

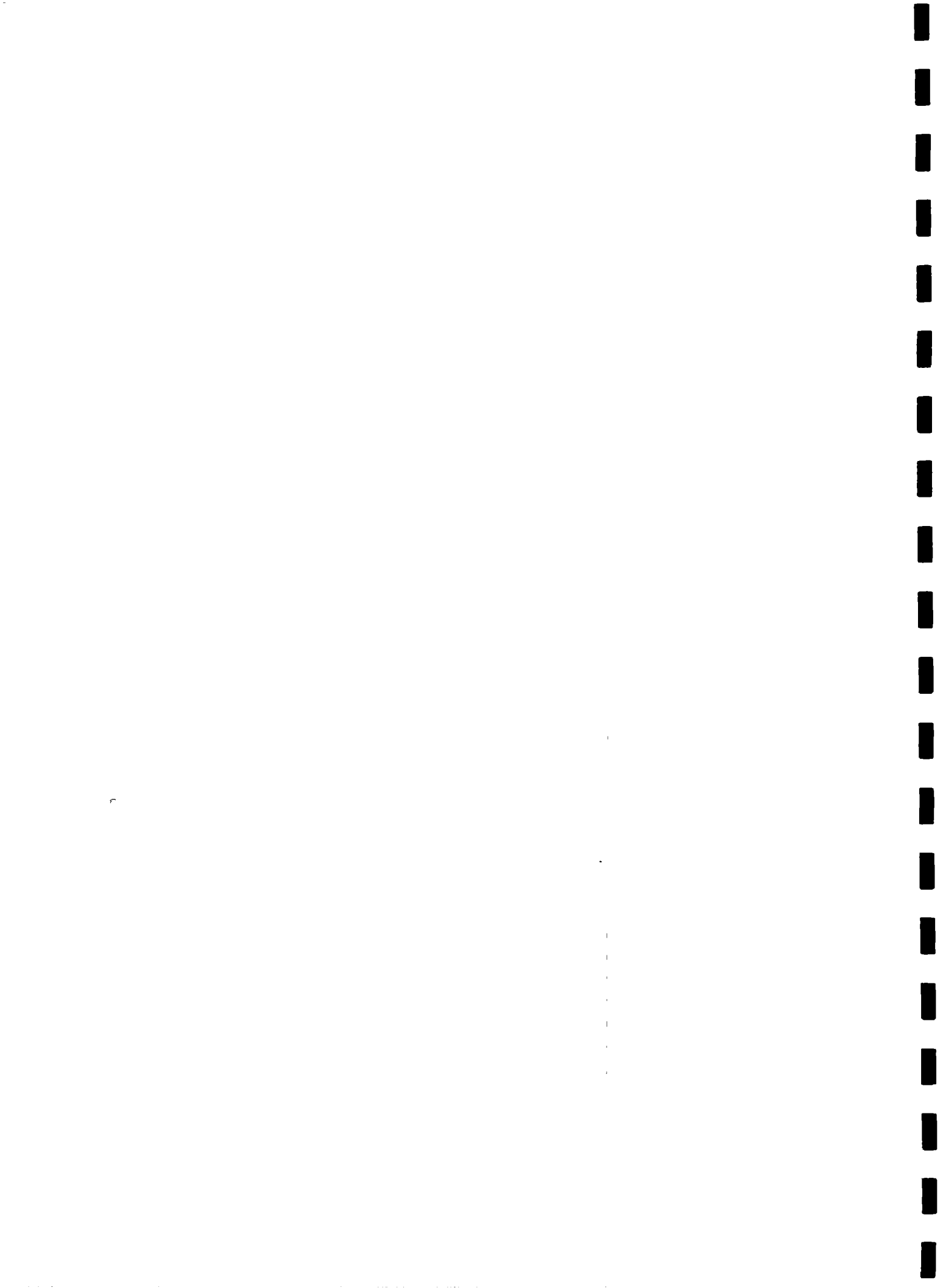
**Water, Sanitation, Hygiene and Health Studies Project
Northern Areas and Chitral**

ISSUE PAPER 4:

**SELF-HELP RURAL WATER SUPPLY SCHEMES:
LESSONS LEARNED FROM THE NORTHERN AREAS
OF PAKISTAN**

by:

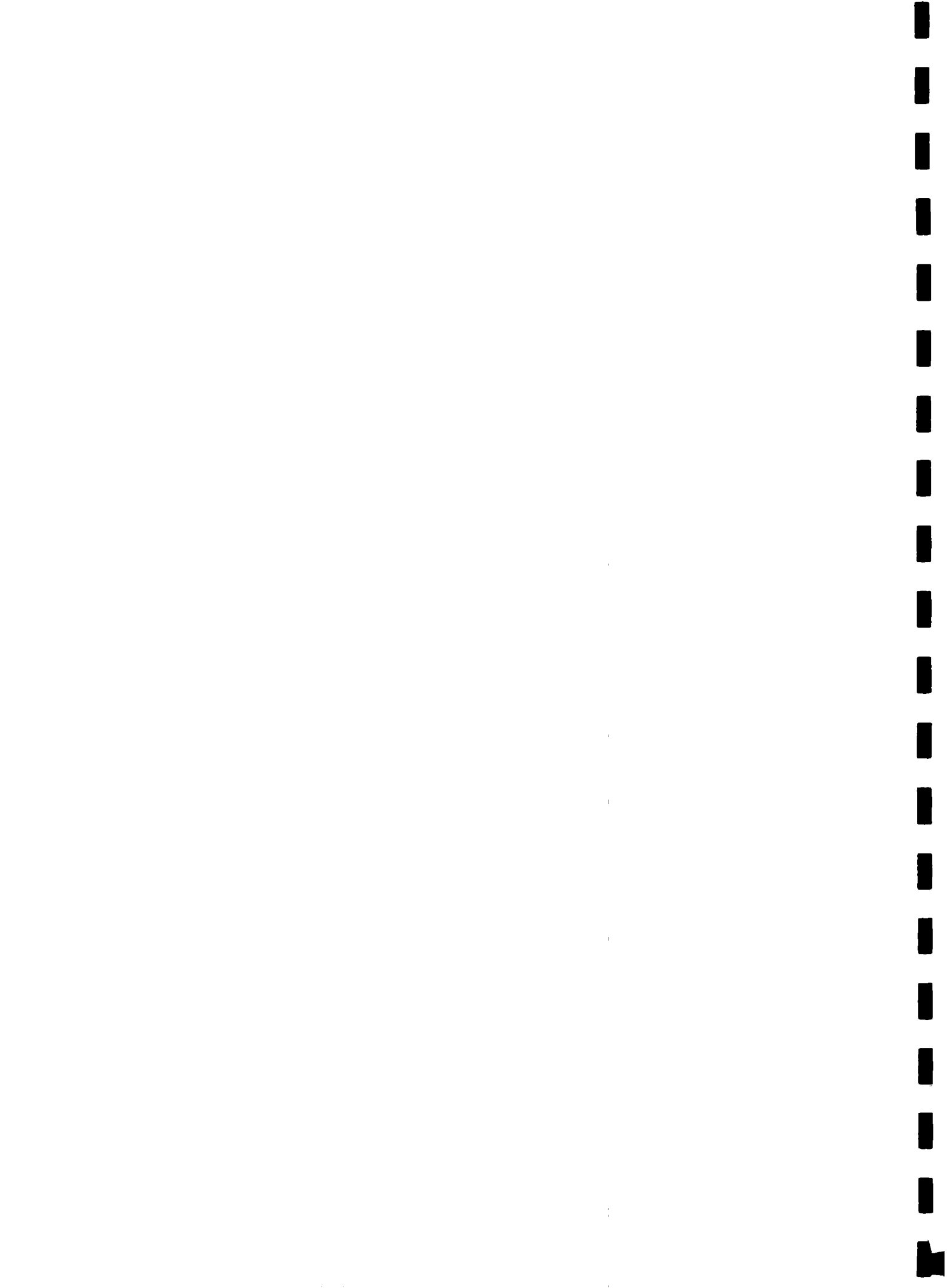
Altaf Hussain and Michael A.M. Langendijk



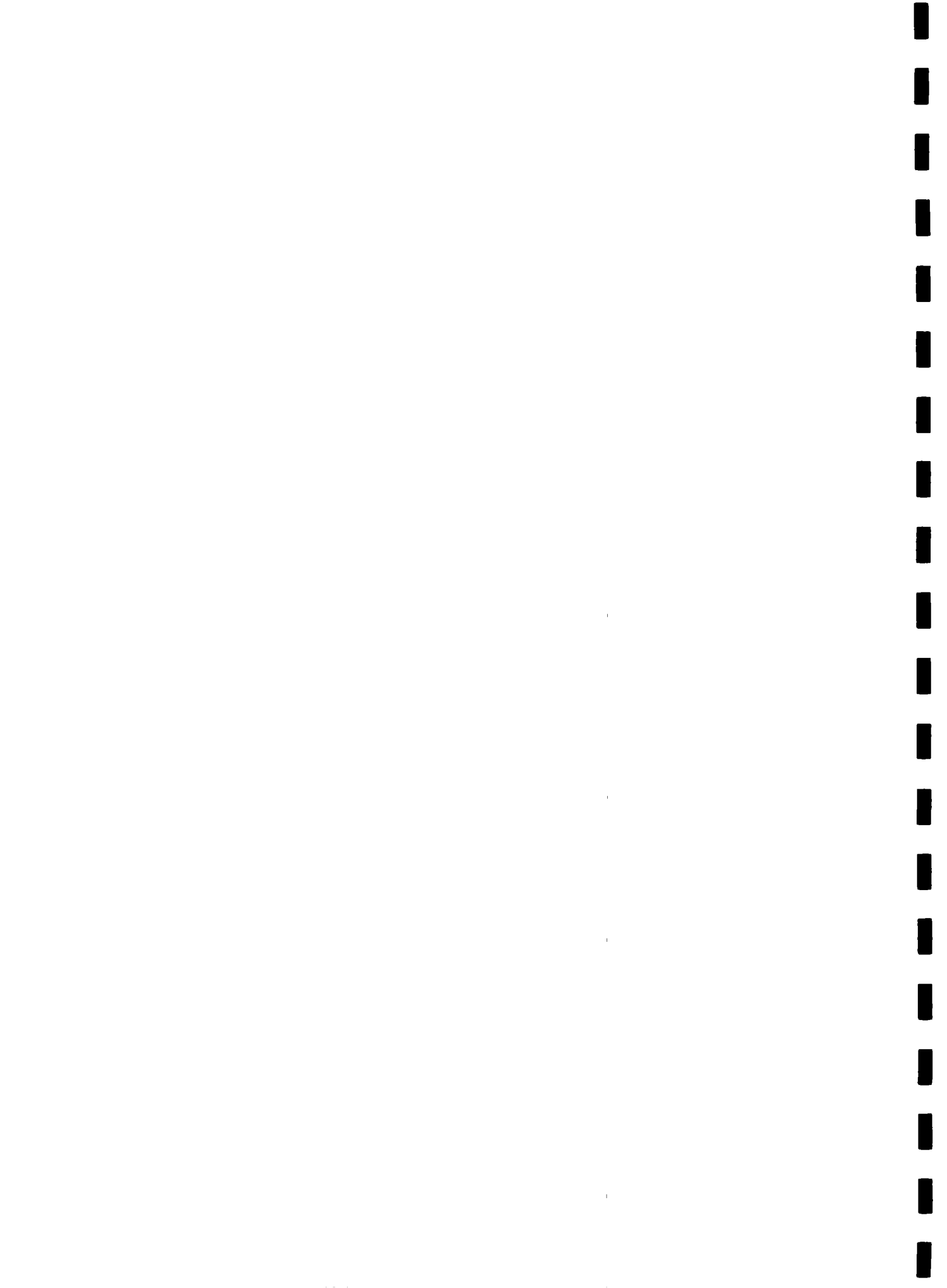
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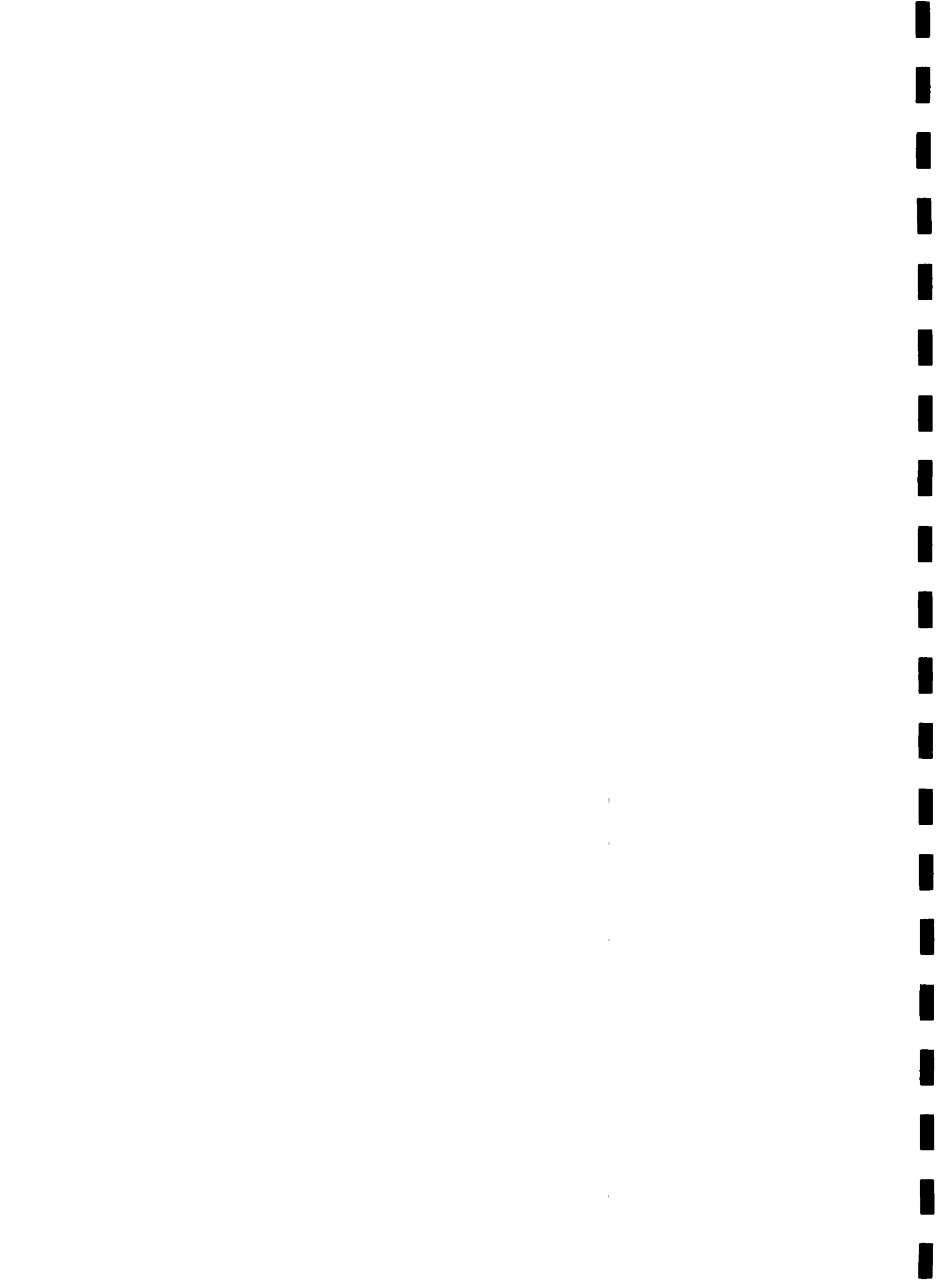


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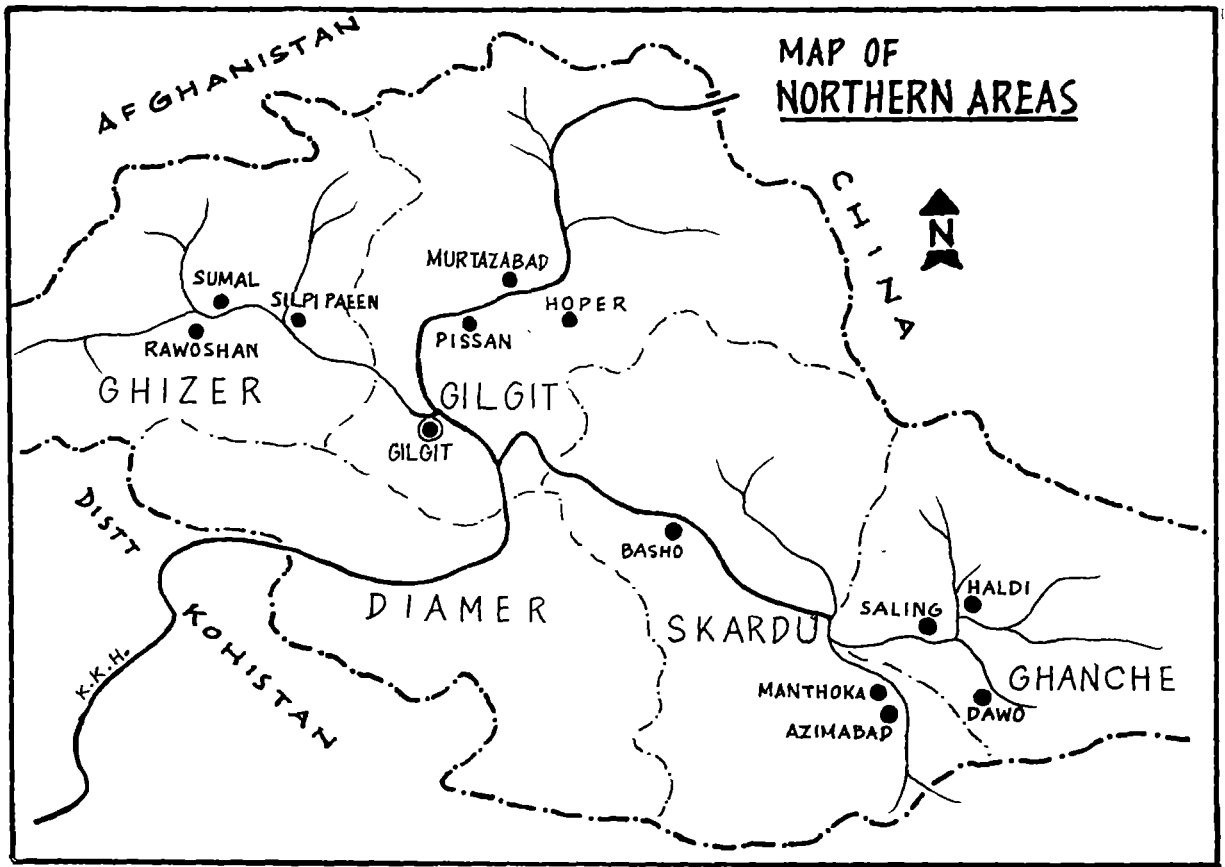
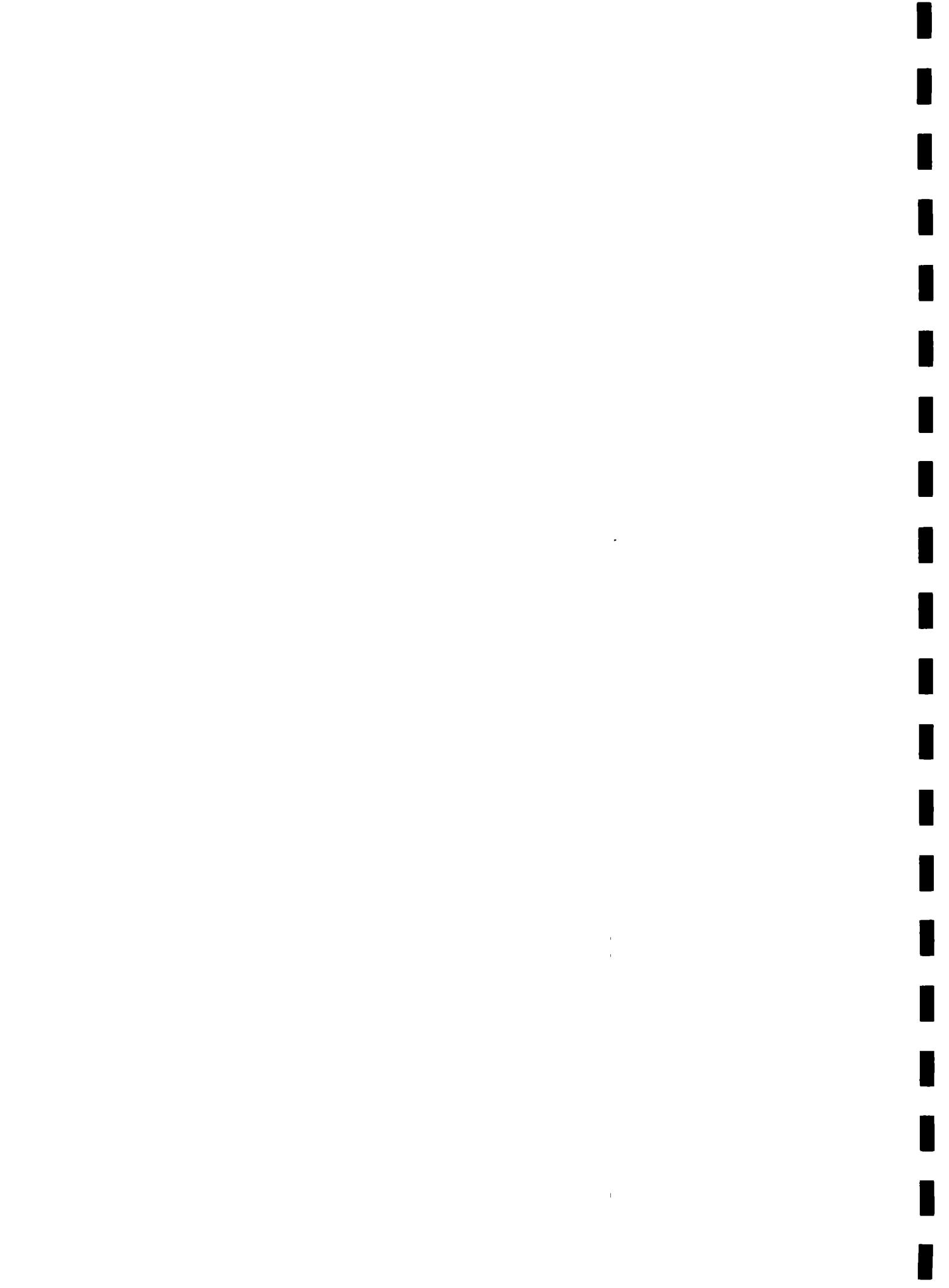


Figure 1: Map of the Northern Areas, indicating the sample villages



INTRODUCTION

This report presents the results of a village level study to existing rural water supply systems (RWSS) in the Northern Areas of Pakistan. The study identifies and describes local practices and solutions applied by communities during the implementation and management of water supply schemes. Its main aim is to determine the strengths and bottlenecks, and the role of communities in the present implementation approach.

The results of the study will be essential in the development of effective strategies and work plans for better planning, implementation and management of piped water schemes. It is hoped that the study will be of interest to the Social Action Programme (SAP), the RWSS component of which is presently being executed by LBRDD in partnership with AKRSP and the informal assistance of the WSH&HS Project

To date about 200 water supply schemes have been implemented in the rural areas, the majority of these schemes have been implemented by the Local Bodies and Rural Development Department (LBRDD) with material assistance from UNICEF and inputs from the communities. The performance of a high number of rural water supply schemes is below the expected level and needs major repairs or complete rehabilitation. The total population covered with piped water is therefore estimated to be less than 30% of the rural population.

The focus of this study to rural water supply schemes lies in the first place on the main actors who constructed and manage the schemes, the village communities. It is their opinions and experiences with RWSS that form the basis of this report. Additional information has been collected from LBRDD field staff, available literature and documents.

OBJECTIVES

To assess the role of rural communities in the various stages of piped water supply projects and identify alternative ways to achieve more participation for a sustainable and self reliant RWSS.

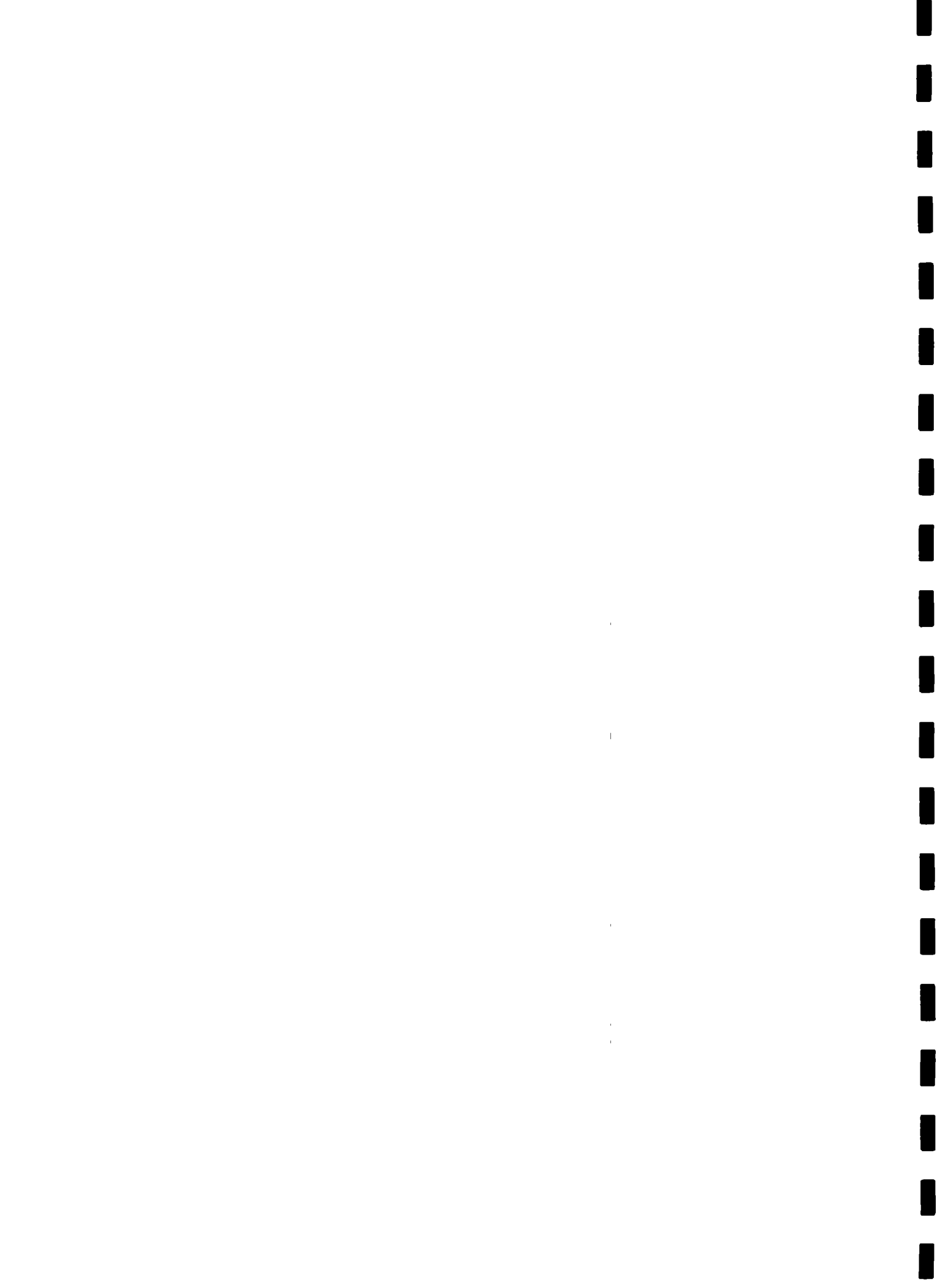
To identify factors that explain the success or malfunctioning of rural water supply projects

To document local experience with resolving technical and social obstacles during the implementation and management of village water supply projects.

METHODOLOGY

For data collection of this report a variety of research techniques were used. First a series of semi-structured interviews were held with key informants during rapid appraisals in the autumn of 1993. These interviews took place in over 25 villages where piped water schemes had been implemented by LBRDD, NAPWD and AKRSP.

Second, an indepth study was conducted in 12 sample villages, in which community based water supply schemes had been implemented through LBRDD. Each of the 12 villages was visited by a social scientist on two or three consecutive days. The indepth study was undertaken in the months



February to May 1994. In each village semi-structured interviews were held with village authorities, water committee members, union council members, plumbers and users of communal stand posts. Group discussions were held to discuss and to cross check information. In two villages participatory village mapping was pre-tested. Furthermore extensive observations and informal talks were used to gather and triangulate data.

Third, interviews were held with LBRDD field staff during the indepth study phase and during five SAP workshops with LBRDD and AKRSP in between October and December 1994. Results of these workshops and the outcome of informal discussion with LBRDD field staff are incorporated in this report.

COMMUNITY SELECTION

In the selection of the 12 villages for the indepth study a distinction was made between water supply schemes in different conditions

- i) under construction
- ii) operational and managed by the community
- iii) completely out of order and in need for rehabilitation

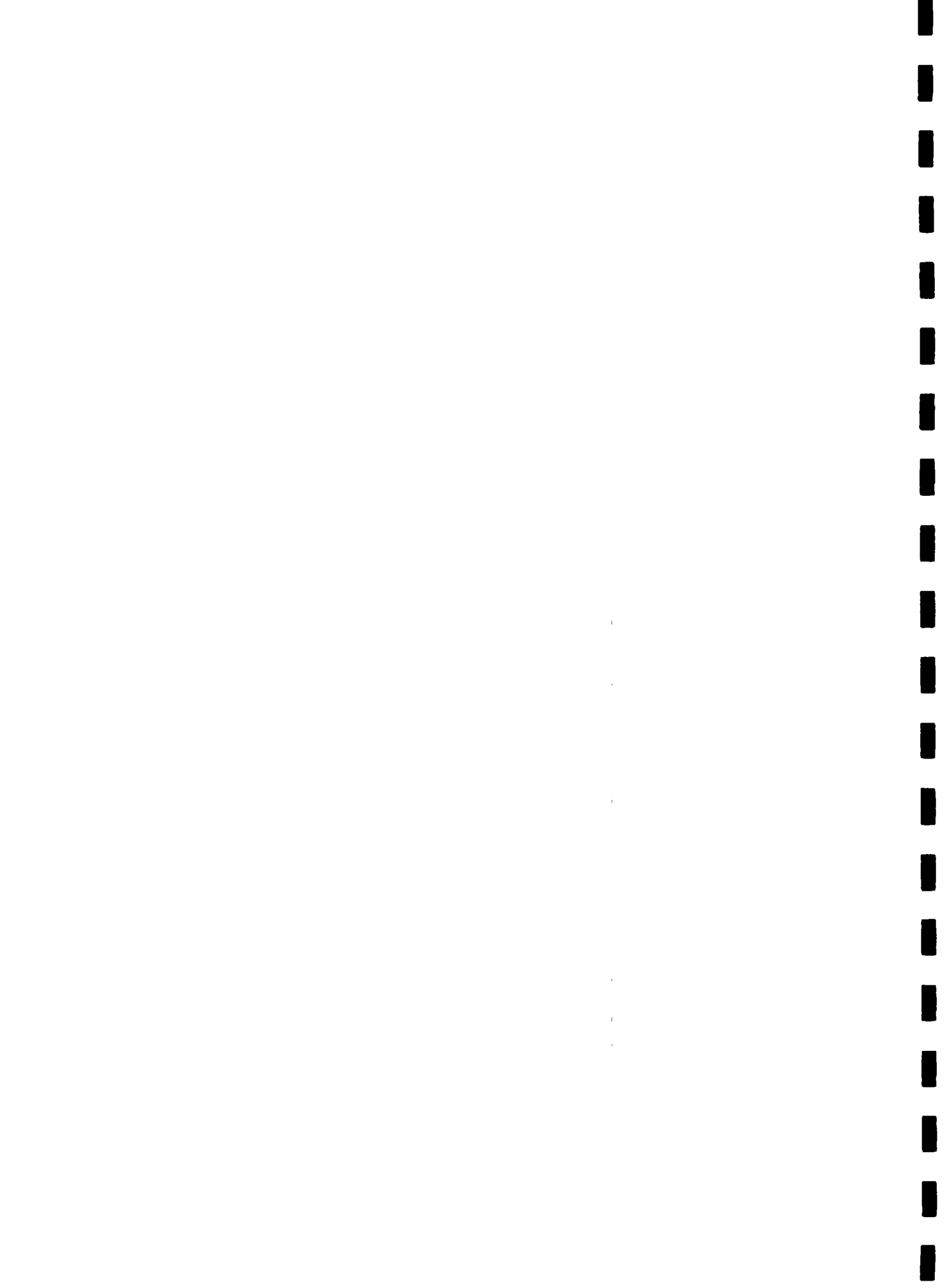
Three schemes were selected from each of four districts in the NAs, Ghizer, Gilgit, Skardu and Ghanche (excluding Diamer). Selection of villages was made with the help of lists provided by LBRDD. Beside the above mention performance criteria, geographic spread and accessibility were considered. See the map on page vi for the location of the villages and Annexure 3 for the selected villages.

ABOUT THIS REPORT

This report consists of three parts. Part 1 of this report introduces the water sector of the Northern Areas. Chapter one briefly describes the conventional water sources that are used in the area. Chapter two focusses on the issues of water use rights and water distribution. Chapter three describes the traditional collective work tradition. Chapter four gives an introduction of the two main implementing agencies in the NAs, the NAPWD and LBRDD and their objectives, working methods and implementing strategies.

Part 2 describes the three main phases of project implementation; identification and planning, construction, and management. Chapter five goes into detail on the initial stages of project implementation such as village identification, project committees and agreements. Chapter six discusses the construction of the scheme. In chapter seven the management of the scheme, including operation, maintenance and repair are discussed.

Part 3 of the report consist of chapter eight in which a set of conclusions and recommendations are formulated.



PART 1

WATER AND WORK IN THE NORTHERN AREAS

CHAPTER 1

WATER SOURCES IN THE NORTHERN AREAS.

1.1. WATER SOURCES

Nullahs (side streams), springs and rivers are the three primary sources for irrigation and domestic water in the Northern Areas. Nullahs and rivers are fed by snow and glacier melt. Water is abundant in the warmer period from April to August but gradually decreases until low levels in January and February, which causes shortage of drinking water in rural areas. In some high areas villagers melt snow if no other water sources are available.

In many villages the origin of water comes from snow and glacier melt which often causes high turbidity of the water, specifically in late Spring and in Summer¹. Usually when villagers are talking about 'dirty' water, they do not signify this as bacteriological contamination but that the water is not clear (turbid or any change in its colour).

Where available the water from springs is favoured by villagers for drinking purposes as it is clean and clear, relatively warm in winter and cold in summers. Such springs are usually at some distance from the village. Precipitation in the Northern Areas is very low and rain water catchment is not practiced.

1.2 TRADITIONAL WATER SUPPLY SYSTEMS AND THEIR MANAGEMENT

Water channels

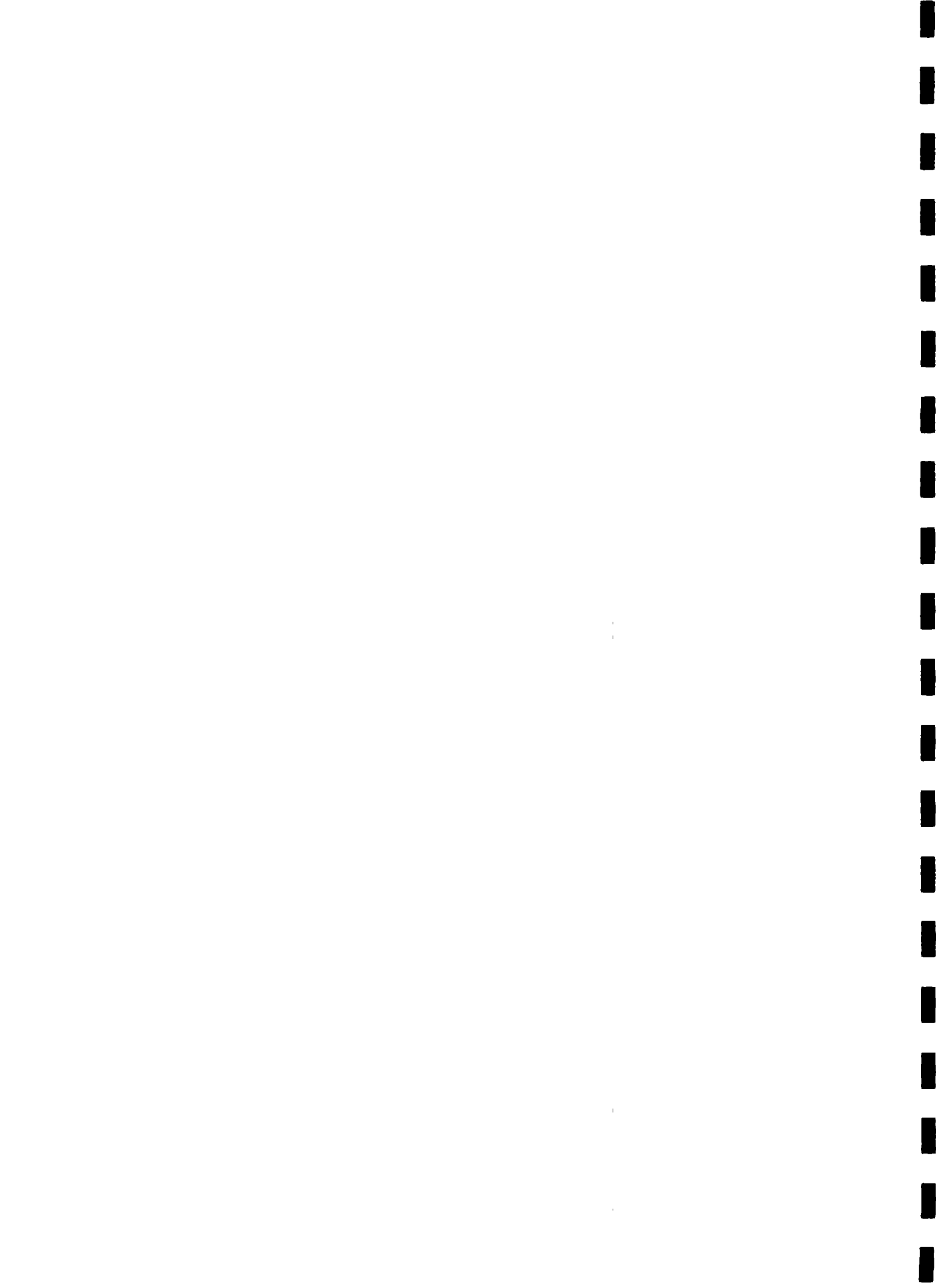
The common water supply system in the villages constitute of water channels which draws their supply from nullahs, springs and to a lesser extent from rivers. This water is used for irrigation, for domestic purposes and usually also for collecting drinking water. In the villages the main irrigation channels are sub-divided into a network of small channels and therefore water is available at relatively short distances from the houses. Where water is available villagers will try to construct a sub-channel near or through the compound of the house.

In villages with turbid water a layer of sediment will form on the bottom of channels. In such villages the villagers will clean their channels for one or more times a year to guarantee a sufficient water flow. The silt from the channels is used to reduce the wetness of the animal shed or for the traditional compost latrines in Baltistan.

Water pits

In Gilgit region and to a lesser extent in Baltistan traditional water pits are used to store water for drinking and cooking. Particularly in areas with water shortage these water pits are big (10 feet diameter) and covered. The water pits are situated near the water channel and when required the pit is opened for some hours to bring fresh water inside, overflow water will pour back into the channel. Charging the pits normally takes place in the early hours of the day to avoid mixing of drinking water

¹ Main causes of turbidity are 'rock flour' and other small soil particles that mix with the water when it is flowing from the mountains. Water with a turbidity of 2000 TU is common in the region.



with waste water from cloth washing and irrigation².

The temperature of water in pits remains relatively low in summers, which people prefer for drinking. The water in pits will settle to some extent which will improve the clarity of the water.

Construction, repairing and cleaning of water channels is a male task and water pits and channels are managed collectively by the villagers, while private water pits and sub-irrigation channels are maintained by individual households.

1.3 LOCAL WATER PREFERENCE AND ITS EFFECT ON THE USE OF TAP WATER

Most household have various water sources at a relatively short distance from their house. Based on rough estimates the average time for water collection is less than 20 minutes per round trip, while in many cases it is less than 5 minutes. The decision of women to use a source to fetch water depends on three main qualities; availability, cold temperature and clarity. If the nearest source does not provide clear and cold water they might decide to go to another source if that is available at a reasonable distance. Within villages there is a considerable variation in the sources used for drinking water, mainly related to the location of the household. Houses at the top of the village for example might take nullah or spring water, while those living at the bottom of the village take river water³

An observation that is much to the Project's concern is that in villages with a operational piped water scheme tap water is not always the preferred source for drinking water. It has been noted in some villages that tap water is used for all domestic purposes except providing drinking water¹. In these villages water was fetched from other, often unprotected sources that were preferred above tap water. Some reasons that lead to this behaviour are:

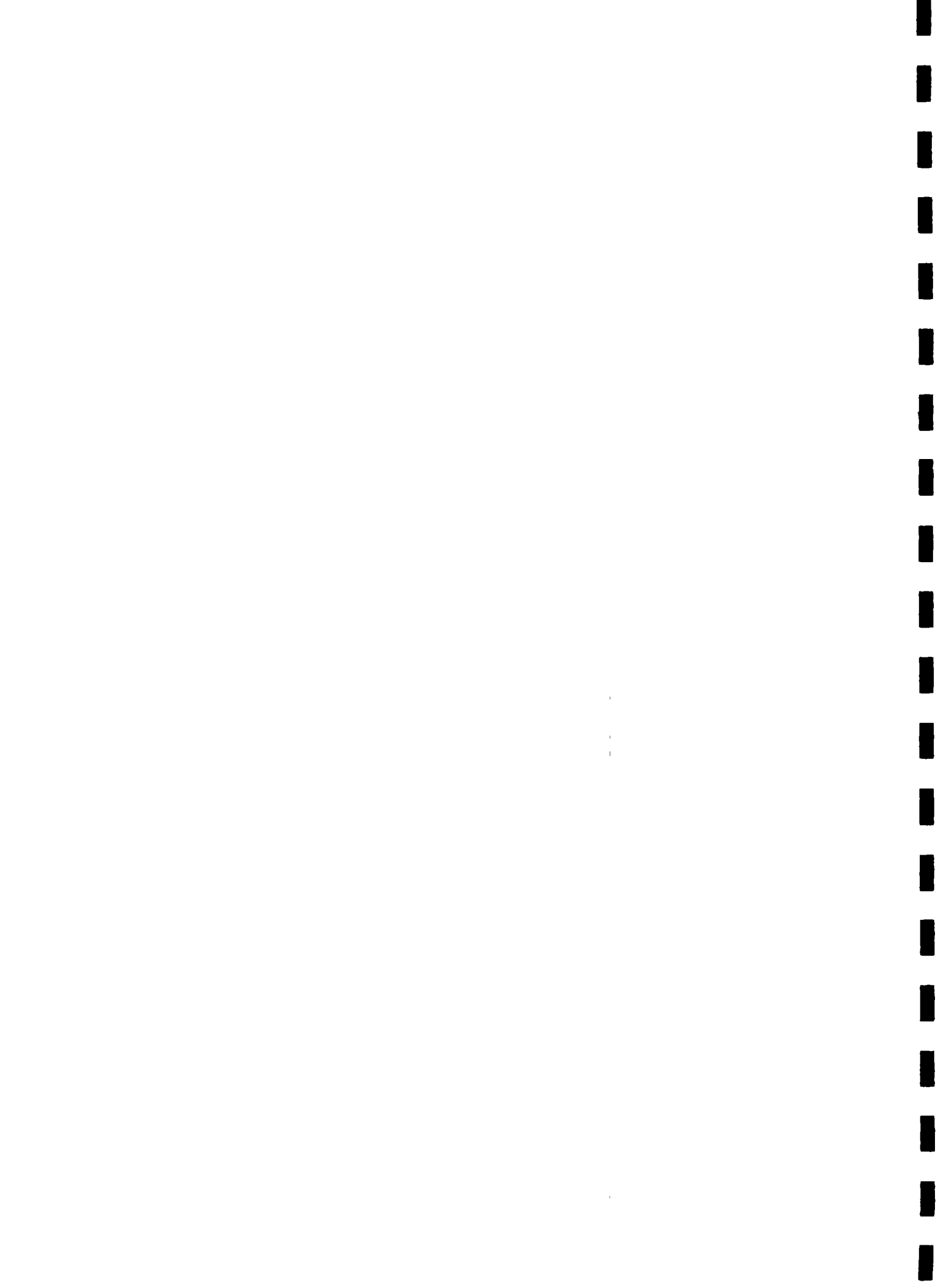
- The temperature of tap water in Spring and Summer is higher than river, pits and channels, and people have a strong preference for cold water.
- Tap water is often not considered as 'fresh' water because it stands still in pipes and people prefer running water;
- Other possible reasons include taste and convenience when the distance to the communal stand posts might be further than nearby water sources like the channel or the water pit

1.4 CONCLUSION

From this chapter two important conclusions can be drawn. First, in the majority of the villages various water sources are available at a reasonable distance from the household (<20 minutes per trip). Though villagers express water as a priority this need seems to be relatively small as compared to hilly areas of Azad Kashmir or Nepal where round trips on average take more than one hour.

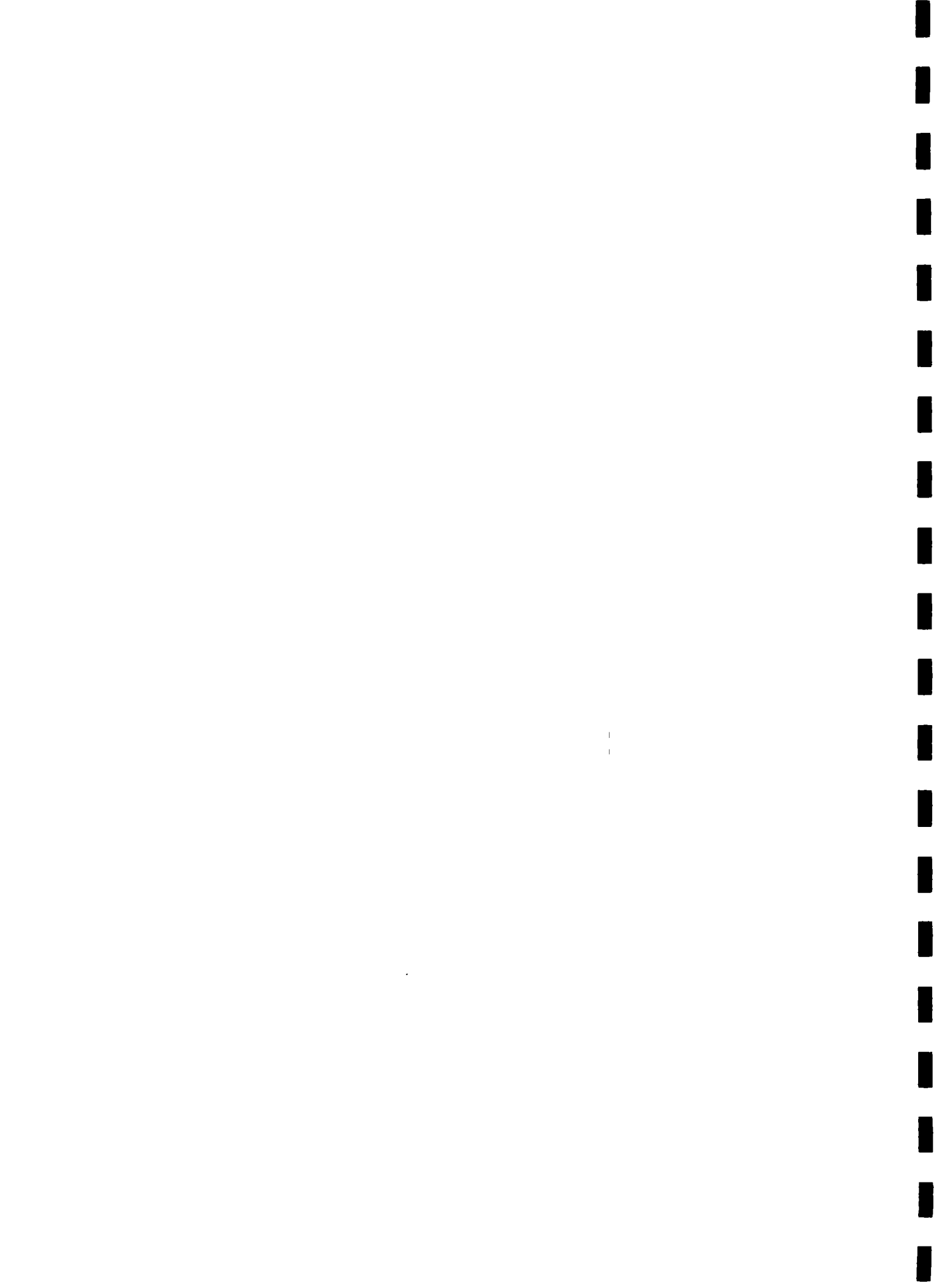
². Despite this provision the bacteriological contamination of water pits is the highest of all available drinking water sources in villages. In a study incorporating over 100 villages the average contamination of water in traditional pits varied between 230 and 800 E-Coli per 100ml. See the Third Progress Report of the WSHHS Project and a forthcoming Issue paper on water quality.

³ See also the forthcoming Issue paper on Domestic hygiene behaviour.



Communal standposts at some distance from household might not be able to compete with the traditional sources from the point of accessibility. This situation implies that for the NAs high service levels (nearby standposts or individual connections) are required, if utilization of the water is to be insured.

Second, people prefer cold drinking water which is usually available in traditional but unprotected sources. This means that the quality of the water provided by the piped water scheme should be comparable to the existing sources i.e. cold, preferably clear and continuous. This will require technically well designed and constructed schemes with good inlet chambers, well protected chambers and storage tanks and sufficient depth of the pipe trenches



CHAPTER 2. WATER RIGHTS AND DISTRIBUTION

2.1 WATER RIGHTS AND THE OWNERSHIP OF WATER SOURCES

In the Northern Areas communities usually claim to have a traditional right to utilize a water source that flows within their village boundaries. The water from such a source is considered as a common property of the village. A neighbouring village, at some distance, is not allowed to use the same source of water without consent of the owning village. In the past traditional water rights were established for irrigation water, nowadays it is also an important issue in relation to piped water supply schemes.

In villages where water is abundant throughout the year and where it is only used for irrigation the water right is not strongly enforced. But in villages with a seasonal water shortage the use right can become more of an issue as it effects the allocation of water. Box 1 and 2 are examples of how water rights forms the basis of distribution of water inside the villages

Rights for utilization of a water source, the example of Jutial nullah

Box 1

In the villages adjacent to Gilgit the water use right is only given to those people who own officially registered 'settled land'. Settled land is agricultural land for which Malia (agriculture production tax) was paid before 1970s. Farmers who brought land under cultivation after this period cannot claim water for their land, and are only allowed to use excess water.

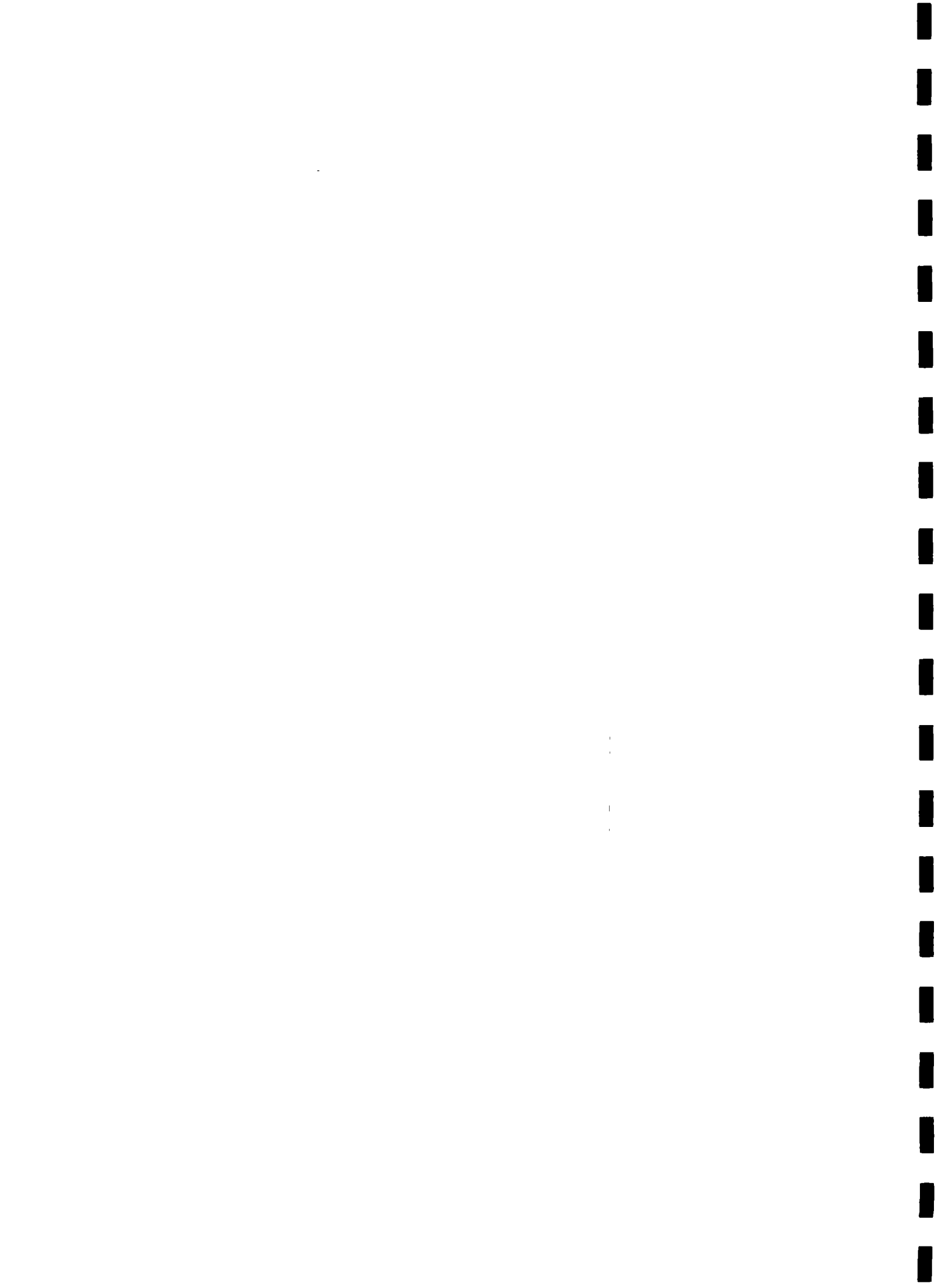
The inhabitants of Jutial and Khomer for example have the joint right to use the Jutial nullah water. In times of shortage (end March till May) this water right is strictly enforced. The irrigation water to a part of Zulfiqar colony is stopped as this is a recent settlement without traditional rights. In this period this colony is also not entitled to use Jutial nullah water for its water supply scheme and therefore is relying on a river water lift scheme for drinking purposes.

Water rights can particularly become a crucial issue during the planning and construction of water supply schemes. Piped water supply schemes provide an equal amount of water to each tap and it is possible that certain beneficiaries are allowed more, or less water than is traditionally their right. This might easily meet with opposition of people in the village. Thus water rights can influence the RWSS design, impede the management of a scheme and give rise to conflicts within and between villages, as for example is illustrated in Box 3.

2.2 WATER DISTRIBUTION

Water use rights institute who is entitled to utilize water. Often village communities have also developed systems to divide how much of that water the villagers are allowed to use. In villages where periods of water shortage occur, indigenous systems for water distribution have been developed by the inhabitants.

In some villages distribution systems are enforced in every month except the summer (when abundant melt water is available), in others it is only used for some critical months of the year. Particularly in



April and May when farmers need more water to irrigate their wheat and barley crops, water demands become critical and distribution of water common.

The distribution system often reflects the village settlement patterns (see Box 2). The kin group or muhallah of the early settlers usually enjoy slightly better distribution conditions, being owners of the source, although over time distribution systems have been modified to include newcomers and incorporate population growth⁴. In some villages water rights have been modified after mutual agreements between old and new settlers. However, often disputes and even court cases occur over these issues.

Change in the distribution of water among kin-groups in Murtazabad

Box 2

In Murtazabad, a village in Hunza, the water from the nullah is equally distributed between its two parts 'Bala' and 'Paen' throughout the year. Traditionally the channel water within Paen was distributed among five kin groups, who are living scattered over three muhallahs of the village. The water was flowing in all three muhallahs and on a particular day only one of the five ethnic groups could use it for irrigation. As water channels are made with sand and stones rather a lot of water was lost through seepage.

To avoid this loss of water a local community council developed new rules to divert all the water for one whole day into one muhallah. Thus the council transferred the traditional ownership rights of the water from kingroups to muhallah basis.

The above mentioned cases are examples of indigenous systems of water rights and distribution. With regard to piped water systems it is important to note that these water use rights and indigenous distribution systems can become an important obstacle during implementation or management. For example if in a village a certain source is not open for all beneficiaries this can easily lead to disputes (see Box 3).

⁴. One of the best documented examples of water distribution systems, and the modifications over time, is the example of Karimabad. See for example Anis A. Dani and Najma Saddiqi, 1986 Institutional Innovations in Irrigation Management: A Case Study from Northern Pakistan. Katmandu: International Irrigation Management Institute, Edward van der Velde, 1989, Irrigation Management in Pakistan Mountain Environments IMMI country paper - Pakistan no.3, and Hermann Kreutzmann, 1989, Hunza, Landliche Entwicklung im Karakorum



Manthoka in Kharmang is an example of a village where disputes over water rights and distribution led to problems with the water supply scheme. Some years ago a NAPWD scheme was suggested for a cluster of four villages. Three of these villages (Gassing, Manthoka and Madupure) are sharing a nullah for irrigation and domestic purposes. The fourth village (Gohari) that was included in the scheme did not have traditional right to this nullah. Villagers from Manthoka started to oppose the scheme and finally NAPWD canceled the scheme.

Some years later LBRDD proposed a water supply scheme for Manthoka and an irrigation channel was selected as the source for the tank. This channel was a common property shared with neighbouring Gassing. The inhabitants of this community opposed the construction of the water tank on their common channel. Their argument was that as the scheme would only benefit Manthoka they were not willing to provide common water. As the scheme was already approved by LBRDD the villagers in Manthoka changed the original tank site to a place lower down in their village. This is the main reason why the scheme not functioning.

Another common example are disputes over the use of springs for water supply schemes. Conflicts can easily occur when the spring is proposed as the source for a piped water system but not all beneficiaries are eligible for it. Gulkin for example has a large spring which is common property of the village. The spring is charging a piped water supply scheme that distributes water to Gulkin and also Gulmit, who do not share in the common property. According to Gulkin's lumbarदार the villagers are thinking to stop this provision in the future. There is a growing concern that due to population growth and the construction of new houses and hotels the amount of water will not be enough in the future for Gulkin.

2.3 CONCLUSION: THE EFFECT OF WATER RIGHTS AND DISTRIBUTION ON RWSS

From the above mentioned cases it can be concluded that for sustainable RWSS the issue of water use rights should be carefully considered and if not be. solved before starting construction. If issues are clarified at an early stage disputes can be avoided and scheme failures evaded.

It will be useful if villagers make an official contract in which it stated that a proposed source is their communal property or that the owner agrees to provide the water for communal use⁵. In case water distribution issues are at stake it will be necessary to assist the villagers with the development of a distribution system for their piped water schemes. Such distribution system should include both technical (provision of one bigger or several smaller storage tanks) as well as social aspects (arrangement of a chowkidar, preset number of supply hours).

⁵ In the IDA funded RWSS project in Azad Kashmir the local LGRDD always clarifies and asks the community to agree on the ownership and access to a source.



CHAPTER 3. TRADITIONS OF COOPERATION

3.1 COOPERATION AS A RESPONSE TO THE ENVIRONMENT

In order to understand the potential and the constraints of villagers working together for the implementation of piped water supply schemes it is useful to provide some background information about existing practices and traditions in the Northern Areas.

Water and land are scarce natural resources of the region and communities have usually developed rules to ensure proper management of these assets for example by making grazing rights in pastures, forest regulations or water distribution systems. In the past such rules were developed under the leadership of the Lumbardar and other village notables.

Nowadays, alongside notables, the Village Organisation provides a broad based platform at grassroot level to discuss and decide about communal resources and issues. Many rules have evolved traditionally and villagers will continue to modify existing rules or develop new ones if the need arises. Although rules are developed with the approval of the community members it is usually a relatively group of individuals who takes interest in thorough discussion about such issues.

Dependency on natural resources and the agricultural character of villages have also created strong mutual links and a pattern of cooperation between villagers. Working together in this environment is needed on for example construction of pony tracks to summer pastures, religious buildings and particularly water channels.

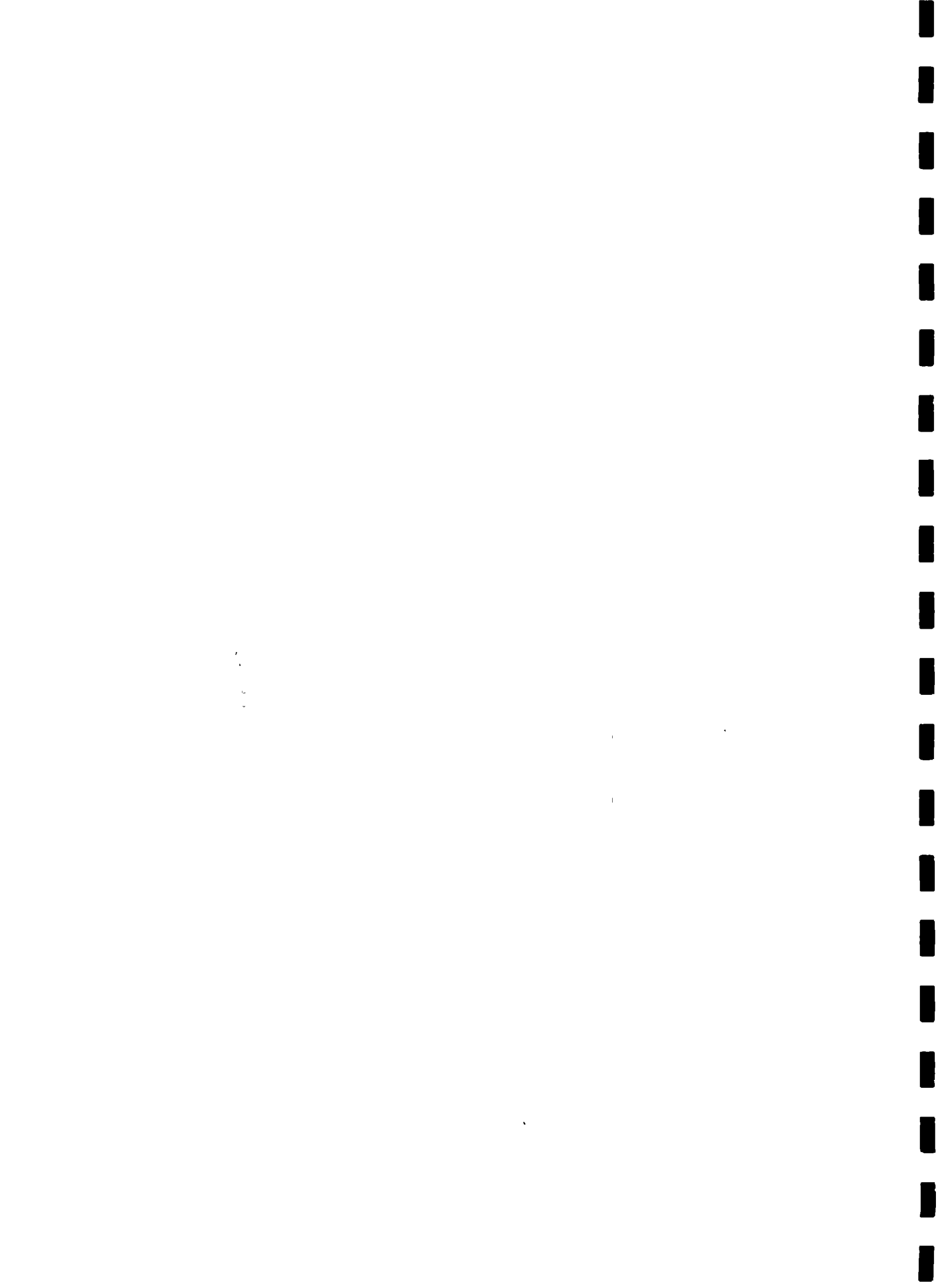
Water channels is the strongest example of how cooperation is essential for survival, without irrigation water agriculture would not be possible in the region. Therefore the initial construction of channels and their regular repair and maintenance have been instrumental in the development of a tradition of collective work in the region.

3.2 RAJAAKI: COLLECTIVE WORK TRADITION

Another important element that has induced cooperation between villagers has been communal work that was ordered by the Raja. Until 1972 most valleys of the Northern Areas consisted of small independent states ruled by Rajas. These rulers had the right to assign a task to a community, such as carrying luggage, harvesting Raja's land, or constructing infrastructure. For this communal work the term rajaaki (Raja's work) was used.

The rules for rajaaki were more or less the same in all villages. If the Raja ordered rajaaki every household would send one male member to participate. Only the old and very young were exempted from rajaaki. In Nagar also rajaaki was ordered to women.

Nowadays in Gilgit region the term rajaaki refers to all communal work. Among Balti speaking people it is called Gama-damsa. Generally the rules of communal work are the same everywhere. When a Lumbardar or village elders decide that some communal work is required a message (bandish) will be sent to all the households. In some cases a special person is responsible for this task, in Punial he is called the zatoon. In the past beating drums was common in Hunza and Nagar.



Nowadays some villages also allow the use of the loudspeakers of the mosque or Imam Bargha for announcing communal work.

Usually it is expected that from every house one male member will join the communal work activities. Families that cannot contribute in the communal work due to activities outside the village are expected to pay an amount (equal to labour wages) to the community. If from a family the member is always absent without good reason social pressure will be applied on them to send a person. If this house fails to do so the community will decide to levy a fine (the amount and shape of which will differ from region to region) and an elder person with a group of young males will be given the responsibility to collect it. After collection of the fine it will be used for a communal purpose.

The following people are exempted from communal work.

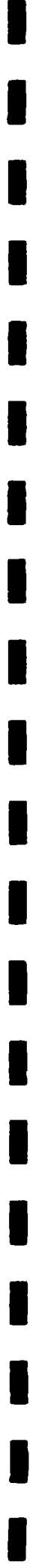
- a widow without adult males in the home;
- in case of serious sickness of any member of the house
- in case of death in the home
- in some cases religious leaders



Figure 2: Communal work during channel cleaning

A lot of regular communal work is related with management of water, cleaning the channels from silt, repair channels once or twice in a year (in case of flood or avalanche more times). In some villages it was observed that breaking ice in the channels to allow to charge water pits and the collection of water, is also performed on a communal work basis. Opening and closing of the channels in springs and winter seasons can also be organized as a communal work. In other villages it can also be performed by a special person⁶ who usually is paid an amount in kind by each household.

⁶. In some parts of Baltistan Chutpa is a person responsible for the control of water and water channels. Chunpa is a village elder who supervises the distribution of irrigation water.



3.3. WORKING GROUPS

The above mentioned communal work is usually performed for activities related to the muhallah or the whole village. There is another old tradition to collaborate with a smaller group, like for example to help relatives or neighbours. Typically such collective working groups are organized in times of emptying the animal shed, during harvesting or when someone is in need of free labour services. The host family is responsible for providing good tea and food for the group. This type of working together is called rokhzdep in Baltistan and Bhuay in Gilgit.

It can be argued that villagers have an ambivalent attitude towards these communal work traditions. On the one hand cooperation with others enables villagers to build infrastructure that none of them could have achieved individually or perform agricultural activities that would need longer time without the assistance of neighbours.

Yet, on the other hand communal work also has an element of compulsion, with unwanted social control and the apprehension that others might be 'free riders'. Also, particularly for elder people, *rajaaki* has a negative connotation as it reminds them of the coerced communal labour they performed for the Raja's. Therefore it is argued here that communal work, though a tradition, is seen by villagers as a necessity to get difficult labour done and that they will try to avoid such work where possible. For this reason it is more likely that villagers will successfully cooperate if there is a genuine need for their activities and if the majority of villagers are motivated to perform the task.

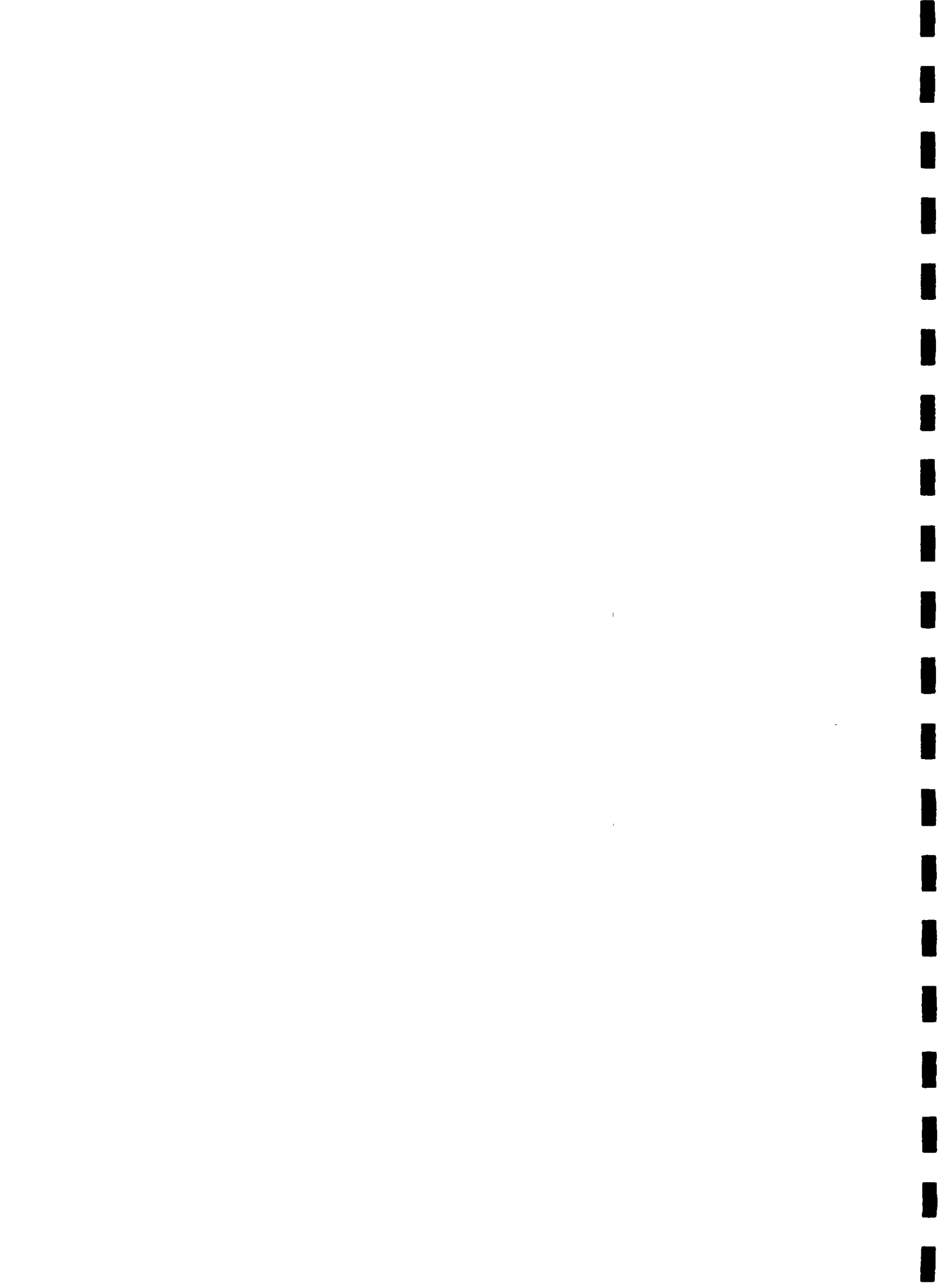
In recent years the tradition of communal work has been further stimulated by LBRDD and particularly by AKRSP. The most important element of AKRSP's methodology is the emphasis on cooperation between small farmers for their economic and social betterment. After the formation of a Village Organization its members are stimulated to work together on the construction of a Physical Productive Infrastructural project (PPI) which the villagers have prioritized themselves. The aim of such project is, besides its expected economic return, mainly to galvanize the communal work tradition and improve the villagers skills to manage these and future communal projects.

3.4 CONCLUSION: IMPLICATIONS FOR WATER SUPPLY CONSTRUCTION

In the Northern Areas social and economic cooperation among individual families, between kingroups, interest groups and villagers is a tradition. This tradition developed as people had to work together to survive in harsh natural circumstances, and as a response to orders of political rulers in the past.

In recent years cooperation between villagers has been further stimulated and developed by AKRSP. To a lesser extent also LBRDD and other NGOs have stimulated villagers to work together for a common goal. Most of these efforts have been successful and the Northern Areas are becoming an important example of an area where people do manage to work together for rural development.

Nevertheless development is leading to changes in the labour patterns inside villages. Job and education opportunities for men are more readily available and looked for, and most households try to have at least one male member working for a salary, mostly outside their village. This will on the short or long term also effect communal work. One expected result is that less (young) men will be present in villages. Another that if they are present that an increasing number of them will have objections to work without payment on a large scale communal project such as a water supply scheme.



CHAPTER 4 IMPLEMENTATION STRATEGIES

4.1 INTRODUCTION

In the Northern Areas two government departments are responsible for piped drinking water supply systems. the Northern Areas Public Works Department (NAPWD) and the Local Bodies & Rural Development Department (LBRDD). In the past twenty years NAPWD has constructed nearly 40 schemes, and LBRDD has assisted communities with the construction of about 165 schemes⁷ On an ad hoc basis a small number of water supply schemes have also been implemented through the private sector and by AKRSP

The NAPWD has been implementing mainly the bigger water supply schemes in district and tehsil headquarters. These schemes are granted to the community. The construction takes place through contractors and the department is responsible for operation and maintenance, a brief description of the implementation strategy of NAPWD is given in Annexure 2.

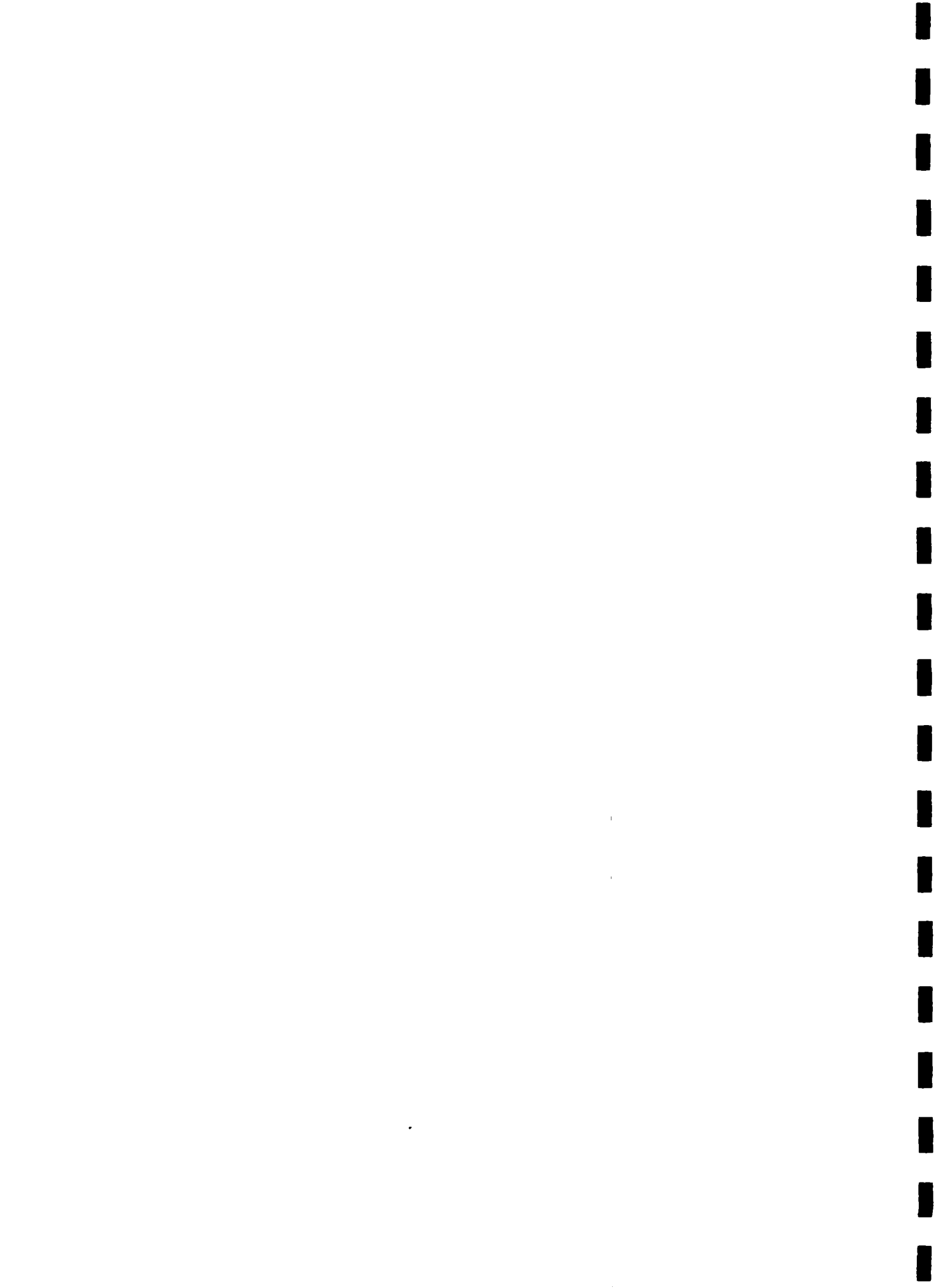
In the rural areas water supply schemes are executed through LBRDD, the main government department in the rural water and sanitation sector. The implementation strategy of LBRDD incorporates some elements of community involvement. LBRDD schemes are popularly called 'self-help schemes', as construction, operation and maintenance is the obligation of the community while LBRDD provides material input and technical assistance.

4.2 LOCAL BODIES AND RURAL DEVELOPMENT DEPARTMENT (LBRDD)

LBRDD is a government department that was established in the 1970s to improve the living standard of rural communities and as a support structure to the Union and District Councils in the NAs. About 105 Union Councils (UC) are established in the NAs, each having 4-8 elected members, see Annexure 1. In the Annual Development Plan (ADP) a budget is made available for development activities identified by each Union Council. Usually these are relatively small scale construction projects such as link roads, bridges, schools or dispensaries. The LBRDD is responsible for releasing funds to the UC-members, organizing the community in a project committee, and the provision of technical assistance and other necessary inputs.

The implementation of water supply schemes is also the responsibility of LBRDD. The budget for material input is funded separately by UNICEF and, since 1994-95 by the Government through the Social Action Programme (SAP). In the near future a People's Work Programme might also be initiated by the present Government. The agency that will execute this programme has not been selected and might include NAPWD, LBRDD or the District Peoples Party.

⁷ These figures exclude the water supply schemes in Diamer district and those that are constructed under the Social Action Programme. Source of information are documents provided by the NAPWD and LBRDD offices in Gilgit. At present the WSHHS Project is conducting a water and sanitation survey in about 800 villages of the Northern Areas and Chitral. This inventory will be used for preparing an up-dated status report on the number and position of water supply systems in the region. First results are expected in Spring 1995.



Organizational structure of LBRDD

The LBRDD head office is in Gilgit and is managed by a Deputy Director. In each of the five districts the department has established a District office with an assistant director (AD) as administrative head and an assistant executive engineer (AEE) responsible for technical designs

In each sub-division (markaz), a team is responsible for the actual development activities. Each team consists of a project manager, who is in charge, a development officer and a sub-engineer. In each Union Council a secretary is on LBRDD's payroll, who is assisting the elected chairman of the Council, see the organizational chart in figure 3

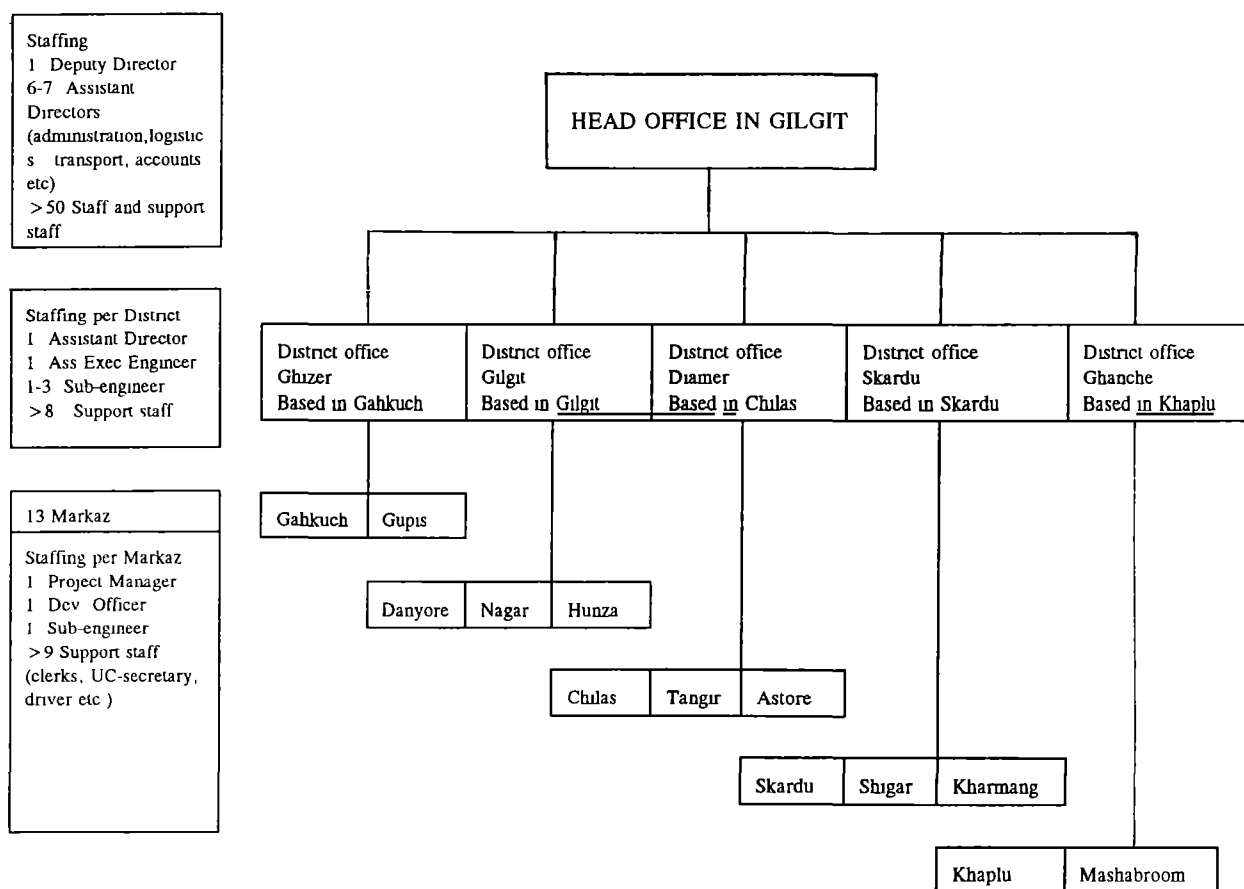


Figure 3: Organizational structure of Local Bodies and Rural Development Department



Identification and project preparation

Development projects are formally proposed to LBRDD District office by the communities through their elected Union Council member. From the large number of applications only a limited number are short-listed. The short-listed schemes that passed the first selection are visited by the LBRDD sub-engineer for a technical survey. Based on these survey data the AEE will design the scheme and prepare a cost estimation including pipe lengths and diameters, transport costs and costs of accessories. This will be developed into a proposal that is put forward to the District Council where final selection of projects take place. Sometimes schemes are identified and proposed by District Council members directly.

The identification of project for two new implementation programmes, the SAP⁸ and the People's Work Programme is somewhat different. So far SAP schemes have been identified along the same lines as the other LBRDD schemes, although schemes are prioritized, based on a needs assessment.

LBRDD Implementation strategy of RWSS

For the last 12 years the majority of the water supply schemes implemented by LBRDD were assisted by funds from UNICEF.

For these schemes LBRDD follows a tri-partite approach:

- i. It is LBRDD responsibility to provide technical assistance, transport⁹ of the construction materials and a plumber for the initial fitting of pipes.
- ii. UNICEF will provide water pipes, cement, GI-sheets and tool kits for plumbers¹⁰.
- iii. The community will provide land and local available building materials for the tank, unskilled labour, and they are supposed to be responsible for management of the scheme.

After water supply projects have been selected by the District Council the usual procedure is to send a cost estimate, including the number and diameter of pipes, to UNICEF in Islamabad. UNICEF normally accepts projects without visiting the sites. After approval UNICEF will procure pipes and send these to the LBRDD main office in Gilgit.

If a written approval from UNICEF is received at the LBRDD district office the project manager or the development officer will go to the selected village to form a project committee. Usually the committee consist of two to six members whom the LBRDD considers as elected representatives of the village, including the UC member and lumbaradar.

⁸. Under the SAP implementation programme (1994-1998) funding of pipes will come from the federal government budget. Furthermore AKRSP will work alongside LBRDD to enhance social organisation and community participation.

⁹ To facilitate transport UNICEF has provided two trucks to LBRDD office Gilgit.

¹⁰ In some cases UNICEF also provides a sanitation and vocational training package to rural communities through LBRDD. For example pour-flush commodes and pipes are distributed in villages, occasional workshops are arranged for plumbers or TBAs and vocational training is provided to girls who are selected with the help of LBRDD.



Often the Union Council member (UC-member) is the most active person during the implementation of a scheme. In theory the UC-secretary is an important intermediary between the village and the LBRDD District office. In practice however, it is often the UC-member who prefers to visit the LBRDD office and link up with officers directly. In some cases LBRDD provides this UC-member with a small fund of 15 to 20,000 rupees, which comes from the ADP budget, to facilitate the construction process by paying for minor local costs.

The project committee is made responsible for organizing the community, suggesting sites for communal stand posts and for supervising the water supply construction. Ideally after completion of the scheme the committee will be responsible for operation and maintenance and for informing LBRDD about any problems with the scheme. In practice, however, project committees cease to exist after completion of the schemes.

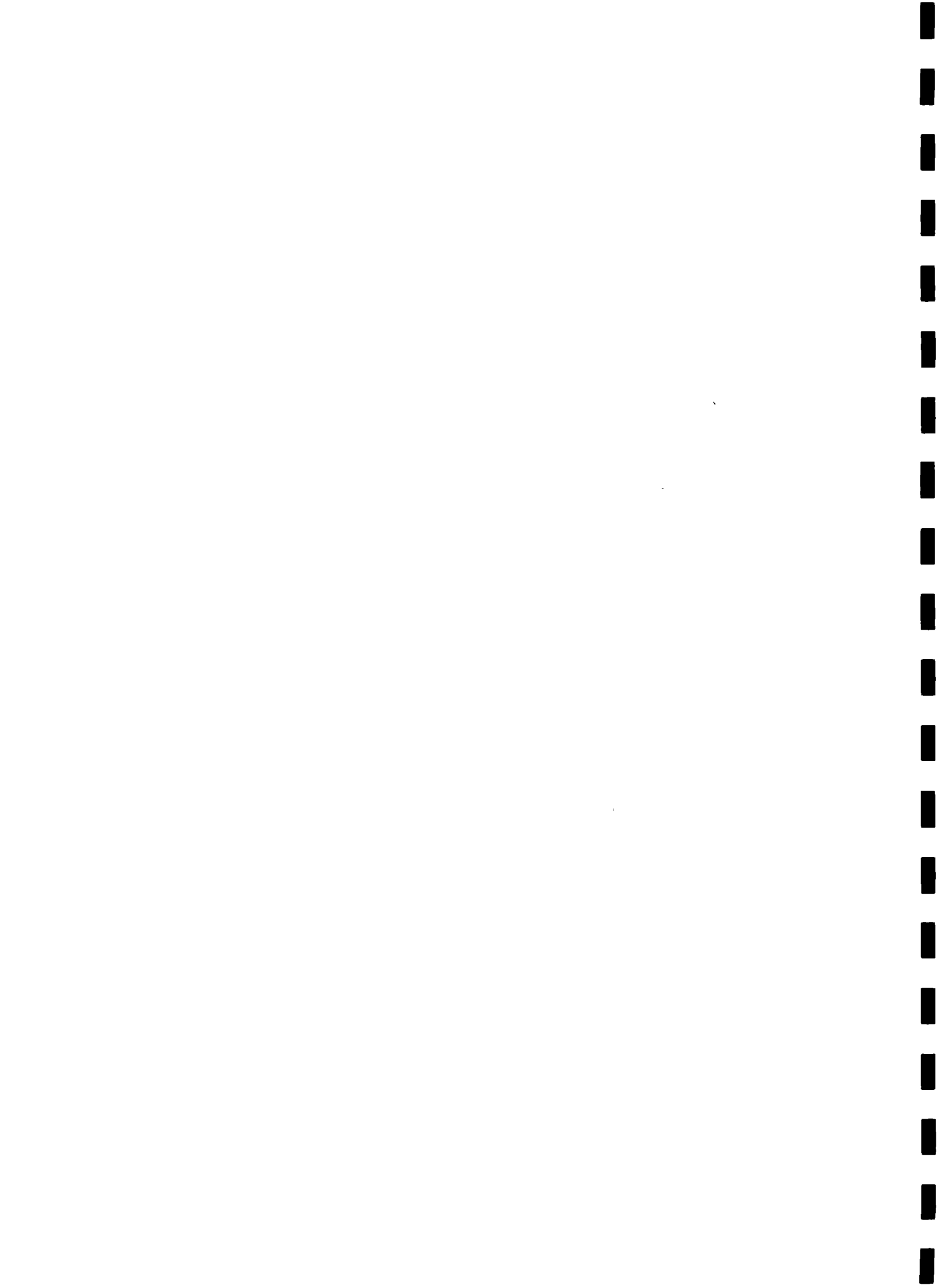
For the schemes which were under construction during the field study of this report, LBRDD had signed an agreement with the community in which a specific time for completion is stipulated.

4.3 CONSTRAINTS FOR LBRDD FIELD STAFF IN THE IMPLEMENTATION OF RWSS

During informal discussions LBRDD employees¹¹ mentioned many issues that make it difficult for them to implement the water supply schemes in a satisfactory way. The following eight issues group together the most important concerns and constraints expressed by the field staff:

1. Limited transport is the major impediment for regular field visits. Few vehicles are available at each district level and only about 20 gallons per vehicle is allotted per month. For repairs only Rs.3,000 per year/vehicle is allocated. Field staff claim that they pay for diesel from their own pockets if they go to the field. Furthermore vehicles are frequently requisitioned by the local administration for their use and for important visitors. The staff mentioned that under these circumstances their visits to project sites are limited to a bare minimum.
2. Engineers feel hindered to design schemes in a more satisfactory way because predefined financial limits do not allow them sufficient flexibility. Budgets for schemes are crudely set on the basis of the number of inhabitants, and for example, do not make any allowances for villages with a dispersed settlement pattern that will need more pipes. The result is that villages can only be partially covered or that pipes with small diameters will be used.
3. There is some concern among staff that the more favourable implementation methodology of the NAPWD will make it difficult for them to motivate villagers to work on a self-help basis.
4. Some staff feel that they have a lack of training and skills in technical surveying and designing, and in social mobilization, particularly in addressing bigger groups. Staff say that they lack incentives and skills to stimulate villagers to complete the work especially in villages where schemes are unfinished because of internal disputes and lack of internal motivation.

¹¹. Discussions took place with about 40 LBRDD staff (Assistant Directors, Engineers, Project Managers, Development Officers and Sub-engineers) during five SAP workshops between October and December 1994.

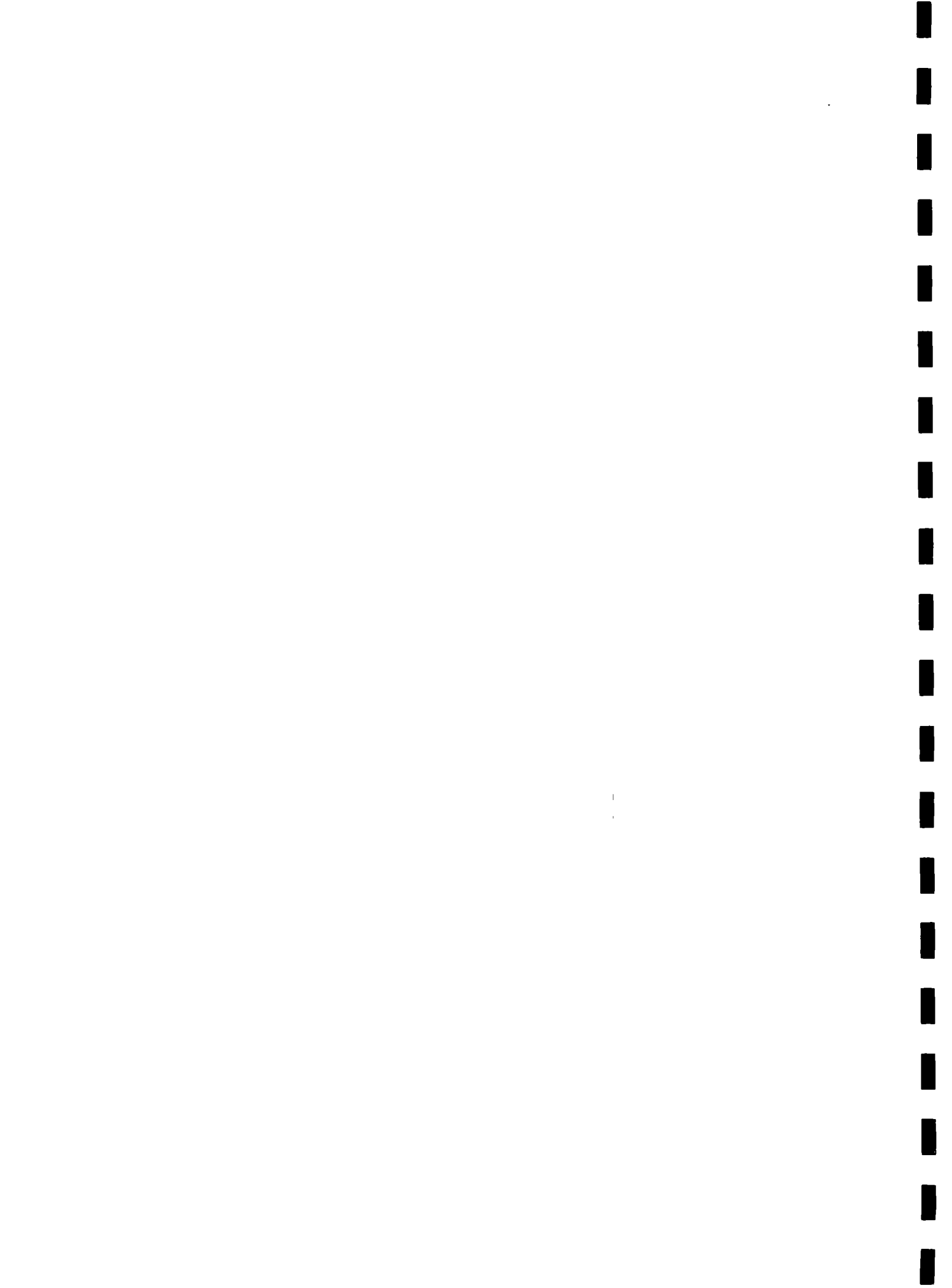


5. Because of a shortage of personnel, field-staff say that they are responsible for many projects at the same time, which combined with the transport problem inhibits them from regularly supervising the construction work. As a result field staff cannot check the quality of the work and are unable to prevent villagers making changes during tank construction and pipe laying which may be detrimental

6. Provision of supplies from the LBRDD store is not punctual and is often inadequate.

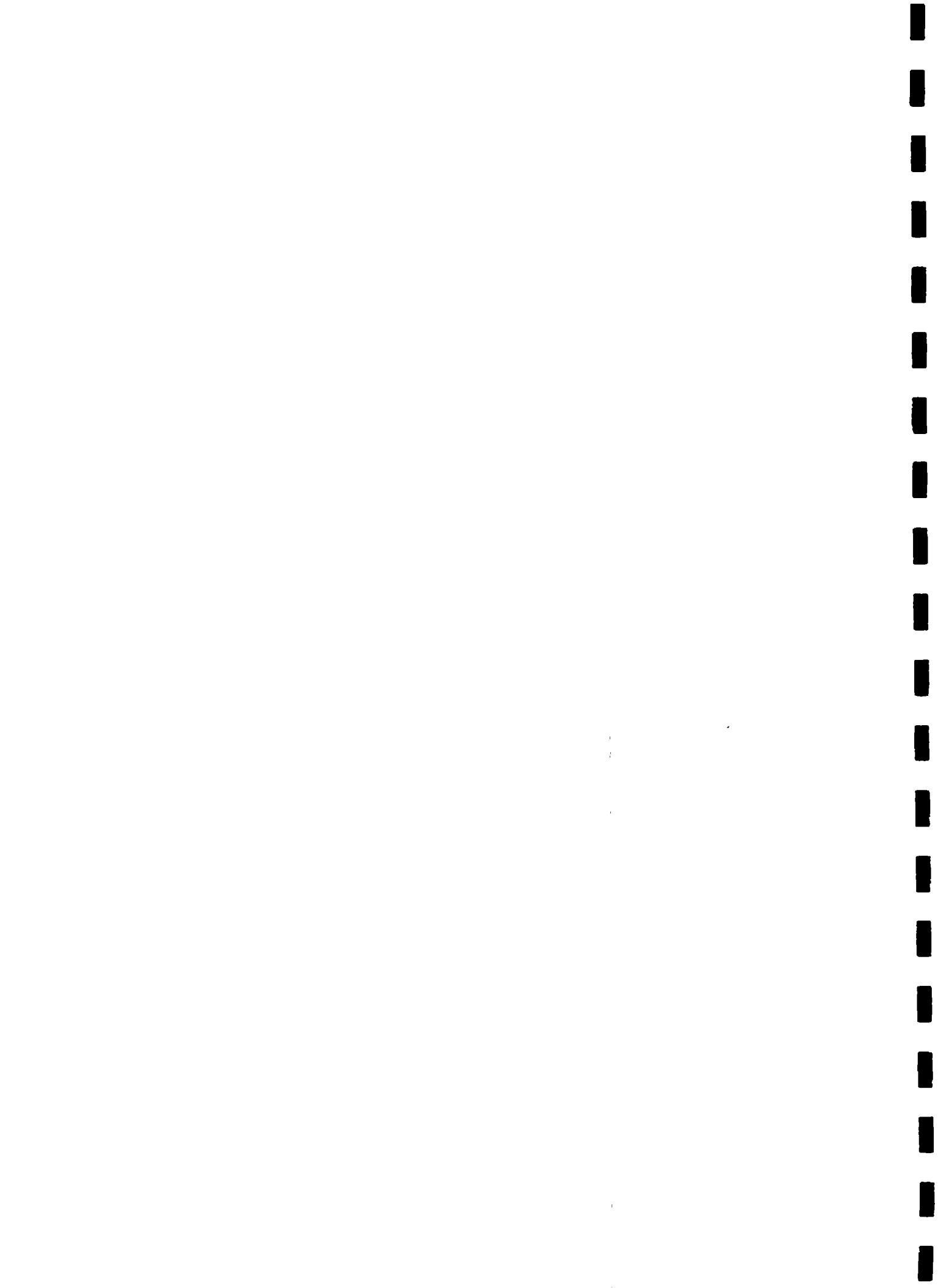
7. Field staff explained that sometimes material is of medium quality, particularly the accessories, and that this was a hinderance to build sustainable schemes.

8. Field staff feel frustrated that many schemes are out of order because of minor defects, for example a few pipes or fittings are broken. Three causes were mentioned. First, after the initial allocation of materials no funds are available for additional materials or small repairs. Second, villagers are not properly trained or motivated to perform regular maintenance. Third, there is no provision to follow up and supervise maintenance once a project is completed.



PART 2

THE DIFFERENT STAGES OF RWSS IMPLEMENTATION



CHAPTER 5 INITIAL STAGES OF IMPLEMENTATION

5.1 IDENTIFICATION AND APPROVAL OF A WATER SUPPLY SCHEME

In the previous chapter it has been mentioned that LBRDD makes a shortlist of schemes and involve the District Council in the final selection of communities. In practice there are three ways for communities to be selected for a water supply scheme.

i) Application by the village community: lobbying and promises

Union Council members and village leaders explained that they have regularly visited the LBRDD office before the scheme was approved. In the first place the member or village leader submitted a formal application for a water supply scheme. Then they tried to lobby to get their village name on the shortlist for a technical survey. Once the survey had been performed they continued to visit the LBRDD office whenever they were in the District headquarters to support their case and to remind the LBRDD staff about their water difficulties.

LBRDD officers receive many visitors in their office who try to obtain a scheme for their village. It is inevitable that some promises are made to villagers, or at least expectations are raised. In this way a large number of villages in each district are already known to LBRDD staff and are lined up for future implementation. By visiting and reminding LBRDD staff the villagers hope their community will get higher on the list.

ii) Political involvement

Members of the District Council and Northern Area Council can help to get certain villages on the shortlist, see for example Box 4.

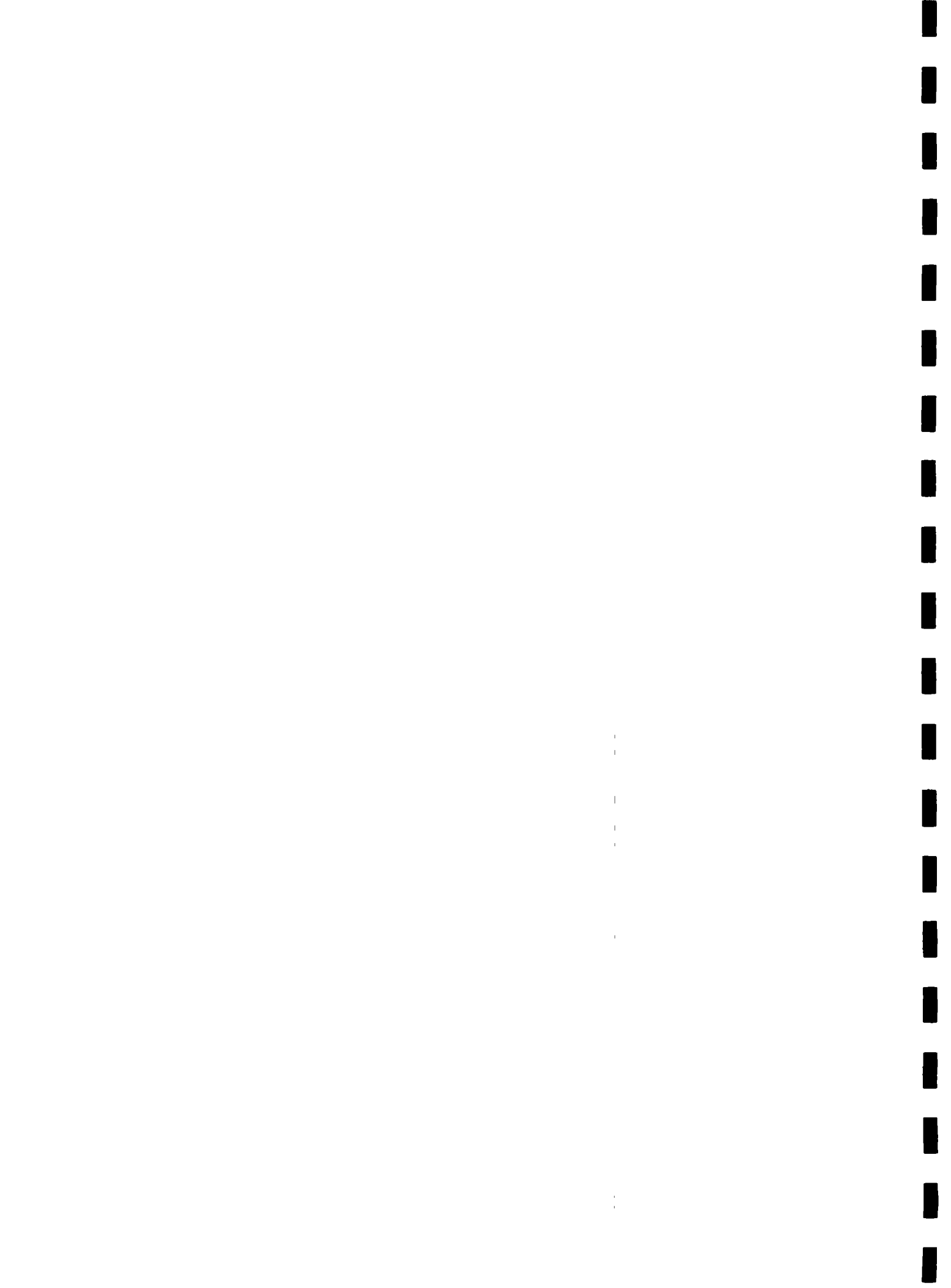
Political involvement in the selection water supply schemes.
An example from Murtazabad

Box 4

During his election campaign the late chairman of the District Council in Gilgit promised the villagers in Murtazabad to give a water supply scheme. He submitted the application during his period as chairman. The scheme has been approved and the village has almost completed two schemes in both Murtazabad Bala and Paen.

iii) Identification through LBRDD

In a few cases it was noted that LBRDD staff went to a village and offered a water supply scheme in addition to pour-flush sanitation facilities as part of the Womens Integrated Development Project. In return LBRDD asked for community participation in the scheme and demanded for one or two females from the community for a TBA/vocational training.



5.2 TECHNICAL SURVEY AND DESIGN

Technical field survey

After shortlisting the scheme the LBRDD field staff will be sent to do a technical survey. Upon arrival in the village the survey team will usually go to the house of the Union Council member or any other person who has been in contact with LBRDD. The selection of the water source, the site of the storage tank and the basic design will be discussed with him and other village notables.

The actual technical survey mainly consists of measuring the site for the tank and the distances for pipe lengths with the use of a tape measure. Only some sub-engineers measure elevation at a few critical points in the village for example at the sites of the tank and stand posts. The use of Abney level or other levelling measurements are not practiced¹² and are now being introduced under the SAP implementation. Until early 1995 only a few alti-meters were present for surveying purposes but they are not easily accessible for all the field staff. Source discharge is measured by filling a container and counting the time to fill it up, or by putting a floating object in the current.

There is no specific time set for a survey, but usually in a small village it will take about a day. A large village, with complicated topography might take a maximum of three days. The sub-engineer is responsible for the survey and he is sometimes accompanied by the assistant executive engineer.

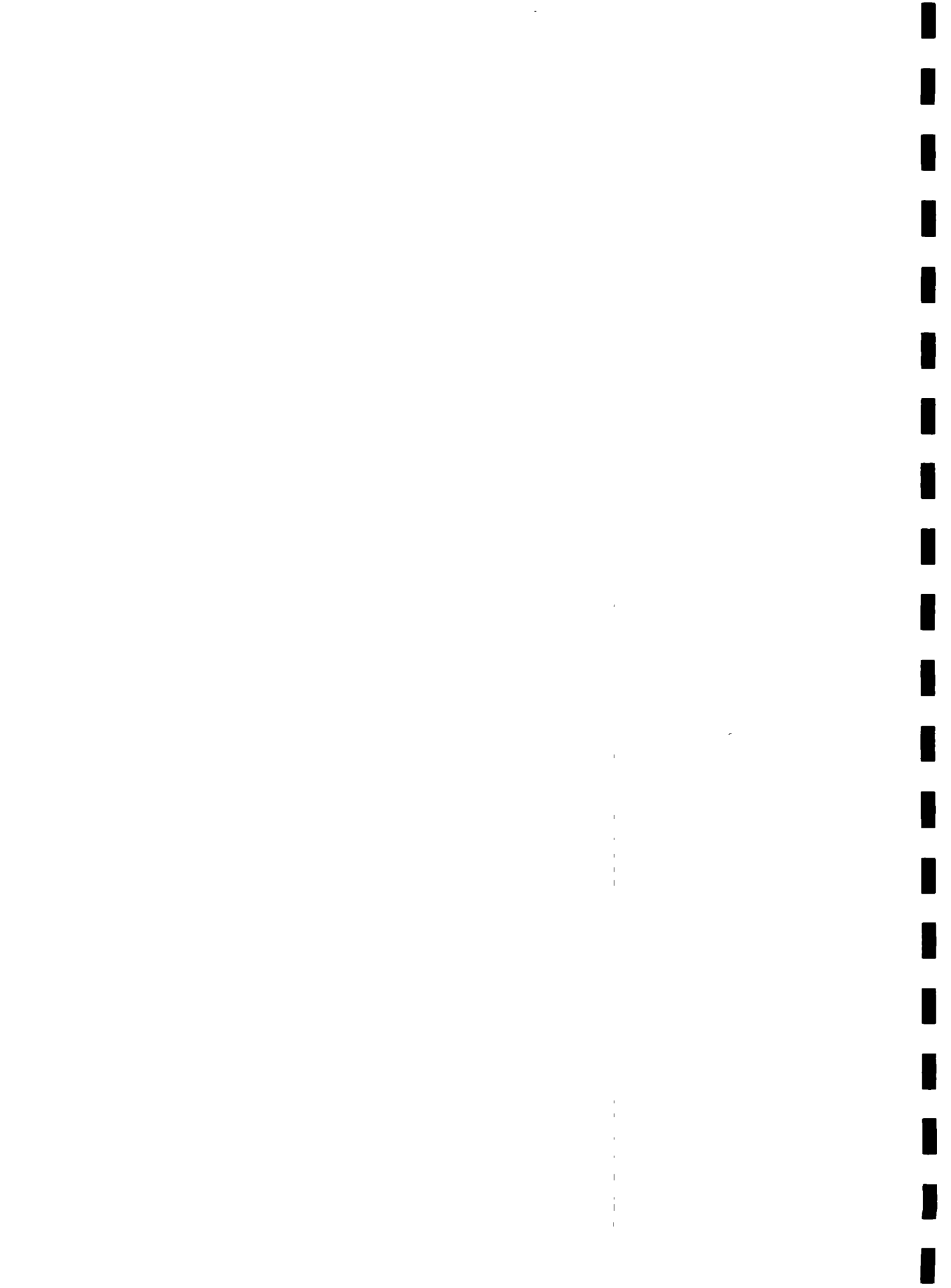
During the survey the villagers sometimes deliberately over-estimate the need for pipe lengths and diameters. One way to influence the design is to exaggerate the distance to a water source (assuming that the survey staff will not walk all the way up); another is to identify a far away source but use a nearby source. Such misguidance can only be avoided by actually visiting the alternative sites and checking the estimated distances.

Design and cost estimates

Based on the field data the tank size will be calculated, a pipe network designed and a budget calculation prepared. Usually the sub-engineer will have this responsibility and the executive engineer will check and approve. No formal design guidelines are used for preparing a RWSS design and LBRDD staff mentioned that their method is based on 'personal judgement' and the 'rule of thumb'

The budget for the scheme will be calculated on the basis of the official, government approved, standard costs for hardware items. Each diameter of pipe for example, has a fixed price per foot which is identical throughout Pakistan. The amounts of pipe of each diameter will be calculated and will be multiplied by a factor 50% to 100% depending on the geographical location. According to LBRDD staff this is done to make the prices realistic for the Northern Areas. Subsequently the total price of pipes, cement and other inputs will be added. On top of this about 10% will be added for transport cost, 10% for accessories and 10% contingencies.

¹². In the mid-eighties most of the LBRDD staff attended a short workshop on RWSS survey and design, organized by UNICEF in Gilgit. The staff appreciated the course but due to lack of equipment and practice it was difficult to integrate their newly acquired knowledge into their daily work.



Flexible design approach: pros and cons

A flexible approach is used to select the source, design the pipe lay-out and decide the number and location of stand posts, as long as the scheme remains designed within a predefined financial budget. This flexibility allows the field staff to adjust the scheme to the local situation and LBRDD staff rightly argue that each village is different.

On the other hand the absence of comprehensive design guidelines is a serious deficiency. For example the field staff have no document stating the maximum number of users per standpost or the maximum walking distance to the nearest standpost. This can lead to unequal service standards within and between villages. Without clear design guidelines it is also possible, and has been observed in some cases, that schemes are over designed, i.e. tanks and pipe diameters are bigger than required for a given or projected population. Without understanding the technicalities that determine a design villagers often believe that 'the bigger, the better'. Big tanks especially are favoured and in the next chapter we will see how villagers manage to make them larger than originally planned.

Lapse of time between survey and construction

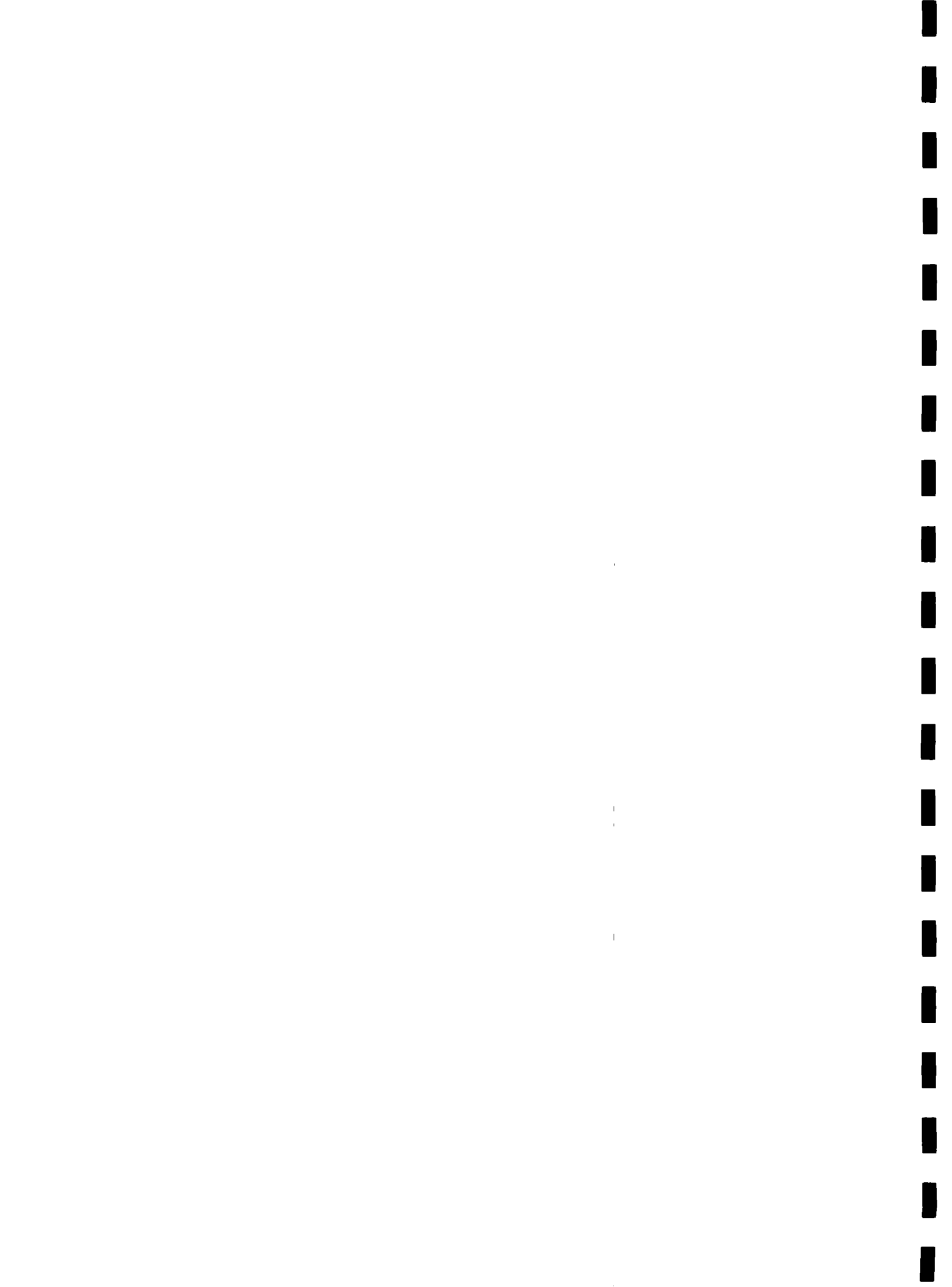
Due to the procedures for the approval of schemes it is quite common that there is a long delay between the technical survey and implementation of the scheme. This can easily result in inadequate estimates, and because of that problems within the community as is explained with an example from Silpi, see Box 5.

Problems arising from the long delay between the technical survey and commencing construction:
an example from Silpi Paen Box 5

In Silpi Paen the scheme has been constructed rapidly through the VO, and the community is maintaining the scheme. Nevertheless problems have occurred because the technical survey was conducted three years before commencement of the construction work. The project committee was established in 1993 and thereafter the community started with the construction of the water tank. After completing the tank LBRDD officials announced that the scheme will provide tap water only to those who were included in the technical survey. About 10 households had not been included because they migrated to Silpi later. Consequently these villagers stopped helping in the further installation of pipes and started to create problems for the others.

To settle the issues the project committee promised to give them a water connection if spare pipes remained. But no pipes were left when in April 1994 the scheme was completed. Besides these ten households about four other households could not be supplied with a nearby standpost. Further problems have occurred: an influential person who had provided land for the site of the tank removed pipe from the main line and kept it in his house for 15 days. After long discussion and a request from the community he returned the pipe. A few days later someone put human excreta in the water tank and the supply had to be interrupted for a week while cleaning took place.

These problems have still not been solved completely. To help settle them LBRDD has promised to provide some extra pipes for the households that were omitted from the initial survey.



5.3 INVOLVEMENT OF THE COMMUNITY THROUGH A PROJECT COMMITTEE

Project committee: intermediary between LBRDD and community

It is the policy of LBRDD to implement the scheme through a Project Committee. Such a Committee is established immediately before construction, once the pipes have arrived in the District LBRDD office. The Committee acts as an intermediary between LBRDD and the community. The field staff of LBRDD will mainly deal with the Committee members and will make the agreements regarding the scheme construction with them. In the implementation process it is rare for LBRDD staff to call for a larger village meeting.

A Project Committee normally consists of three to four members and occasionally contains up to six members. Where a UC-member is available¹³ he is responsible for the formation of a Project Committee. In villages without a member the LBRDD staff will organise the Committee.

Selection of Project Committee members

It is customary that the Union Council member is requested to be the President of the Committee. If no UC-member is residing in the village another village activist will assume this leading role. Field data indicates that an active chairman greatly enhances the success and efficacy of a scheme (see chapter 6.5 for an example). The other members often include the lumbaradar and two or three other village notables. In villages of Nagar and Baltistan it was found that also religious leaders are often active as Project Committee members.

The procedure for the selection of the members is usually not very democratic as selection of the members is made by a small group of village notables. Members of the committee are typically selected from different muhallahs, ethnic groups or kin groups of the village. However examples are abundant where some households are neglected in a scheme because nobody represented their interests. Proper representation is not a guarantee for equitable decisions though, in Sumal for example representatives were selected from each muhallah but this has not avoided some households being omitted in the final lay out.

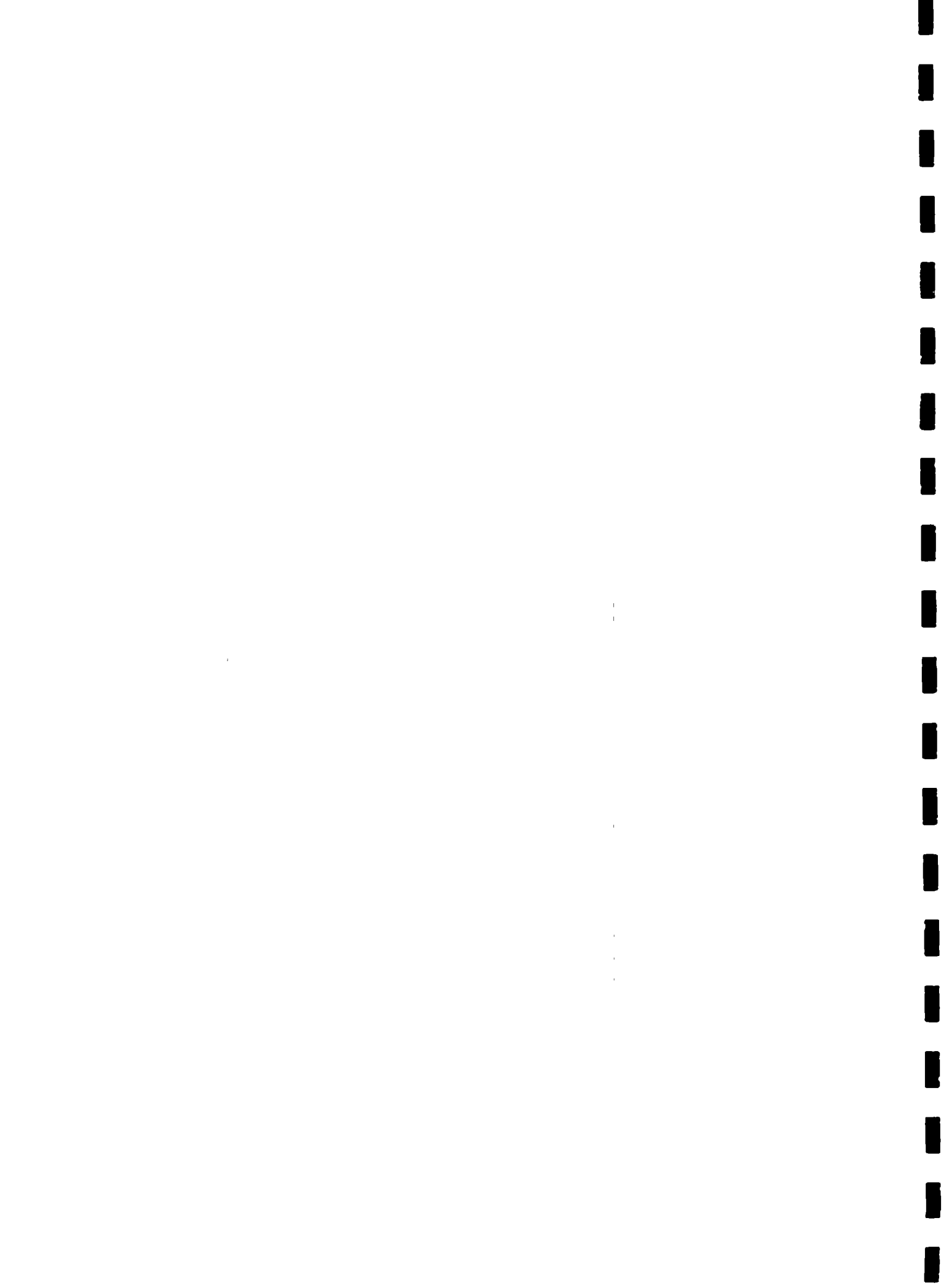
Once a Project Committee is formed the Union Council member or the complete committee will go to the LBRDD office for official registration.

Roles and responsibilities of the Project Committee

The project committee members that were interviewed, mentioned the following tasks be part of their responsibility:

- * to collect pipes, accessories, G.I sheets and cement from LBRDD at the nearest road head,
- * to motivate and organize the community for construction of the scheme;
- * to arrange local materials, free labour, free land and access for pipe laying;
- * to maintain an attendance register during construction and collect fines from absent workers,
- * to decide about the sites for communal stand posts.

¹³. It is possible that small villages do not have their own UC-member but are represented by a member living in a neighbouring village



Agreements between LBRDD, the Committee and the community

After the project committee is established various, usually verbal agreements are made between them and one or two officers from the department. The verbal and private character of the agreements often leads to misunderstandings between both parties often only becoming evident when at a later stage problems occur. During recent years some communities have signed written agreements with LBRDD although verbal arrangements remain the norm.

Usually the agreement a water supply scheme contains a whole package of different claims, rights and responsibilities for both parties. Though there is a uniform and fixed policy with regard to the input of LBRDD it depends to some extent on the negotiations with the Project Committee as to what the actual input will be. Usually the following elements are part of the agreement

LBRDD will be responsible for:

- * A technical design and cost estimates;
- * Provision of input according to the cost estimate that was based on the technical survey and included in the proposal approved by the District Council. Typically this includes pipes of various diameters, a maximum of 40 bags of cement, GI-sheets for tank covering, accessories etc;
- * Provision of a plumber for fitting the pipes and to give training to a village plumber,
- * Transport of the materials to the village or, where a village does not have a road, to the nearest possible road head.

LBRDD expects the community to abide by the following:

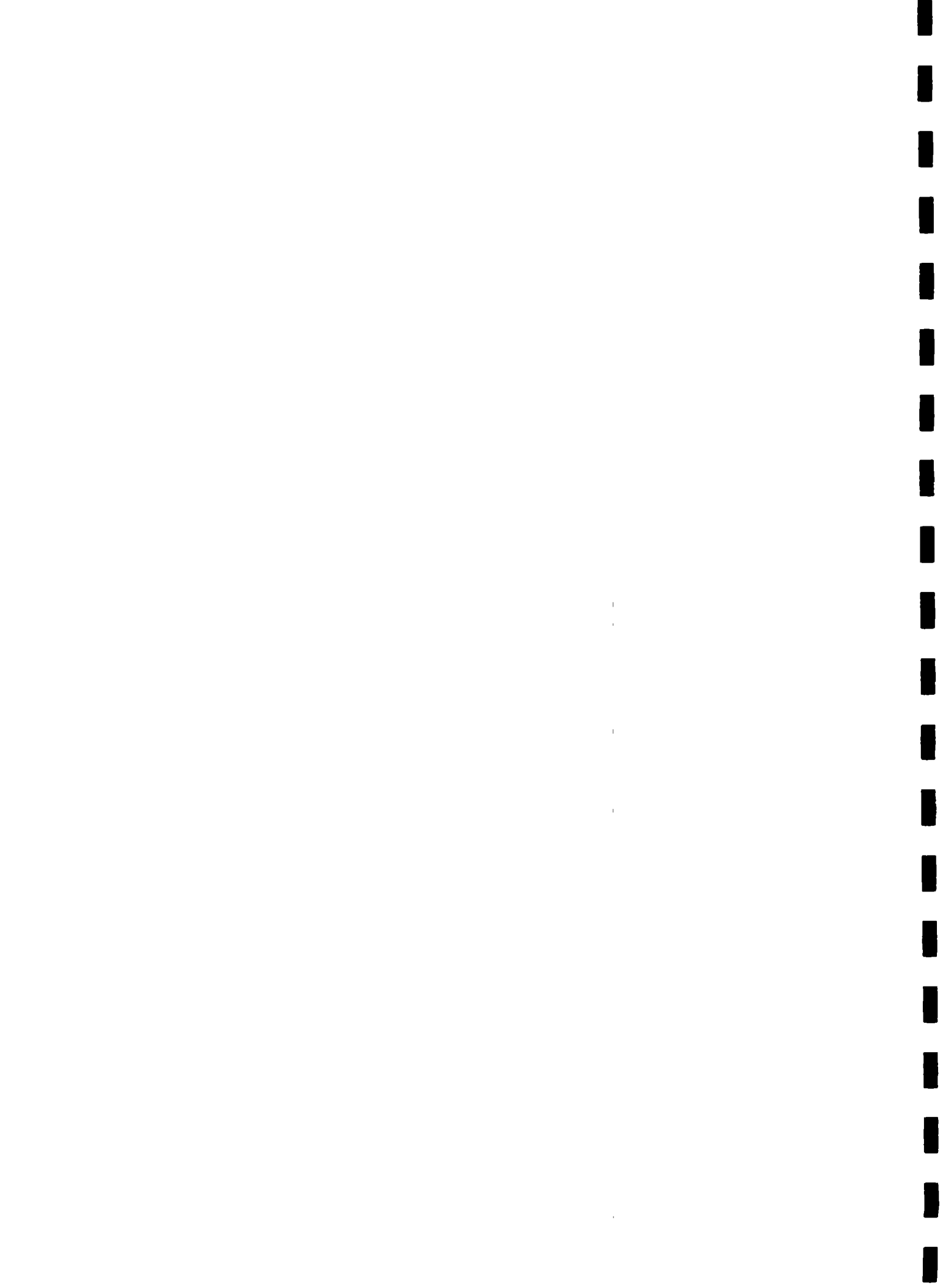
- * A man to be trained as a plumber and (only in Baltistan) a woman nominated for UNICEF TBA/vocational training,
- * Provision of land for the tank (without compensation);
- * Provision of stones, sand aggregate and wood for the tank;
- * Provision of voluntary labour to construct the scheme according to the approved design;
- * The management of the scheme;
- * Construct within a specified time limit set by LBRDD.

Once the Project Committee has accepted these terms and conditions with LBRDD it is assumed that it will communicate these with the villagers.

Whether or not the Project Committee is consulting the community in its decision making procedure is not checked by LBRDD.

The data of this study shows that some Committees discuss the terms and conditions thoroughly with the rest of the village before accepting them, for example in Silpi and Murtazabad. In most other villages, however, it seems that the Project Committee member make decisions after discussing it in a small group, without properly consulting the rest of the community.

Meetings of the general body of the village are not usually held until the pipes have arrived in the village and construction starts. The exact modalities of the scheme are often explained to the villagers only after problematic issues come up during construction



Within the communities criticisms were noted about the functioning of the Project Committees. During group interviews and key person interviews villagers mentioned a number of deficiencies:

- Domination of the Project Committees by the UC-member, and criticism of them using communal funds for personal gain. Whether such accusations are true or not, they are likely to make it difficult for these persons to organize and motivate the community;
- Many UCMs and lumbardars are illiterate and it is difficult for them to understand agreements and the need to consult other villagers about the implementation;
- Young and educated people do not like to follow the decisions of traditional leaders who are often taking a lead role in the Committee,
- Though religious leaders can play an important role in motivating and organizing the community they are often not familiar with dealing with implementing agencies directly,
- Where the VO does not cover the whole village its office bearers face difficulties in involving the non-members.

5.4 CONCLUSION: DIFFICULTIES IN THE INITIAL STAGES OF IMPLEMENTATION

Considering the experiences of the different parties involved in the initial stages of implementation the following issues appear to merit greater attention:

* Need assessment

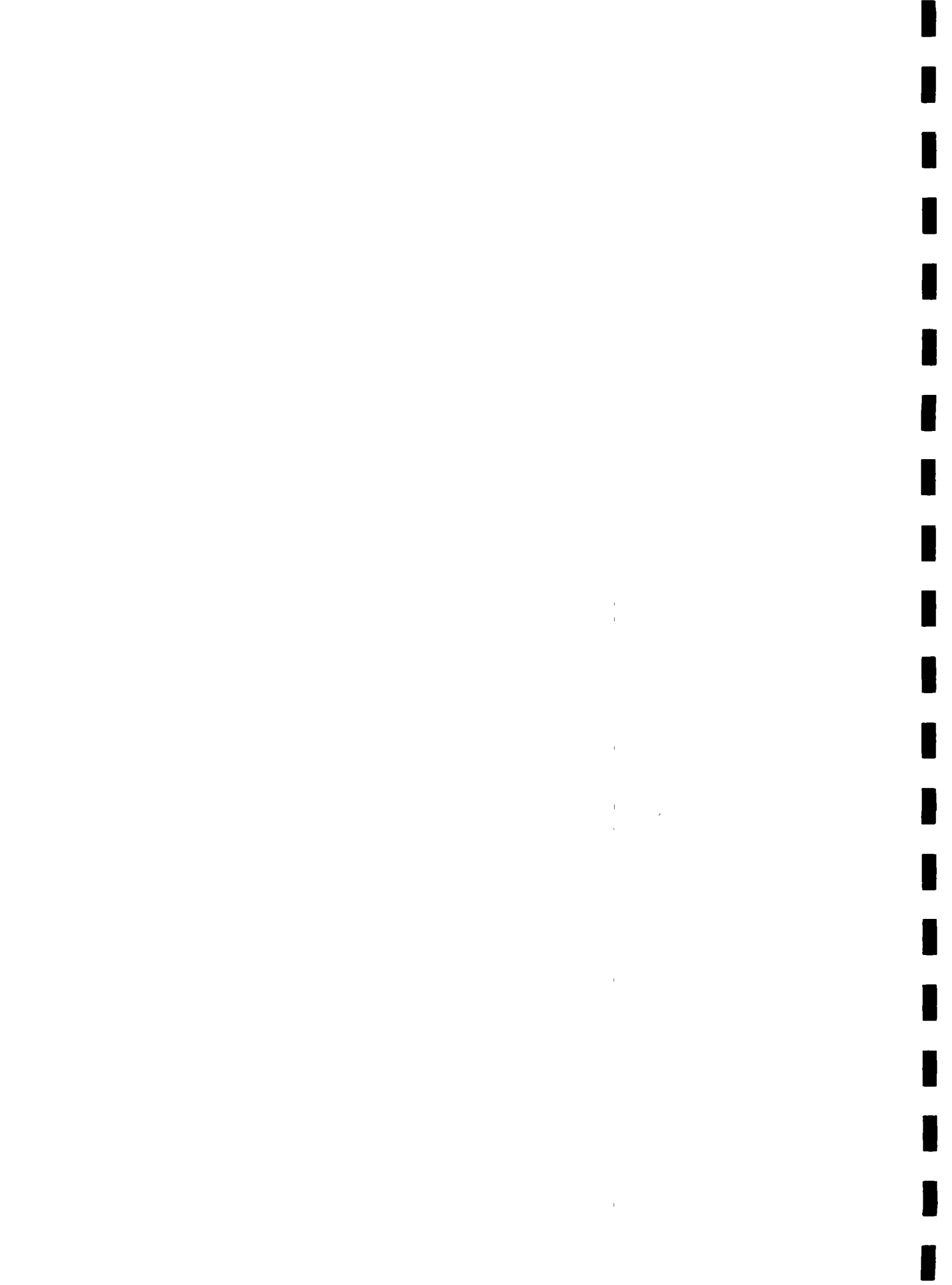
Water supply schemes are short listed after requests from Union Council members or elected members of District or Northern Area Council. The actual need of the community for a RWSS is not being assessed. The selection of villages for RWSS can be influenced by political pressure from Union, District and Northern Areas Council members.

* Technical survey

In the planning of the schemes a flexible approach is used that allows field staff to adjust the design to local circumstances but which can also lead to inequality and over-designing.

* Lapse of time between technical survey and construction

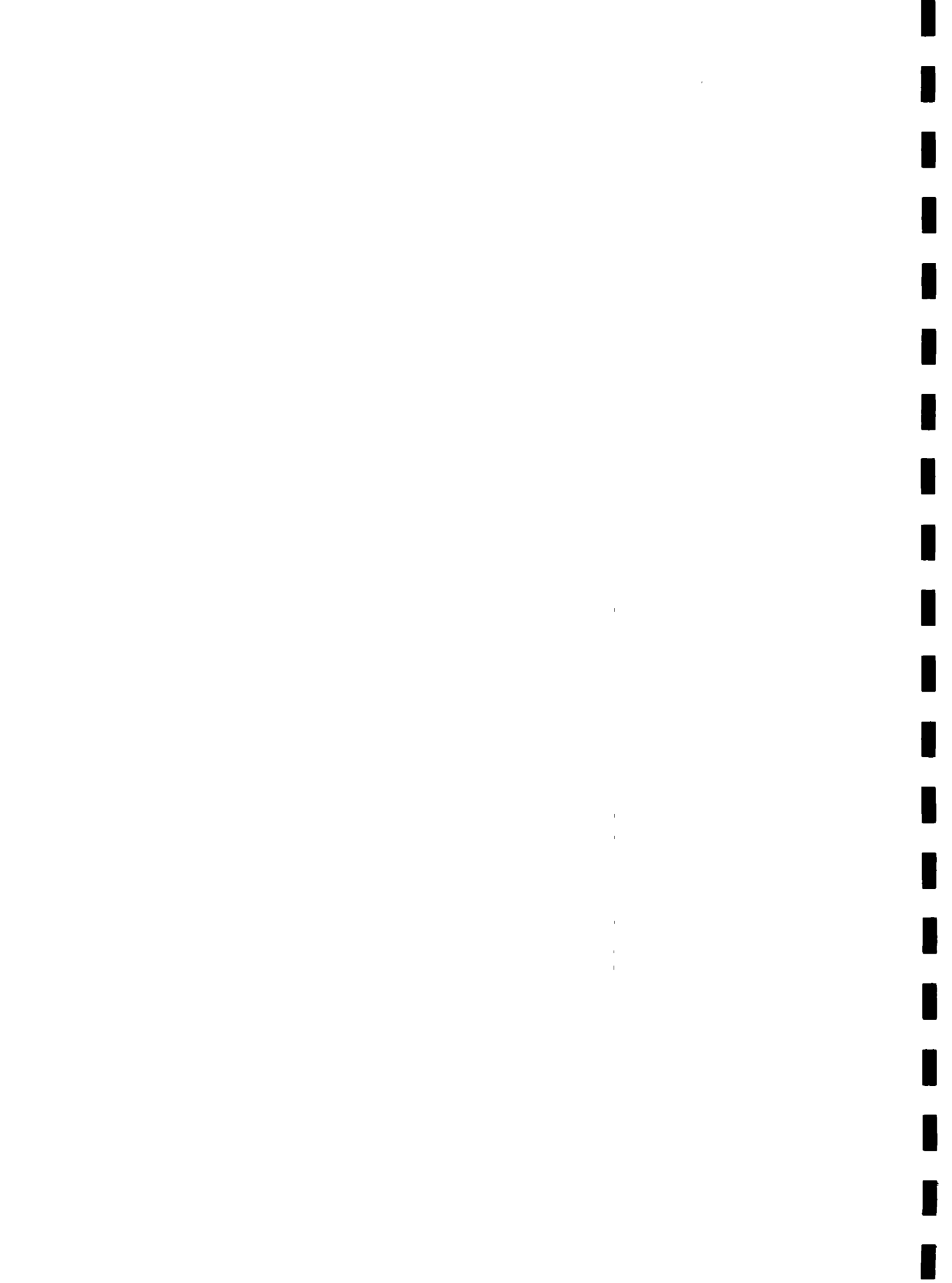
A problem that was identified by communities concerned a long (sometimes one or two year) time between the technical survey and commencing construction. During this period new houses may have been constructed and they may be excluded from the scheme. Another important reason for minimizing the delay relates to the momentum of enthusiasm and motivation that may be lost. Also, villagers can get the impression that the agency is not serious in fulfilling its obligations so why should they.



* Project Committee

Generally the Project Committee is not democratically elected by the community. As the villagers are not usually involved in the decisions of the Committee their sense of ownership and responsibility for the scheme may be limited. The political character of the UC member can further inhibit the support of the community, who may not like to work under his leadership

The implementing agency does not utilize the full potential of the Project Committee. Instead of using it to coordinate the involvement of the whole community, the Committee is merely used to agree the modalities of the scheme and to hand over the materials. Also the Committee is only concerned with the construction phase and not the later management of the scheme. Another important observation about the Committees is that their membership is completely male. Considering that domestic water is an issue of great importance to women, the absence of their involvement in the decision making process is a serious shortcoming



CHAPTER 6 CONSTRUCTION OF PIPED WATER SUPPLY SCHEMES

6.1 ORGANIZATION OF LABOUR

i) Communal work on the main components of the scheme

All the villagers will work together on the common components and tasks of the supply scheme (transport, tanks and main line). However, if the water supply scheme does not cover the whole village only those who benefit from the scheme will participate. This form of communal work is similar to the way rajaaki or gamsa dams is organized during the construction, repairing and maintenance of the irrigation water channels (see chapter 3).

During communal work it is expected that one male from every household will participate. Children and men who cannot carry a load of 40kg are exempted or not considered suitable for rajaaki. It is usual that some of the older men and notables will participate by coordinating and supervising the work without doing much physical labour themselves.

Those who do not participate in construction work are supposed to pay the charges equal to the wages of an un-skilled labourer. It is very common however, that Project Committees fail to collect these charges. Some of the ex-committee members suggested that the best way to put pressure on such defaulters is refusing them a water connection near their house, if they don't pay the fine. If funds are collected they are spent on communal tasks, for example transport charges of tractors, blasting material or skilled labour.

In some cases villagers do not work themselves but hire unskilled labourers as for example in Azimabad, a small village consisting of members of the ex-raja family who are not used to do labour work. Also in other villages people may contribute money instead of participating themselves in the construction of the water supply scheme.

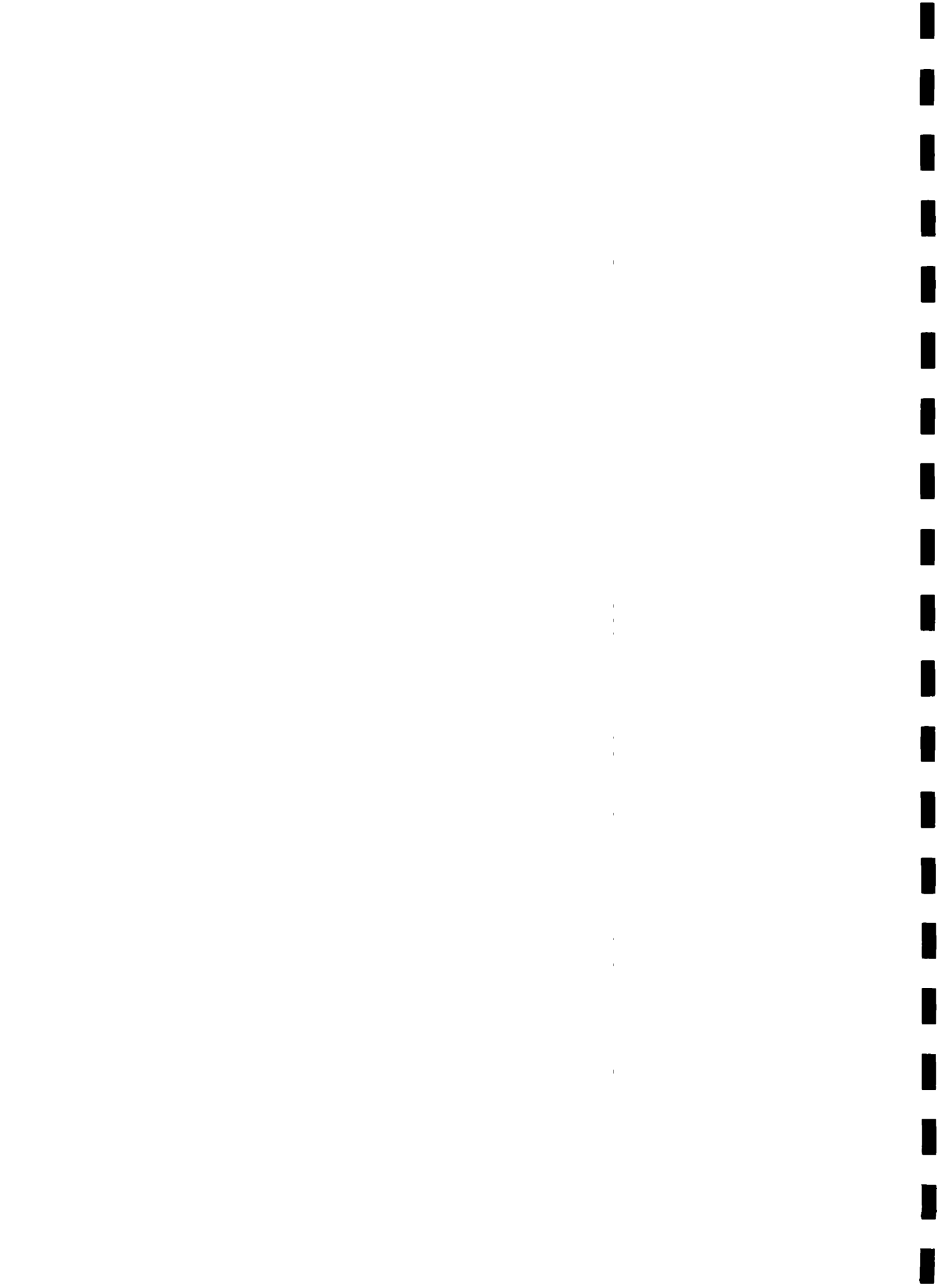
Transport of material, the first communal work on the scheme

Box 6

In some villages it is impossible for a truck or tractor to come into the village. Therefore supplies have to be unloaded at the nearest accessible point and then the villagers will transport the supplies into their village. In Silpi for example, pipes were transported from Gahkuch with a raft across the river and in Basho the supplies were transported with a cable-lift and then carried up to the village. In this and in some other villages in Baltistan it is common that women and men will work together on the transport of pipes.

ii) The formation of work groups called 'detail' for communal work on the distribution lines

It was found in all villages and actually observed in Silpi and Murtazabad that during most of the construction work the community divided into small work groups. In Gilgit region such groups are known as details and are based on muhallahs or kin groups. A detail is an interest group, representing the beneficiaries of a particular distribution line or muhallah.



For work on the tank and main line in small communities the whole village works together. In bigger villages the Project Committees divide the work between different details. For a certain period one detail will work on the scheme, then another will take over etcetera.

The construction of distribution lines is usually done in details. If a detail is well organized and motivated by an active coordinator, it can complete its work quickly and to a high standard. Good cooperation and steady progress will encourage a sense of satisfaction and responsibility for the scheme. In a good detail all the participants, who will eventually be the beneficiaries of the pipe they are installing, will make sure that the job is done properly and will share the work equally. In this way a person who lives at the end of a distribution line will work an equal number of days as a person living at the start.

Participants of less well organized details who are less motivated and without an active leader tend to lose interest in helping the others once the pipe has reached their own house. In this situation people living at the end of a line will have to do more work, without the assistance of the other members of their detail. In these cases it may be observed that the quality of pipe laying work is particularly poor at the end of the lines.

Reasons for the formation of details:

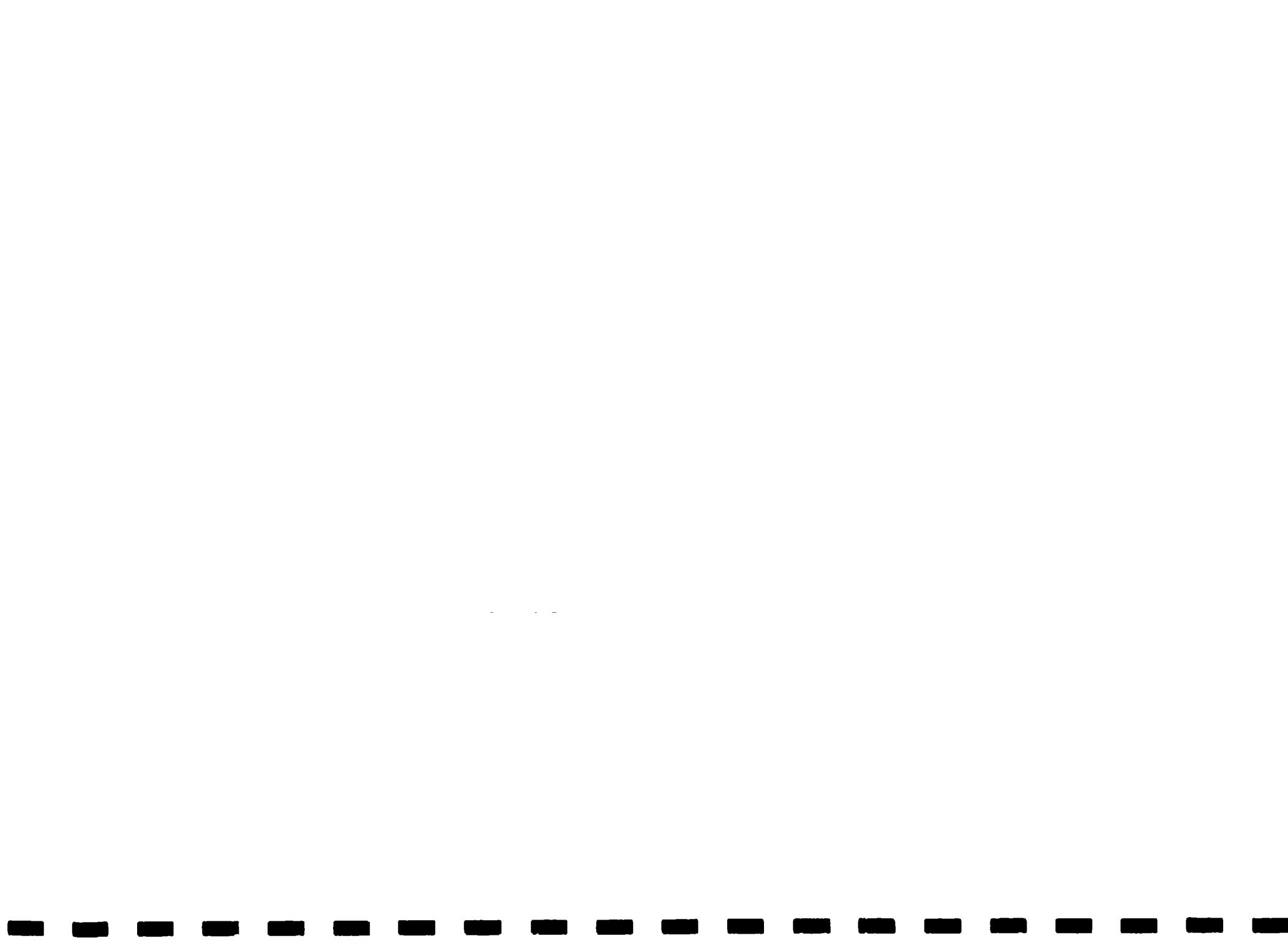
- a) A large group working on a single site e.g. the storage tank is difficult and ineffective,
- b) The community has the opportunity to be more flexible in work hours and agricultural activities can be continued on the day the detail is not working on the scheme,
- c) Those who did not join their own group due to any reason, can continue the work with next group any other day to avoid getting a fine for not participating,

Work in details can have some drawbacks. As only a limited number of labourers are present on a given day the work might be slower than if a larger group would cooperate. Details will work more effectively if an active Project Committee coordinates and supervises the construction process. By keeping a register of the construction activities for example, the Project Committee can help to avoid criticism between different working groups ('we worked but they other skipped their turn, why should we work more?'). The effectiveness of details could also be increased if from each one a person is nominated onto the Project Committee.

iii) Skilled labour

Usually masons and carpenters are needed to help with the construction of the storage tank. Villages prefer to use skilled labourers from their own community but if they are not available they can be hired from a nearby village. Where available a plumber will be asked to work on the installation of pipes.

If masons, carpenters or plumbers are working in their own village some interesting methods to compensate them were noted. In Silpi Paen for example the village mason and carpenter worked on the construction of the water tank and both were exempted from working on the main and distribution lines. In Basho the village mason was paid after deduction of un-skilled labour wages.



6.2 WORK SEQUENCE

After transport of the supplies to the village the construction usually starts¹⁴ with digging the foundations for the storage tank¹⁵ and transporting materials like stones, sand aggregate and wood to the site. If these materials are not available nearby the community will try to organise a tractor, for which the cost will be shared amongst each other or paid from any collected fines.

After the tank the work on the trenches will start with the help of the whole community. The next step is to dig trenches for the distribution lines by the details. Finally the stand posts will be constructed.

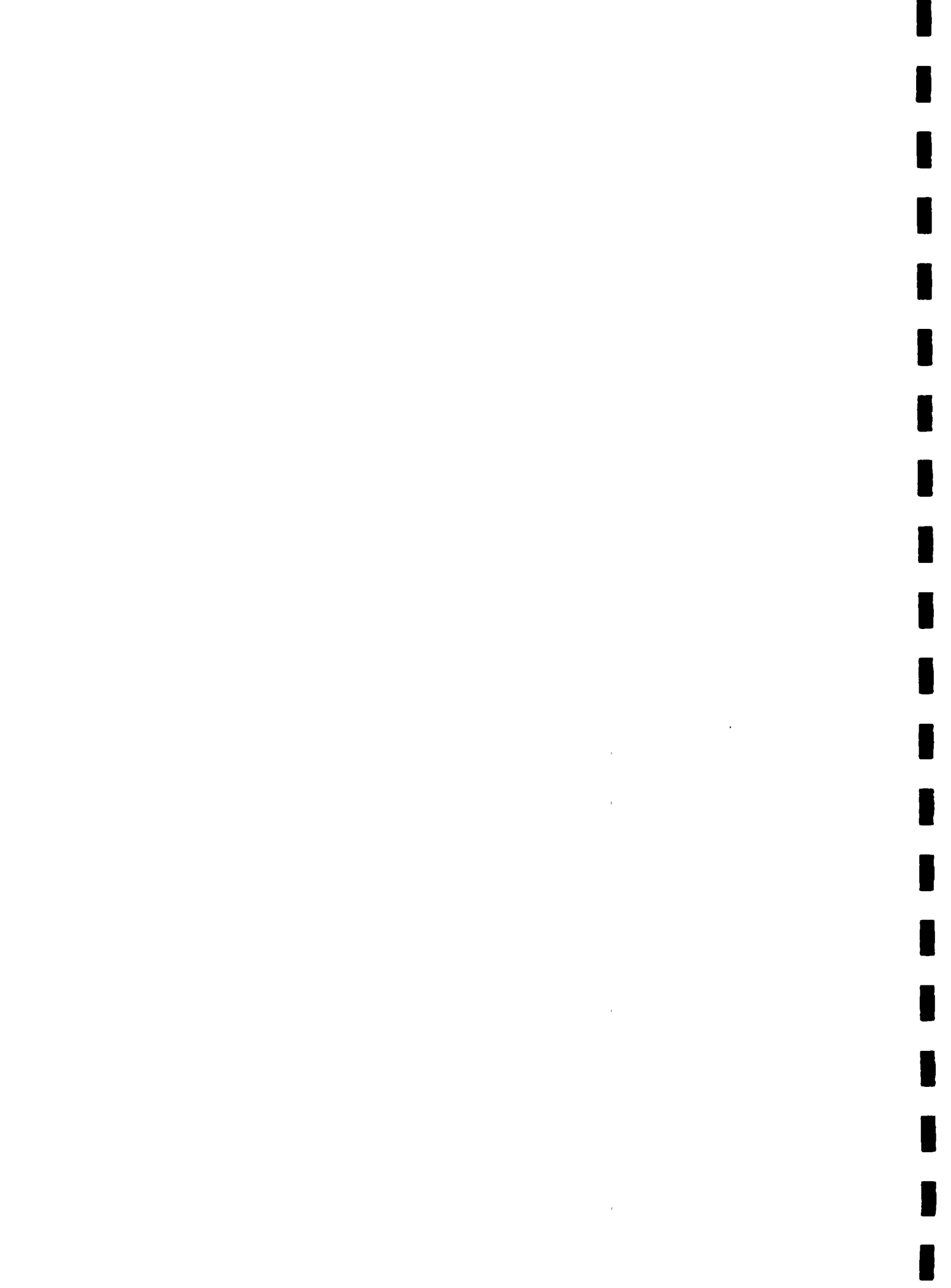
Working from top to bottom of the scheme seems to be the most logical sequence and LBRDD is advising the communities to work in this order. LBRDD usually first supplies the cement for the tank before it brings the pipes to the village. Particularly in schemes where the water tank construction is difficult or far away villagers have to abide by the rule to start with the tank. Starting with the tank has the advantage that villagers are more motivated at the outset of the scheme and that the most arduous job is finished first. If the tank is the last construction activity it might become a rushed job. Once the tank is completed it is possible to distribute water in the pipes during installation to facilitate the testing for leaks before covering the pipes in the trenches.

Some communities have decided to start with construction at the bottom of the village and work upwards. A number of reasons were identified for adopting such a strategy:

- Infrequent visits of LBRDD staff to supervise the tank construction, trench digging and pipe fitting work;
- Community installed the distribution lines and later hired a contractor to construct the tank and the main line,
- Committee decided to change the design and connect the pipe to existing water reservoirs, without constructing a new tank;
- Construction work on the tank and the lines started at the same time but the former took longer than expected;
- Community manipulated LBRDD by first installing all the pipes in the lower areas and then demanding more pipes to complete the system and make it functional, see Box 7.

¹⁴ According to villagers it is auspicious to offer some special food (butter or meat) on the first day of a new construction. This custom is in practice among all communities in the area. In Haldi for example a goat was slaughtered and eaten near the spring when construction of the water supply was started.

¹⁵ In a normal water supply scheme the storage tank and the inlet structure are constructed near the source. In cases where the source is higher up the mountain, which is usually the case with springs, the scheme may commence with the construction of a spring protection work, an inlet tank and a transmission line.



During the technical survey in Saling community leaders assisted LBRDD in the identification of the source, the sites for the stand posts and layout of pipes. After approval of the scheme pipes of different diameters were supplied to the village. According to the Project Committee the pipes were not enough and they requested LBRDD for more. LBRDD explained that they could not provide more pipes. The Project Committee organized a village meeting and decided that they begin installing the pipes which they had in the distribution network first.

The construction work of the water supply started by laying distribution lines in the lower muhallahs. The Project Committee supervised the work without consulting the overseer of LBRDD and a private plumber was hired. All pipes were installed in two muhallahs and no pipes were left for the main line or for the distribution lines in the other three muhallahs.

The Project Committee submitted an application to LBRDD for more pipe, which was finally approved after a year. Two small water tanks were then constructed and the new pipes were used to make the main line and the distribution lines in the other three muhallahs. Nowadays the scheme is partly working, water cannot be supplied to the upper muhallahs because of insufficient discharge of the spring, a leaking main line and because large diameter pipes were used in the lower muhallahs.

6.3 CONSTRUCTION OF THE DIFFERENT RWSS COMPONENTS

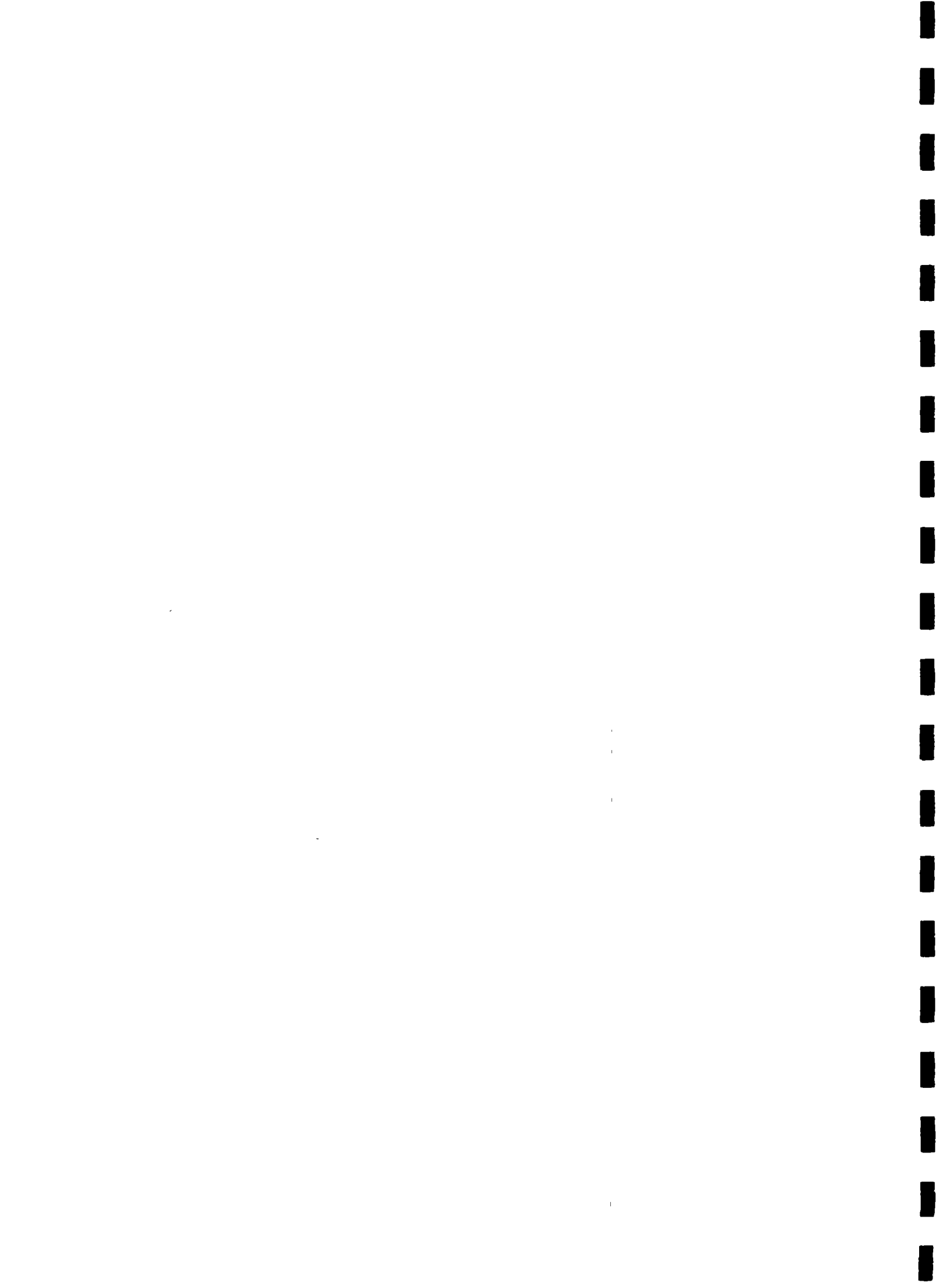
i) Tank

The tanks proposed by LBRDD are usually made with stone masonry constructed partly below ground-level. Reinforced concrete is not commonly used in tanks, only sometimes for covering the tank. LBRDD calculates the tank size based on the technical survey, and a projected population size. In practice however the size is determined by the available site, and the amount of cement. Usually LBRDD provides a maximum of 40 bags. Villagers often complain that LBRDD designs the tanks too small.

In several schemes that are under construction (Silpi Paen, Hakis and Murtazabad) a disagreement has developed between LBRDD and the community on water tank size. The community was not satisfied about the size and wanted to enlarge it to meet their future water needs. In such cases the LBRDD policy is to provide the maximum amount of cement while the deficit and other construction material will be the responsibility of the community.

A substantial number of schemes have operational problems due to damage or other difficulties with the water tanks. Many reasons were identified by the communities and by LBRDD staff:

- * Often tanks are not very reliable because insufficient cement is used. This happens when villagers try to construct the tank larger than the initial design without using proportionally more cement or because of misappropriation,
- * The quality of cement deteriorates during transportation and storage;



- * The lack of supervision and skilled labour results in low construction quality.
- * The limited space, the slope and the ground conditions of tank sites near to springs often causes difficulties to build a satisfactory tank. Excavating in these circumstances is difficult and tanks have to be constructed at ground level. Freezing of the water in such tanks occurs easily and this can cause damage to walls leading to leaks and eventually total breakdown.
- * The site of tanks are often changed by the community when land owners refuse to provide land or in cases of conflict over a source. Cases have been noted where the site was changed to economize on the design due to shortage of pipes. Newly selected sites are often at a lower elevation which can then cause problems of water distribution.

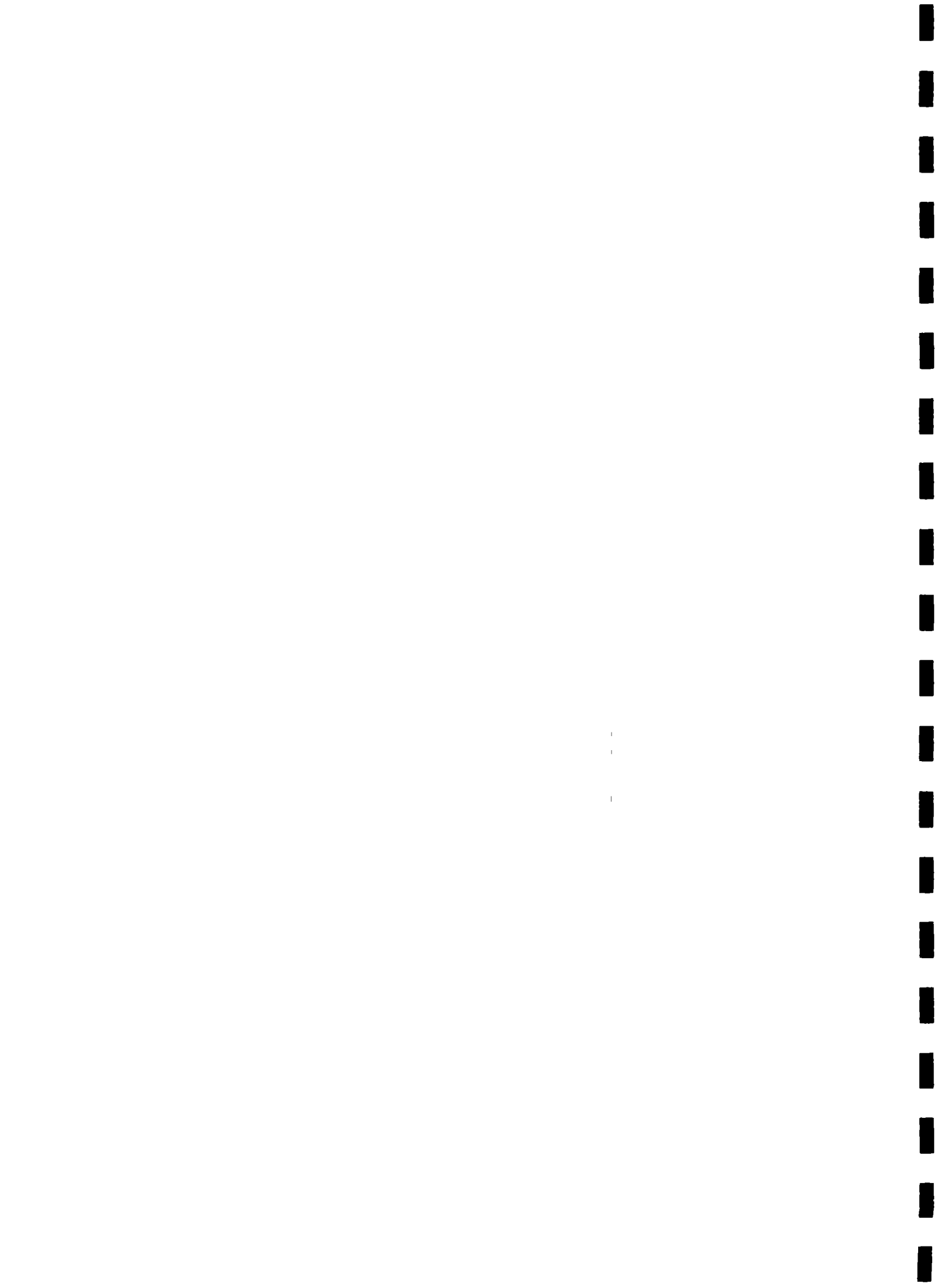
ii) **Excavation of trenches**

According to LBRDD the standard depth for laying pipes is three feet. The main technical reason for this depth is to avoid freezing of water during the winter. An important socio-technical reason for following this guideline wherever it is possible is the fact that without doing so the water will warm up during the hot summers with the result that villagers will reject it for drinking purposes.



Figure 4: Village men, assisted by their sons, working on excavating trenches in Silpi Paen

It was observed in most of the completed schemes, and those under construction that the standard depth for digging trenches is not followed. The causes for this shallow digging are listed below and relate to the natural circumstances, the availability of labour and the access to resources.



In all villages some explosive material was required for digging the trenches to a proper depth. In some cases villagers used surplus explosive material from AKRSP projects or purchased it from the market.

Common causes for shallow excavation of trenches for pipes

Box 8

Natural circumstances

- The ground is rocky or has compact gravel which makes digging very hard work;
- It is difficult to install pipes across a terraced slope without leaving them partly uncovered;
- Impractical to cross nullahs and channels at the required depth,
- Limited space for digging in paths,
- Pipes are installed in sub-channels.

Labour availability

- Few young men are available and interested in digging work,
- No awareness among communities about the standard digging depth nor understanding for the reasons to do so,
- Communal work is only well organized for main lines and the beginning of distribution lines; at the end of distribution lines only a few people work and quality deteriorates;

Resources.

- Lack of elbows and other accessories to install pipes around big rocks;
- Few good shovels and pickaxes are available in the village,
- No easy access to blasting material or pneumatic drills.



Figure 5 Exposed pipes due to shallow or non-excavation of trenches



4

5

iii) Installation of pipes; plumber and the tool kit

After the trenches are excavated LBRDD sends a plumber for the installation of the pipes. Depending on the type of pipe his work will include threading and joining, and if possible cleaning and testing for leaks. One selected person will assist the plumber during this work and in this way receives 'training on the job'. After pipes are installed the villagers will close the trenches.

This village plumber will be responsible for a tool kit donated by LBRDD, see figure 6. The tools are used during installation of the pipes and it is anticipated that the village plumber will use them for later operation, maintenance and repair of the scheme.

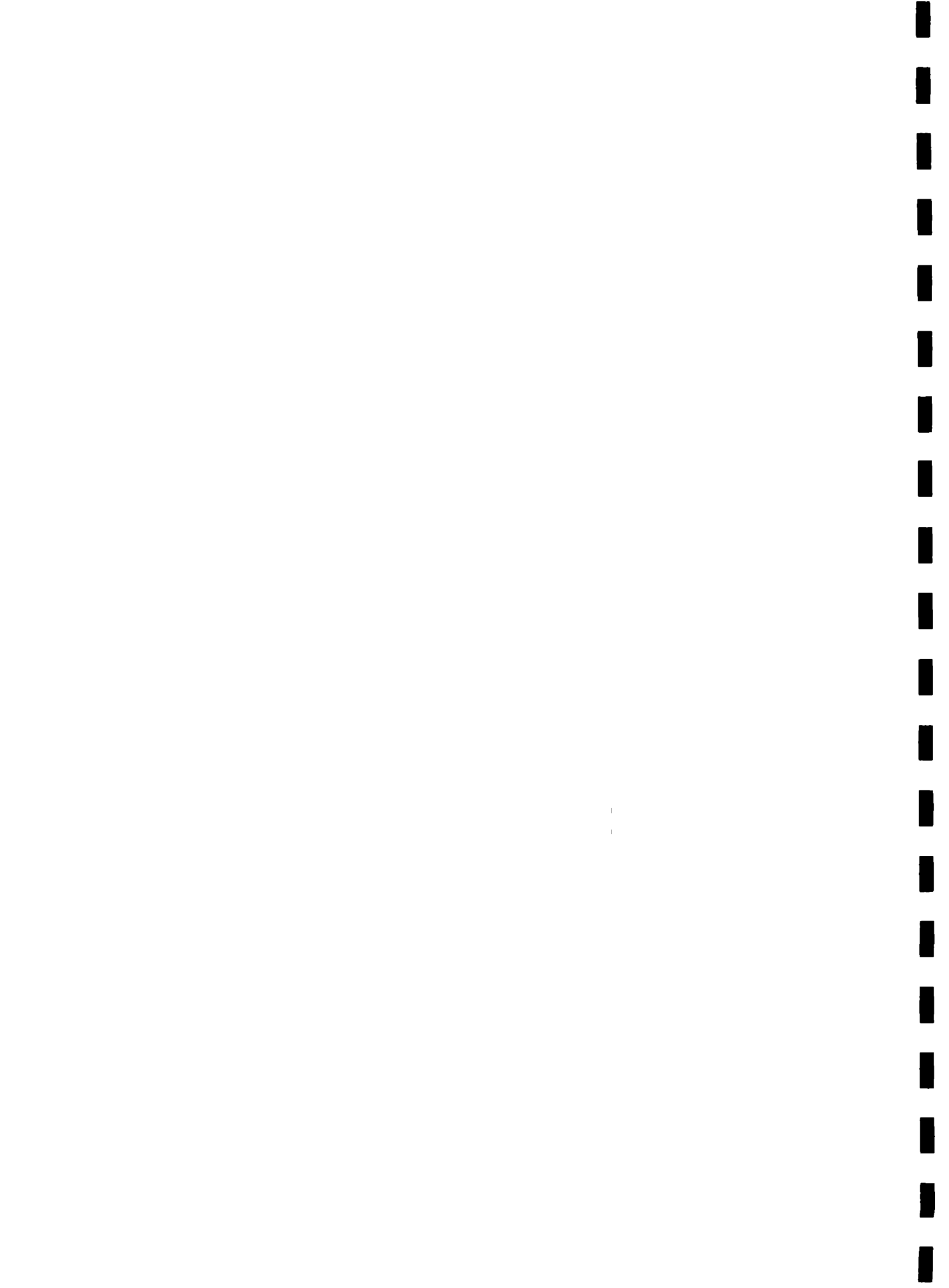
In the past however, LBRDD did not have a uniform policy for the distribution of the tool kits. In some villages LBRDD provided one kit, while in other villages the plumbers of two or three adjacent schemes have had to share the tools. In some schemes no tool kit was available at all, and in these villages the community was told to submit a written request to LBRDD whenever a major repair was needed. The purchase of a tool kit by the community is difficult as the tools are not easily available in local markets and are expensive (see also chapter 7.3).



Figure 6. Photograph of the tool kit of the village plumber in Sumal

iv) Construction of standposts

LBRDD does not have a standard design for a stand post. It is usually up to the sub-engineer and the villagers to decide the type of stand post. Some villagers buy extra cement or use cement left over from the tank construction to make concrete stand posts. More usual however is that the plumber will make a tap stand with pipe, an elbow and a bib-cock. Waste water is disposed of into channels and normally cemented platforms are not constructed.



6.4 COMMON PROBLEMS DURING CONSTRUCTION

i) Construction difficulties

The problems with the construction of tanks and the excavation of trenches have been mentioned above. Another problem relates to crossing nullahs and channels with pipes. In almost every village one or two nullahs are flowing through the village. People are settled on either side of the nullah and with a single water supply scheme both will have to be facilitated. In many villages, where there is for example no bridge is available to attach the pipe, this becomes a technical challenge because:

- a support structure is needed to prevent the pipes from bending and breaking at the joints;
- the pipes can be damaged in summer by the high flow of nullah water,
- the pipes can be damaged in winter by frost.

Awareness of Committees about the problem of crossing nullahs with the pipe line Box 9

In Pissan the Project Committee refused to give standpost connections to a muhallah on the other side of the nullah. Their reason was that the Committee expected that the pipes would be damaged by the nullah water. At the scheme under construction in Haldi the Committee has reached the same conclusion.

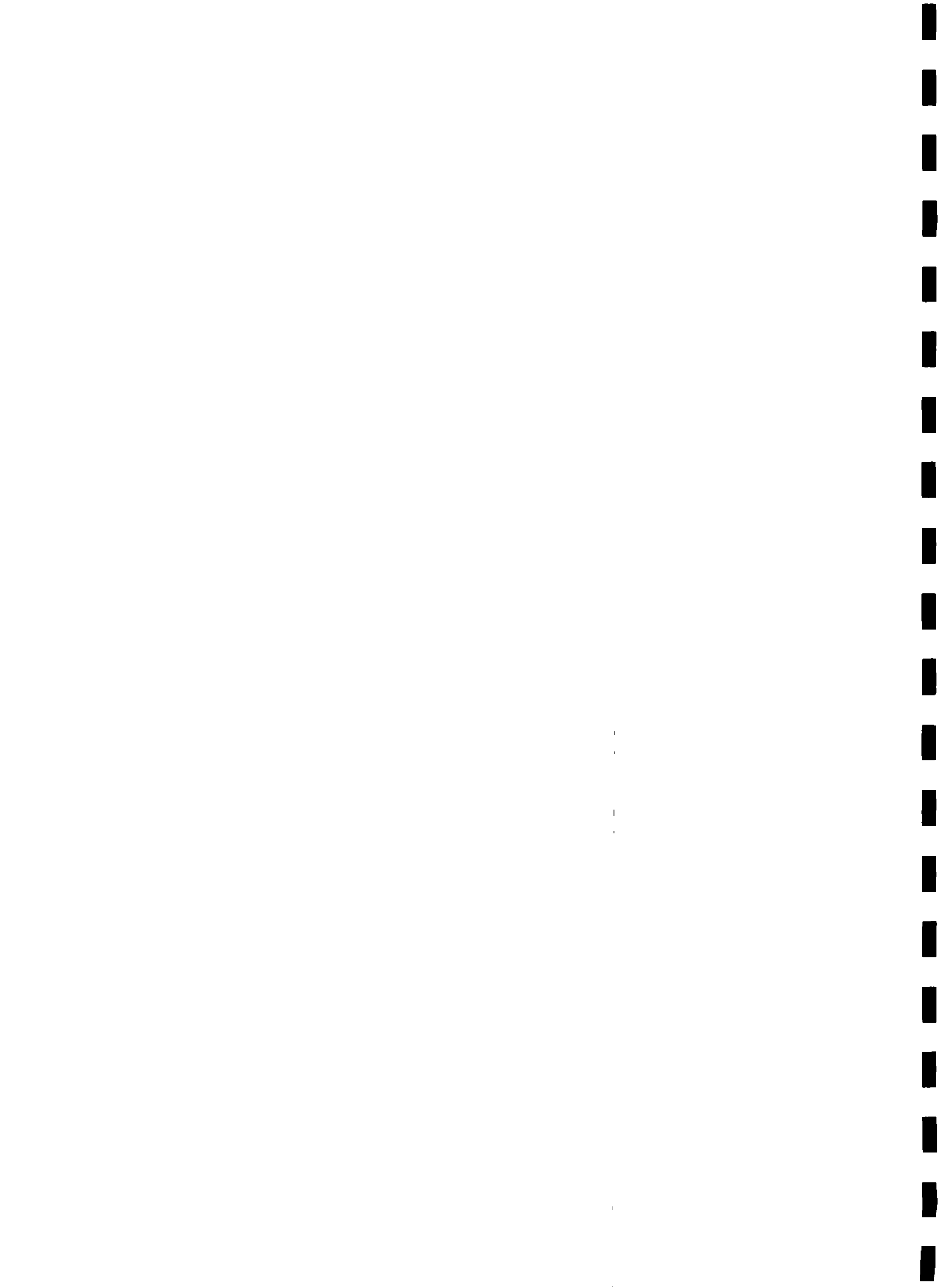
ii) Quality of pipes, accessories and other input

According to LBRDD staff different qualities of pipes are used in the construction of schemes. For UNICEF schemes an extra strong galvanized pipe is made available from Karachi. According to all concerned this is the strongest pipe available which is easy in installation and will not break due to frost.

For the limited number of schemes that LBRDD implements with funds other than UNICEF the pipes are procured in Rawalpindi or Lahore. The latter pipes come in four different qualities called 'low, middle, high and extra high pressure pipes'. LBRDD field staff prefer to work with UNICEF pipe as they never face problems with these pipes. According to them other pipes can give problems during threading and bending, and will more easily crack during cold weather. Communities like for example Dawo and Manthoka reported that the pipes in their villages are not of a high quality and that this has caused many leakage problems in their system.

In general the LBRDD staff was disappointed about the quality of the accessories that are made available. It was added that better materials are available but due to funding shortage this quality cannot be purchased. Examples were given that sometimes during installation of the pipes sockets starting leaking immediately.

The transport and storage of material occasionally also causes problems. In Saling for example cement was provided to the community but some bags were badly effected by the rain and the cement had turned into big worthless lumps. In Rawoshan it was reported that pipes and their sockets were stored for more than a year before installation. The pipes got very dirty inside and the children of the village squandered the majority of the sockets.



A striking case was noted in Baltistan where it was said that a transporter was involved in replacing high quality pipes with other, lower quality ones in the process of transporting them to the village.

In most of the villages that were studied the community complained that not enough pipes had been supplied to the village. Due to the shortage of pipes some households could not be supplied with a nearby standpost and therefore they were not getting any of the benefits of the water supply scheme.

iii) Delays in the construction

The majority of the schemes that were studied took more than a year to complete and it is not uncommon for construction to take longer than two years. The communities identified a large number of issues that cause this delay.

In the first place the size and the complexity of the scheme is inherent to the time it takes to construct. Second is the issue of timely input of pipes, cement and local materials. A third matter relates to the motivation of the community, the leadership and the lack of internal conflicts and disputes. A final factor that influences construction progress relates to the availability of labour to construct the scheme. These reasons are listed in Box 10.

Issues that account for delay in the construction of schemes

Box 10

Physical circumstances:

- altitude and the presence of snow and frost,
- long distances between the source and the village;
- rocky land and other physical obstacles (crossing a nullah)
- short working season (usually from March to November).

Timely material input:

- slow process of delivery of material (cement and pipes) to the community;
- limited availability of local materials;
- non-availability of a jeep road to the village results in longer time to bring pipes and cement into the village.

Motivation, coordination and cooperation:

- No motivation and organisation of the community;
- Weak leadership and lack of coordination;
- Community conflicts about the ownership of the water source, the tank site, the donation of free land and its internal compensation;
- Community conflicts about the lay-out of pipes, trespass for trenches in fields and courtyards and agreement of sites for the stand posts,

Availability of labour:

- limited availability of labour due to agricultural work, commitments or priority to other communal activities (channel work, marriages, funerals); seasonal outmigration of young men, small number of inhabitants living in a dispersed village;
- Non-cooperation by villagers who will, or fear they will, not be served with a nearby standpost.



6.5 CONCLUSION: CRUCIAL ELEMENTS DURING CONSTRUCTION

* Working groups

A community that is divided in well organized and motivated 'details' can work quickly and produce high quality work. If one person is coordinating the work of a detail and motivating the members this further enhances the output. Where available such a person is member of the Project Committee

* Community leader

The chairman of the Project Committee plays an important role in the implementation. Without proper coordination of efforts, without him motivating the other members and the villagers the construction will take a long time. In the two most successful schemes that were included in this study, Silpi and Murtazabad, strong and motivated villagers played a crucial role. The following case illustrates the effect of the absence of a villager who takes an active lead in the construction

The crucial role of the community leader, an example from Rawoshan, in Ghizer Box 11

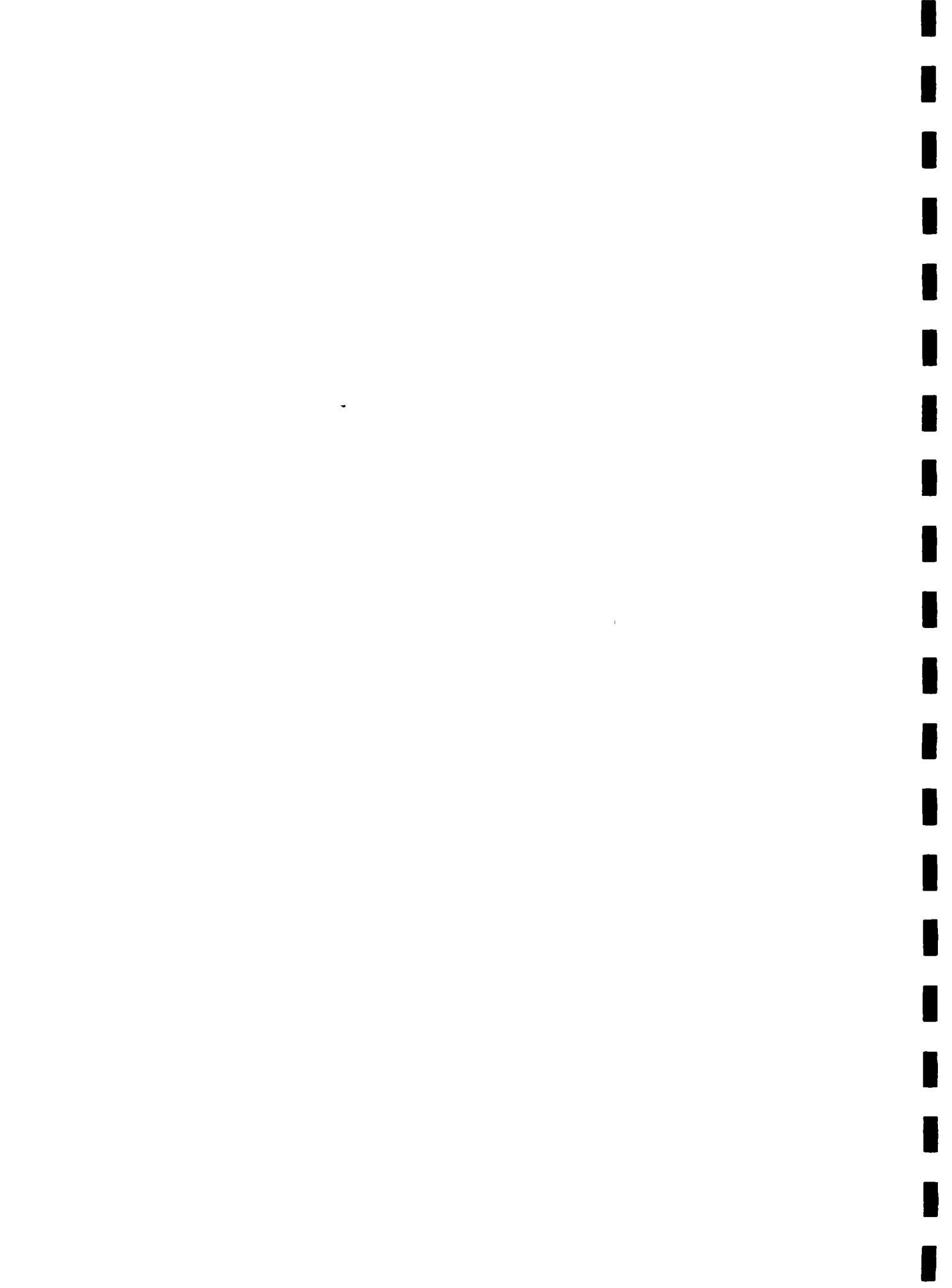
In Rawoshan village, LBRDD supplied pipes to the community but they were not installed for the next three years. The UC-member failed to motivate the community to start construction. Nobody agreed to provide free land for a site for the water tank and many were not prepared to provide free labour.

After Union Council elections the newly elected UC-member solved these internal problems and he motivated the community to construct the water supply scheme. However, after completion of the scheme the tank broke down due to poor construction and the pipe lines became blocked due to lack of maintenance. This time the member was unable to motivate the villagers to cooperate for repairing the scheme. The scheme is now out of order.

* Regular visit of the implementing agency

In each of the villages included in the study the community mentioned that LBRDD staff visited the community a total of three or four times. None of the communities could remember more frequent visits. This observation confirms what LBRDD staff have identified as a constraint in their work

In this chapter several examples have been given to illustrate that the construction quality can be improved by better supervision of the work. More regular visits will help to prevent communities making detrimental changes to the design (for example the unnecessary increase of the tank size) and they can help to improve construction quality (for example excavating trenches to the correct depth). Furthermore visiting staff can assist resolving problems and disputes at an early stage and can help motivate the community with the result that the construction process can progress smoothly or even be accelerated. More interest visits from the donor agency might have a motivating effect on the implementing agency.



CHAPTER 7 OPERATION AND MAINTENANCE

Once the construction of the scheme is completed the implementing agency assumes that the community will be responsible for its operation, maintenance and repair. This chapter gives a description of how communities manage this vital task

7.1 TYPES OF GRAVITY FLOW WATER SUPPLY SYSTEMS

All the water supply schemes in the Northern Areas are gravity flow systems. Tubewell systems are not present and only very few handpumps have been installed. Basically the gravity flow schemes consist of a storage tank at a high point in the village from where one or two mainlines distribute water. The mainline sometimes branches into distribution lines. The daily operation of such a scheme is determined by the availability of water. If water is abundant it is possible to have a continuous flow supply system. If water is limited storage and some form of scheduled distribution will be required.

i) Continuous supply systems

In this case the output of the source is enough to supply water into the whole distribution network for 24 hours a day. The input to the tank from the source is not regulated and any excess water will simply overflow. The output from the tank flows continuously into the mainline and from ~~these into the~~ into the distribution lines. The tank usually has two valves, one to shut off the flow ~~into the~~ distribution network and another one to allow repairs to be carried out to drain the tank during cleaning or repairing.

ii) Scheduled supply systems

In a large number of villages the amount of water from the source does not permit the community to have a continuous supply system throughout the year. The usual solution is to construct a storage tank in which water is stored during the night and during other periods of low demand. When water is short in some, or perhaps all the months of the year, a distribution schedule is required to ensure an equitable supply to the village. This requires valves in the mainline or distribution lines and that the timings of these are opened and closed by the authorized operator at predetermined times.

7.2 THE DAILY OPERATION OF A WATER SUPPLY SYSTEM

The above mentioned systems will each have their own set of operational arrangements to ensure their proper functioning. The management of the taps is the same for both systems.

Operation of a continuous supply system

In the case of a continuous supply system the community usually does not see the need to appoint a person, at least not on payment, to look after the daily operation. The owner of the land is often asked to check the tank and he usually does this, not least to make sure that the overflow is not damaging his land.



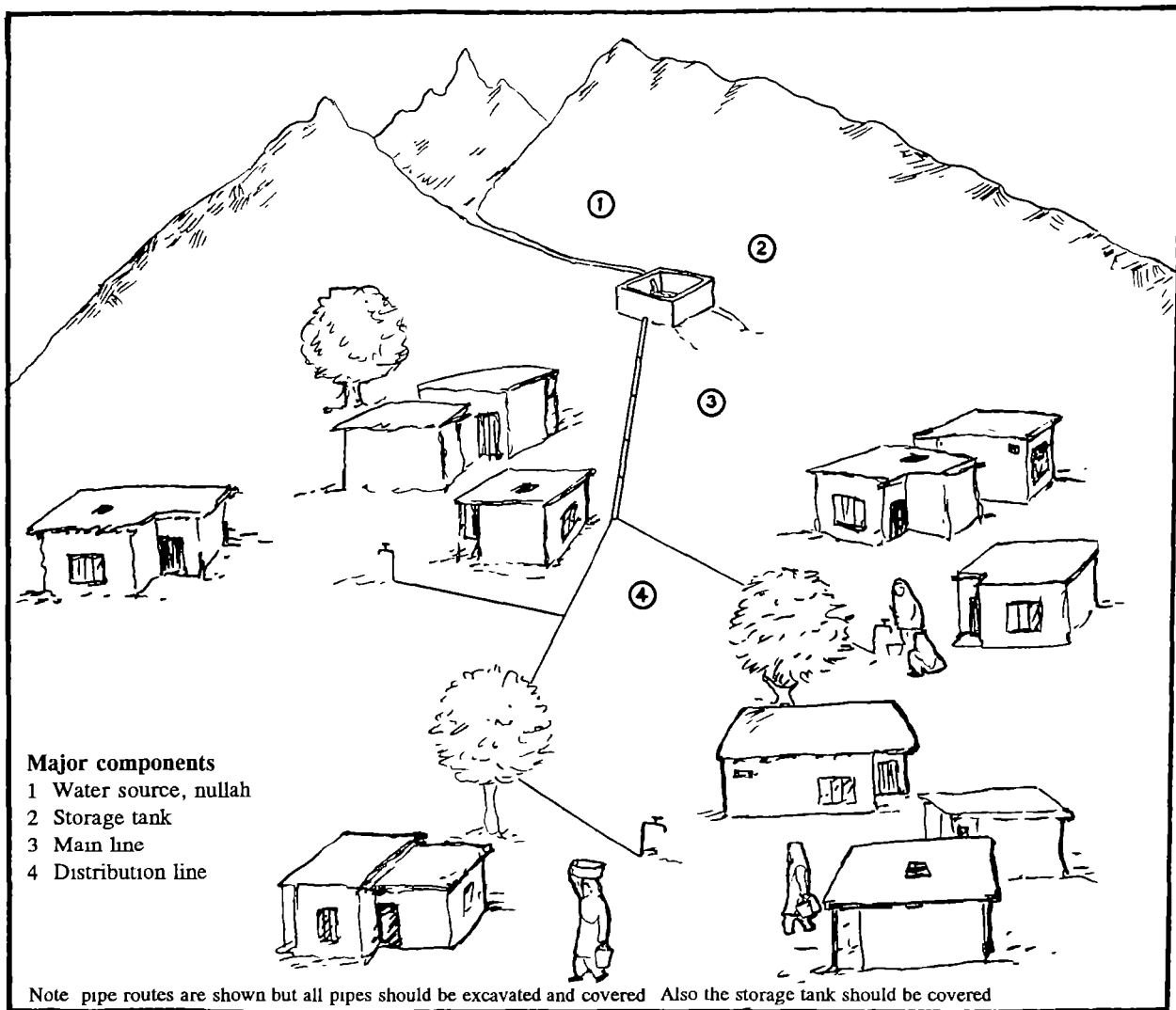


Figure 7 : Gravity flow system

Operation of a scheduled supply system

In the case of a scheduled supply system, a number of tasks must be carried out frequently for the system to function to the satisfaction of the users. To achieve this communities have developed different kinds of arrangements

i) Operation of a scheduled supply system with the help of a caretaker

Ideally a watchman or a chowkidar should look after the tank and the opening and closing of valves. Only in a small number of villages is such a person appointed, usually because of the difficulties with paying him a salary (see also section 7.3). One of the reasons for communities for not being willing to arrange a salary is the policy of the NAPWD. They pay a government salary to the chowkidar and



plumber of their water supply schemes. On this issue villagers often argue in a similar way to this person from Daeen:

"If NAPWD is paying the salary of the chowkidar, and the plumber, and an overseer in Chatorkhand why should we have to pay a chowkidar from our own pockets?"

Villagers often motivate the owner of the tank site to donate land by promising him an official post as a chowkidar. In Sumal and Pakora for example this prospect persuaded the land owners to give their land. In Pakora the owner worked as caretaker of the tank but he became demotivated when after two years an official appointment and a salary had still not been provided.

There may be some communities that have officially appointed caretakers to operate their scheme although such cases were not identified. If there are some it is unlikely that the caretakers are paid a salary on the level of NAPWD, more probable is an annual payment of grain, like some communities give to the person responsible for managing the irrigation water. It might be a feasible solution to ask the person who is traditionally responsible for the distribution of irrigation water to become a watchman for the piped water supply too.

**ii) Operation of the scheduled supply system by the villagers:
'opening the valve, starting a conflict'**

In the majority of the villages having schemes that would benefit from a caretaker, the community has instead adopted a very informal solution to the operation issue. Usually several people are allowed to open and close the valves and they will do so according to what they feel is needed. In some cases communities have developed a rudimentary schedule for operating the valves and those living nearby are requested to look after the valves at the agreed timings.

In many villages such an informal arrangement will probably result in reasonable performance of the system. However, such an informal management system can also lead to erratic practices when almost anybody can open and close the valves in an attempt to provide water to their respective muhallah. A number of examples can be quoted in which such informalities led to general dissatisfaction among the users or even fierce conflicts between them.

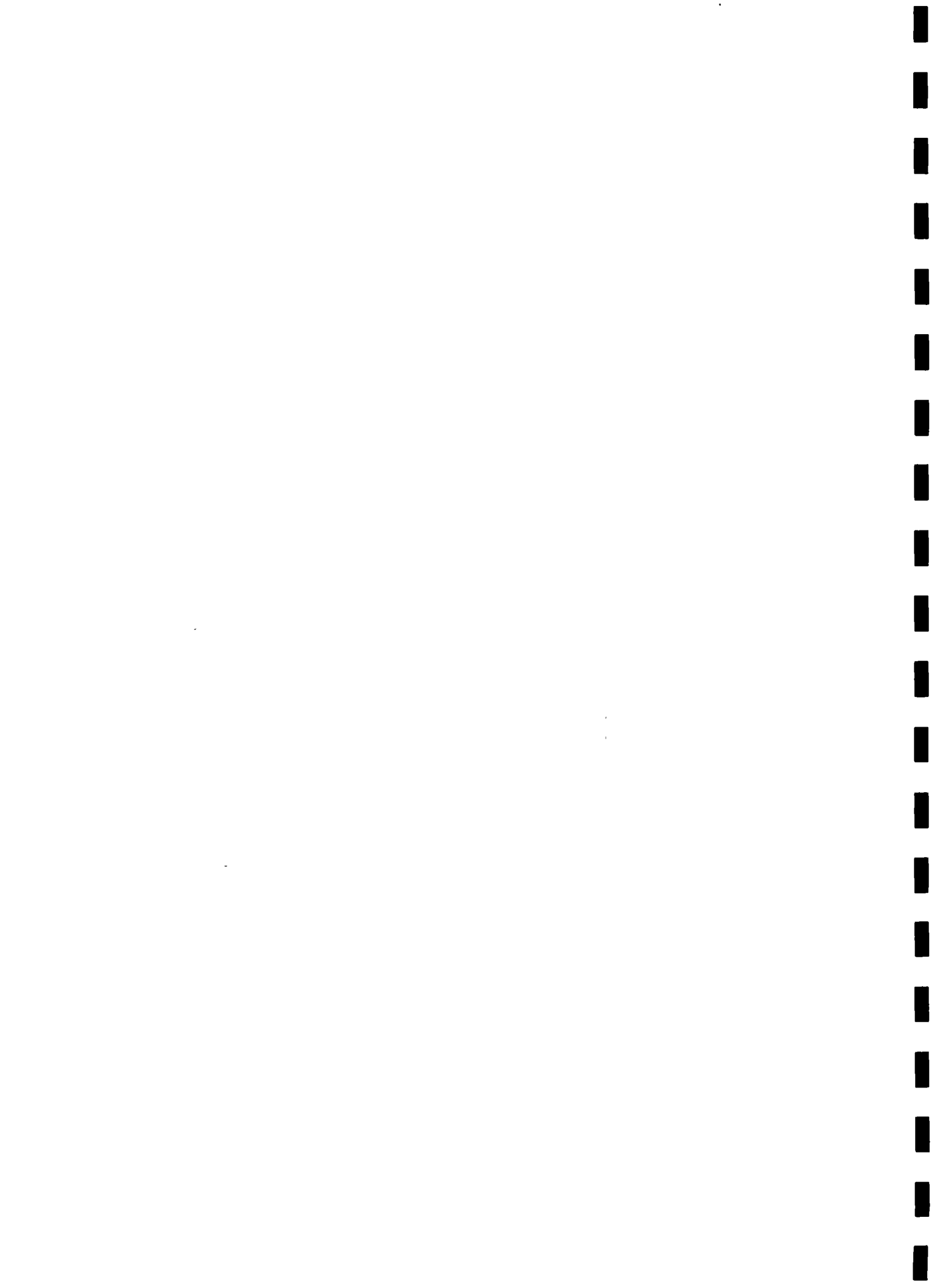
Why villagers leave the taps open

Box 12

Village elders who have tried to motivate people to close the taps explained that villagers were disinterested to do so, or did not want to spend money in case of a broken bib-cock. In some cases though, people have practical reasons for leaving their taps open.

One argument is that in villages without a reliable supply the women keep taps open in order to collect any water that might come from the pipe. If the water comes the bucket underneath will be filled, although a lot of water can be wasted if nobody is present. Such behaviour can be eliminated redundant if a good management system insures the supply at fixed times.

In the winter it is common for people to leave open their taps to avoid freezing of the system, although this can cause dangerous patches of frozen overflow. In Baltistan the disposal of water in winters is such a problem that some people prefer communal taps to individual connections.



Operation of standposts and individual connections

The improper closing of taps causes a lot of annoyance among the beneficiaries of a scheme because open taps can influence the flow in other taps. Particularly in a village with a water shortage this wastage is a serious loss. In most villages the members of the Project Committee and village elders admitted that although they have tried to convince people to close their taps this had generally failed, see Box 13.

Some households use tap water to irrigate their vegetable and fruit garden by connecting hose pipes to the taps. Such gross use of water can have a very disruptive effect on the performance of the systems. Similar to the problems with valves the management of taps can cause disputes within the community. The following example from Sumal shows how leaving taps open can lead to such problems.

Open taps leads to conflict

Box 13

In Sumal the community constructed a water supply scheme with LBRDD and later AKHB installed a water filtration unit. One muhallah of the village does not have tap water and another upper muhallah complains about low pressure in their taps. The reason is that people of the lower muhallahs do not close their taps.

The people from the upper muhallah wanted to install a valve on the main line but all the other muhallahs opposed this idea. This issue was settled by the village elders who decided in a community meeting that people of the lower muhallahs should close their taps after fetching water. A committee of village elders was formed under the leadership of the UC-Chairman to supervise the agreement. If an open tap was found the committee had the right to impose a Rs 100 fine on the household.

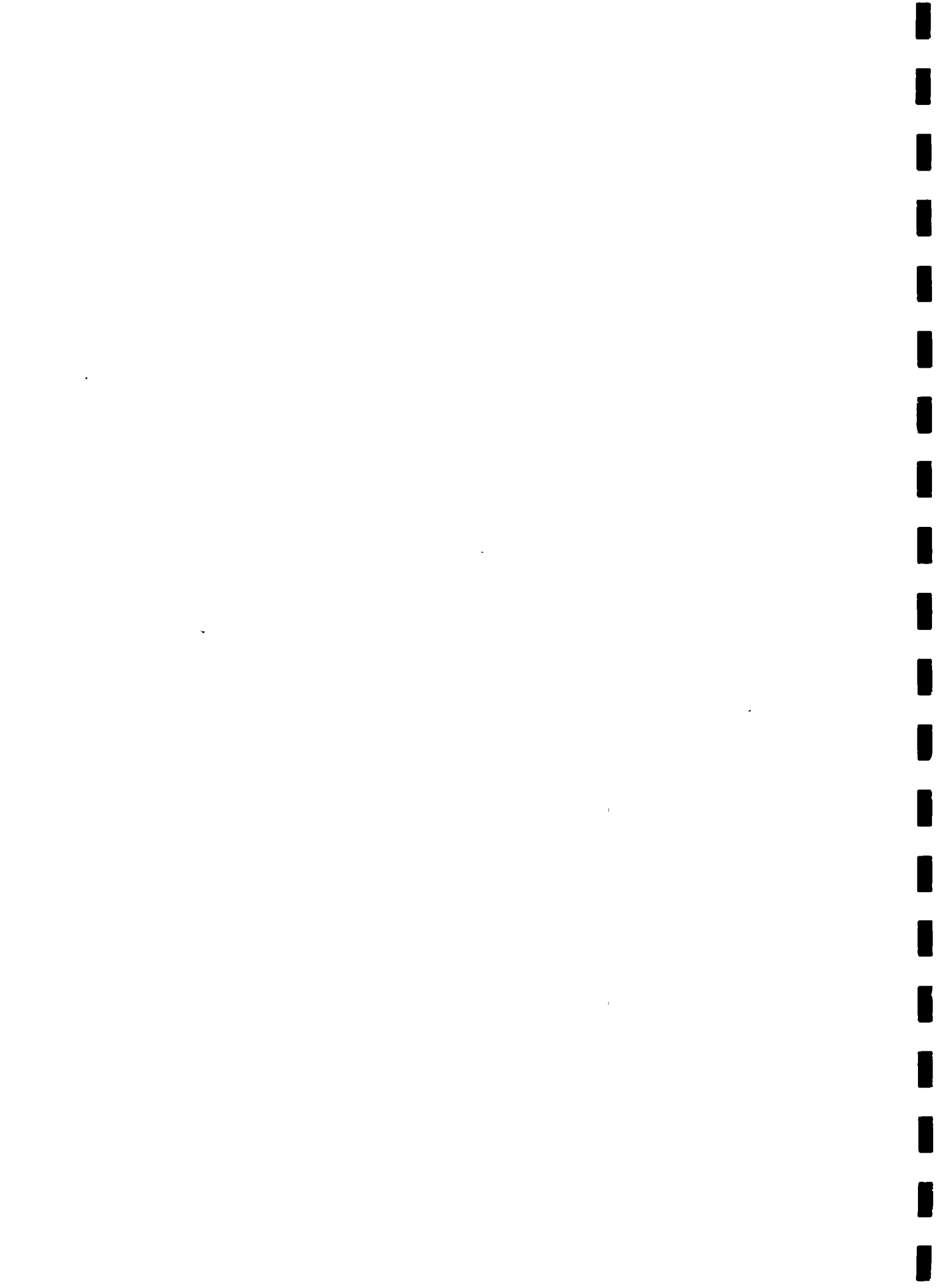
However the committee failed to impose fines on those who violated the rules. For the communal taps that were found open it was impossible to impose fines and it was difficult to check the yard connections. The result was that the committee was unable to solve the problem of the upper muhallahs even though some households are abiding by the rules more than before.

7.3 MAINTENANCE AND MINOR REPAIRING OF THE SCHEME

i) Management of the water tank

LBRDD provides communities with GI sheet to cover the tank. In several villages these sheets were not installed at the time of constructing the tank. One reason is that the community does not organise timber for the beams. The tank roofs are often constructed a year or more later, sometimes after an accident with a child falling in or after contamination by animals. Some villages still have tanks without a proper roof particularly in cases where sheets got 'misplaced' during construction.

The cleaning of silt from water tanks is communal work that most communities do once or twice a year. In villages with a lot of sediment in the water this requires one or two days of labour. Some villagers argue that they do not cover the tank because it is easier to remove the sediment from the tank without a roof.



If a tank starts to leak the community does not usually repair it immediately, they are not very concerned about small leaks and the collection of funds to buy one or two bags cement is not feasible. Consequently small leaks are usually being neglected. If the leak becomes too big and the tank gets out of order it usually takes several months before any action takes place. There are some examples of villages where tanks were repaired with community funds. However, if the tank starts to leak for a second time it is unlikely that the community will be able to gather contributions again. In some cases an activist might write an application to LBRDD but in most villages they will wait until the government comes.

ii) Repair and replacement of bib-cocks

The replacement of broken bib-cocks is always done by the beneficiaries themselves, rather than a plumber. It's always the men who will do this repair, although women say they would be able to do this task, see box 19.

A new bib-cock costs about Rs 20-25 and is easy to install. Nevertheless replacement of broken taps usually takes a long time, if replaced at all. Particularly in the case of communal standposts, in villages with high water pressure (see figure 8), and where people keep their taps open in winters the villagers give very little attention to their replacement.



Figure 8: Water loss from broken tap



Figure 9: Provisional repair of leaking pipe with rubber

iii) Management of the main and distribution lines.

A properly functioning scheme will require regular small maintenance and repair work on leaking pipes and taps. Many of these small repairs however are neglected by the community, particularly the communal parts of the scheme. For example a small leak from a pipe near a path or channel will very likely not be repaired quickly. But in case of leakage from a pipe that passes through someone's land the owner will wrap a piece of rubber around the leak to stop the water coming out (see figure 9). Men of the village know how to do this and it is not considered something to call the plumber for.



In winter when water from the leak will turn into ice it is more likely that a pipe on communal land will be repaired. When pipes get choked the villagers dig the pipes out of the ground to investigate the cause. This activity often leads to shallow reburying of the pipe.

If pipes get frozen during the winter the affected beneficiaries will try to unblock the pipe by heating with burning sacks, maize stalks or kerosine. In villages where temperatures are very low and villagers have the experience that pipes are difficult to defreeze they will not even bother to try until the weather gets warmer.

If a pipe gets damaged due to a flood and needs to be replaced this will take considerable time, if the repair happens at all.

iv) Village plumbers

Small repairs on the water pipes is the task of the village plumber that was trained by LBRDD. These men were trained initially by the LBRDD plumber during installation of the pipes and they were provided with a tool kit. For reasons explained in page 28 not all plumbers have a tool kit.

These village plumbers are working part-time in the village and will try to charge a small amount of money as compensation for their work. Several plumbers became frustrated because villagers refused to give any money arguing that this was their duty as a fellow villager. One person requested to be paid in kind by asking eggs and even that proved to be difficult. For the installation of private connections and for plumbing work inside the house the plumber is paid. Plumbers do not earn enough money from their work to support the livelihood of the family. They often work outside their village and are not readily available at all times to do repairs.

v) Physical and technical problems with operation and maintenance

Several of the operational difficulties with valves and taps that have been mentioned are basically social problems. A large number of other problems are of a technical nature.

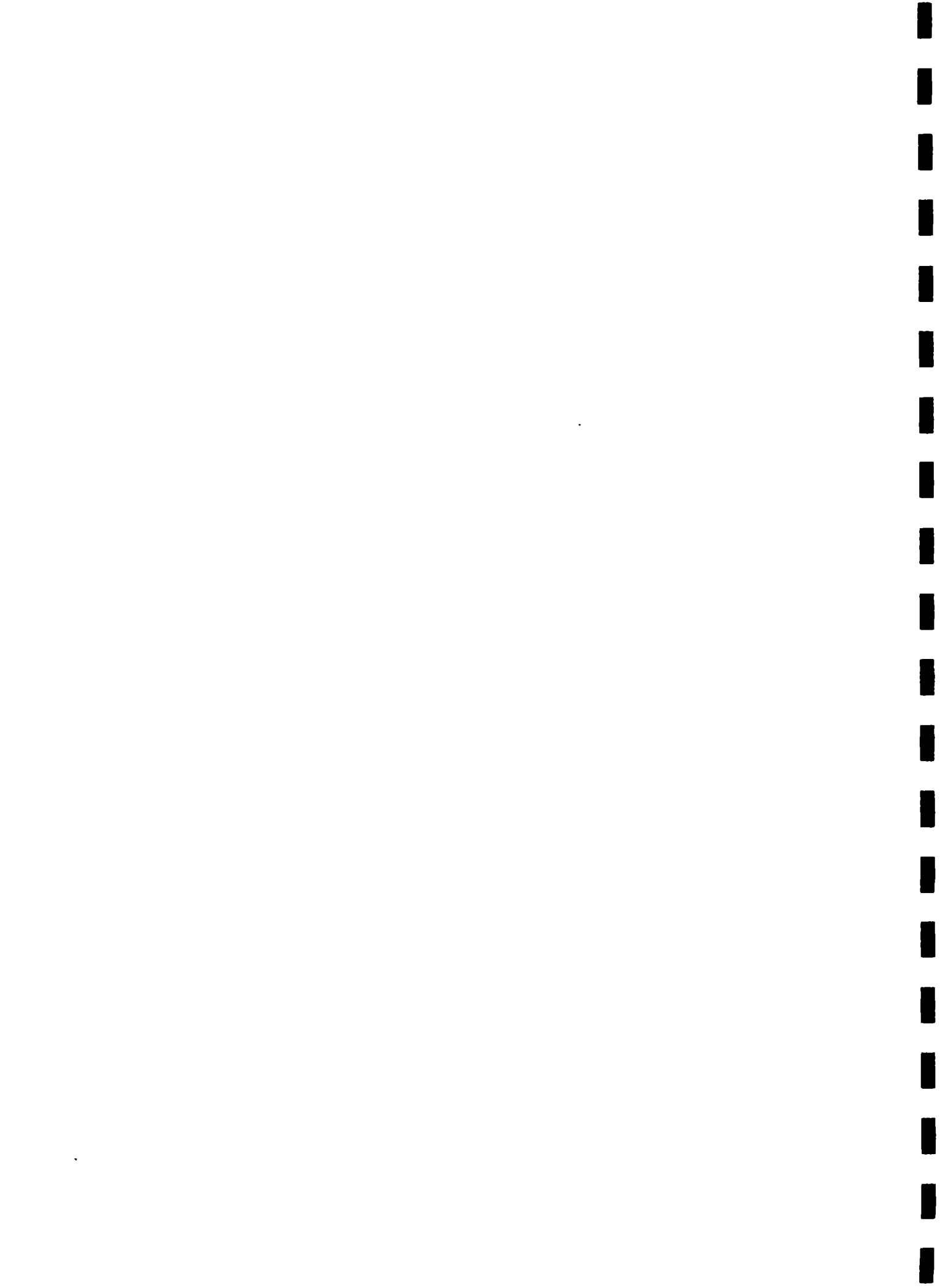
*** Water shortage**

If at certain times of the year water is not enough the scheme will not be able to supply water to all taps, all of the time. In order to supply water equitably a proper water distribution schedule is required, otherwise and this is more common the taps will supply water haphazardly.

*** Turbid water and other particles causing blocked pipes**

In the spring and summer the water in several villages has a high turbidity and carries large amounts of sediment. It is not uncommon in the Northern Areas that water has a turbidity above 2000 TUs. Sediment can reduce the effective storage volume of the tank, and can clog the tank outlet and the pipes. To reduce turbidity sedimentation and filtration is required¹⁶.

¹⁶. The WSHHS Project is working on village water treatment plants as a continuation of AKHB's experiments with water filtration units.



Other materials that can interfere with the operation of the scheme are stones or pieces of waste (plastic bags, leaves, straw), an example is given in Box 14. Sometimes children get up to mischief and put stones in the inlets or outlets. In other cases this can also be a deliberate act of sabotage if there is any dispute within the village.

Stones block water system in Dawo, in Ganche

Box 14

After a landslide damaged the main line of the scheme in Dawo the community decided to relocate the inlet of the pipe in a water channel nearer to the village. The pipe lower down the system however, got blocked by small stones. The villagers tried to prevent this from happening again by putting a piece of cloth over the inlet but this reduced the flow. So the villagers made a grill with wooden sticks to stop stones and other objects entering the pipe. But still the pipes got blocked again and the scheme is now out of order.

* Damage by floods and slides cause problems with tanks

Tank sites, particularly near springs where little space is available, are prone to damage due to floods, mud flows and avalanches. During summer the high water levels in the nullahs cause soil erosion and the movement of large boulders which can damage pipe lines.

Two examples where floods threatened the operation of the RWSS

Box 15

In Basho the community chose a spring source for supplying the scheme. The site selected for the tank was very small, steep and subject to frequent land slides. During such a slide the tank was destroyed. The community successfully rehabilitated the scheme by building a small strong tank.

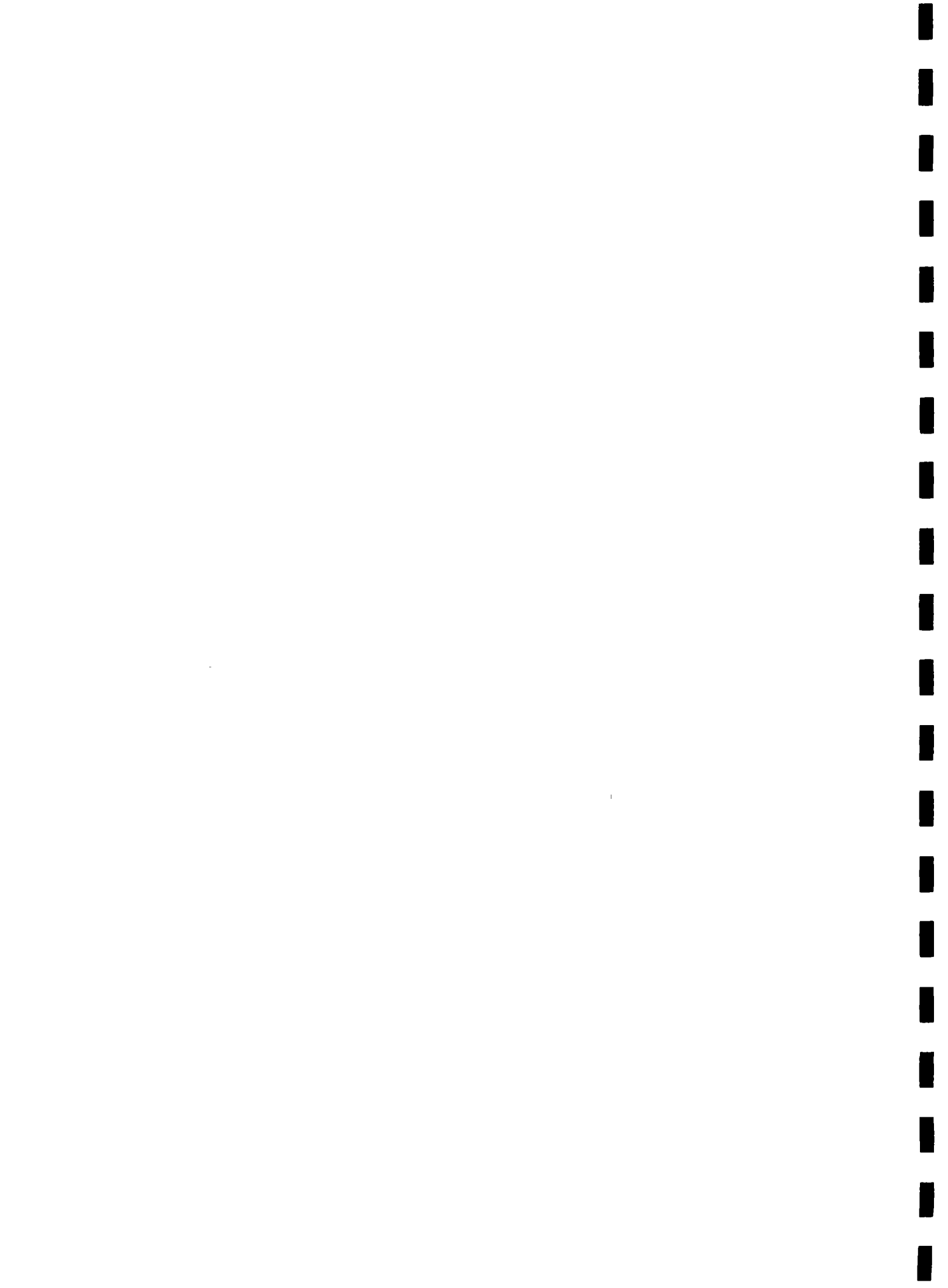
In Dawo the community built a small wall along the side of the mountain to protect the pipeline from being damaged by the regular floods and small landslides.

* Pressure

When water tanks are constructed high above the village the pressure in the system can be very high. In many villages no arrangements are made to reduce the pressure with break pressure tanks due to the unavailability of funds to provide cement. The high pressure can cause pipes to burst and will damage valves and bib-cocks which will result in leakage.

* Frozen pipes

Perhaps the most common operational problem occurs in the winter when pipes become frozen. For this reason people leave their taps open.



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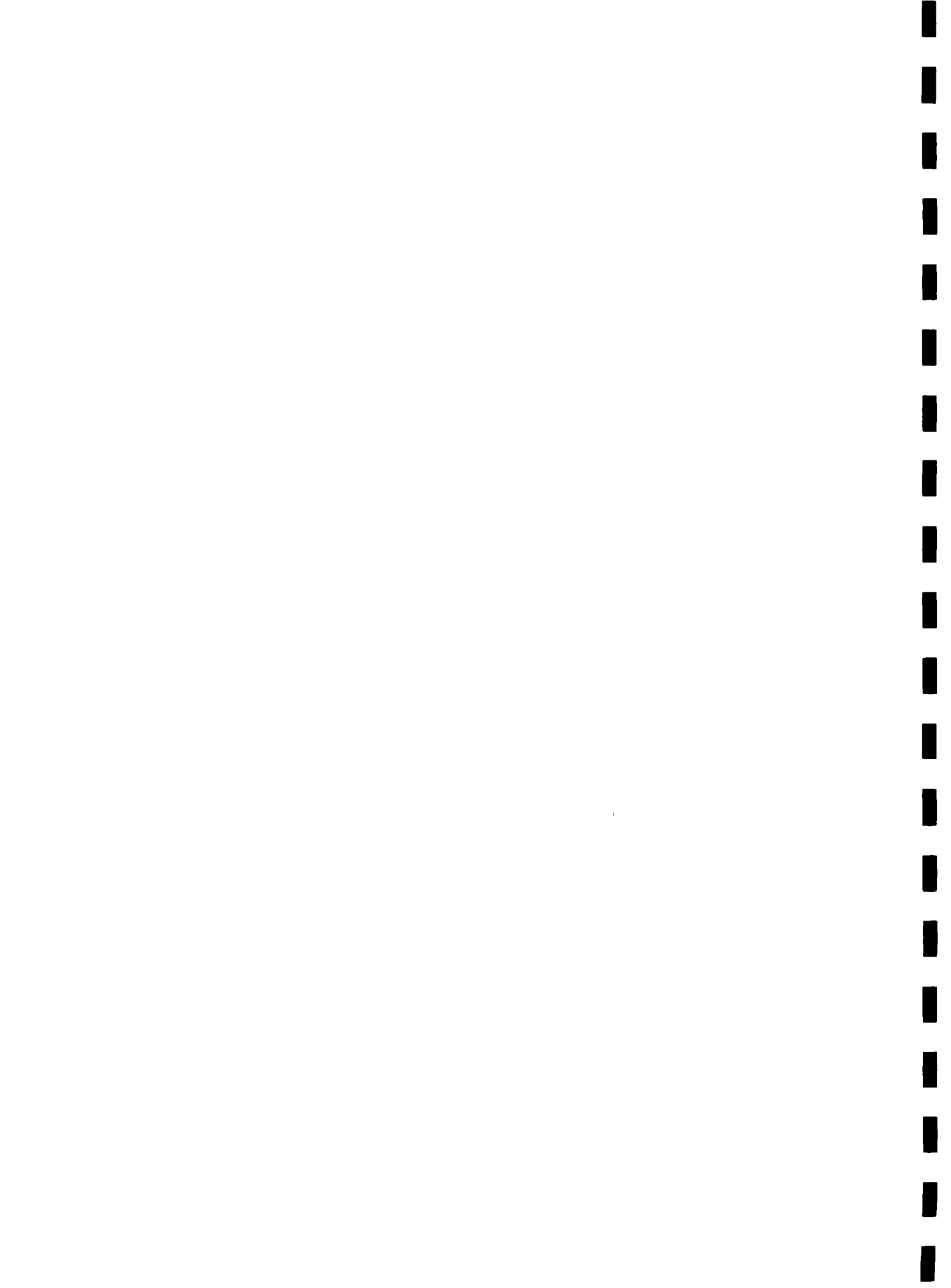
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7.4 "WHY SHOULD I HAVE TO PAY FOR MY DRINKING WATER", WILLINGNESS TO PAY FOR OPERATION AND MAINTENANCE

It has already been mentioned that many villages are unable to organize a paid caretaker to look after the operation and maintenance of their water supply system. One explanation is that where NAPWD provides a paid chowkidar for their systems nearby villages don't understand why they should have to pay for their chowkidar themselves. Another reason is that villagers are not accustomed to paying levies in cash; people in the Northern Areas for example are exempted from paying taxes. Most villages though have a custom of remunerating in kind for services of the village blacksmith or the irrigation water caretaker, see box 16

It could be an interesting possibility to revitalize this custom for the payment of the piped water supply caretaker. Such a system would correspond with existing practices, would be easy to understand by all villagers and would not put a cash burden on households. However there may be disadvantages. For example it is not very likely that a caretaker will work long hours if he is only paid in kind. Cash is increasingly in demand in rural areas and paid labour is likely to be preferred to remuneration in kind. The tradition is to pay not more than 10 kilograms of grain per year per household to be collected by the caretaker. In a average village of 50 households the caretaker can collect a maximum amount of around 500 kilogrammes per year, which equals about Rs 2,500. This traditional payment could be considered as the caretakers basic income which could be supplemented by paying him cash during the busy times of the year.

Traditional remuneration of irrigation chowkidar and blacksmith

Box 16

In some villages it is, or has been, a custom that each household pays a certain remuneration in kind to the person who looks after irrigation water and to the village blacksmith. The irrigation chowkidar is responsible for looking after the main irrigation channel while the blacksmith will do all the sharpening and repairing on spades, axes and other agricultural tools.

Payment was usually in the form of a certain amount of wheat, potato or maize that is paid annually, at the end of the agricultural season. Every household gives an amount that is fixed by the village elders. Though the tradition of an annual remuneration still exist in some villages, it is gradually changing, especially blacksmiths prefer nowadays to work for cash.

In some schemes village elders, water committees or members of the Union Council have tried to introduce a user fee in their village. A very common response from their fellow villagers was that they refused on the basis that:

"We don't want to pay money for our drinking water. This water has been flowing here since our grandfathers time. It came free of charge so why should we now start to pay for this?"

Despite these remarks some village activists have tried to motivate their communities. In cases where they succeeded they then had difficulties with managing the collection and use of the funds in a proper way, see Box 17



Difficulties with the collection of maintenance funds, an example of Manthoka,
in Kharmang

Box 17

In Manthoka the Union Council member and village elders decided to collect one egg or one rupee from every household for the repair of leaking pipes. The whole community agreed to pay but a sustainable system for the collection of funds could not be organized and the plan failed

There are a few examples of villages where people have managed to institutionalize a system of water fees. In Damas for example people pay Rs 15 per month for their piped water supply. Other villages mentioned that were doing the same were Bubur and Japuke but this could not be confirmed.

Another example is Basho where instead of people paying a regular amount they collect money whenever a repair is needed. The villagers accept that some people can pay in kind if they are unable to contribute cash, see Box 18.

Basho; an example of successful collection of funds in cash and kind

Box 18

Though Basho is a small community they are always ready to give money for repairing their water supply scheme. Several times money has been collected to replace broken pipes and to rehabilitate the water tank.

The people in the community who were unable to participate in the construction of the scheme contributed in other ways. The villagers quoted an example of an householder who was absent during the construction. It was impractical to ask him to pay a fine and so this person was assigned the task of cleaning the tank for two years.

These examples are in direct contrast to the results of a small survey, see box 19 in which people expressed their willingness to pay a regular amount for a reliable water supply though they had some reservations about paying for repairs



Small survey on Operation and Maintenance

Box 19

A small survey with 133 respondents 85 men and 48 women from all twelve sample villages was included in the study. Three questions were asked about operation and maintenance of their water supply scheme. The majority of male respondents, about 90% of the men, expressed a willingness to pay a certain amount of money (here arbitrarily put at Rs.10). The small sample size does not allow firm conclusions to be made, but the answers at least indicate that opposition to paying some monthly contributions is less than expected.

The replies to the second question shows a reduced willingness to contribute a one-off amount (set at Rs.50) for a hypothetical repair to their scheme. 30% of the men and 12% of the women did not think this would be possible. It is noteworthy that the number of women who felt unable to answer the first two questions is very high¹⁷

(n=133)	MALE			FEMALE		
	Yes	No	don't know	Yes	No	don't know
1 Are you willing to pay a monthly amount of Rs.10 for O&M?	76	9	0	27	1	20
2 Are you willing to pay Rs 50 for a repair on the WSS?	60	25	0	13	6	29
3 Can women make small repairs to taps?	30	50	5	44	2	2

Women however, have a very outspoken opinion about the third question and the majority (91%) think they are capable of doing repairs to taps. Compared to large number of 'don't know answers' on the first two questions this not only indicates that they feel confident to do this task but also it shows that they consider it as a part of their domain.

Many men (58%) on the other hand thought that women were not able to do such work. 35% of the men expressed the opinion that the women could do this work although this is not the same as giving them permission and it is therefore expected that in practice this figure would be lower

¹⁷ The high number of 'Don't know answers' among women reflects the clear division of male and female roles in the local society. Women often said that the men of their household should reply because the question referred to an issue that the women did not feel competent to answer



7.5 CONCLUSION: WHY OPERATION AND MAINTENANCE IS DIFFICULT

In the preceding sections a description has been given about the activities related to operation and maintenance of water supply schemes. In discussions with village communities and LBRDD staff, the lack of management of the scheme was identified as the main factor causing poor performance. From the discussions the following issues have been formulated to explain the difficulties in operation, maintenance and repair of schemes¹⁸.

i) Lack of a management system for O&M

After construction the scheme is 'handed over to the community'. The Project Committee which has served its purpose, ceases to function and the responsibility for the operation, maintenance and repair of the scheme is supposed to be taken on by the community.

But LBRDD gives no clear guidance about how best to do this. It is assumed that 'the community' will be able to establish a viable management system for O&M. However, because most villagers were not involved in earlier decisions and because they do not have a strong sense of ownership of the scheme, it should not be surprising that they do not feel responsible for managing it.

Many villagers think that the piped system is a government scheme that has been 'handed over' to them. Consequently they expect that the government (NAPWD or LBRDD) should be responsible for correcting any deficiencies in the scheme and not somebody from the community. Other villagers might think that it is the trained village plumber who should rectify problems or that it is the responsibility of the UC-member and other people who were members of the Project Committee.

This confusion and the absence of somebody to organise villagers generally has a paralyzing effect on the community. However, it be mentioned that there are some good examples where active villagers have motivated the rest of the community to do something when their scheme became out of order, for example Box 11.

ii) Unequal services, social conflicts and disunity

In many villages there are social conflicts for one reason or another that can easily effect cooperation between people. The construction of the water supply scheme can give rise to new disputes, the most common being due to the unequal distribution of water. Influential people often obtain individual household connections (constructed with community pipes) while others have to share communal standposts which for some may be a long way from their house. In such situations it is unrealistic to expect people to pay equal contributions and difficult to motivate every household to support a O&M system. The inequalities of the water supply can also effect a whole muhallah and then it is likely that those with little or no water will loose enthusiasm for the scheme, see box 20.

¹⁸ The authors of this report agree that management of the schemes in the operation and maintenance phase is indeed very important but they would like to add that community organization, management and decision making during the earlier stages of identification, planning and construction will have a significant impact on the subsequent performance of the scheme.



Seven years ago the village Rawoshan installed a piped water supply in the upper and lower muhallahs. The scheme is now out of order due to a leaking tank, blocked pipes and disunity of the community.

In the upper muhallah water stopped coming from the taps only a few days after completion. As the inhabitants have clear channel water near their houses they were not very interested in repairing the scheme.

At first repairs were done by the rest of the community but they steadily became discouraged due to lack of cooperation from the upper muhallah. Now the lower muhallah has abandoned the scheme too.

iii) Lack of resources for minor repairs

The reasons why villagers have difficulties in collecting contributions for O&M have been explained in section 7.4. With the availability of a budget, minor repairs that only need a few accessories, a bib-cock, a bag of cement or a few pipes would be quite feasible for the village plumber to attend to.

iv) Water as a relative priority; the perspective of men and women

A final point that affects the willingness of villagers to manage their scheme is the availability of alternative water sources. In many of the villages channel water is available relatively close to the house. Villagers in Northern Areas generally do not have to contend with difficulties like for example people in Azad Kashmir, where no channels are available and women have to fetch water daily from distant springs or rivers.

Although villagers in the study area identify piped water as a priority, it should be realized that looking at the available water sources, this is a relative need. Once the novelty of the newly constructed scheme has passed, villagers start to see that to keep it operational their time, energy and even money is required. With this realization their views about the need for tap water might change somewhat. For the implementation and subsequent management of the scheme men will have to add new responsibilities to their tasks, whereas collection of water, whether from tap or channel, is an existing female task. Therefore it may be argued that men in particular have little incentive and good reason to abstain from investing their scarce resources in the O&M of a scheme. Through male effort channel water is already available, free of cost and a well-developed workable management system in place. Because of the aforementioned problems it is understandable that men will be hesitant to wholeheartedly support a community owned and managed piped water scheme.

Such a line of reasoning might be particularly common in those who have little awareness about cleanliness, water-borne diseases, the work load of women and who have no aspirations for a bathroom with running water and a flush latrine. Without a realization or genuine prioritization of water for these needs, the motivation for management of the scheme will be relatively low. The convenience of a reliable piped water supply primarily benefits women and they are more likely to feel motivated to keep it functioning once they see the advantages of it. Nevertheless women have not yet been provided with the means to do this and up until now they have been excluded from influencing the management of schemes.



PART 3

CONCLUSIONS AND RECOMMENDATIONS



CHAPTER 8 CONCLUSION

This report is the outcome of a study of community-based water supply projects in four districts of Northern Areas. It presents an overview of the implementation strategy of LBRDD and gives a description of the community participation in the various phases of the scheme. In the report the issues which aid or impede successful implementation are identified and discussed.

Implementation strategy

LBRDD is the government department responsible for implementation of rural water supply schemes based on community participation. After identification of a community LBRDD will facilitate implementation of the scheme through a Project Committee. LBRDD is responsible for the technical design of the scheme and will assist the Committee with the implementation of the scheme. The material input of pipes, cement and GI sheets is provided by UNICEF. The local materials such as stones and wood and the unskilled labour work on the construction of a tank and the pipe lines is the responsibility of the community. As they do not receive payment for their work this implementation strategy is called 'a self help scheme'.

Community Participation

Participation of the community mainly takes place during the physical construction work. By community participation is meant the provision of labour and material resources by the villagers as a means to reduce the implementation costs. Decision making during the identification and planning of the schemes involves only a few individuals, usually the Union Council member and some of the village notables. These men form the Project Committee that makes the majority of the decisions with the implementing agency. It is uncommon that general village meetings are arranged and it is up to the Committee to what lay persons can influence decisions regarding the scheme.

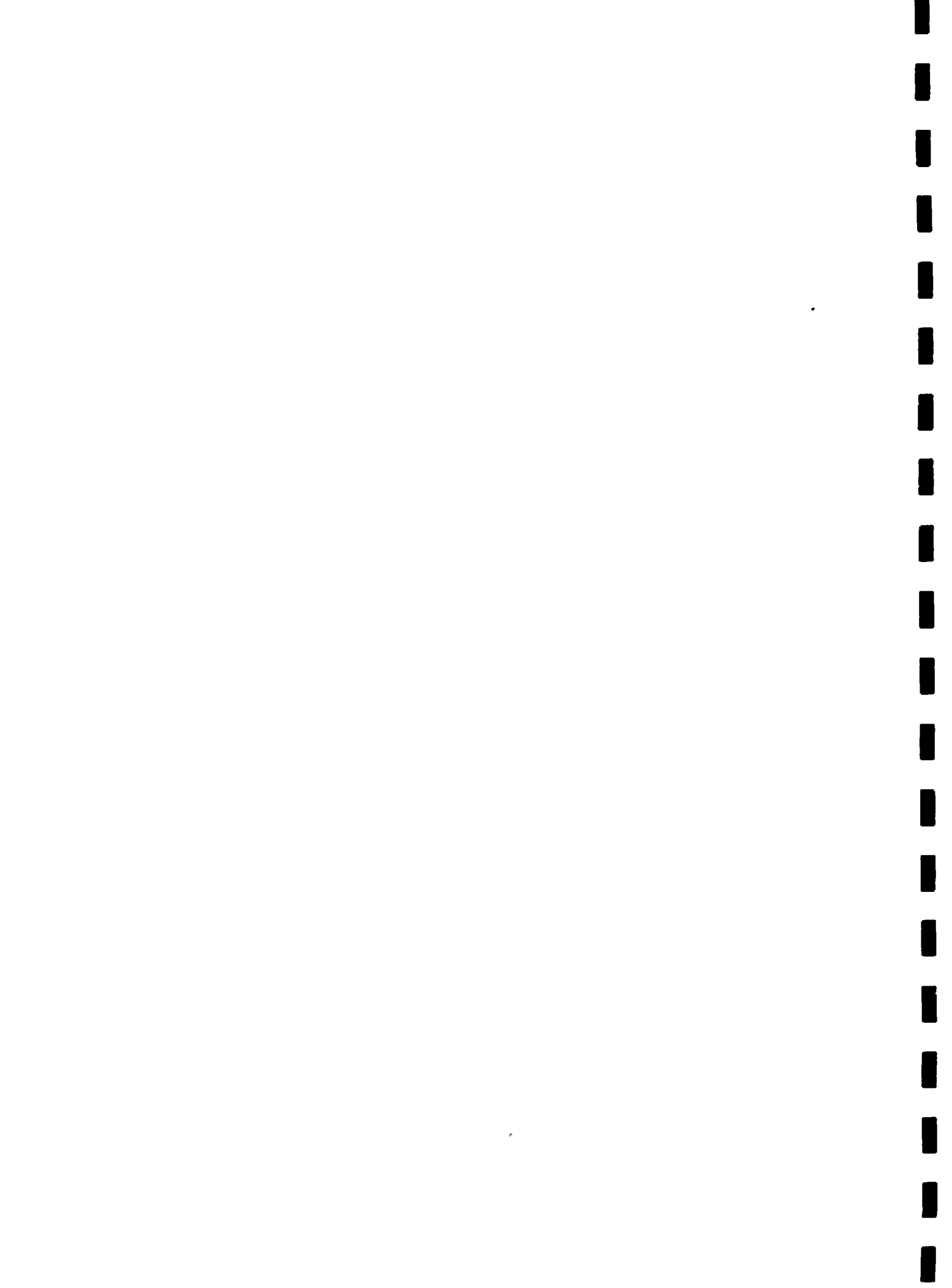
The Project Committee is existing during the construction phase and will be dissolved after completion of the scheme. The community is expected to take the responsibility for the further management of the scheme (operation, maintenance and repair) after completion. The implementing agency does not provide guidance to the community on how they should manage the scheme with the result that nobody takes care of operation, maintenance and repair.

IMPEDIMENTS TO SUSTAINABLE IMPLEMENTATION

After implementation more than 50% of schemes perform below their technical capacity or become out of order. The report identifies a number of reasons for these problems, which can be grouped under five headings:

1. Physical circumstances;

The villages are situated on mountain slopes at high altitudes where land slides, floods and frost can easily damage the water tanks and pipe lines. The steep terrain and rocky ground make secure installation of the scheme difficult.



2. Inadequate material input and poor construction quality;

Water tank sites and technical designs are often modified by the community, leading to pressure problems, 'oversized' tanks and installation of wrong diameter pipes. Lack of awareness and insufficient equipment for digging of the trenches lead to shallow burying, un-buried pipe lines or installation in sub-water channels. In this way pipes are prone to be effected by natural hazards such as land slides and freezing during winter. The materials provided by LBRDD sometimes deteriorate during transport (wet cement) or arrive in smaller quantities than the community expected (missing accessories). Occasionally sub-standard materials have been provided.

3. Lack of community involvement and coordination;

The implementing agency only deals with the Committee members and does not directly communicate with other villagers about the modalities of the water supply schemes. As a result village men do not have a sense of ownership for the scheme and often do not realize that they are responsible for the maintenance and repair. Women will have the same detached idea about the scheme (or even more so) because they are never directly involved or consulted in any phase of implementation.

4 Institutional constraints of the implementing agency

LBRDD field staff has identified a large number of constraints in their work that influences the quality of the water schemes. For them it is impossible to make regular field visits to supervise and follow up the construction due to lack of staff and logistical support (transport, diesel, TA/DA). Design and execution of construction are hindered because practical design guidelines, technical equipment and training in technical and motivational skills are not available. Furthermore they do not have the mandate to follow up completed schemes or to assist villagers with the O&M.

5 Lack of management of the scheme after completion.

In many villages nobody looks after the scheme after the Project Committee is dissolved. It is very common to find water supply schemes at least partially out of order although only a small repair would be required to rectify the system. Lack of cooperation, social disputes and unavailability of resources are the main reasons why villagers do not, or cannot manage their schemes. Only in very few villages water fees are collected and a caretaker is appointed. Many villagers think it is strange to pay for their drinking water but there is some evidence based on field data and existing customs that some form of payment might be acceptable to the community.



LOCAL STRENGTHS AND SOLUTIONS

During the study some interesting local initiatives, solutions and ideas for the implementation and management of piped water schemes were encountered. Though a number of them are only indicators of small scale, localized practices any of them can act as a clue or a valuable suggestion in the development of improved implementation strategies for the future. The most striking strong points of implementation are summarized below.

1. Key person who motivates the community

In all the schemes active and respected leaders enhanced the overall construction process by motivating the community, coordinating and supervising the work and settling disputes. Several religious leaders had a very positive influence on the implementation process, sometimes by using Islamic concepts to involve villagers. The Committee performs better if from every area with a separate distribution line there is a representative.

2. Transparency in dealing with the implementing agency

In some successful schemes the modalities of the scheme were discussed in a community meeting or VO meeting and contracts were agreed amongst the villagers.

3. Activities taking place in small work groups

For the construction of projects the labour is divided in working groups (details) that work on a particular day and belong to the same geographic area. In this way the people work on pipe lines that will provide water to their own muhallah. If those groups have a motivated leader they can perform their tasks quickly and produce good quality work.

4. Trust among the villagers

Daily registration in an attendance register and a system to collect fines from absentees motivates villagers to continue the work and will avoid conflicts. In some villages fines were collected in cash and used for collective expenses; in others alternatives were developed for those who could not pay (cleaning of the tank for two years). Plumbers and masons of the village were only paid a small salary or where not paid and the were exempted from other work.

5. Awareness about technicalities of the scheme

Villagers were aware of the technical difficulties the scheme might cause and showed willingness to construct the scheme in a proper technical way.

6 Regular supervision and technical assistance

Regular visits of LBRDD staff helped to keep the construction work on schedule and helped to guarantee the quality of the scheme. The staff of LBRDD are interested and motivated to further enhance their skills and show very strong willingness and potential to include new practices in their strategy, once the major constraints to their work are alleviated.



CHAPTER 9

RECOMMENDATIONS

1. Needs assessment of applications for new schemes

Greater effort should be made to assess the genuine need and willingness of a community to construct a water supply scheme. Final selection of villages should be based on objective and unbiased information.

A method to assess a genuine need is to start asking for a certain contribution (for example a certain fixed amount of Rs 750 per standpost) before granting a scheme to a village.

Rapid indepth village studies could be performed to gather baseline information that can be used for later monitoring and evaluation.

2. Involvement of villagers

The village men and women should be consulted and involved as much as possible in the decisions about water source, the location of the pipe network and the design and location of water points.

Resource mapping is a recommended tool for gathering initial information (about water sources, water rights and distribution, households) and for involving villagers in initial planning of the water supply design.

The modalities of the scheme and the terms of partnership between the community and the implementing agency should be made absolutely clear to all members of the community by the Water Committee and the staff of the implementing agency. A clear and legal document about the mutual responsibilities should be prepared and signed by the villagers and the implementing agency.

3. Water committee

It is strongly recommended to modify the Project Committee into a broad based Water Committee with members elected in front of the community.

Membership of the Water Committee should still be open to the lumbar and the Union Council member and opportunities should be created for including a religious leader, VO activist and an elder woman. Moreover each muhallah or distribution line should be represented on the Committee by their work group leader. In larger villages it is suggested to establish sub-Committees for every distribution line.

If possible women should form small standpost committees that are responsible for the maintenance of their shared water point

The mandate of the Water Committee should include the management of the scheme after completion of construction and the importance and responsibility for this task should be properly emphasized.



4. Rehabilitation of existing schemes

Many schemes are out of order because of relatively small defects. With limited financial means, and a lot of manpower such communities can be motivated to repair their scheme

5. Technical design

In order to design appropriate systems, and to provide a consistent level of service throughout the region a comprehensive set of design guidelines is required. For more rigorous design of pipelines computer programmes are available.

For efficient technical design more precise field data are required. Therefore field staff will have to be trained in technical surveying techniques.

To minimize the effect of harsh physical condition on the scheme it is suggested to experiment with ideas aimed at protecting vulnerable components. Once proven to be successful protective measures should become part of standard practices. The following might be included:

- Sanitary protection of springs and other water intakes
- Provision of adequate wash-outs for silt removal in pipes and tanks
- Securely fitting inspection covers for water tanks
- Protection of pipes against freezing
- Secure pipe crossings for nullahs, channels and roads;
- Break pressure chambers and other pressure reducing techniques;
- Protection of standposts against freezing and provision for waste water drainage;

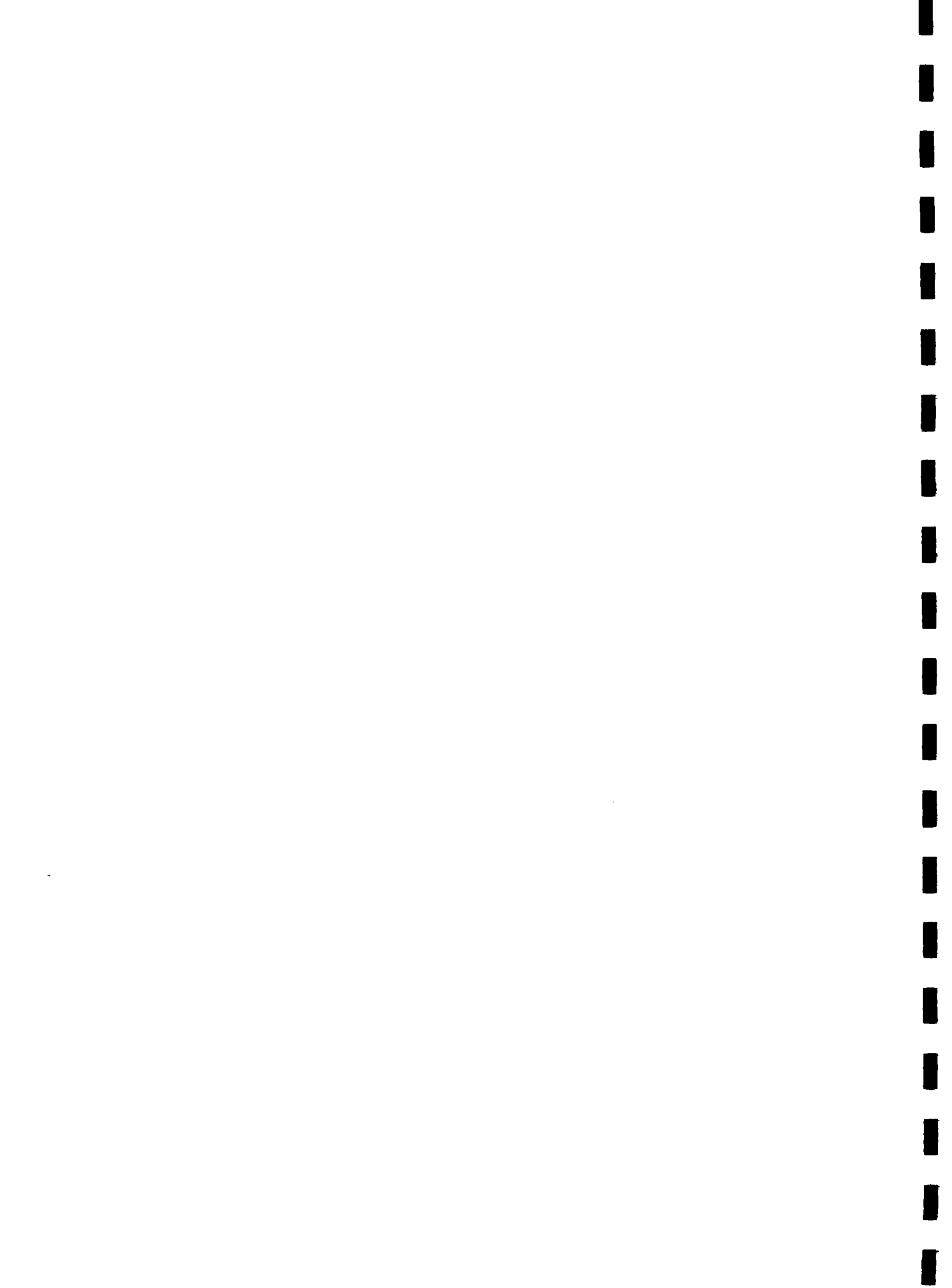
Where proper burial of pipes is possible GI pipe can be substituted by HDPE pipe
Where stones are not available ferrocement tanks can be introduced

6. Construction of the scheme

It is suggested that villagers will be more motivated to work if they form work groups (details), have attendance registers and have rules about people who are absent. Ideally every work group should be represented in the Water Committee.

The implementing agency should help the community plan the construction of the scheme avoiding busy agricultural seasons. Logistical support and field visits should ensure that construction of pipe lines can commence early in the year (February-March) or after harvesting (September-December). The tank and standposts should be programmed for construction between April and August.

Frequent visits by technical staff during critical stages of construction are recommended to ensure implementation of the scheme according to design, and to guarantee satisfactory construction quality. Short periods of residence in the village should be considered where appropriate.



7. Management of the system: operation, maintenance and repair

The Water Committee will coordinate the management tasks. Where possible the Committee may work as a sub-committee of the VO and discuss all important matters during the meetings of the VO. The members of the WO, where available, should be motivated to discuss water related issues in their meetings too, and a female member should communicate their concerns at the Water Committee meetings.

8. 'Water fees' and the appointment of a caretaker:

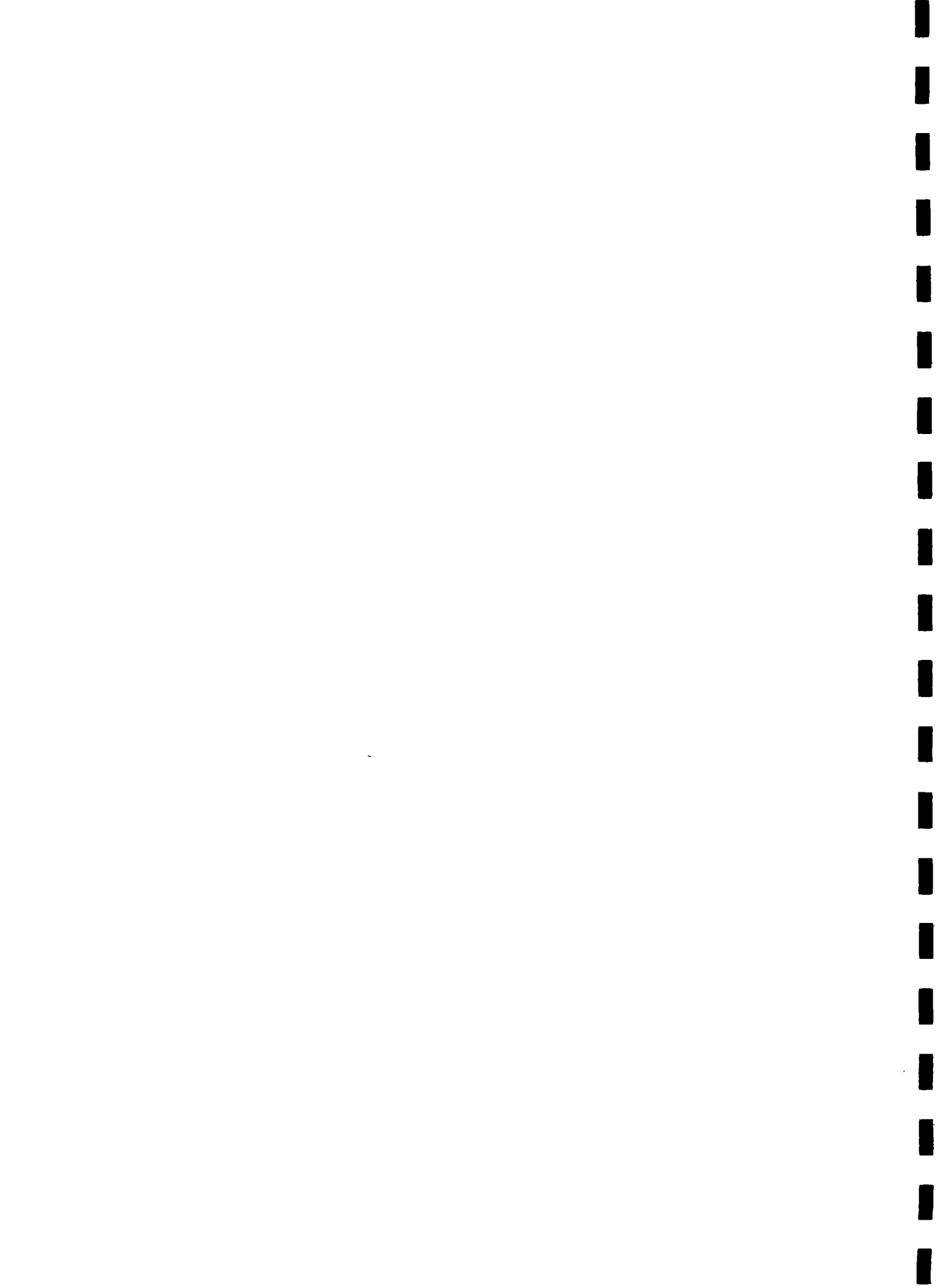
The community may be motivated to pay a 'water users fee' by drawing a comparison with their traditional system for paying their irrigation caretaker, for example annually giving him an agreed amount of grain. People who prefer to pay cash should be charged an equivalent amount. The amount should differentiate between individual and communal connections and should reflect the estimated annual costs of O&M. Possibly a seasonal surcharge can be agreed for the months that a caretaker will have to distribute the water in times of shortage.

Where an irrigation channel caretaker is present he may be the most appropriate person to be caretaker for the water supply scheme if he is willing. He would also be a good candidate for the village plumber. After receiving training on the job and a tool kit he should be able to look after both operation and maintenance. Such a combination of responsibilities will allow such a person to get a reasonable income.

9. Awareness raising, health education and sanitation strategy

Considering the problem with drinking water quality and the tendency of villagers to use unprotected sources it is recommended that awareness raising and health education be included during implementation. Suggested issues for attention are cleaning of tank, protection of source and tank, maintenance of tank and taps, transport and storage of water, need for sanitation and personal hygiene.

Environmental sanitation improvements should be promoted and assisted in all villages where a water supply has been or will be constructed.



ANNEXURE 1

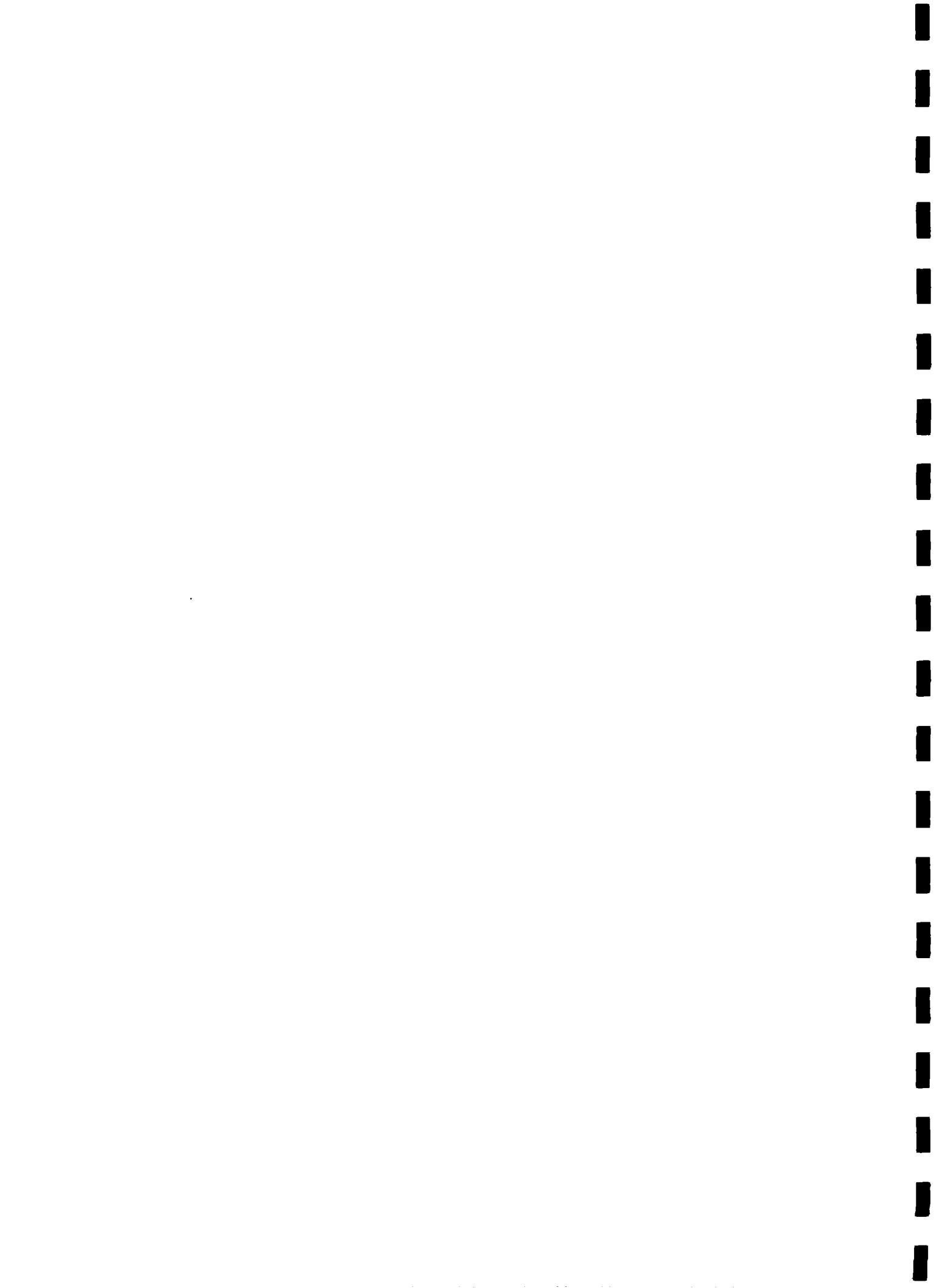
1.1 ADMINISTRATIVE STRUCTURE OF NORTHERN AREAS

<u>Administrative units</u>	<u>number</u>	<u>Names</u>
District	5	Ghizer, Gilgit, Skardu, Ghanche and Diamer
Sub-division	13	In Ghizer: Yasin/Gupis and Punial/Ishkoman, In Gilgit: Hunza/Gojal, Nagar, Gilgit; In Skardu: Rondu/Skardu, Shigar, Kharmang In Ghanche: Khaplu, Mashabroom In Diamer: Astore, Darel, Tangir
Tehsil	102	

1.2 LOCAL ELECTED BODIES

Institutions	Gilgit	Ghizer	Diamer	Skardu	Ghanche	Total
District Council	1	1	1	1	1	5
DC-members	15	9	14	14	10	62
Union Council	25	15	18	30	14	102
UC-members	159	97	174	210	89	729
Municipal Comm.	1	1	1	1	1	5
MC-members	22	7	8	14	10	61

Source: Office of the Deputy Director LBRDD Gilgit.



ANNEXURE 2: NORTHERN AREAS PUBLIC WORKS DEPARTMENT (NAPWD)

The NAPWD is a technical department responsible for most infrastructural activities of the government. About 90% of the budget of the Annual Development Plan is utilized by the department on infrastructural projects. All these projects are identified and approved by the Northern Areas Council. Water supply is a relatively small activity of the department.

A chief engineer is departmental head of NAPWD. Each of the five districts has a separate office headed by a superintendent engineer (SE). Water & Power is one of the sections at district level with an executive engineer (XEN) in charge. The section is divided in two sub-sections: water supply and (electric) power, with two assistant executive engineers (AEE) as sub-sectional heads.

In the water supply sector PWD has the mandate to implement water supply schemes in urban areas and the district and tehsils headquarters¹⁹. The NAPWD staff design these water supply schemes, sometimes including simple filtration systems, while the construction will be assigned to contractors, after an official tender procedure.

Step-wise execution of NAPWD schemes:

Box 21

- 1) Identified water supply schemes are submitted by the Northern Area Council members (MNACs).
- 2) The Council has to approve the scheme.
- 3) After approval of the proposed scheme, an NAPWD survey team assesses its feasibility
- 4) A technical PC-1 report is prepared under the supervision of the executive engineer (XEN). Subsequently NAPWD prepares a second report, the PC-2, which is sent to the NAs Administrator for approval.
- 5) After approval by the Administrator the proposal must be discussed in the meeting for the Annual Development Plan (ADP) In this meeting the Development Commissioner, NA Council Members and NAPWD representatives will participate.
- 6) When the proposed scheme is approved in the ADP meeting, a public tender procedure will start.
- 7) The NAPWD officials evaluate the prequalified contractors' rates and then choose a contractor for construction. A contract is formulated according to the NAPWD regulations.

After this process of identification, design, approval and allocation the actual construction is done by contractors. The contractors will work according to the technical design as prepared in the PC-1. The engineers and overseers of NAPWD monitor the work. Based on their reports payments are made by installments to the contractor. NAPWD normally provides communal stand posts to the village.

For O&M of the scheme NAPWD will appoint local staff, normally including a chowkidar, a plumber, and in some cases a helper and supervisor. They are supposed to look after daily operation and smaller managerial and technical problems. Larger breakdowns of the system, for example due to a landslide, will take time before they are repaired as local staff lack resources and skills, and new funds for the repair will have to be allocated through the ADP.

¹⁹ In a special case the department has implemented rural water supply schemes in a group of 11 villages in Kharmang, Skardu district. The villages were combined into one big scheme



ANNEXURE 3

COMMUNITIES SELECTED FOR THE INDEPTH STUDY TO RWSS

Region	District	'operational'	'under construction'	'out of order'	Total
Gilgit	Ghizer	1	1	1	3
	Gilgit	1	1	1	3
Baltistan	Skardu	1	1	1	3
	Ghanche	1	1	1	3

Ghizer District

1. Sumal From 1 - 3 February, 1994 (operational)
2. Silpi Paeen From 5 - 7 February, 1994 (under construction)
3. Rawoshan From 27 - 28 April, 1994 (out of order)

Gilgit District

1. Pissan From 1 - 3 March, 1994 (operational)
2. Murtazabad From 11 - 12 April, 1994 (under construction)
3. Hoper Holshal From 5 - 6 March, 1994 (out of order)

Skardu District

1. Basho Khawartheng From 24 - 25 March, 1994 (operational)
2. Azim abad 17 May, 1994 (under construction)
3. Manthoka From 21 - 23 March, 1994 (out of order)

Ghanche District

1. Saling From 8 - 9 May, 1994 (operational)
2. Haldi From 11 - 12 May, 1994 (under construction)
3. Dawo From 12 - 13 May, 1994 (out of order)



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