily distinguish them.

It takes a flood approximately three hours to reach from the mountain slopes to the Pachad command area, so the area people keep a continuous watch on the mountains and can tell by looking whether it is raining in the Mithawan catchment area, how heavy the rainfall is, and how high and intense the resulting floods might be.

There is an old Baloch way of forecasting future events by reading the scapula of a sacrificed goat or sheep. This practice, called "bardast," has specialists who can tell about future events falling within the coming week or so. The bardast readers claim that they can always predict with accuracy when, where, and how heavily it will rain.

The villagers seem to be less capable of predicting or forecasting possible torrent or wah bed adverse alterations or course changes. Thus, forecasting technical damages in the hill torrent or wah bed and initiating action does not seem to be a strong characteristic of the local kamaras.

### 3. Feasibility of Expansion of Kamara Activities.

The Mithawan apex area is near Choti Bala, about 2 kilometers downstream from Darra from which it emerges, and is also the location where the main river Mithawan fans out in different directions. Here at Hudwali a gandha or an embankment must be constructed to guide the flood waters away from those without rights (ghair-haqooq) to those with rights (haqooq). This operation was traditionally planned, implemented, and supervised by none other than the Leghari tumandar or the ruler of the territory. After the expiry of the tumandari system in 1950s, people continued constructing gandhas over the hill torrent bed. The existing partially washed out dam

at Hudwali was constructed by the soil conservation department with contributions from the local kamaras.

At this location traditionally, at least once a year, all the command area farmers were summoned with their bullocks and plows to construct earthen dams to guide the flood waters toward the haqooq area fields. The command area was then far bigger because the DGK irrigation canal now supplying water from the Indus was constructed only in 1958. For the Mithawan fan area people the golden era, still remembered, was when Nawab Jamal Khan Leghari, the grandfather of the present sardar and the president of Pakistan, sardar Farooq Leghari, was the tumandar and sovereign ruler of all Leghari territories including these. The Nawab, in consultation with mokadams, would decide about the date and location of the gandhas or dams to be constructed on the main Mithawan river bed. He would then require all the share holders and beneficiary farmers in the command area to present themselves along with their bullocks and equipment on a fixed day to construct a series of gandhas. Normally as many as seven gandhas were constructed in the approximate location where Hudwali stands today. The men and pairs of bullocks harnessed would many times exceed a thousand, and in most situations the Nawab would himself be present throughout the work to ensure that the job was performed satisfactorily. Those who committed a "nagha" (not showing up at the call of the Nawab), would be severely punished and would pay fines valued at least four times the original work. Although the tumandar or sardar was exempt from this contribution as he managed and supervised the work, it is said that Nawab Jamal Khan would normally prefer to contribute his own share to the common work. In other words, in those days the tumandar or sardar was the coordinator of all kamaras in the Mithawan Hill Torrent fan area.

It appears that these days the main problem faced by the people of the area is the lack of leadership and a coordinating force at the higher level. The kamaras are effective at their own subtribal or sectional level, but cooperation as well as coordination of kamara activities for the good of the Mithawan area as a whole is weak. There seems to be an urgent need for a Kamara Coordinating Committee that would represent the interests of all the farmers of the Mithawan area. We specifically asked villagers' opinions about the formation of a coordinating committee of the kamaras to, more or less, revive the role of tumandar in older times. People were not sure whether such a committee would work, but all agreed that there was an urgent need for a high level coordinating body.

Although the tumandari system ceased to be a viable system around the time of independence 50 years ago, some of the important functions were continued until about 1960. Since then there has been no coordinating personality, yet a gandha at Hudwali was constructed a few times through the combined efforts of all the second level kamaras, which were headed by the sectional heads, the mokadams. Even the present Hudwali, Chitri, and Bhattiwala bunds were constructed with part contributions from the benefiting kamaras. It is believed that the abolition of the tumandari system has somewhat slowed down, but not eliminated the need, the functions, and indispensability of a high level coordinating kamara in the area.

#### 4. The Role Of Government in Rod Kohi Water Management

##### (i) The Concerned Departments

##### (a) The Rod Kohi Department

The Rod Kohi Department involvement was small under the tumandari system before independence. Since the 1950s after the demise of the old tumandari system, the department has gradually increased its involvement all over the Pachad area. The Collector Rod Kohi is the highest official in the District, under whom a Tehsildar Rod Kohi and a few Daroghas work. Besides keeping the land records, it also settles water-related disputes among individuals and groups. What is of relevance with respect to the kamara system is the fact that those not cooperating, or committing a nagha, are reported to the darogha of the area, and the department is supposed to take action against the non-complying kamara member. The daroghas again try to settle such disputes through local elders and compromise techniques. In addition to the above, the department also settles water disputes that arise between communities or different kamaras. It may be mentioned here that the tumandars had the services of chaprasis (messengers), darogha (foremen), and risaldar (constable) available to them, in that case also provided by the government to enforce the water rights and members' compliance with rules.

##### (b) The Punjab Irrigation and Power Department

The Punjab Irrigation and Power Department has in recent times been involved in helping different communities, mostly in the repair and maintenance of dispersion and distribution structures over the various hill torrent beds. The dispersion structures over Kaha hill torrent to the south, and all the different bunds over Mithawan and its branches, are cared for and maintained by the irrigation department.

(c) The Soil Conservation Department has also been involved in constructing various structures on the rodkohis, including the construction of Chitri and Hudwali bunds at Mithawan.

##### (ii) What People Think of Government Intervention

The People have mixed opinions about government intervention into their flood irrigation systems. On the one side, they want the government to help them construct their gandhas, protect their villages and farms, etc. On the other side, they are vehemently opposed to any interventions in their indigenous systems of distribution and sharing of flood waters, sociopolitical leadership, and other such matters that they think they can manage themselves best.

The people look favorably to government intervention as long as it is in areas considered beneficial to them. We were told during interviews that the Rodkhi department was a very poor substitute for the tumandari system, since their complaints against non-compliers went unheeded and, because of that, more and more people were committing naghas. Other than that there is

a general distrust of the government departments and a feeling that any funds that should be spent for the improvement of their water and other systems normally get embezzled and fill the bureaucrats' pockets. Such feelings were more prevalent in the Kaha Hill Torrent area where ADB financed structures were recently constructed.

#### E. CONNECTED PROJECTS, RELEVANT SOCIAL ORGANIZATIONS, AND WATER USER ASSOCIATIONS

##### (1) Connected Projects

The long term success of Mithawan project will depend upon the success of conservation and development activities in its watershed area. Similarly, for a successful and sustainable Mithawan dispersion structure, the Sharti wah must be restored. A few points about both these projects are discussed below:

##### (i) The FAO Watershed Management Project at Doli

The FAO Mithawan watershed management project activities were started in March/April 1995 and appear to have progressed very well. Not only in the Mithawan catchment area, but all along the Suleman mountain ranges, there exist conditions of continuous range resource depletion, deforestation, and serious erosion. The FAO project addresses these very serious problems. But as is the case in most places around the world, the causes of resource overuse and depletion are mainly socioeconomical, and the problem cannot be solved without the cooperation and participation of local people. The Baloch of these areas along the Suleman mountain slopes raise animals for a living, and both animal and human populations depend on local resources of grasses, trees, and other vegetation. In recent years, both human and animal populations have increased, putting excessive pressure on the already low yielding and sometimes precarious resources. Cutting of trees and overstocking of the ranges continue to worsen the soil erosion and land denudation problems. Although it is not possible to stop this process of resource depletion completely, it can be lessened by a combination of programs that aim at educating local populations about the serious consequences of overgrazing, and assisting them to avail alternative means of income generation. Development of small scale industries using local talent and traditional skills as well as locally produced raw material, can go a long way in reducing pressure on local resources.

In order to achieve the above objectives, the FAO is banking on the ability of the local people to mobilize and pool their resources, and change their attitudes toward a more conservative resource use. This program is still in its initial stages, and such programs aimed at changing people's attitudes are particularly time consuming. Although it is difficult to assess this program's success at this stage, both the approach and programs seem to be going in the right direction. The FAO leaders at the top as well as its field workers are introducing useful programs in the area which should result in improved living conditions for the people. The women's group promoters' work is particularly impressive and greatly successful at this initial stage. The mountain Baloch at Doli are among the most traditional Baloch, who always suspect

outsiders and do not appreciate any city influences, but despite their traditionalism they appear to have shown a willingness to allow their womenfolk to participate in FAO programs.

#### (ii) The Sharti Wah

Sharti Wah is the first wah branching out of main Shomali Talha wah, and has a command area located in the middle section between Talha and Siraj wahs. The distributory is relatively small, but has a gross command area of 2,150 Ha, on which normally thousands of families depended for a living. An unusually high flood in 1976 concentrated in and rushed through Sharti wah, and after scouring it deeply reached the DGK canal, causing it great damage and greatly reducing the flow into the main Talha wah. During the three years between the incidence and the construction of an embankment, the flows were significantly reduced in both the Shomali Talha and Janubi Siraj wah. The government constructed the Chitri bund/embankment to block the sharti wah, thus reducing downstream damage and restoring normal flood flow into the Talha and Siraj wahs. As a result of the blocking of Sharti wah, thousands of people mainly from the villages of Malghani, Sharti Birmani, Mirziani, and Kalung were forced to partly abandon their villages and to migrate to other places in the Pachad or in Sind (canal irrigated areas). Today, most of these villages and adjoining fields remain abandoned, and their former residents live under conditions of extreme poverty and deprivation.

We visited the Sharti wah command area, mainly to find answers to three main questions. (a) why the affected villagers did not do anything over the last twenty years to restore their wah (b) How they were able to make ends meet. (c) Would the village/sectional kamaras be able to get together and undertake repair and maintenance work, if outside help were made available for the restoration of the Sharti wah.

Our findings, in this regard, are summarized:

(a) The affected villagers were obviously the most poor in the entire Mithawan area; there were no schools, medical facilities, roads, or even drinking water facilities in the entire area. There were very few educated people, and the mokadams did not have access to the government authorities. Although the leadership of all villages got together from time to time, to approach the government authorities (and applications were even given to the president in recent years), they were not able to get the Sharti wah restored. Their own resources were too meager to even attempt any restoration work themselves.

(b) Almost all the families of the area have either migrated to the canal-irrigated areas or have a member working as a share cropper or seasonal laborer there. Many have gone to DGK and other industrial cities to find jobs, some have also gone to the Middle East to find employment. The people also resorted to raising more animals than before so that in villages like Malghani animal raising, not crop raising, provides the main means of living.

(c) These affected people have lost their entire means of livelihood in Sharti. They seemed to be prepared and in fact, enthusiastic, to work cooperatively through their kamaras if the Sharti wah is restored.

It is highly recommended that along with other construction work at Mithawan, the restoration of Sharti wah also be undertaken.

### (iii) The Kaha and Choti Wah Dispersion Structures

The Kaha and Choti Nala dispersion structures were built during the last few years by funds from the ADB and JICA respectively. During our survey we looked into their management systems to see if there were any changes due to these recent structural improvements. With regard to Kaha, we heard some complaints from the Noorwah command area people, particularly from the residents of Miranpur, about insufficient flows in the channel, but did not hear of any change in the previously existing management systems. In the case of Choti Nala, the people had great appreciation for the newly constructed dispersion structure, but there were complaints about non-cooperation of kamara members. Such lack of cooperation, according to some, was getting more serious by the day. There is a need to strengthen the kamara systems in the area through social organization work.

## (2) Water User Associations

Attempts have been made throughout the developing world to form water user associations and other cooperative organizations to help improve the systems and the lot of their beneficiaries. Only two such systems, both practiced in different areas of Pakistan, will be described below for purposes of comparing them with each other and with the kamara system of the Pachad.

### (i) The Karez Water User Associations in Makran, Balochistan

A karez (called qanat in Iran), consists of a series of vertical wells and an underground slightly downward sloping horizontal channel, where water from the headwells dug into the water-bearing layers of the alluvial fan at a higher elevation is conveyed to surface settlements and farms, through gravity, at a lower elevation. The Karezes had their origin in old Persia thousands of years ago. Even today their largest number is in Iran, but they are also found in Yamen, Oman, North Africa, Afghanistan, Pakistan, and Sinkiang in China. In Pakistan the largest number is in Balochistan; within Balochistan, Makran in the southwest has the largest number of karezes.

The karezes are planned, constructed, and managed by share holding members or cooperatives. Costs for an average karez in Makran, estimated in 1982, came to two million rupees. Therefore a person of average means in Balochistan cannot undertake the construction of a karez all by himself. A person or few persons with investible resources conceive the idea of a karez construction and start working for its realization. They convince relatives, friends, and other interested people to buy shares in the karez, the total value of the shares being equal to the



estimated total cost of the karez construction. If the total amount contributed and pledged is considered to be more or less sufficient to finance the construction of the karez, they start a karez water user association, where normally the person with the highest number of shares becomes the leader, called "sarrishta" or "mir-i-aab" in Balochi. After completion of the construction work, the WUA switches to management and maintenance work. The sarrishta remains the head of the cooperative as long as he maintains his highest number of shares and manages the karez satisfactorily. The fines and punishment for non-complying members are severe and could, in extreme and persistent cases, result in the member's losing his share along with the land, if the sarrishta after consultations with other members so determines.

The karez owners associations have been in existence for centuries and although very simple and limited to water use only, they can be considered very successful. One reason for their success may lie in "small is beautiful," i.e., the numbers of share holders is normally small except in case of large karezes with discharges over 3-4 CUSECs. Second, the KWUAs are indigenous, grassroots-level organizations where rights and obligations are balanced, each member perceives the organization to be fair and just for all, and those with a larger number of shares do not dominate nor those with a smaller number of shares feel ignored and unimportant in decisionmaking. Community and family pressures force the share holders to participate in karez maintenance and cleaning activities. Since the initial investment is relatively high and since ignorance of cleaning and maintenance activities may lead to the Karez becoming completely dysfunctional, the members risk to pay too high a price for not cooperating with the group. Since the group as a whole bears the costs accruing due to non-cooperation of an individual, they can go to any length to force members to cooperate. The karez water user association is only one of the many cooperative activities that the local community engages in. The community survival to a large extent depends upon the members of the group cooperating with each other.

#### (ii) The Water User Associations under the On-Farm Water Management Project (OFWM)

In the framework of the On Farm Water Management Activities, water user associations have been established throughout Pakistan as a requirement for providing assistance basically for lining water courses. Based on literature, expert opinion, and objective evaluation of these water user associations in Pakistan, the generally agreed opinion is that these WUAs have not met with any significant success. The consensus viewpoint is that as long as the physical improvement works were in progress, most of the WUAs functioned seemingly well. As soon as the main task, that is, the lining of the water courses, was completed, the water user associations almost always disintegrated.

We visited the DGK office of OFWM directorate and were told by the staff that the water user associations were operational and effective throughout the DGK area. No particular efforts were made to ascertain the validity of such success claims, but previous studies in the area showed no indication that things were any different here than elsewhere in Pakistan. A few points, in this regard, may be mentioned here: (a) In the irrigated areas of Pakistan, where most of these WUAs have been formed, there are no traditions of communities themselves managing their

irrigation systems at any level. The government has always been there as a big brother. (b) The water user associations under OFWM are normally dominated and controlled by big landlords. An average member is normally not involved in decision making. (c) The WUAs are required to fulfill certain obligations, but have no power or incentive systems at their disposal to reward those members who cooperate and punish those who do not.

## SUMMARY AND CONCLUSIONS

### 1. Summary of the Paper

The Pachad area of Dera Ghazi Khan, lying between the canal irrigated areas and the Suleman mountain ranges, is one of the least developed areas of the Punjab province of Pakistan. Thirteen major and numerous minor hill torrents provide the only source of irrigation to an area of 0.81 million Ha and about the only means of livelihood to a population of over 2 million persons. The proposed Mithawan hill torrent pilot project is aimed at controlling, regulating, and better utilizing its flood waters. The project, if undertaken, will benefit thousands of families by providing more reliable and certain irrigation to a cultivable area of over 90,000 acres annually. The social soundness study was undertaken to find answers to the following questions:

- (i) What kind of a socioeconomic environment prevails in the Pachad area in general, and in the Mithawan command area in particular?
- (ii) Who are the anticipated project beneficiaries, and is the project socially feasible?
- (iii) What are the local and indigenous water use and management practices followed? How efficient and sustainable are these systems as compared to other possible management systems? Should a new management system be introduced or should the existing systems be strengthened and expanded?

The main conclusions, based on field studies, observations, and interviews, are summarized below.

(i) The area was formerly part of the Leghari tuman territory, so the population is predominantly Leghari Baloch, speaking both Saraiki and Balochi languages. Although the sardari/tumandari system ended a long time ago, the people are still organized in tribal and subtribal groups under the leadership of their local traditional mokadams. The traditional Baloch value systems covering interpersonal and intertribal relationships, and the tribal code of conduct are, at least partially, still followed. Disputes are settled under a system similar to the old jirga or Panchayat system, where community elders get together and decide matters according to the customary and traditional laws.

(ii) The people of the area live under marginalized conditions and barring outside income they generally just survive and are at the continual risk of starvation. The average land holding size is extremely small at 1.3 Ha, and considering that any production from this land is uncertain, depending upon unreliable rainfall and flood incidence, this holding is way below subsistence even applying local standards. Thus the main beneficiaries of the project would be small subsistence farmers, tenants, and landless labor. A very small number of large land holders,

normally, give their lands to share croppers usually on a 50:50 share basis. Even in this case local share croppers and poor tenants will be the main beneficiaries. On the basis of this fact, and of our general analysis we conclude that the proposed project is socially sound and feasible. The benefits of the project will be widely distributed and the beneficiaries will participate in project activities. The expected and potential beneficiaries have indicated their willingness to participate fully in repair and maintenance of the flood irrigation systems, particularly if they are involved in the decision making from the outset. Many families and individuals who have migrated to other areas because of uncertain local irrigation will return if the Mithawan project is successfully implemented. Similarly, if successful, the Mithawan structures and systems would be followed by the local people, the government agencies, and international donor agencies to regulate and better utilize the flood waters of scores of similar hill torrents in the entire Dera Ghazi Khan Pachad region. The project, because of its special nature and possible outcomes and benefits is considered to be socially feasible.

(iii) Mithawan hill torrent floods are the main and about the only source of irrigation in the area. At the apex, the Mithawan hill torrent branches out into two main wahs, the Shomali Talha and the Janubi Siraj Wah. As these wahs pass through the cultivable areas temporary gandhas or embankments are constructed to block and divert flood waters into branch wahs or distributories which are similarly further blocked and diverted to the adjacent fields for flood irrigation. At different stages and locations of the main source and the branch sources, cooperation and collective action by all farmers is required. Therefore, people have traditionally formed water user associations called kamara. Various forms and levels of kamaras have been in existence in this part of the world for centuries. The kamara WUAs could be entirely tribe based, subtribe based, or lineage/clan based, and are accordingly sardar/tumandar led, mokadam led, or mazan/wadera led.

Traditionally the highest level kamara led by the Leghari tribal tumandar covered the entire Mithawan command area, and all second- and third-level kamaras and member farmers were obliged to contribute labor toward it. In other words, the tumandar or sardar acted as the main coordinator and arbiter of the main Mithawan-wide kamara. All mokadams who were heads of the second-level kamaras followed the tumandar's orders for the high-level work. Although the mokadams had sufficient autonomy in running their own subtribal wah or wahi based kamaras, disputes between the various kamaras were taken to the tumandar for settlement. If a member of a lower-level kamara did not contribute his due share to the high-level Mithawan-wide work, the tumandar would hold the local mokadam responsible for it. Privileges as well as responsibilities were shared by the community. Thus, the mokadam had to persuade the concerned individual to comply or accept the tumandar's punishment. The punishment for not attending to the collective kamara activities varied from money fines to land confiscation, and in extreme and persistent situations to banishment from the area. Thus, there were all types of incentive systems provided in the days of the old tumandari.

The demise of the tumandari system created a vacuum. High-level works at the main Mithawan are not being done as regularly and as efficiently as before because of less coordination of kamaras at that high level. This, however, does not mean that such cooperation or coordination

of kamaras has been completely lacking since the tumandari system. In fact, all the main structures over Mithawan and the main wahs, including at Hudwali and Chitri, were constructed with partial contributions from entire Mithawan area kamaras.

But, there is a need for the restoration of the old coordinating function, and the establishment of a kamara coordinating committee (KCC). This committee, consisting of all the existing second and third level kamaras, may initially need help from outside sources, possibly including JICA and PID. The help will particularly be needed in the areas of supervision, provision of common equipment, and in social and technical training.

The probability of failure of such a coordinating committee will be low, since this would not be introducing a new organization or a new concept. The tumandar, in his time, acted as the head of the kamara coordinating body, while all the mokadams were its members or functionaries. The tumandari system was far from being democratic, but all indications are that, at least in the area of kamaras and water use, the tumandars themselves participated, and in many cases contributed their own share of labor, and the system on the whole was perceived to be just and fair. Similarly the mokadam system today exists because the members consider it to be of benefit and value to them. The kamara system, with all of its weaknesses, still appears to be a better system, and therefore at the subtribal and sectional level it has been sustainable and relatively efficient. If there is equal representation by all the subtribes and sections in the coordinating committee of the kamaras, and democratic decision making is encouraged, it will bring about a more egalitarian and equitable system at the local level. In the text, examples of two water user associations are instructive for our purposes. The Karez water user associations formed by the farmers and followed in neighboring Balochistan, closely resemble the kamara system and have worked successfully for centuries. On the other hand the water user associations formed under on-farm water management projects with the help of government or donor agencies have generally not been successful. The probability of KCC succeeding are relatively high.

If crowned with success, the KCC can be used not only to undertake the maintenance and repair work on their structures and beds, but also to introduce other improvements in their irrigation and crop practices. Such improvements could include better on-farm water management and maintenance of the water courses, better crop varieties, and better access to credit and other inputs.

## 2. Conclusion 1: A Kamara Coordinating Committee Should Be Formed

Based on historical evidence and the obvious inability of the members of the existing kamaras to construct or even repair the main dam structure to guide waters to the haqooq areas, and restore the Sharti wah which was destroyed two decades ago, it can be concluded that the local people lack the resources to manage high level floods. A serious problem is the lack of a coordinating person or organization to fill the vacuum created by the demise of the old tumandari system.

For this purpose it is recommended that a Kamara Coordinating Committee (KCC) be formed on the lines of a similarly existing organization that was headed by the tumandar until the 1950s. The KCC will have the administrative capacity to implement the programs assigned to it, since with few exceptions these represent straightforward extensions of programs that it is already implementing elsewhere in the general area without serious difficulty. This KCC would simply be an extension of the present kamara activities, and if provided necessary support and guidance in the initial stages, it could fill a long overdue and badly felt need of the local farmers. With some help from outside at the outset, the KCC will take over all important matters regarding the overall fan management. The KCC should soon be able to handle monitoring, forecasting, maintenance and financial matters for all major community works. The KCC can be formed along the following general principles:

(i) The membership of the KCC should be drawn from all existing and viable kamaras, based on the kamara size or bund ownership. The total number of members should be between 15 and 25.

(ii) Equal representation should be given to the Shomali (Talhaw) users and Janubi (Sirajwah) users, while a way could be found to give representation to the Ganehar wah (escape) beneficiaries. In this regard, matters regarding the review of water rights should be taken up in consultation with all the mokadams of the area.

(iii) Once formed, all decisions should be taken following basic principles of democracy and one man one vote, etc.

(iv) Most of the members would be either mokadams or mokadam nominees. Following the analogy of the old tumandari system, the mokadams forming a council of elders or jirga will elect their own tumandar (chairman) and other office bearers.

(v) The KCC should register itself with the social welfare department, and get itself recognized as an entity.

(vi) The KCC, along with the mentioned social and technical training, should in the long run also be provided some training in cooperative activities, movements, and the benefits of such cooperatives as input cooperatives, production cooperatives, and marketing cooperatives.

### 3. Conclusion 2: Institutional and Technical Support is Needed

Overall, the Mithawan area farmers seem to be capable of managing low to midlevel flood situations; they may not need much help for that. But they had had difficulty managing floods over 15,000 CUSECs. They can monitor and detect detrimental changes in the embankment structures, but not in the channel beds and courses. Thus, there is a need for training from outside sources like JICA and IDP. In the initial stages, the following forms of social and technical support will be needed by the KCCs.

(i) Training in the areas of social organization, cooperative activities, group harmony, etc. needs to be provided. A social scientist with long experience in social organization, preferably among tribal, semi-tribal, and traditional communities, needs to be associated with the KCC, and to possibly stay in the general area and work with the communities. The engineering staff of the irrigation department, particularly those dealing with the rodkohis, also need some training in social organization, group action, and farmer organizations. Similarly, although the FAO staff are doing a commendable job at Doli, they are young men and women who have just entered this difficult area of public service. Dealing with different cultural and linguistic groups and with people of differing tribal and semi-tribal backgrounds, and then hoping to organize them for collective activities is a task of enormous proportions.

While a senior-level social scientist works in close collaboration with the KCC, at least two of the six social organizers (group promoters) of the FAO project at Doli may be assigned, initially for a period of one year, to work in the Mithawan command area. The FAO senior staff agreed that there was such a need, and they feel that the services of two group promoters from Doli could be spared at least part of the time.

(ii) Technical Training: There are two types of monitoring activities that must continually be undertaken in order to avoid catastrophic situations from developing. First, the structures, mainly the gandhas and embankments, must constantly be monitored for erosion, cracks, and give-ins. Such situations need to be immediately reported and prompt action taken to ameliorate the situation. Second, the channel beds need to be continually monitored for unfavorable changes and variations. The channels showing signs of degradation, aggradation, and change of course must be taken seriously at first sight, reported, and appropriate action taken. As mentioned in the text, the local kamaras appear to understand and normally take some action with regard to damage detected in the structures, but there is less understanding and realization of the seriousness of variations in the channel beds. It is important that technical training in both the above areas, with emphasis on the latter, be imparted to the local farmers. Such areas should include damage monitoring, damage detection and assessment, forecasting, and prompt action techniques, etc. JICA, in collaboration with the PID, may also provide equipment such as a bulldozer and a few tractors and related equipment. Putting these at the disposal of the KCC under JICA/IDP supervision will provide an incentive, a common property, and also practical hands-on training in cooperative use of inputs.

#### 4. Conclusion 3: Sharti Wah Should Be Restored

The disfunctioning of Sharti wah has adversely effected thousands of families and thousands of acres of productive land. As it happened during 1976-79, Sharti could again have devastating effects on the entire Mithawan system, if not restored and stabilized. It is recommended that restoration work on Sharti be undertaken at the same time as the construction of the dispersion structure.

#### 5. Conclusion 4: The FAO Watershed Management Project Should Be Supported

Support for the FAO watershed management project and its social organization work at Doli is important for bringing development activities to one of the most neglected tribal areas of Pakistan. The project encourages conservation of natural resources, stabilization of the Mithawan catchment area, and mobilization of the local people to participate in activities of common good. Among other benefits, this project will help ensure the long term success of the Mithawan pilot project. It is recommended that support for the project by JICA be continued.

## ***DRAWINGS***



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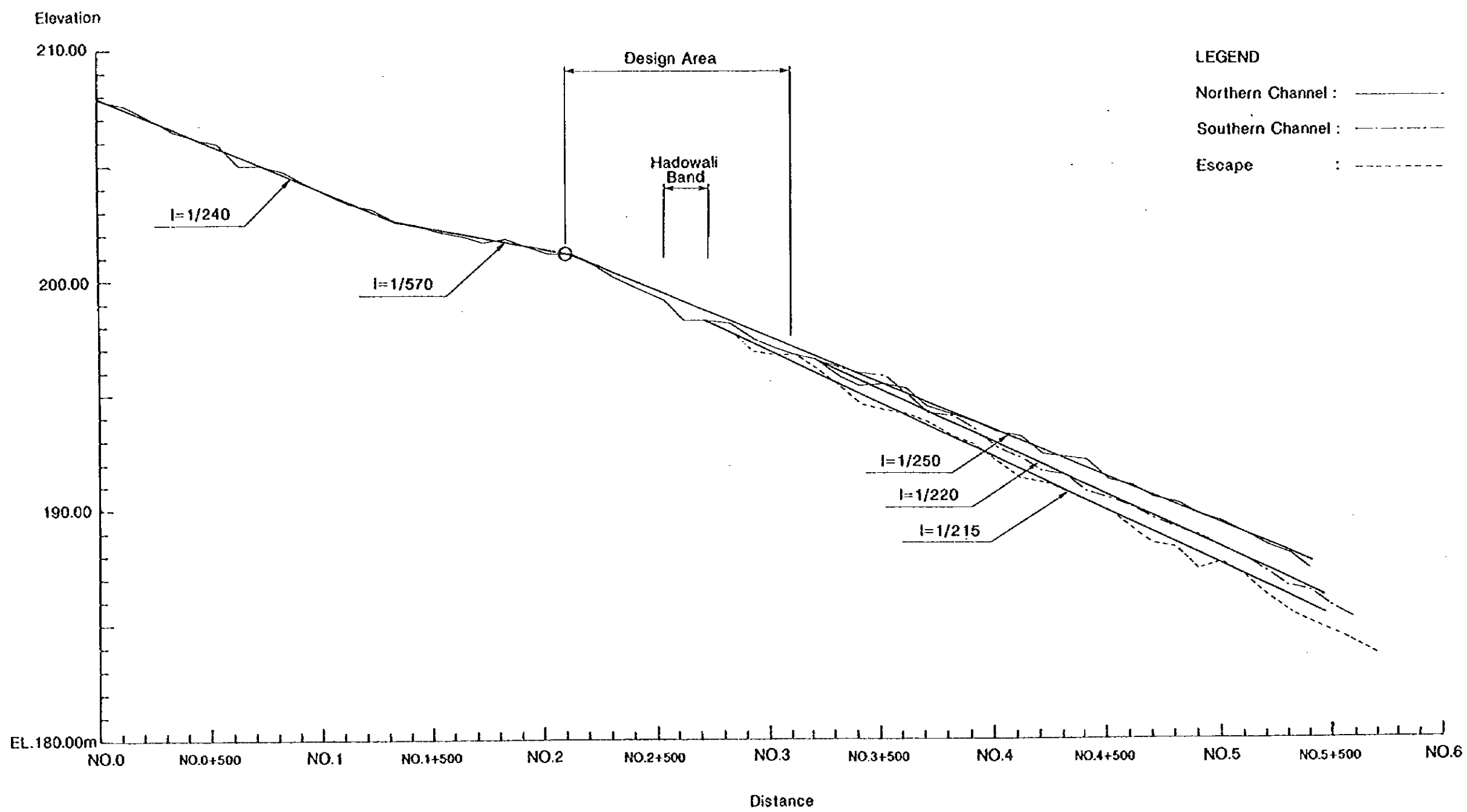
## **DRAWINGS**

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- Fig.1 Present Riverbed Longitudinal Section
- Fig.2 Location of Dispersion Structure
- Fig.3 Longitudinal Section of Dispersion Structure
- Fig.4 Plan of Dispersion Structure
- Fig.5 Front View of Dispersion Structure
- Fig.6 Cross Section of Dispersion Structure
- Fig.7 Cross Section of Longitudinal Structure



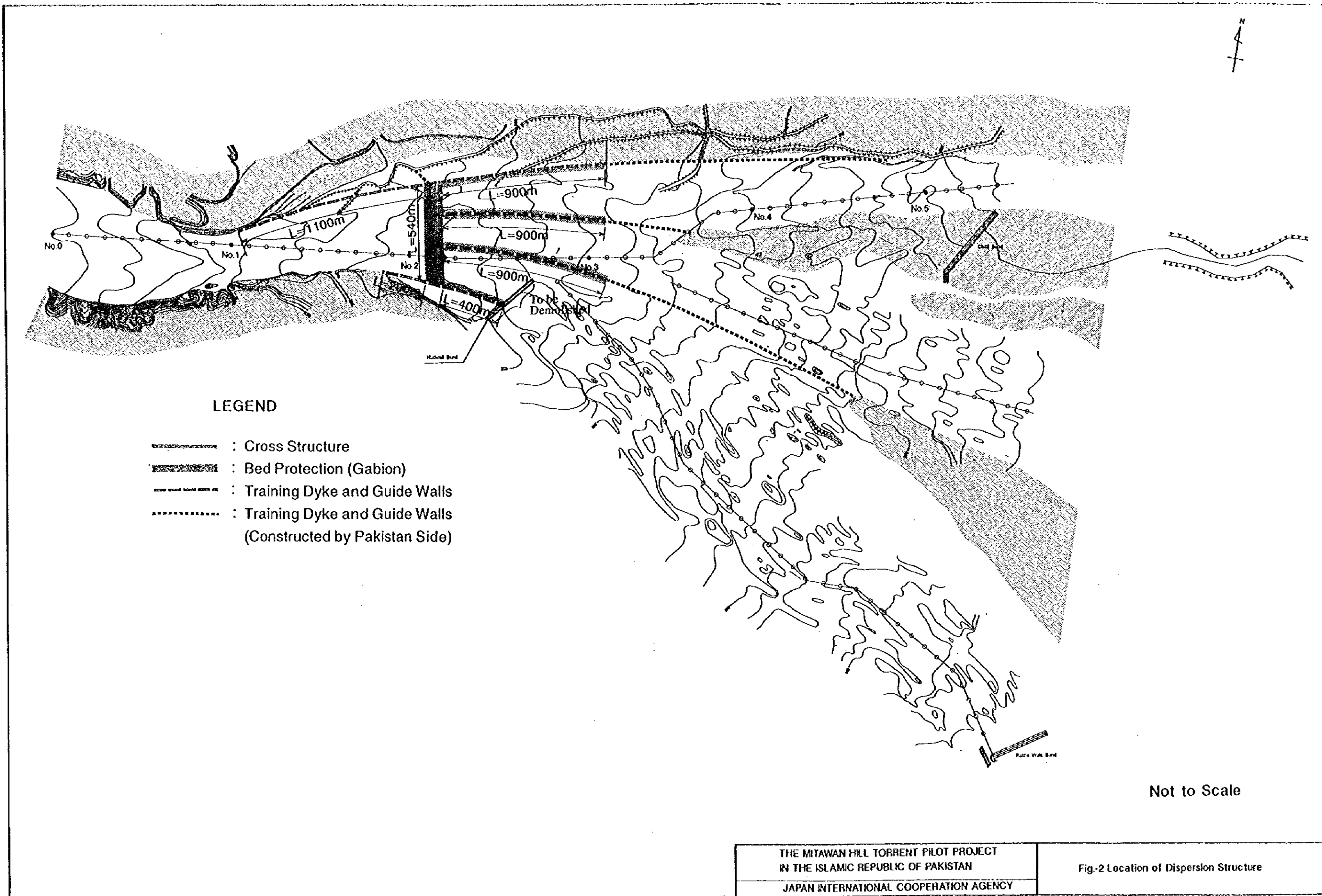


LEGEND  
 Northern Channel : ———  
 Southern Channel : - - - -  
 Escape : . . . . .

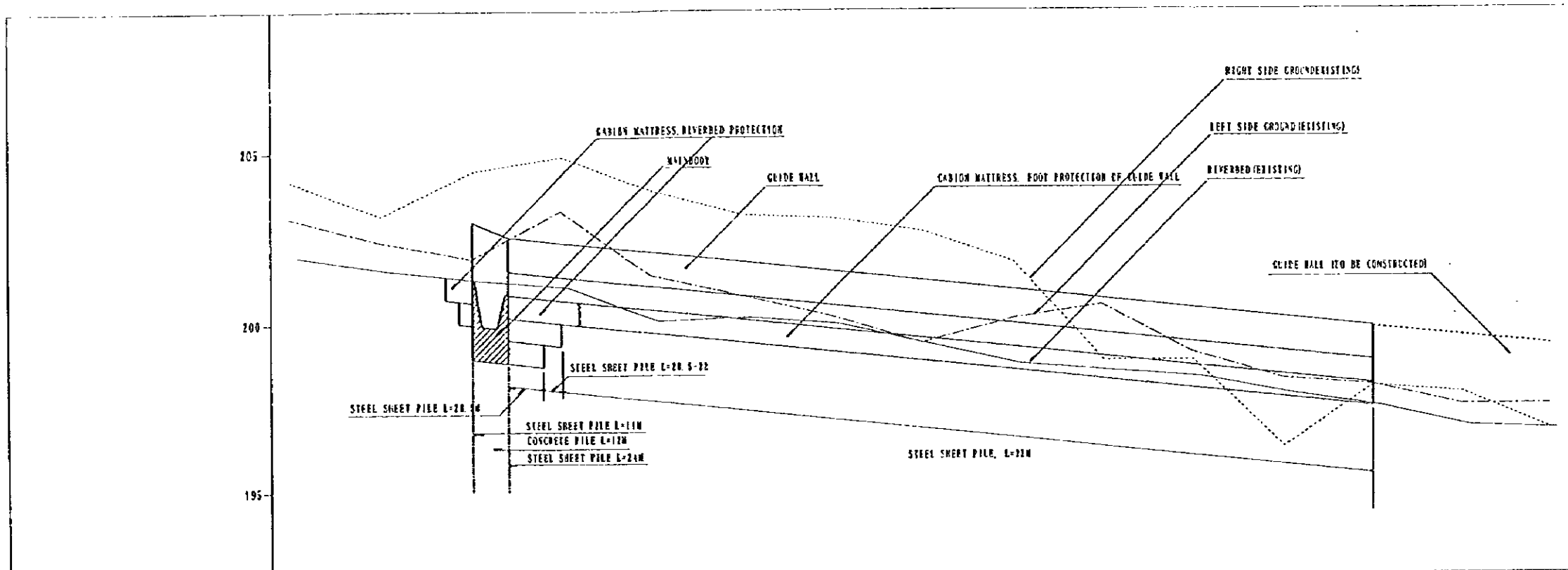
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THE MITAWAN HILL TORRENT PILOT PROJECT  
 IN THE ISLAMIC REPUBLIC OF PAKISTAN  
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Fig-1 Present Riverbed Longitudinal Section



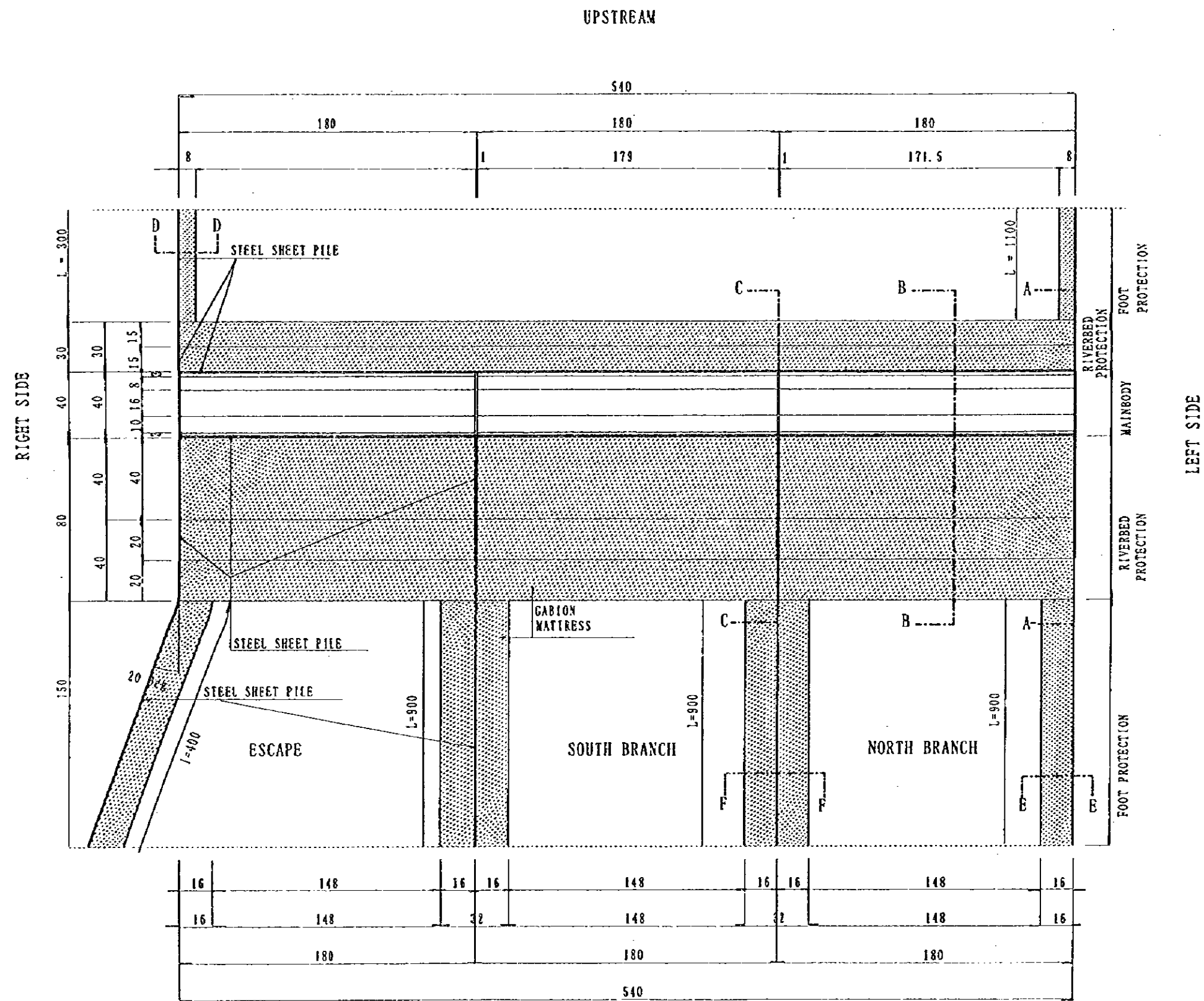
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Design Riverbed Gradient		1/230														
Design Elevation (m)	Dike Crown	203.7	203.3	202.8	202.4	202.0	201.5	201.1	200.7	197.7	199.8	199.4				
	High Water	203.7	203.3	202.8	202.4	202.0	201.5	201.1	200.7	197.7	199.8	199.4				
	Riverbed	201.2	200.8	200.3	199.9	199.5	199.0	198.6	198.2	197.7	197.3	196.9				
Existing Elevation (m)	Right Side Ground	204.1	202.1	204.4	204.8	203.8	203.1	202.6	201.7	198.8	198.8	196.2	198.0	197.8	196.7	
	Left Side Ground	202.9	202.2	201.7	203.1	201.2	200.6	199.2	199.9	200.3	198.9	188.1	197.9	197.3	197.3	
	Deepest Riverbed	201.9	201.5	201.2	201.0	200.0	200.1	199.9	198.7	198.5	198.3	197.8	197.4	196.8	196.7	
Distance (m)	Accumulative Distance	1900.0	2000.0	2100.0	2200.0	2300.0	2400.0	2500.0	2600.0	2700.0	2800.0	2900.0	3000.0	3100.0	3200.0	3300.0
	Single Distance	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Cross Section		1.90k	2.00k	2.10k	2.20k	2.30k	2.40k	2.50k	2.60k	2.70k	2.80k	2.90k	3.00k	3.10k	3.20k	3.30k

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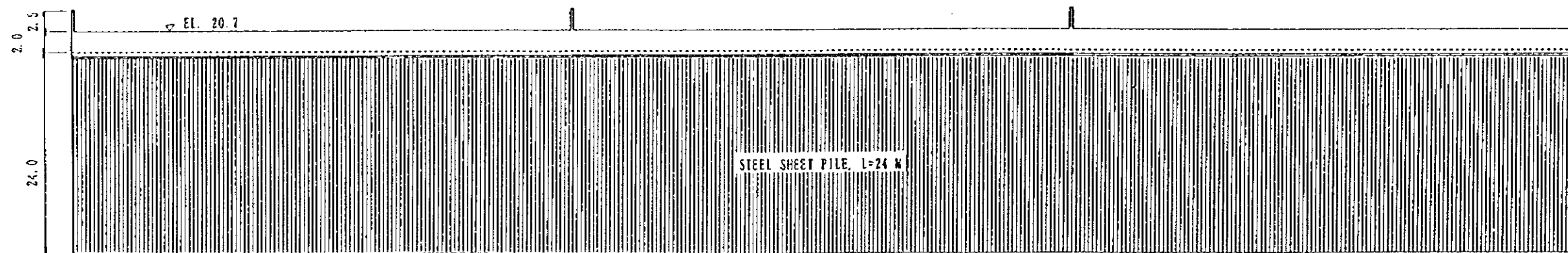
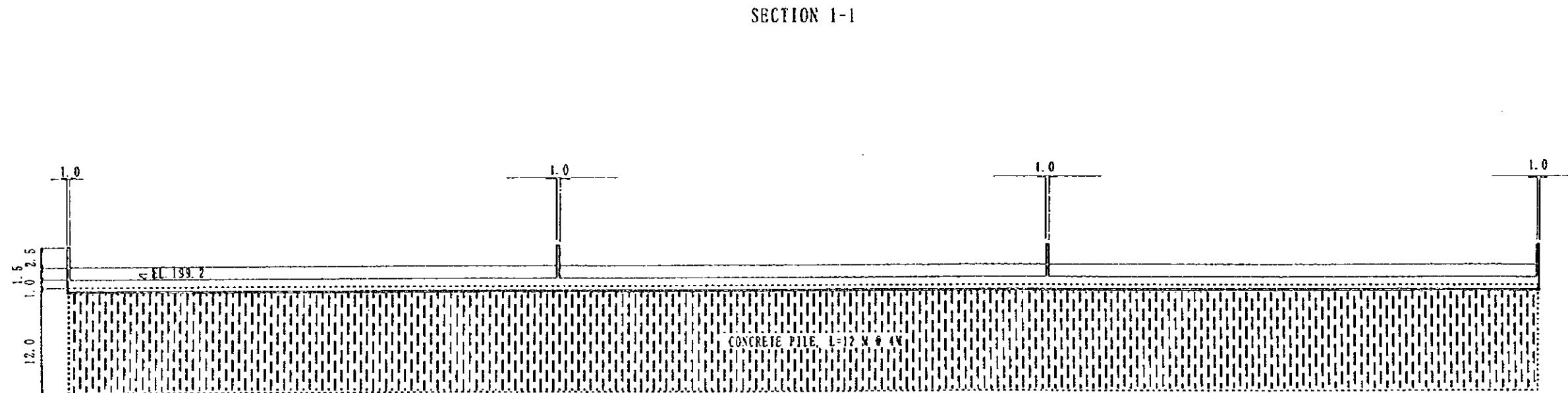
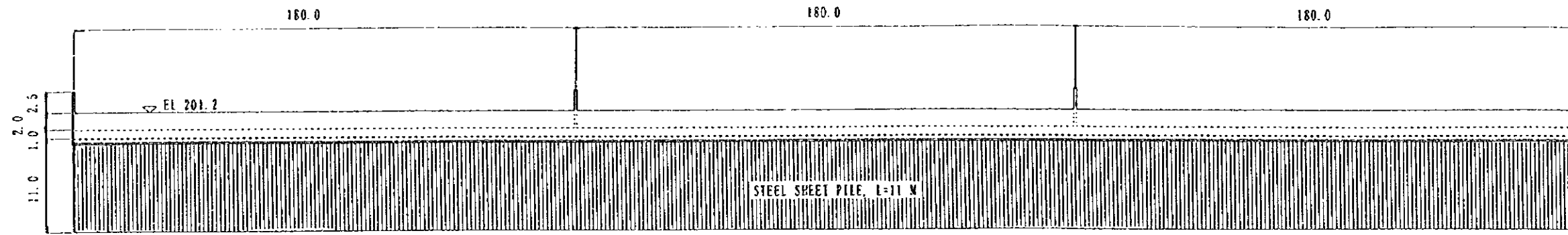
THE MITAWAN HILL TORRENT PILOT PROJECT  
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 Fig-3 Longitudinal Section of Dispersion Structure



Not to Scale

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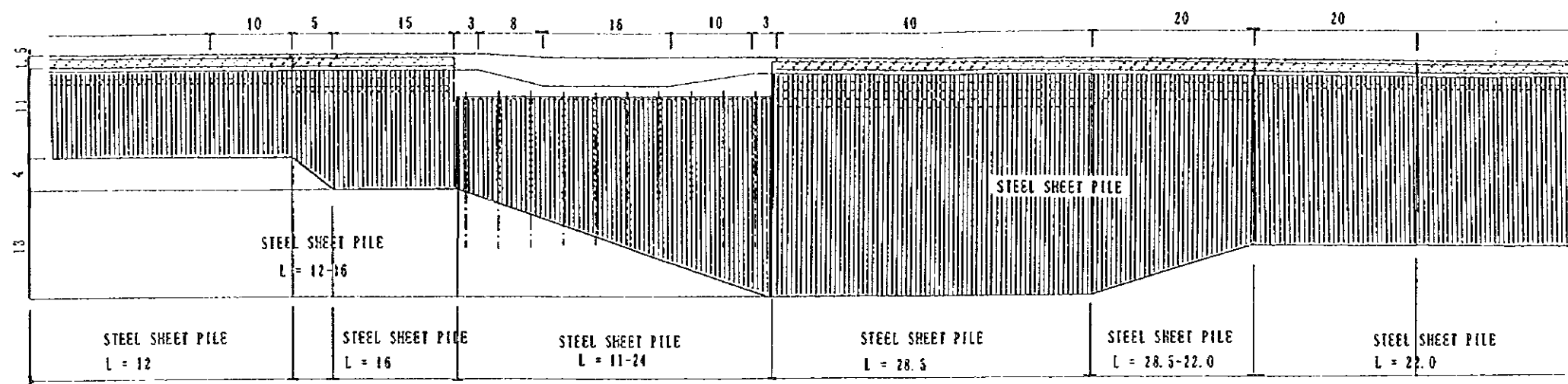
Fig-4 Plan of Dispersion Structure



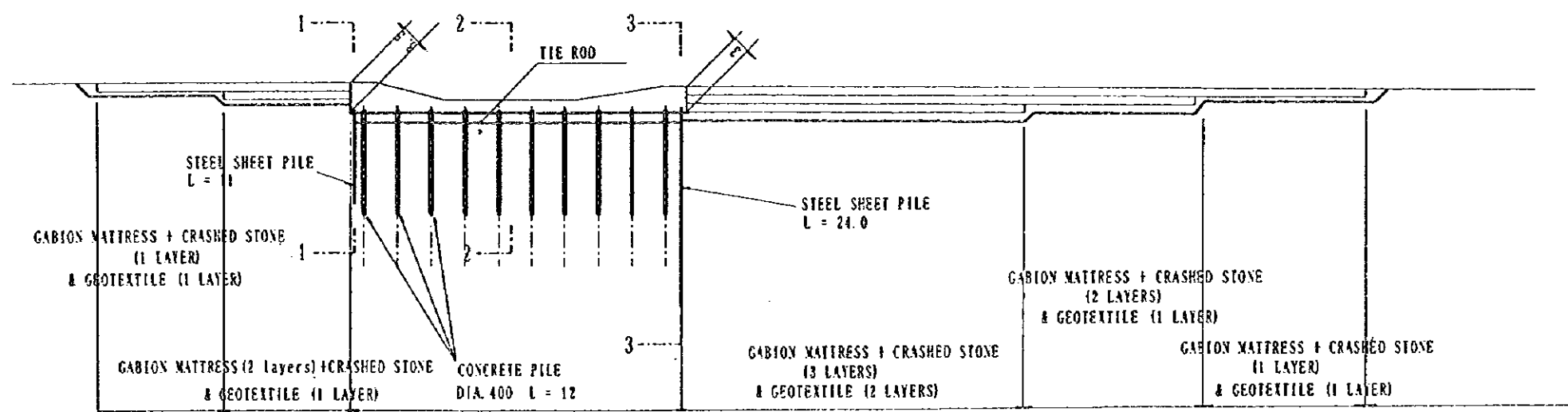
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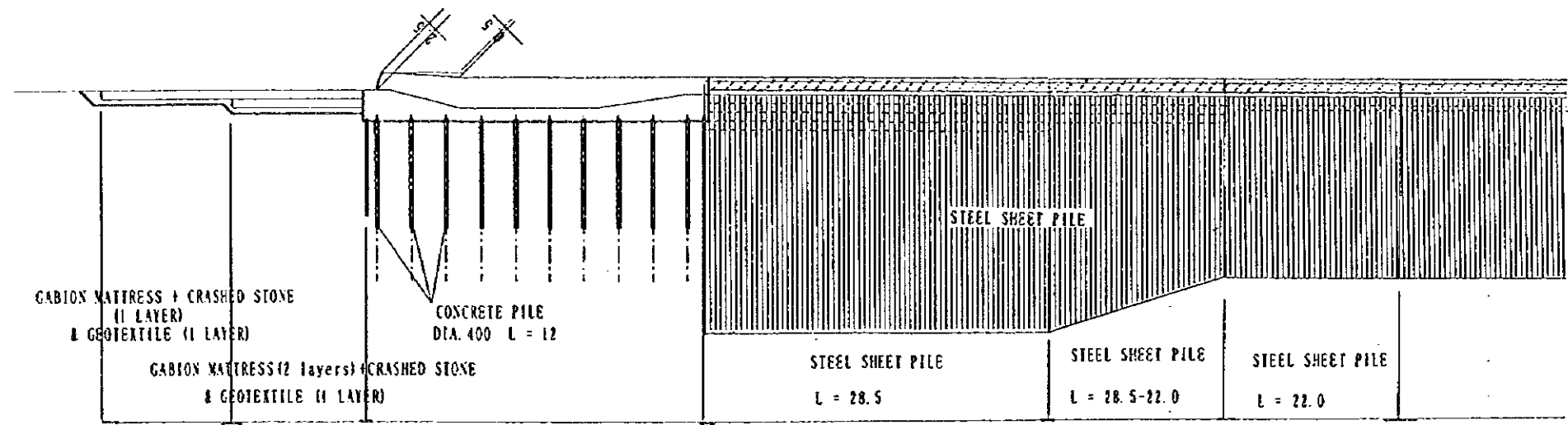
Fig-5 Front View of Dispersion Structure



SECTION A-A



SECTION B-B



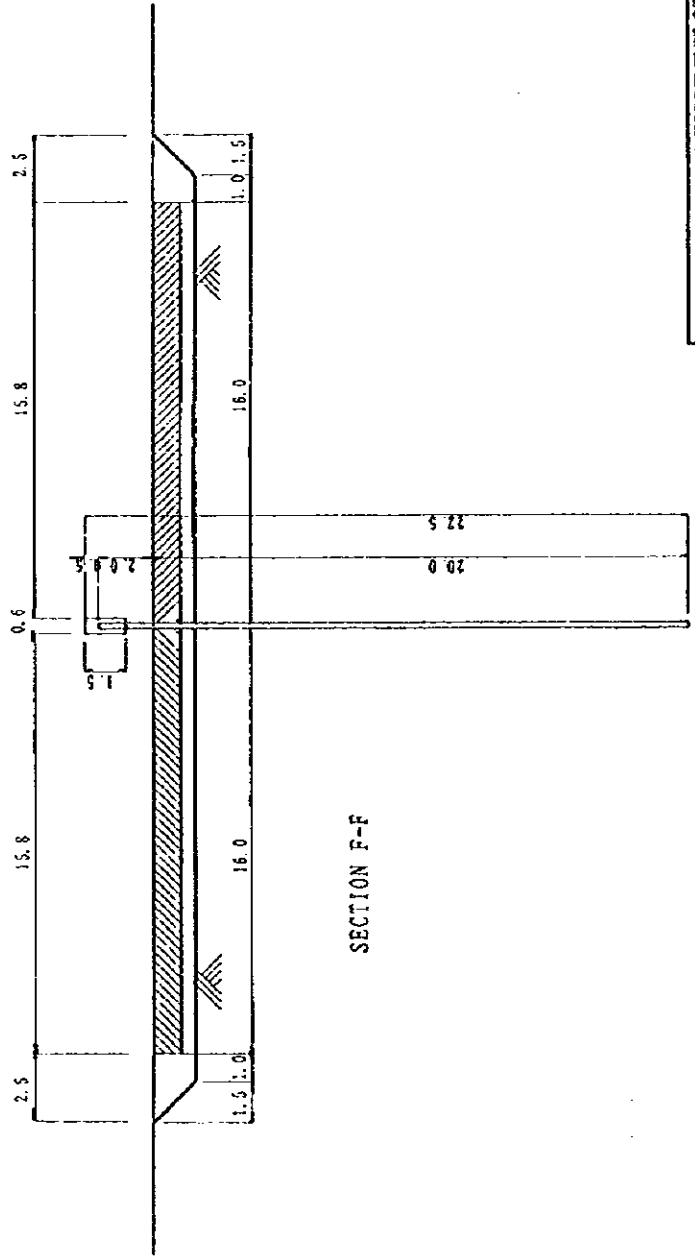
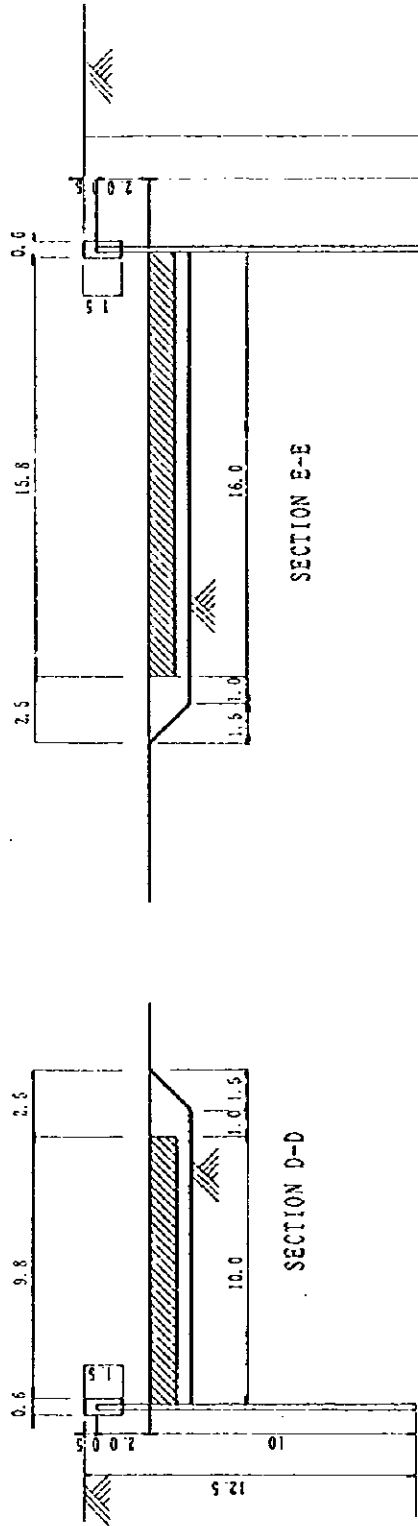
SECTION C-C

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Fig.6 Cross Section of Dispersion Structure





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Fig-7 Cross Section of Longitudinal Structure







JICA