

**COMPREHENSIVE ASSESSMENT OF DROUGHT AND FAMINE
IN SIND ARID ZONES LEADING TO A REALISTIC SHORT-
AND LONG-TERM EMERGENCY INTERVENTION PLAN**

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This report is the result of a joint assessment undertaken by the Government of Sind, and UNICEF (Pakistan) and Save the Childrens Fund (SCF) UK. The assessment team consisted of Philippe Heffinck, Resident Officer, UNICEF (Sind); Andrew Rusk, Field Officer (SCF); Martin and Maureen Crill (SCF); Mansur Memon (SRPO); Momin Bhatti (SAZDA); Mohammad Noman, representative of Arif Hasan; and Arif Hasan, UNICEF consultant. The paragraphs on health and nutrition, which form part of chapters - 2 and 7 of this report, were compiled by Martin and Maureen Crill, on the basis of two surveys they carried out. Thanks are also due to Dr. Rashid of SAZDA and Mrs. Nazir of the Sind Dai Training Programme, for their help in the nutrition survey.

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CHAPTER 1

INTRODUCTION

1. BACKGROUND TO THE REPORT

1.1 PUBLIC, GOVERNMENT AND INTERNATIONAL INVOLVEMENT WITH CONDITIONS IN THE ARID ZONES

Drought conditions in the arid zones of Sind have created serious problems for the human and animal population of the desert. Public and Government concern over these conditions has been voiced and a number of agencies have initiated relief work in the affected areas.

1.1.1 Press Reports: The drought conditions have been reported extensively in the national press. However, these reports have been contradictory. Some have painted a picture of appalling misery and reported a large loss of human life due to famine conditions. Others have maintained that the drought is not an unusual phenomenon in the desert and that the population knows how to cope with the situation.

1.1.2 Politicians' Involvement: The situation in Thar has been discussed in the Provincial and National Assemblies, and a number of politicians have visited the area. Some have also raised funds, suggested relief measures, and offered their own evaluation of the situation. These evaluations have been given great prominence in the media and have conflicted with the views of professionals who have been involved with development work in Thar.

1.1.3 Government Relief Work: The Government of Sind has initiated a number of relief measures for the affected areas. These measures include the provision of subsidized wheat; payment of cash from zakat funds to the "deserving" among the Muslim population; payment of cash from the Prime Minister's and Chief Minister's fund to a section of the non-Muslim population, and the free distribution of a limited quantity of foodstuffs. In addition, the district authorities in Tharparkar have made an evaluation of famine conditions and compiled a report on the subject.

1.1.4 International Agencies: A number of international agencies have responded to the situation in the arid zone. The Japanese have donated a mobile hospital; the ODA, two rigs for water exploration; Save the Children Fund (SCF)

of Great Britain have made an assessment of drought and famine conditions and intend to set up a pilot project in the area; an Asian Development Bank team has recently visited the arid zone and will be giving its recommendations; the UNDP consultants' report has also drawn up a set of recommendations for the SAZDA programmes. In addition, a team from the Federal Republic of Germany is carrying out an airborne hydro-geological survey in the desert areas.

1.2 UNICEF'S INITIATIVE

1.2.1 UNICEF's Concern: UNICEF Pakistan has been involved in water exploration in the arid zone in Sind for the past many years. Because of this association with the area, UNICEF has felt that the famine conditions in the desert are not the result of the drought alone, but have been accentuated by major demographic, social, economic and environmental changes that have been taking place in the desert. It was felt by UNICEF and its consultants that an understanding of these changes was essential if meaningful development work was to be done in the desert. In addition, it was felt that relief work, commendable as it was, should somehow be tied to development activity, have a long-term effect, and must not consist of merely handing out doles to the population. It was also noted with concern that proposals for development activity, whether national or international, were prepared without coordination between the various concerned organizations.

1.2.2 UNICEF's Proposals: As a result of these concerns, UNICEF proposed to the Government of Sind that a joint assessment of the conditions in the desert should be undertaken by the Government of Sind, Save the Children Fund and UNICEF. Furthermore, it was suggested that the assessment should be comprehensive and must take into consideration the social, economic and environmental changes taking place in the desert. The proposal was accepted and the terms of reference drawn up accordingly (see Appendix - 1: Terms of reference). It was further decided that for the present the assessment would cover only the desert *talukas* of the Tharparkar district. Similar assessment for other arid areas might follow. Work on the assessment began in the first week of November 1987.

1.3 AIMS AND OBJECTIVES OF THE ASSESSMENT

The aims and objectives of the assessment are spelt out in the terms of reference. Briefly, they are to:

- 1.3.1 Understand the ecology of Thar and its relation to the present drought and famine conditions;
- 1.3.2 Evaluate the effect of the drought on the animal and human population;

- 1.3.3 Study the famine relief measures taken by the Government of Sind and the District Administration and analyse their effect on the situation;
- 1.3.4 Study and assess the role of national and international development agencies in the development plans of Thar and in relief measures;
- 1.3.5 Based on the above findings, to suggest short-term relief measures for the desert area and long-term development plans which will minimise drought effect in the future.

1.4 METHODOLOGY OF ASSESSMENT

The assessment exercise was divided into two parts. Part one consisted of collection of all available data on the desert areas of the Tharparkar district and the analysis of this data. Part two consisted of field visits, analysis of the data collected, and report writing.

1.4.1 Data Collection: Mr. Mansur Memon, Deputy Director of the Sind Regional Plan Organization and Mr. Mohammad Numan, assistant to UNICEF consultant Arif Hasan, were given the task of data collection. For this purpose they contacted a large number of organizations in Karachi, Hyderabad, Mirpurkhas and Tando Jam (see Appendix - 2: Organizations Contacted for Data Collection and Appendix - 3: Documents Collected). On the basis of the collected data an outline of an interim report was prepared and discussed at a meeting on 24 November 1987, with the head of relevant departments of the Government of Sind. The meeting was chaired by the Additional Chief Secretary, Mr. Soomro.

1.4.2 Field Trips

- Field trips for the health and nutrition survey:
 - The first field trip for the health and nutrition survey was undertaken between 21 and 28 November 1987. The team members were Martin and Maureen Crill of the SCF; Dr. Rashid of SAZDA and an LHV of the Sind Dai Training Programme. The survey was made for the eastern areas of Thar (for details of the trip see Appendix - 4: Health and Nutrition Survey: first field trip).
 - The second field trip for the health and nutrition survey was undertaken from 5 to 12 December, 1987. Except for Martin Crill, the team consisted of the same members as for the first survey. The survey was undertaken for the western areas of Thar (for details of this trip see Appendix - 5: Health and Nutrition Survey: second field trip).

- Field trip for drought and famine assessment: This field trip was undertaken from 6-12 December 1987. The team members were: Philippe Heffinck, Resident Programme Officer, UNICEF (Sind); Momin Bhatti, SAZDA; Mansur Memon, SRPO; Martin Crill, SCF; Mohammad Numan, assistant to Arif Hasan, UNICEF consultant; Arif Hasan, UNICEF consultant. (Details of the field trip are given in Appendix - 6: Field trip of drought Assessment Team: places visited, people met. Appendix- 7 shows, on a map of Thar, the routes taken by the three field trips.)

1.5 GEOGRAPHY OF THE DESERT AREA OF THARPARKAR DISTRICT

The desert area of Tharparkar district, generally known as Thar, consists of the *talukas* of Mithi, Chachro and Nagar and parts of the Diplo and Umerkot *talukas*. The total area of the desert is 22,000 square kilometers and the population is between 0.7 and 0.8 million. The animal population is estimated at 1.5 to 1.8 million. Except for the south-eastern part of the Nagar taluka, the desert consists of sand dunes between which are flat plains where agriculture can take place.

CHAPTER 2

AN ASSESSMENT OF DROUGHT AND FAMINE CONDITIONS

1. AGRICULTURE, PASTURE LAND AND WATER AVAILABILITY IN THAR DESERT AND ITS RELATION TO RAINFALL

1.1 AGRICULTURE

Agriculture in the desert is entirely dependent on rainfall. This rainfall occurs between July and September and in normal years varies between 200 mm to 300 mm. Sowing is done immediately after the first rains. The main crop is *bajra* (millet) and it matures in seventy to seventy-five days. However, more than one shower, preferably three, is required to produce a good crop. Consequently a smaller quantity of rain spread over two months produces better results than one heavy shower. In addition to millet, which formed, until recently, the staple diet of the people, *till* (sesame), *gowar* (fodder) and cluster beans are grown. The stalks of the crop are used as supplementary feed for the animals.

1.2 PASTURE LANDS

After the rains the Thar Desert supports extensive grass growth which provides high value feed to livestock. In drought years, however, sheep and cattle are forced to migrate. Goats, donkeys and camels can manage to survive on shrubs such as *ak* (*Callotropis Procera*), *booh* (*Aerua Tomentosa*), *phog* (*Callygonum*) and *khip* (*Leptidinia*). Depending on the intensity of rainfall, grass in the pasture land can grow upto three feet high and can be cut and stored as fodder for the animals.

1.3 WATER SOURCES

All water sources in the desert are charged by the rains. These water sources consist of wells, tarais and covered tanks.

1.3.1 Wells

In different areas of the desert wells behave differently. Certain wells retain fresh water in spite of long periods of drought. Others become brackish by February or March in spite of heavy summer rains, in which case the population has to cart water from perennial fresh water wells which may be six to eight miles away, or migrate with their livestock to the barrage areas. Wells behave in this manner in a small part of Thar; such wells are mainly to be found in the Chachro and

Umerkot talukas and a small part of Parkar in the Nagarparkar taluka. Of the twenty-four places visited by the assessment team only four faced this problem. However, in periods of successive drought (for example, 1951 to 1955) the amount of water in some perennial fresh water wells also falls and people can only withdraw small quantities at a time. The depth of the wells also varies from 20 to 30 feet in certain areas of the Diplo and Nagar talukas to over 200 feet in certain areas of the Chachro taluka.

1.3.2 Tarais

All settlements in the desert have their tarais or ponds, where rain water collects. A tarai is a natural depression between sand dunes. Water in large tarais can, if the monsoons are adequate, last for over six months. The animals are watered at the tarai, and shallow wells are dug in the tarais once the surface water has evaporated. In the larger tarais, permanent deep wells are sunk with platforms raised above the tarai water level around them. These wells in the tarais constitute the most reliable sources of potable water in the desert. The tarais are also convenient as animal watering points. As long as there is water in them, water for animals does not need to be drawn from wells. The storage capacity of tarais is sometimes increased by building embankments in appropriate places on their periphery and by desilting them annually or bi-annually. Traditionally, the village population, organised by the thakur of the settlement, would undertake the maintenance of the embankments and the desilting of the tarai.

1.3.3 Covered Tanks

In villages where perennial sources of fresh water are unreliable, or far away from the settlements, people also construct covered, surface water tanks. These are really miniature tarais with a thatched roof on them and belong to extended families and not to the whole community. They are used exclusively for human consumption and seldom last for more than four months.

2. RAINFALL PATTERNS IN THAR

2.1 RAINFALL IS NOT UNIFORM

Average rainfall in Thar over the last twenty years has been between 200 to 300 mm. However, rainfall is not uniform all over Thar. For example in 1971 rainfall recorded at Mithi was 129.5 mm while at Nagarparkar it was 492.76 mm. Similarly in 1986, rainfall in Umerkot was 37.5 mm and at Diplo it was 106 mm. Rainfall in Umerkot and Chachro is normally much lower than in Nagar, Diplo and Mithi (see Appendix - 8: Rainfall figures for Thar).

2.2 THE CYCLE OF DROUGHT

Rainfall figures show that every four to six years a drought period of two to three years sets in. Thus, there were major drought periods between 1951 and 1956; 1962 and 1963; 1968 and 1969; 1979 and 1981 and again 1985 to 1987. The worst recorded drought occurred between 1951 and 1956 when there was no rain at all in most of Thar except in 1954, when it was abnormally heavy (see Appendix - 9: Rainfall data from 'Water Resources Survey').

2.3 RAINFALL PATTERN SINCE 1981

1981 to 1984 were exceptionally good rainfall years in Thar. Showers were almost evenly spread out over July, August and September and so agricultural yields were high. In 1985, however, rainfall in large parts of Umerkot and Chachro talukas was as low as 30 mm. This rainfall, again, was spread out over two months and a crop in most areas of the two talukas was possible. In Nagar, Mithi and Diplo rain was normal in 1985 and there was no drought. In 1986, the monsoons failed on two counts. First, rainfall was low. Second, it all occurred in the last week of July and the first week of August, making agriculture impossible. Pasture growth was also far poorer than in the preceding years.

3. EFFECT OF THE PRESENT DROUGHT

3.1 EFFECT ON AGRICULTURE

3.1.1 Effect According to Government-Statistics

The effect of the drought on agriculture has already been described in paragraph - 2 of this chapter. However, changes in acreage for different crops, reduction in cultivated area as a result of the drought, and changes in yield per acre are difficult to work out from the available government figures. The picture that does emerge is that the cropped area and cultivated area had dropped in 1985-86 as against 1983-84 by 2 percent and 10.38 percent respectively. However, the total cultivated area in the desert, according to government figures, increased by 15.6 percent or by a total of 57,808 hectares between 1981-82 and 1985-86. Fodder and *bajra* cultivation increased in 1985-86 as against 1981-82 by 104 and 88 percent respectively, and *jowar* cultivation in the same period fell by 90 percent along with a fall in the cultivation of maize and barley. These figures show a marked increase in the cultivation of crops which require less water in 1985-86. The increase in *bajra* cultivation can also be explained by an increase in the market price of *bajra* (see Appendix -10: Land utilization Table; Appendix - 11 : Crop acreage 1981-82 and 1985-86; and Appendix - 12 : Taluka-wise crop acreage for Thar).

3.1.2 Effect According to the People

The villages visited in the Mithi, Nagar, Diplo and the south-eastern portions of the Chachro talukas had a normal crop in 1985. However, production in 1986 dropped by over 70 percent and there has been no crop in 1987. The villages visited between Chachro and Khinsar, and between Khinsar and Umerkot, give a different picture. Agricultural production in these villages in 1985 was less than 50 percent of 1984. In 1986 it was no more than 10 percent of the 1984 average. Farmers fear that if the fields are not cultivated next year, then the top soil will be carried away by the desert winds, reducing the productivity of the land.

3.2 MIGRATION OF POPULATION

3.2.1 Earlier Migratory Patterns

From time immemorial, the desert population has migrated to the (irrigated areas or the) flood plains of the Indus during the dry season, between February and June. In this period, the wheat is harvested in the irrigated areas and the desert population provides labour for this harvesting. The migrants are accompanied by their cattle. It is generally agreed by the elders in the villages that before 1972 it was rare that the Tharis were paid cash for the labour they provided. They were given protection, provided grazing grounds for their cattle and allowed to take back the wheat stalks to the desert as fodder for their animals. In addition, they sold *ghee* (clarified butter) to the irrigated areas for cash. It is held that the irrigated areas depended entirely on Thari *ghee* before vanaspati replaced it in the '70s. Tharis also provided labour for cotton picking in central Sind. They received a part of the cotton crop as payment. This cotton was carried back to the desert and turned into cloth on handlooms by the Maghwars in the desert settlements. The cotton picking season, however, coincided with the good months in the desert and so this migration was usually small. In the '70s, sugarcane production was introduced in the irrigated and Thari migrant labour is now used for its harvesting, which takes place between October and January.

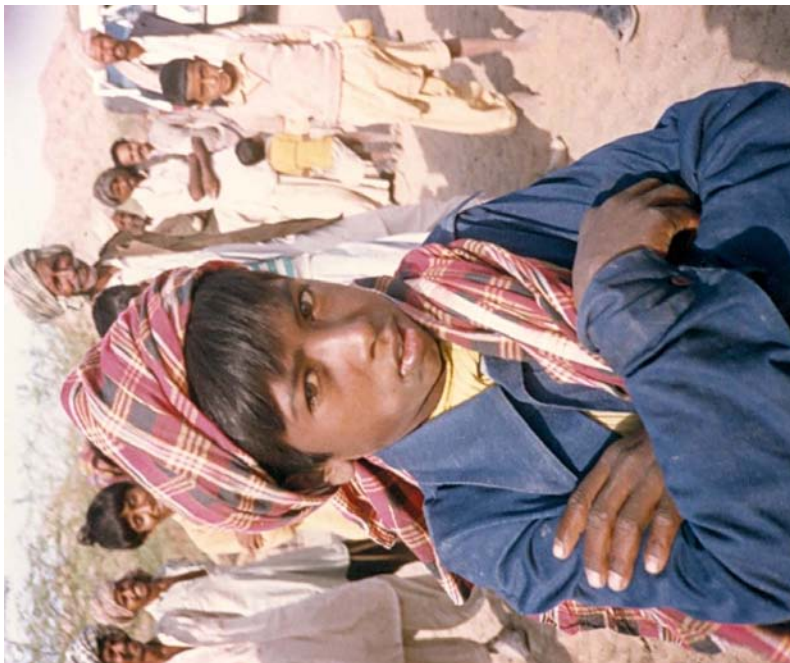
3.2.2 Castes and Migration

Not all the castes from the desert migrate to the barrage areas. The Thakurs and the Nooris, who constitute the upper castes, do not migrate at all. Their cattle is taken across to the barrage lands by people hired for the purpose. Previously, they were paid in food, milk and *ghee*, but now they are paid in cash at Rs 15 per day. The Kohli caste, who are agriculturists and share croppers, migrate with their animals. It is estimated that in the sugarcane harvesting period 50 percent of all Kohlis with their families and animals migrate to the irrigated areas. It is further estimated that 90 percent of them migrate for wheat harvesting. The migration of the Bhil caste seems to be smaller, and a minority among them migrate with their families. Muslim castes such as the Bajirs do not normally migrate with their families, except in drought years.

PEOPLE



95 YEAR OLD DAWOOD OF HERA-DETHA VILLAGE, HAS
SEEN NUMEROUS EARLIER DROUGHTS



BUT IT IS THE FIRST DROUGHT FOR THIS YOUNG
MAGHWAR

CATTLE MARKETS



THE CATTLE MARKET AT JUDHO

3.2.3 Extent of Migration in Years of Normal Rainfall

It is very difficult to work out migration figures from the data available. However, from interviews conducted at the twenty-four settlements visited, a picture does emerge. One can safely assume that in normal years 15 percent of the population migrates in the sugarcane harvesting and cotton picking seasons. This increases to well over 40 percent in the wheat harvesting season. In certain areas such as Nagarparkar where there is a large Kohli population, and in certain parts of the Chachro taluka, where there are water problems, migration can be as high as 70 percent in the dry season.

3.2.4 Migration in Current Drought 1986-87

According to the Deputy Commissioner's report on relief measures for calamity affected areas, 50 percent of the desert population has migrated to the barrage areas as a result of the drought (see Appendix - 13: Migration figures of the District Administration). According to the findings of the assessment team, migration in 1986 was normal. However, an abnormally high level of migration has taken place since September 1987 and it can be safely assumed that almost 40 percent of the population has already moved to the barrage areas and an additional 14 percent to other locations within Thar. This figure is normally reached in March (see Appendix - 14: Migration chart as per the findings of the Assessment Team).

3.2.5 Effects of the Larger Migration This Year

This year's larger migration has affected the labour market in the barrage areas in both agriculture and trade. Labourers in the animal markets in Mirpurkhas and Judho complain that it is no longer easy for them to get daily jobs at the normal rate of Rs 30 per day. Thari migrants are willing to work for as little as Rs 15 per day. Similarly, an excess of migrant Thari labour has brought down the rate of agricultural labour from Rs 20 to Rs 15 or, in some cases, even less. The rate of sugarcane harvesting per maund has also fallen by 20 percent. In spite of low wages there is considerable unemployment and there are also other problems. Pasture land is insufficient in the barrage areas for the Thari cattle because of the drought and the larger number of cattle that has moved in. Fodder is not scarce nor has its price gone up, but due to the decrease in wages and the larger requirements this year, the immigrants cannot afford to buy it. In addition, the Thari population has to now send back money to dependants in the desert for the purchase of grain for everyday use.

3.3 EFFECT ON LIVESTOCK

3.3.1 Normal Migration Patterns of Livestock

In good years, livestock migrate to the barrage area with those castes who migrate with their families. According to estimates made as a result of conversations with the Tharis in the barrage areas and in the desert, no more than 20 percent of the total livestock moves out in years of normal rainfall. On the contrary, in exceptionally good years livestock from the barrage is brought over to graze in the desert. The 20 percent migration that does take place begins in February and the animals return in time for the first rains in July.

3.3.2 Migration Patterns for the Last Two Years

In 1986 there was a 50 percent increase in the movement of animals from certain parts of the Chachro and Umerkot talukas. This migration took place in March and the animals returned in July. According to the villagers, this migration took place because the pasture land had not been adequately replenished because of meagre rains in 1985. However, the human and animal population faced no major problem as a result of this movement. Other parts of Thar were unaffected. In 1986, there were meagre rains all over Thar and the grasslands were depleted by March 1987. A large proportion of the cattle was shifted to the barrage areas. However, the sheep, goats and some cattle necessary for fulfilling the milk needs of the people were kept maintained in the desert. The condition of these animals deteriorated and by July they had become very weak. They were not shifted for two reasons. One, because the people waited for rain, and two, because they were assured, by certain quarters, of government assistance. When it did not rain, the population started shifting cattle and other livestock to the barrage area in late August. In many cases, this movement took place in September.

3.3.3 Livestock Deaths

Almost 96 percent of all livestock deaths occurred during their movement to the barrage lands as the cattle had become too weak to make this journey. People who were able to transport their animals by GMCs were able to save them. However, the cost of transportation by GMC is exorbitant (see Appendix - 17: GMCs rates for transport of animals). A number of livestock were also saved through rail transportation from certain parts of the Umerkot taluka.

3.3.4 Figures of Animal Migration and Deaths According to the Findings of the Assessment Team

According to the findings of the assessment team 75 percent of cattle, 54 percent of sheep and 53 percent of goats have migrated from the desert to the barrage areas. In addition 15 percent of cattle, 44 percent of sheep and 9 percent of goats have died. This means that a total of 58 percent of livestock has migrated

and 20 percent is dead (see Appendix -15: Migration and death figures for livestock as per the findings of the assessment team).

3.3.5 Figures of Animal Migration and Deaths Given by the District Authorities

According to the data collected by the district authorities, 84 percent of all livestock has been shifted from the desert and 4.7 percent has died. These figures conflict with the ones given by the people of the villages visited by the assessment team (see Appendix -16: Migration and death figures of livestock given by the District Administration).

3.4 EFFECT ON LIVESTOCK MARKETS IN AND OUTSIDE THAR

3.4.1 Normal Market Practices

Over 3000 animals from the animal markets of Mirpurkhas and Judho go to Karachi every week. An equal quantity is sold for other cities of Sind. They are transported from these markets by truck. Thari cattle constitute 60 percent of all sales between September to December and, on average, 15 percent for other months. After the rains the Tharis graze their cattle for two months and then walk them over to the barrage lands. On their journey to the markets they find ample grazing grounds, if the rains have been adequate. Before the 1970s, the owners of the animals or their hired hands undertook this journey with the animals. However, middlemen have become active in the desert areas due to improvement in transport modes. They now purchase the animals from their owners in the villages and walk them over to the markets. Although the owners are paid less by the middlemen than by the merchants at the cattle markets, they prefer this type of transaction as it saves them a long journey. Since the road was extended to Mithi, middlemen have become increasingly active in the desert around the town and animal prices have gone up by about 15 percent. Animals are now also shifted by truck to the barrage markets (see Appendix - 17: Animal and meat prices at the markets: 1985-86, 1986-87). These markets are held at Mirpurkhas on Wednesday; at Bacha band on Thursday; at Umerkot and Judho on Monday; at Duronaro and Jamesabad on Sunday. An estimated total of 15,000 animals per week are sold at these markets. If the figures given by the animal merchants are accepted, then an average of 30 percent of all animals sold in these markets every year are from Thar. Thus the figure of Thari animals sold per year works out to about 250,000!

3.4.2 Effect of the Drought on Livestock

This year the animals that came from Thar were of very poor quality. Many died on their journey to the markets, and those that arrived could hardly stand. A much larger number, at least 30 percent more than last year by some estimates, were available for sale. However, they were not only famished but the quality of

their meat was also very poor. As a result, in the meat markets at Mirpurkhas and Judho, Thari mutton sells at Rs 24 per kilo as compared to Sindhi mutton at Rs 30 to Rs 32 per kilo. Similarly, the price of Thari beef is Rs 12 per kilo as compared to Sindhi beef which sells for Rs 18 per kilo. Because of the poor quality of animals from Thar, the Karachi slaughter houses have also refused to buy them. Investigations at Karachi show that in this season the quantity of Thari animals at the slaughter houses has fallen by over 60 percent. A number of Tharis told members of the assessment team that the price of animal skins from the desert had also fallen by 50 percent. Apart from the losses that the desert population has had to incur, the cattle merchants also complain of poor business transactions as a result of drought conditions in the desert.

3.5 EFFECT ON TRADE, COMMERCE AND TRANSPORT

3.5.1 Grain Market

Grain transactions have been poor this year. The price of bajra in the market is Rs 130 for 40 kilos. Last year the price was the same. However, *bajra* is not available this year at all and last year only 50 percent of what is available in good years was available for sale. The price of *jowar* has gone up from Rs 180 for 40 kilos last year to Rs 320 this year and *til* has disappeared altogether. Wheat sales have not even been 15 percent of previous years' sales because of the supply of subsidized wheat by the government. Grain merchants at Islamkot and Mithi estimate that their trade has fallen by over 70 percent as a result of the drought and the government supply of subsidized wheat. Grain merchants have also indicated that their trade increased enormously (merchants estimate 100 percent) in the four years preceding the drought because the price of *bajra* grown in the desert became higher than that of wheat. As a result, the desert population sold their *bajra* to the grain merchants and purchased wheat for their use.

3.5.2 Fodder

In good years, fodder is not imported into the desert areas. This year, however, there has been a big movement of fodder into the desert. This movement began in April 1987. According to a fodder depot in Umerkot, 200 maunds of fodder was being sent to the desert from this depot in May 1987. By the end of September this had increased to 2000 maunds. It has now fallen to less than 1000. The price of fodder has not increased as a result of the demand in the desert. It costs Rs 30 per maund at Naukot, but due to transportation by GMC its cost at Diplo is Rs 40 and at Nagar Rs 50 per maund (see Appendix - 18 : Prices of fodder at different location in the desert).

3.5.3 Wool and Animal Hair

According to the Assistant Director, Animal Husbandry, before the drought there were approximately 304,713 sheep in the desert. Each sheep produces about

0.5 kilo of wool in September, and again in early April. Middlemen roam the desert and buy this wool at Rs 15 per kilo in April, and Rs 6 per kilo in September. This difference in price is because the wool is dirty in September, because of the rains, and has a lot of moss and twigs in it. Merchants in the taluka headquarters also purchase this wool directly from the people at Rs 20 per kilo and Rs 10 per kilo for the April and September produce respectively. This is sold to the Karachi market at Rs 30 to Rs 32 per kilo for the April produce, and Rs 18 to Rs 20 for the September produce. This means that about Rs 3,000,000 is earned by the desert population per year through the sale of wool. An equal amount is made by a handful of middlemen. This year the wool merchants in the taluka headquarters complain that there has been less business than normal in September as the sheep started dying or were moved to the barrage areas. The people, on the other hand, complain that the middlemen, taking advantage of the situation, have offered them less than half the normal rate for wool this year (see Appendix - 19: Details of wool and animal hair production).

3.5.4 Transport

Transport activity in the desert has declined due to the drought. Although the GMCs function normally, household goods and necessities of life such as clothes, shoes, soap, tea etc. are no longer transported to the desert. Similarly, grain from the desert is no longer transported to the barrage areas either. In September this year there was considerable business as animals were being moved by GMCs to the barrage areas to save them from dying, which they would if they had been made to walk this distance. Again, in August and September this year large quantities of fodder were sent by GMCs to the small towns in the desert. The transporters feel that they have survived because of these supplies to the desert, and because of being hired by the government to carry subsidized wheat to the drought-affected areas. Their return journey is now usually made without adequate 'load'.

3.6 EFFECT ON WATER AVAILABILITY

People at all the settlements visited by the team said that water for the animals was available in sufficient quantity. In the areas between Chachro and Umerkot there were villages which had problems of water availability. However, the villagers maintained that they have similar problems in good years as well, but only from February onwards. This year these problems had begun in November. At all the places visited the people made it clear that the reason for animal deaths and migration was the lack of fodder and pasture land, and not the non-availability of water or its quality. In certain villages people complained that pulling out water from the wells had become difficult as the animals for drawing water had migrated or were dead. This, in the case of the Chachro-Khinsar belt was a serious problem as the wells are between 120 to 200 feet deep (see Appendix - 20: Water position in areas visited by the team).

3.7 EFFECT ON HEALTH

The health and nutrition survey carried out by the SCF members of the assessment team has established the effect of the drought on the Thar population. The survey method is explained in Appendix - 21 (Nutrition survey method) and the findings are given below (see Appendix - 22: Health and Nutrition Survey: tables and charts).

3.7.1 Survey Findings: Nutrition

- a) A total number of 669 households were interviewed. Of these 67.4 percent (451) were Muslims and 32.6 percent (218) were Hindu. A great proportion of Hindu families had gone to the barrage areas accounting for the difference in Table - 1A (see Appendix - 22: Health and Nutrition Survey: tables and charts).
- b) By counting the children (15 years and under) and the adults in each household we established an average family size of 6.0. There was no statistical difference between Muslim and Hindu families (Table 1B and Table 1C).
- c) The average number of children per household was 3.7, again with no statistical difference between Muslims and Hindoos (Table 1D).
- d) In the families interviewed 57.2 percent (383) fathers were present in the village while 42.8 percent (286) were absent. Most had gone to the barrage areas as labourers, while a few were permanently employed outside Thar. All but 2 fathers were sending money home to the village (Table 1E).
- e) Of the 1,000 children seen 51.3 percent (513) were boys while 48.7 percent (487) were girls (Table 1F).
- f) Figure 1A shows the percentage of children seen by age group. Because of the well-known difficulties of obtaining the correct ages of children in rural populations, the broad divisions of 1-2 years, 2-3 years etc. were used. In the field this presented few problems and when uncertain a greater effort was made to establish the child's correct age.
- g) Percentage of children in MUAC ranges: Figure 2A and 2B. There is no statistical difference between the 2 stratas. The mean MUAC was 13.4cm (Table 2A).
- h) MUAC for age: Figure 2C and 2D. The degree of severe malnourishment, i.e. under 12cm is age related; it is concentrated in the 1-2 years old age group and possibly indicates an association with weaning.

However, as no data on past or present weaning practices is available and neither is there comparable anthropometric data, it is not possible to state the exact reason for this pattern. As discussed further in this report, study needs to be made of past and present weaning practices as well as normal dietary patterns to ensure that relief assistance effectively reaches this vulnerable group.

- i) MUAC range by sex: Figure 2E. This shows that twice as many girls are likely to be severely malnourished as boys. This tendency is not seen in the 12-13.5 cm and above 13.5 cm ranges. Study is needed to find out a possible reason for this occurrence.
- j) MUAC ranges for religion, presence and absence of father and family size: Figure 2F, 2G and 2H. These show no statistical difference and the children appear to be unaffected nutritionally by the above factors.
- k) Oedema: No children were found having oedema. There was also no evidence of past Kwashiorkor even in the extremely malnourished group (Table 2B).
- l) Night blindness: Figure 3A and 3B. The mothers were asked if they had noticed night blindness in the sample group. 7.2 percent (72) of the children had reported night blindness. In figure 3A one can see that the rate of night blindness apparently increases with age. However, in figure 3B the rate of night blindness is greater in the severely malnourished group. In the first instance mothers might find it difficult to observe night blindness in the small child as often they are not mobile after sunset. Also this observer felt that night blindness was reported in the hope of receiving free drugs (Table 2B). However, all medical staff reported an increase in patients complaining of night blindness over the past 3-4 months.
- m) Immunization: For the purpose of this survey the simple acceptable technique of estimating immunization coverage by the presence of a written record showing the child to have received every dose of each antigen was used. It must be stressed for those people not familiar with immunization procedures that a child is not protected from the diseases until he has received the full number of vaccines at correct intervals and at the correct age. Table shows a difference in immunization coverage between the two strata. Strata 2 had a higher fully immunized coverage rate due to a 'crash' immunization programme carried out over 3 months in 1985-86 in talukas of Diplo and Mithi. No such programme appears to have been undertaken in the talukas of Chachro and Nagarparkar (Table 3A).
- n) Infant mortality: During the survey it became apparent that the questions involved were not being asked or answered correctly. As a result, all the

data has been discarded. It would, however, be of value to introduce this technique for estimating infant mortality in maternity facilities in the future.

- o) Uptake of health facilities: (formal and informal). After analyses of the data it is felt by these writers that the figures are of no information value. It was, however, observed that wherever relevant, the service of the local *dai* had been used consistently. This fact combined with a lack of facilities for the female population of Thar indicates that it would be appropriate to establish ways of using the *dais* to reach this population i.e. through training courses, equipment, referral and follow-up systems (Table 2C).
- p) Relief assistance: Of the Muslims 74.3 percent had received *zakat*. It was perturbing to note that with only one exception widows and orphans were not receiving *zakat* as the father's name had been removed from the list after his death. In many instances government workers were also receiving *zakat*. It is clear that the *zakat* lists need additional criteria for the distribution of *zakat* so that it may truly benefit those most in need. Other cash relief was found to be from the Prime Minister's fund for deserving non-Muslim families. Only 2 (0.9 percent) had received this. We found various factors for this low figure:
 - Many Hindu families had already left Thar for the barrage areas.
 - Wives did not appear to know if their husbands had received money.
 - Incorrect information in the hope of receiving further funds (Table 2C).
 - 99.3 percent had received other relief in the form of subsidized grain and free oil and powdered milk.
- q) Borrowing: The women were extremely reluctant to answer this question. Other field workers found that most of the population was in debt and continuing to borrow (Table 2C).

3.7.2 Health

- a) There is frequently a tendency among policy makers, and indeed the general public, to assume a causal link between a shortage of rain and the poor health status of the affected population. The general assumption that health problems should figure strongly in short-term drought relief policy are largely erroneous. The complex of factors that militate against the present structure's ability to fulfil the health needs of the Thari population have little to do with the current drought, and the search for solutions should not be set in the context of short-term relief inputs. This having been said, there are two specific health problems upon which the current

drought may have some bearing, and these (vitamin A deficiency and tuberculosis) are discussed below.

- b) The greatest single factor limiting the impact of health services in Thar is the low level of uptake of these services by the population. There are several causes:
- The lack of lady doctors and lady health visitors in Thar: There is not a single government female health professional working in the desert, further restricting the female population's access to the few government health facilities available. In view of the cultural factors working against both the full representation of women in the medical profession as a whole, and against their availability for work in the more remote rural areas, the women and small children of Thar are likely to remain underserved for the foreseeable future. However, the government should look into ways of attracting at least a few female health professionals to the area. One obvious approach is to offer incentive bonuses for rural health posts. Wherever possible, husband and wife doctor or doctor/LHV couples should be posted together. Investigations into the precise nature of the cultural constraints working against the acceptability to the population of unmarried female health staff should be undertaken with a view to finding ways to circumvent them, perhaps by providing for the employment of a respected local woman as their ayah, for example.
 - The lack of continuity of drugs supply: Accommodation should be provided to doctors posted to schools and dispensaries and preferential arrangements for hardship allowances should be made. Health policy in Pakistan is based on the concept of free treatment as a right, but present budgetary allocations only allow for a hopelessly inadequate proportion of the needs of the population, both at government health facility and at District Council dispensary levels. Several approaches or a combination of them can be used to address this problem.

Increased budgetary allocation.

- The application of an "essential drugs" list comprising 15 or 16 drugs would permit bulk purchases at lower rates, more efficient stock control and distribution and a greater assurance that stock held at dispensary level is appropriate to the health priorities of the population. A rigorously applied "essential drugs" list would greatly increase the real value of any given budget allocation. A proposed essential drugs list is given in Table 4 of the annex to this chapter. The costs involved would amount to a maximum of Rs 3.75 per annum per head of population.
- Greater provision for revenue generation by District Council for drugs procurement.

- Statutory provision for cost recovery systems to be established through rug sales, community-financed medical assistance schemes, and the like. There exists a whole gamut of cost recovery techniques which largely rely for their success on the provision of some generation of excess profit to ensure free treatment to those unable to pay for membership of a mutual assistance scheme or service fee. Such techniques would imply major changes in federal policy and consequently may rightly be considered as outside the scope of this report. They are included here only because such mechanisms exist and as such should figure in any survey of policy options.
- Accessibility of health facilities and problems of referral: The scattered settlement pattern and the lack of transport facilities in Thar, make it difficult for patients to reach health facilities and also for more difficult cases to be referred on. This is especially true for women experiencing difficulties in child birth. This is an intractable problem, the only remotely feasible solution to which is the provision of metalled roads linking major centres, which is examined in other parts of this report, in the larger context of the region's economic development.
- c) Training Needs:
- Dispensers: Whatever the statutory function of District Council dispensers, their relatively widespread distribution has resulted, in reality, in their acquiring many characteristics of a first line health service, with a strong element of diagnosis and treatment. Drugs from the district council only last for 2 months; supplies for the remaining 10 months come from middlemen. The precise circumstances under which this is permissible need to be established. If brought under supervision and management and with proper training the dispensers may be made to constitute a very important first rung of the referral chain. The role of the private sector in the provision of first line health services would need to be addressed. The application of an essential drugs list appropriate to his function may further serve to ensure that the dispensers do not exceed their professional capacity. Furthermore, it has been noted that in the absence of female medical professionals, *dais* have established close working relationships with dispensers, often referring women with gynaecological and obstetric problems to them. With adequate training, incentives and supervision, this role can be built on and may constitute a major source of support to the *dais*. Provision should also be made for regular refresher courses, perhaps every 3 years. In conjunction with the implementation of the above training recommendations, provision must be made for integrated supervision of dispensers both by the District Council and by the health department.

- Medical officers: The Pakistan government's commitment to primary health care needs to be reflected more in the training of doctors. Medical officers' activities remain clinic-based and emphasise curative work almost exclusively. There exists a wide gulf between the medical profession and the population which both find hard to cross. Post-graduate courses in primary health care and community health should be made available and salary structures should reflect the value of qualifications in these subjects. It was felt that a major impediment to a continued high quality of work by medical officers was the lack of professional support and stimulation once these doctors had taken up their posts in Thar. Senior medical officers need further training in man management and the provision of technical support. They also need facilities and transport to provide the required back-up and professional stimulation to their medical officers.

d) Immunization:

Immunization coverage in Thar is extremely low. There is at present no long-term strategy for how to achieve a substantial high level of coverage. In the short-term three measures can be taken:

- Establish routine vaccination services in all health department facilities through the provision of necessary equipment (including solar-powered fridges) and training. Technical back-up and equipment is readily available, except for solar-powered refrigerators which are required in areas without electricity.
- Mount a 6-month pilot mobile programme in a desert area (perhaps Nagar would be a good representative area), with a view to establishing an overall long-term strategy, based on the following information:
 - How long will it take to deliver the highest possible proportion of vaccinations in facilities?
 - What can we reasonably expect this proportion to be?
 - Does the number of children who cannot be expected to be present at fixed centres for vaccination justify the maintenance of mobile facilities in perpetuity?
 - Will such use of mobile vaccination teams be year round or seasonal?
 - For how many mobile teams (if any) will there be a permanent need?
 - How will costs be borne?

- What are staff training needs?
- What are other resource needs?
- Who will be responsible for coordinating the Expanded Programme of Immunization (EPI) activities?
- What will be the methods of supervision and evaluation?
- How will EPI activities be integrated with other health activities? i.e. TB case follow-up, vitamin A supplement programmes, community health worker supervision.
- What are the recurring costs and are these covered in the budget?

There are many examples of immunization campaigns having been mounted as a component of relief or accelerated development efforts aimed at drought or other calamity affected areas. On no occasion have these efforts achieved success in terms of sustainable protection of the population. EPI coverage as a permanent feature of health facilities requires long-term budgetary commitment, organization (often entailing organizational restructuring), training, supervision, technical support at all levels, practice and above all the commitment of those involved. A well-monitored and well-designed pilot project should do much to identify ways of assuring these aspects.

e) Vitamin A deficiency:

This is probably the only health issue that can be addressed in the drought relief context. Health staff throughout Thar have reported an increasing incidence of 'night blindness' over the past 3-4 months (since September), and although no real estimation of incidence can currently be made, given the prevailing conditions it seems reasonable to assume that the situation might become serious over the coming months if prompt action is not taken. Rather than attempting to identify groups at risk, this report recommends that vitamin A be made available to the whole population. Stocks should be sent to all health department facilities and dispensers should be given a date for collection. On this date a short instruction should be given on the preventative and curative doses, as well as the dangers of vitamin A. The curative dose should be given to anyone complaining of night blindness. The estimated total of capsules for the first distribution is 300,000 capsules at 200,000 i.u. Vitamin A supplements will be needed every 6 months until the current drought has passed.

f) Tuberculosis:

Deteriorating nutritional status may reduce resistance to TB, and reports from medical officers in Thar that incidence among the child population is increasing, indicate that this might already be happening. However, the complications of diagnosis, monitoring and follow-up of patients involve a far greater organizational effort than food or vitamin A distribution. Existing TB clinics, such as the social welfare financed clinic at Diplo, could probably handle more cases if more drugs were made available on a permanent basis. However, even working at full capacity these centres can only treat a fraction of cases, and additional drugs do not solve the problem of follow-up. Provision should be made to treat all presenting TB cases at all health department facilities. In the longer term it should prove possible to integrate the follow-up of cases with other outreach activities, or with dispenser's functions.

4. LONG TERM EFFECTS OF THE CURRENT DROUGHT

4.1 SALE OF LIVESTOCK

The people of Thar sell their livestock to purchase the necessities of life such as shoes, clothes, household goods etc. This year they are also selling their livestock to purchase food grains and in many cases fodder for their animals. In addition, the price of animals is half that of previous years and wages in the barrage lands have fallen by at least 30 percent. This means that a far larger percentage of animals will be sold this year. People's estimates of the percentage of animals that will be sold in the coming year vary from 30 to 75 percent of the animals available. Even if an average of 50 is agreed upon, then the animal wealth of Thar will fall by 900,000 heads. In normal years, the Tharis maintain, there is no decrease in the number of animals in the desert as new animals are born to take the place of the ones that are sold.

4.2 THE BURDEN of LOANS

Most Tharis every year take loans either from their *waderas* (landlords) or from *banyas* (money-lenders). These loans are normally taken in April or May and are returned after the harvest in October or November, or after a few animals have been sold. The rate of interest varies from 3 percent to 10 percent every month at a compound rate. Interest for the poorer sections of the population is higher, so as to cover the risk factor. If the loan is from a *banya* then in the majority of cases the poor also have to pawn their valuables with the money-lenders. As the price of animals has been low this year and there have been no harvests, people who have taken loans do not see how they will be able to repay them. In addition, the drought situation has forced the people to take larger loans than usual. Thus next year, whether there are rains or not, the people of Thar will be much poorer. If the monsoons fail again, they will be unable to repay their loans, and their

valuables, which are their capital, will be lost to them. It is worth mentioning here that the National Bank of Pakistan in Chachro has given loans of Rs 300,000 each to 6 shopkeepers. The people in the *bazar* believe that these shopkeepers have loaned out this money at a 5 to 10 percent monthly rate of interest to the residents of nearby villages.

5. AN EVALUATION OF THE EFFECTS OF THE DROUGHT

The drought in Thar has affected every aspect of economic life in the desert. Agriculture, trade, commerce and transport have suffered. Migration of human and animal populations has taken place, and both are facing difficulties in the barrage lands. In addition, the loss of half the cattle through sale, and the fact that the population is now living off its capital, will have long-term effects on the desert economy. It will increase the power of the middlemen and further integrate the desert economy with that of the barrage lands and the cities of Sind. This further integration will not take place on terms dictated by the Tharis. However, this is not the first drought in Thar and it is certainly not the worst in the last forty years. Older residents remember the earlier droughts. However, they report that the problems that they now face, such as grain and fodder shortage; deaths and mass sale of animals; problems of migrant Tharis in the barrage lands; the heavy and increasing burden of loans were absent in those droughts. These problems, they maintain, are the result of demographic, social, economic and cultural changes that have taken place in Thar. To understand the present crisis therefore, it is necessary to understand these changes.

CHAPTER 3

SOCIAL, ECONOMIC AND DEMOGRAPHIC CHANGE AND IT'S RELATION TO PRESENT DROUGHT AND FAMINE CONDITIONS

1. DEMOGRAPHIC CHANGES

1.1 CHANGES IN HUMAN DEMOGRAPHY

In 1961 the population of Thar was 396,993. In 1981 had increased to 774,617. That means that in 20 years it increased by 95 percent, or at a rate of 4.75 percent a year. Thus the rate of increase was 1.55 percent higher than the national average of 3.2 percent. During this 20 year period the urban population increased by 362 percent and the rural by 86 percent (see Appendix -23: Demographic data: human). In addition to natural growth there has also been a migration into Thar from Indian Rajistan. 400 families were settled in Nagar after the 1965 war and an additional 3000 in the Chachro taluka.

1.2 CHANGES IN ANIMAL DEMOGRAPHY

According to the figures of the animal husbandry department at Mirpurkhas there were 445,240 animals in the desert in 1976. In 1986 this figure stood at 1,268,960, an increase of 185 percent. The figures sound incredible, but the residents of the settlements visited also give similar figures for the increase of animal heads in their villages. The largest increase, 538 percent, has been in sheep. This is because of the expanding trade in wool and the growing dependence of the Karachi and Hyderabad cottage industry on it (see Appendix - 24: Demographic data: animals).

2. DISAPPEARING PASTURE LAND

2.1 GOWCHER LANDS AND THE LAND GRANT POLICY

2.1.1 *Gowcher* lands

Under the settlement carried out by the British colonial government, large tracts of land were identified and preserved as pasture lands or *gowcher* (cow grazing lands). The *thakurs* (upper caste Hindus who owned most of the land in Thar) and *patels* (village headmen) were responsible for protecting these lands from cultivation and deforestation. This alliance between the feudal order and the government worked as long as the *thakurs* and *patels* had power. However, for reasons explained later in paragraph 3, major social and economic changes over

the last 25 years have all but demolished the old social order, and changed its relationship with the state institutions. As a result, most of the *gowcher* lands have been taken over by important persons in the area. However, what government records do not show is that much of these lands has been encroached upon. An increase of only 15 percent in the total cultivated area is shown in government records between 1981 and 1986. On the other hand, people in all the settlements visited complained that 50 to 80 percent of these lands were now under the plough. In some villages the people said that *gowcher* lands had simply ceased to exist. In addition, there was general consensus among the villages that trees from the *gowcher* land had been cut for firewood and house construction, and that the *phog* shrub, which holds the soil together, had been used in a big way for making dry hedges around the ever-increasing houses and settlements. This depletion has been on so large a scale that large tracts of land have been turned into absolute desert.

2.1.2 The land grant policy

According to the land grant policy of the government a one-year contract for cultivating *gowcher* or government wasteland can be acquired by local landlords. This contract is known as *yaksala* or 'yearly'. If the landlord can hold this land for 5 years through yearly leases, then he can buy it at Rs 15 per acre. According to the residents of Thar, large tracts of good pasture land have been taken over by local landlords under this policy, thus depriving the local population of grazing areas.

2.2 LAND GIVEN TO REFUGEES FROM INDIA

After the 1965 and 1971 wars a large number of Muslim refugees moved into Thar. They were given 12 acres of land per family from government wasteland. As per government records this land amounted to 42,000 acres. According to the local population the refugees also occupied double the land allotted to them.

2.3 THE GHULAM MOHAMMAD BARRAGE AND THE COLONIZATION OF PASTURE LANDS

The older residents of the settlements visited remember the days when there were large tracts of pasture land in the now irrigated areas. In dry seasons, when the Thari pasture lands were depleted, the cattle moved to the pasture lands in the Badin district. In the barrage areas also there were large uncultivated spaces to which the desert population could move its animals while it worked as agricultural labour for wheat harvesting or cotton picking. The entire Badin district was colonized by the canals from the Ghulam Mohammad Barrage in the mid and late fifties, and extensions of the Jumrao canal system have brought a major part of the non-Thar part of Tharparkar under cultivation. Thus, in addition to having lost their pasture lands in the desert, the Tharis have also lost the possibility of grazing their animals in the neighbouring areas.

3. SOCIAL AND ECONOMIC CHANGES

3.1 REASONS FOR CHANGE

The economy of Thar before the 1960s was a subsistence one. Before the 1960s the relationship of the people with each other, and with the outside world, was one of barter. The desert people produced almost everything they needed for their existence. Cloth, shoes, blankets were all manufactured locally. Food consisted entirely of millet bread (*bajray ki roti*) and yogurt or *lassi*. Tea, biscuits, city-made clothes and shoes were unknown. Shops in villages were non-existent. Animals were rarely sold for cash and the only source of income was from the sale of *ghee* (clarified butter) to the barrage lands. In fact, a large part of Sind depended on *ghee* from the desert. Middlemen, however, did not go into the desert in search of *ghee* but purchased it from the Tharis working in the barrage areas during the wheat harvesting season. Land belonged entirely to the upper castes who controlled every aspect of life in the villages. They mobilized the people for maintenance of embankments and tarais and protected government wasteland from encroachment and deforestation. However, from 1947 onwards, changes slowly started to take place in the desert. In the post-1965 period, cash was introduced extensively as a means of exchange, and after 1972 the integration of Thar's economy with the Karachi and Hyderabad market began. There are a number of reasons for these changes.

3.1.1 The creation of Pakistan

The creation of Pakistan as an Islamic state in 1947 had a major psychological impact on the sociology of Thar. The old order, dominated by the Hindu higher castes, had to hand over some of its power to the Muslim landlords. This weakened the government-feudal relationship and made encroachments on government waste-lands possible.

3.1.2 The extension of the irrigation system

The creation of the Ghulam Mohammad Barrage in the '50s and the subsequent colonization of pasture land adjacent to the present desert further deprived the Tharis of grazing tracts. Thus their relationship with the landlords of the barrage areas changed as their dependence on barrage agricultural produce for feeding their animals increased. In addition, the colonization through the Ghulam Mohammad Barrage and extension of the Jumrao Canal system also introduced a new sort of farmer in the barrage areas. This farmer had links with the outside world, was not a native of the soil, and through official patronage could receive government loans for agriculture. Consequently, his relationship with the migrant Tharis was bound to be different from that of the older landlords. It was through these new landlords that cash payments to the Thari seasonal agricultural labour were introduced.

3.1.3 The policies of the Ayub era

During the Ayub era major changes were attempted in the barrage areas. New varieties of seed and fertilizer were introduced. Loans for agricultural purposes were made available and mechanization of agriculture was promoted. Although these were not entirely successful during the tenure of the Ayub government, they laid the basis for future developments and had a major impact on the thinking of the people. At the same time, development projects on a small scale, such as the erection of wind-mills for pumping out water and the building of dams in Nagar, were undertaken. In addition, through the Basic Democracies System, people elected their own representatives. Through these developments the people of Thar, so long isolated from the mainstream of economic and political life in Sind, came into contact with the outside world. Industrially manufactured vegetable oil as a substitute for Thari *ghee*, factory-produced shoes, cloth and agricultural implements, also made their appearance in Thar along with tea, biscuits and white sugar. The most powerful impact on the social structure of Thar, however, came with the 1965 Indo-Pakistan war. As a result of the war many higher-caste Hindus fled to India and their lands were given to their lower-caste Hindu *haris*. Muslims from Indian Rajasthan also moved into Thar. This further weakened the *thakurs* and *patels* and intensified the disintegration of the old order. At this time, mechanized transport through GMCs increased from about 6 to 10 trucks in 1964, to over 25 in 1967.

3.1.4 The post 1971 era

After the 1971 war Thar was occupied by India. In 1972 it was handed back to Pakistan. A large number of the remaining Hindu merchants and landlords migrated to India and the process of social disintegration begun in 1965 was completed. The post-war economy of Thar was in a shambles and the city traders stepped in to colonize Thar. All the shops in the villages visited by the assessment team were opened after 1972, and the majority of them after 1980. Middlemen started visiting the desert to collect wool, animals and handicrafts and Tharis started using city-made shoes, clothes, soap, matches etc. Tea replaced *lassi* as the main beverage and wheat bread became popular.

3.1.5 Cash as a means of exchange

The changes described above were accompanied by changes in the barrage lands as well. Industrially manufactured *ghee* replaced Thari *ghee*. Mechanization of transport and improvement in roads, along with an increase in the price of agricultural produce, changed the economy of the barrage areas. Tharis were now paid in cash for their labour and they needed this cash for purchasing the necessities of life. By 1974, one can safely say that Thar had been colonized by the city market forces and its dependence on cash was complete.

3.2 REPERCUSSIONS OF SOCIAL AND ECONOMIC CHANGE

3.2.1 New requirements

As a result of the social and economic changes that have taken place, the Tharis' eating and dressing habits have also changed. Vegetables, meat and tea are now part of their diet. The vast majority purchase industrially manufactured shoes and clothes. Since cash is needed for these items, *bajra* is no longer stored for bad years but sold in the nearby markets or to wandering middlemen. Similarly, livestock has become a marketable commodity and everything possible is done to increase its quantity. This change is so enormous that Hindus, who previously for religious reasons did not sell cattle for slaughter, now have no qualms in doing so.

3.2.2 The power of the middlemen

Middlemen are now an important economic power in the desert. They are the suppliers of essential items, money-lenders and purchasers of produce. The dependence of the population on them has increased to such an extent that whatever power the *thakurs* and *patels* may have retained is dying out.

3.2.3 The search for social mobility

The search for social mobility among the desert population is obvious in their new aspirations. Where schools are available an increasing number of lower caste Hindus and Muslims send their children to them. In all the villages visited there is a demand for hospitals and medicines. The Maghwars have stopped producing leather and now animal skins are sold directly to the city markets. The reason is that tanning is considered to be a 'dirty' job and tanners have traditionally been considered as untouchables. The Maghwars have given up tanning with the hope of improving their social status. Similarly, there are young Kohli doctors and engineers in the desert and an increasing number of Tharis are going into trade in the expanding market towns of Thar. Before 1961, Umerkot was the only town in the desert.

3.2.4 Breakdown of cohesion

The economic changes have resulted in the breakdown of social cohesion. Caste barriers have weakened and the village populations insist that the government through the Union Council (UC) or other institutions should look after the tarais and embankments or dig wells as they have no faith in *Thakurs*, *Patels* and *Mukhis*.

4. ENVIRONMENTAL CHANGES

The demographic, social and economic changes that have taken place in the desert have resulted in the desertification of Thar. The process of desertification and the reasons for it can be clearly identified.

4.1 THE PRESSURE ON LAND

Because of the increase of population larger areas of land are required for cultivation. This has led to the disappearance of pasture land and an end of the system of crop rotation. Previously 50 percent of agricultural land was cultivated and the remaining was set aside for animal grazing. The animal droppings fertilized this remaining land and the following year the cultivated part was set aside for grazing. This system produced higher yields and also provided extra pasture lands. This system of crop rotation is no longer followed.

4.2 DEMANDS OF AN INCREASING ANIMAL POPULATION

On one hand, the animal population has increased by 185 percent. On the other, pasture lands have decreased considerably, both in the desert and in the neighbouring areas. Thus overgrazing of the pasture land has taken place. Older residents in the villages report that 20 years ago grass would grow up to 5 feet high after a good monsoon year. It could be cut and stacked for over three years. Now it hardly reaches a height of two feet and there is never a sufficient quantity available for storage for more than one season. In addition, there is a general consensus among the older residents of the settlements visited that animals today are of a far inferior quality than their counterparts of 10 years ago. According to the UNDP consultant's report, "Review of Strategy and Plans for the Development of Arid Zones of Sind Province" (February 1987), the appropriate stocking ratio for excellent rangeland condition is quoted as 30 cattle equivalent units per 100 ha. In Thar, the stocking ratio is 68 head per 100 ha in degraded rangeland. The report feels that the rangelands in Thar in their present poor condition are incapable of supporting the current livestock population.

4.3 INDICATIONS OF DESERTIFICATION

Trees that normally grow in good soil conditions such as *Khejri* (*Prosopis Cineraria*), *Rohiro* (*Tecoma Undulata*) and *Beri* (*Zizyphus Mauritna*) have almost disappeared. Trees and shrubs which have replaced them are the *Ak* (*Calotropis Proceras*) and *Aristida Fumiculata*. Both are multiplying rapidly and are indicative of degraded rangeland. In addition, the *Phog* species (*Alligonum Polygonoides*) has also become scarce, and between Chachro, Khinsar and Umerkot has almost disappeared. *Phog* is an important soil stabilizer and in the areas where it has become scarce, soil erosion is taking place. This is obvious from the fact that the roots of almost all large trees are visible and the main trunk begins a good one to two feet above the present earth level. Because of

selective grazing, it seems that only shrubs and trees that are unpalatable to the animal population are likely to survive. Unfortunately, these plants are not good soil stabilizers.

DEFORESTATION AND SOIL EROSION



BUT IT HAS BEEN DEPLETED FOR MAKING HEDGES AROUND
THE SETTLEMENTS.

4.4 LONG TERM REPURCUSSIONS OF DESERTIFICATION

As a result of desertification the land will not be able to meet the demands of the animal population even in good years. If animal husbandry has to continue to be a source of livelihood for the population of Thar, then either fodder will have to be imported to the desert, or a massive programme for range land management and rehabilitation will have to be undertaken. In the absence of these programmes the people of Thar will have to depend increasingly on the barrage areas and the towns in Sind for jobs, and a remittance economy will emerge in the desert.

5. CHANGES IN THE TRANSPORTATION SYSTEM

5.1 INTRODUCTION OF GMCs

Transportation in the desert before the 1950s was entirely by animals or private jeeps. The first GMCs (6 wheel drive trucks) started plying in 1956. These carried only passengers and were two in number. By 1967 these had increased to 25, but still they catered mainly to passengers to and from the desert. In the mid-seventies there was a big increase in the GMCs and there are now over 100 plying from Naukot to the desert and over 50 from Umerkot. The increase in their numbers took place not only because of an increase in passenger traffic but more so because of the need to transport grain and daily necessities of life from and to Thar. The urban centres of Thar and their markets developed and expanded as a result of this mechanized transport.

5.2 OPERATION AND MAINTENANCE COSTS OF GMCs

Maintenance costs of GMCs are about Rs 35,000 to Rs 50,000 per year. Fuel consumption is about one litre of diesel for every 1-1/4 kilometer. An average GMC can carry up to 7,000 kilo. Two wheel drives capable of carrying the same weight on normal roads would require no more than Rs 10,000 as maintenance costs and would cover 4 kilometers in one litre of diesel. Thus the cost of maintenance and operation would be reduced to less than one-third of the present costs.

5.3 GMCs

Data on routes, capital costs, operation, maintenance and transport fares. (See Appendix - 25: Data on GMCs.



A GMC LEAVING NAUKOT FOR THE DESERT



ANIMALS BEING TRANSPORTED FROM DROUGHT STRIKEN
ISLAMKOT TO THE BARRAGE

CHAPTER 4

THARS MINERAL RESOURCES AND ARTISANAL SKILLS

1. THAR'S MINERAL RESOURCES

1.1 GRANITE

Granite rock formations are found in the Nagarparkar region of Thar. These formations are 1450 to 1500 feet high and cover an area of about 40 square miles. Unlike granite formations in the Indian peninsula and Rajputana, which are mainly grey in colour, Thar granite is available in a wide range of colours and textures. Multicolour granite, which is very rare, is also present at Churio. According to a study made by Abdul Hafeez Bahalim, who is interested in extracting granite from Thar, economic extraction of the stone is possible at Karunjhar and Bhodesar since water, labour and security are available. Nominal amounts of water are essential for initial processing. Bahalim has discussed the possibility of the extraction and export of granite in raw boulder form to Italy with Italian organizations and received a very positive response. He feels that his venture will provide employment to 1000 persons from Nagarparkar and generate about Rs 8 million dollars as foreign exchange. In addition, it will develop skills in stone extraction, administration and marketing. Transport to Thar will also be available at cheap rates as the trucks transporting granite to Karachi will return without cargo (see Appendix - 26: Abdul Hafeez Bahalims proposal). However, roads and electric power are considered essential for making granite mining economical.

1.2 CHINA CLAY

China clay is found in Dedhvero, 130 kilometers from Mithi. 3.6 million tons is available at 35 pockets spread over an area of 125 square miles. According to the Pakistan Mineral Development Corporation (PMDC), 80 percent of Pakistan's china clay requirements are met by imports from other countries, mainly China, and the remaining from the NWFP. The PMDC expert on the subject, Mr. Sispal, says that the Dedhvero china-clay is comparable to the imported one. According to the representatives of Style tiles, a major manufacturer of ceramic goods, the Dedhvero clay is superior to the NWFP clay which they often use. At a modest estimate the Karachi ceramic industry alone consumes over 400 tons of china-clay per month. To meet this requirement 1200 tons of material will have to be excavated, as only 27 units of china-clay is extracted from 100 excavated units. This will generate employment for over 1500 unskilled persons around the year. This figure does not include transporters, administrators and people working in the service sector which will cater to the new industry. The above calculations

have been worked out from the fact that at present 30 people working at the mines excavate 32,000 kilos of material per month. However, to make mining economical and feasible, metalled roads and large quantities of fresh water are required.

1.3 THE CHINA-CLAY FACTORY AT MIRPURKHAS

The owner of the Dadhvero mines has established a china clay extraction unit at Mirpurkhas. On average, he markets 6 tons of china-clay to Karachi every month. He says that he can increase production easily by 600 percent but it would not be economically feasible for the following reasons:

The absence of a road: In the absence of a road he has to pay an enormous amount of money to GMCs to bring in the china-clay. He estimates that if a road were built the cost of transportation would be reduced by 60 percent and the cost of excavated material, Mirpurkhas price, would work out to slightly more than 50 percent of the present cost.

The absence of fresh water at Dedhvero: 27 percent of the excavated material from the Dedhvero mines consists of china-clay. To extract this china-clay from 1 ton of material, 2 tons of water are required. If this was available at site then china-clay extraction from the excavated material could take place at Dedhvero itself. This would reduce transport costs by about 70 percent. For Dedhvero china-clay to compete with Mardan and imported china-clay it is necessary that a road link with Mithi is established and water in sufficient quantities is made available at Dedhvero.

2. THAR'S ARTISANAL SKILLS

The Maghwar caste in Thar manufactures shawls from cotton and silk thread; blankets from sheep wool; rugs and cloth made from animal hair. All these items are prepared on primitive handlooms which the artisans manufacture themselves. Raw material, except for cotton and silk thread, which are imported from Karachi and Hyderabad, are produced locally. Wool is prepared from fleece on a spinning wheel by women; animal hair thread is manufactured by men in their spare time, while socializing or walking. Although production for local use had dropped over the years, it has increased, according to Hera Mal, a middleman from Karachi, 20 times since 1968 for the Karachi market. For the past two years the market has been static. On a blanket, (*khatta*) an artisan earns about Rs 40 for 2 days labour on the loom and an additional 2 days for manufacturing wool on the wheel. Similarly, the manufacture of a rug takes over 10 days and the time required for making animal hair thread for the rug takes an additional 10 days. Profit for the artisan is between Rs 100 to Rs 150. A silk shawl, whose fibre is imported from the cities, fetches the best profits. An artisan finishes it in one day and makes a profit of Rs 20 to Rs 30. The shawl manufacture was introduced in Thar by middlemen from the cities and the

demand for Thari *shawls* is on the increase. All production takes place in the homes and centres are not required. Middlemen go to the villages with orders, advance cash payments and raw materials, where required, and then go again to collect the finished goods. Artisans who do not require a loan, often take their goods to the *taluka* headquarters and sell them to shopkeepers directly, thus making an extra profit. No scientific study of the handicraft industry in Thar has been made to-date. Figures related to production, earnings, number of artisans, market possibilities etc. are not available.

THAR ARTISANAL SKILLS



A MAGHWAR MAKING A SILK SHAWL



SHOE MAKING IN THE VILLAGES

CHAPTER 5

FAMINE RELIEF OPERATIONS

1. GOVERNMENT RELIEF OPERATIONS FOR THE DROUGHT AND FAMINE EFFECTED AREAS

The DC's report "Relief measures in the calamity-affected areas of District Tharparkar", describes in detail the relief measures taken by the government. Briefly, these measures consist of the following:

1.1 SUPPLY OF SUBSIDIZED WHEAT

Subsidized wheat was supplied to the population from March 1986 to August 1987. This wheat was transported to 171 relief centres in the desert and its distribution was supervised by committees consisting of chairmen of Union Councils, chairmen of *zakat* committees, Union Council secretaries, *tapedars* of the area and village notables. The quantity of subsidized wheat works out to 5 kilos per person per month. The availability of this wheat kept grain prices normal in Thar and prevented black-marketing. Since it has stopped being supplied grains have disappeared from the market completely and the population is facing hardship. Most people in the settlements visited had made full use of subsidized wheat.

1.2 ZAKAT FUNDS

Rs 11.424 million were distributed from *zakat* funds to about 39 percent of the Muslim population in 1986, at Rs 500 per family. In 1987, Rs 44 million were distributed again, at the rate of Rs 750 per family. Almost 100 percent of the Muslim families received this money. Many of the people interviewed had used this money, or part of it, in paying off debts.

1.3 PRIME MINISTER'S GRANTS

Rs 4.5 million were distributed to about 15,000 families from the Prime Minister's relief fund for the minorities in Thar. This means that Rs 300 were given to each of 25 percent of the Hindu families.

1.4 FREE DISTRIBUTION OF BUTTER OIL, DRY MILK AND WHEAT

In November 1987 distribution of 1-1/2 kilo of butter oil, 1-1/2 kilo of dry milk and 20 kilos of wheat was carried out. Only those family heads whose names appeared on the male voters lists received this aid.

2. PEOPLES VIEWS OF RELIEF WORK

By and large people at the settlements visited, agreed that relief work was well-organized and efficient. Muslims felt that the *zakat* funds gave them temporary relief. Hindus complained that very few of them had received aid and that Rs 300 per family was not at all adequate. The main complaint was that the criteria set for receiving the free butter oil, milk powder and 20 kilos of wheat were unfair and unjust. Instead of giving these items to the male voting members they should have been given to female voting members because most of the men are away working in the barrage areas. In addition, it was argued that there are many widows and families without men. Another argument was that cash should have been given instead of free butter and milk. This cash could then have been used by the recipients for whatever they considered necessary. However, it was generally agreed that apart from the supply of subsidized wheat, the rest of the relief operations have not really helped the Thari people. Since March 1986, the government has given a total relief aid of Rs 83.5 million, apart from the remission of taccavi and land revenue. This works out to just over Rs 5.6 per person per month as aid.

3. RELIEF WORK AND THE ANIMAL POPULATION

The general complaint of the people of the settlements visited was that the relief work had not catered to the needs of their livestock. They felt that if the livestock had in some way been taken care of in the desert and in the barrage areas, then they may have been able to look after themselves better. At present they have tackled this problem in two ways. One, by importing fodder at enormous cost. Two, by migrating to the barrage lands with the animals, working there as labourers, and purchasing fodder. This year, as wages are low in the barrage lands, the second alternative is very difficult to achieve. The question has been posed: Is it not possible to supply fodder at subsidized rates or free of cost in the same manner as wheat was supplied? The quantum of fodder necessary would, of course, be enormous, and would pose huge logistic problems which the existing desert transport systems could not possibly cope with (see Appendix - 27 : Food and water requirements of different animals).

4. RELIEF WORK AND THE DEVELOPMENT NEEDS OF THAR

The Rs 88 million spent on relief work is an enormous amount of money. However, though it has alleviated the sufferings of the people, it has in no way contributed to the short or long-term development needs of Thar. Since, it is unlikely, that there will be any rains before July next year at the earliest, relief work in Thar has to continue. If there is no rain after July it may even have to expand. It is important therefore, that instead of simply handing out doles to the desert population, money should be used for development in a manner which

also provides relief from the conditions created by the drought. This is further discussed in Chapter - 7 of this report. In addition, it is felt that sections of population whose need is greater should receive more.

CHAPTER 6

EXISTING ADMINISTRATIVE STRUCTURES AND DEVELOPMENT PLANS FOR THAR

1. NATIONAL ORGANIZATIONS

1.1 THE DISTRICT ADMINISTRATION

The district administration is mainly a revenue collection organization. It is firmly entrenched in the rural areas and is organized at district, subdivision, *taluka* and *tappa* levels. A *tappa* consists of 5 to 10 villages. Thus the district administration reaches out to the remotest areas of Thar through its 5 *mukhtarkars* (head of the *taluka*); 10 assistant *mukhtarkars*; 22 senior *tapedars* (in charge of a *tappa*) and 81 *tapedars*. The District Commissioner (DC) is head of the administration and there are Assistant Commissioners at Mithi and Chachro (see Appendix - 28: The structure of the district administration and storage facilities in Thar).

1.2 THE LINE DEPARTMENTS

1.2.1 The education department

The education department is responsible for the operation of masjid schools, Nai Roshni schools (new light schools), and primary, middle and secondary schools. (Details of the number of educational institutions, number of students, number of staff etc. are given in Appendix - 29: Educational institutions in Thar.) The picture that emerges is that 19.3 percent of primary school-age children go to school. Of this figure only 16 percent are girls. Similarly, only 6.6 percent of middle and secondary school-age children go to school. Of these 13.5 percent are girls. Total girls attending school are 3.6 percent of school-age females in Thar as opposed to 22.9 percent boys. These figures, especially for girls, are well below the national average. The other points that emerge from the statistics in Appendix - 29 are that there are only 6 middle schools and 5 high schools in the whole desert for girls. In addition, these schools are located at Umerkot and Mithi, areas nearer to the barrage and serviced by roads. Even the vast majority of boys' schools are in these two talukas. Many people, especially in the larger settlements, give great priority to education and are quick to see the link between well-functioning educational institutions and roads. A common complaint was the lack of hostel facilities in the taluka headquarters for students from the countryside. Where such facilities exist, their maintenance is extremely poor.

1.2.2 Health department

The health department, headed by the District Health Officer in Mirpurkhas, operates 3 taluka hospitals, 1 maternity home, 8 rural health centres and 2 sub-centres. A total of 122 hospital beds are available in the desert for a population of 700,000. This works out to 1 bed for every 5,737 persons. Again, 84 of the 118 beds are in Mithi and Umerkot, talukas linked to the barrage areas by roads, while there are no beds or other facilities available in Nagar, the *taluka* furthest from the barrage areas. The number of doctors in the desert *talukas* is 25. Seventy of these are in Umerkot and Mithi and 1 in Nagar. As against 25 doctors the total number of paramedical staff available in the desert is 46. This figure includes nurses, compounders, LHVs and midwives. Again, the desert population is very conscious of a lack of health facilities and has indicated that maternity centres and treatment of TB are a definite priority (see Appendix - 30: Health facilities in Thar).

1.2.3 District Council dispensaries

65 District Council dispensaries have been established in the desert. However, the people complain that there are no doctors or medicines at these dispensaries although doctors have been appointed. The only exceptions to this are the dispensaries at Umerkot and Mithi.

1.2.4 Animal husbandry department

The department operates 2 government veterinary dispensaries in the desert. In addition, there are 4 District Council dispensaries and 27 Union Council veterinary centres. Although the assessment team did not visit the veterinary institutions, the people of the settlements visited stated that they did not make use of their facilities. This is because the dispensaries and centres have no staff or medicines available. Instead, people take their animals to traditional healers who treat them with herbs and salts.

1.2.5 The Local Bodies and the Rural Development Department (LB&RDD)

The local bodies in Thar operate District Council dispensaries, veterinary dispensaries, Union Council veterinary centres and through the Union Council and District Council carry out the desilting of tarais, building of protective embankments etc. In this connection they are supposed to take technical advice and directions from the RDD. However, no RDD structure is functioning in the desert and thus all work done by the UCs is without competent technical help.

1.2.6 The highway department

The highway department has constructed the Naukot to Mithi road in 1986. Tender for the construction of a number of schemes has been approved by the

government and work has started on some of them. The technology being used for the construction of these roads is discussed in the recommendations.

1.3 SAZDA (SIND ARID ZONE DEVELOPMENT AUTHORITY)

SAZDA has an ambitious programme for the uplift of the arid zones in Sind. The programme is an integrated one covering social uplift, community development, economic activity, rangeland management, public health engineering, education, health, forestry and development of water resources. To prepare this integrated programme SAZDA intends to carry out action-oriented research through pilot projects and also intends to be the implementing agency for the programme. So far, SAZDA has been engaged in the making of tarais in certain areas of Thar and digging wells. The organization required for undertaking research work for the plan has not yet been created (see Appendix - 31: SAZDA: Organizational chart).

2. AN EVALUATION OF GOVERNMENT FACILITIES AND DEVELOPMENT PLANS

2.1 PROBLEMS

2.1.1 Manpower

Health, veterinary and education facilities suffer because of the non-availability of staff. Doctors, vets and lady teachers, even where they have been appointed, do not attend to their duties. As most of these professionals do not belong to the desert, they find it difficult to put up with lack of comfortable transport, electricity, running water and difficulties in commuting to their homes outside Thar. In addition, the difficulty in communication between the district headquarter and the taluka headquarters, and between the taluka headquarters and the villages, makes supervision of these services almost impossible.

2.1.2 Finance

In addition to the problems of logistics, government facilities, especially related to health and veterinary services, face financial difficulties, making the supply of drugs and equipment and the maintenance and operation of the system impossible. For example, the population of the Chachro taluka is 220,000. The health budget of the *taluka* is Rs 50,000 per year. This works out to Rs 0.22 per person per year !

2.1.3 Coordination

The local bodies, SAZDA and the health department of the government, all operate health programmes. Similarly, the local bodies (the District Councils and the Union Councils) and the animal husbandry department, run veterinary services. SAZDA and the education department are involved in setting up and operating schools. PHED is involved in developing and operating water schemes, a role that SAZDA will also be playing. The local bodies are desilting tarais while SAZDA is building new ones. Thus a lot of parallel work is being done by different organizations without any coordination between them. This work does not even form part of an overall master plan. As a matter of fact such a plan does not even exist. In addition, none of this work so far is the result of any form of overall social or economic research, nor does it help to meet the aims and objectives specially worked out for the desert as a whole.

2.2 THE NEED TO STRENGTHEN THE LINE DEPARTMENTS

The line departments need to be strengthened. This can only be done if their functioning can be made appropriate to the social and economic environment in which they are operating. For this purpose research and extension of that research to them and to the desert population is required. SAZDA could play the role of a research and extension organization for the line departments, in which case it should aim at operating only pilot projects to discover new social, economic or technical models for development. Thus it must cease to be an implementing agency or alternatively take over the line departments completely.

3. THE ROLE OF INTERNATIONAL AGENCIES

A number of international agencies are already involved or are planning to be involved with development work in the desert. These include the Swiss Development Corporation (SDC); UNICEF; UNDP; the Asian Development Bank (ADB); Save the Children Fund (SCF); the Overseas Development Agency (ODA) and the Japanese government. From the information available, there appears to be no coordination between these various agencies. However, their activities are briefly described below.

3.1 UNICEF/SDC

UNICEF, financed by the SDC, has been involved with the PHED of the Sind government in carrying out test boring for potable water and in establishing piped water systems. UNICEF findings are covered in section 5 of this chapter. In the process, UNICEF has acquired considerable knowledge of working in desert conditions, logistics and manpower problems, and the problems of operating rigs in roadless arid regions.

DEVELOPMENT FAILURES



THE MOTOR OF A WIND MILL IN ISLAMKOT LIES IN THE END



THE DAM AT UC PITHAPUR: WASHED OUT BY RAINS

UNDER CONSTRUCTION ROADS



A PREMIX CARPET ON A SAND BED IS ACCEPTABLE



BUT THERE IS NOTHING TO CONTAIN THE SAND UNDER IT

3.2 UNDP

The UNDP, in February 1987, in conjunction with SAZDA has prepared a report on a strategy for the development of arid zones in Sind. What the follow up on the report or its recommendations has been is not known.

3.3 ASIAN DEVELOPMENT BANK (ADB)

An ADB team recently visited the Thar region to examine the possibilities of involving itself with the development of the arid regions in Sind. From talks with a member of the team it appears that the ADB is willing to offer a US\$ 10 million loan for the development of roads in the region.

3.4 GERMAN HYDROGEOLOGICAL SURVEY

A team from the Federal Republic of Germany in association with WAPDA is carrying out an airborne hydrogeological survey of Thar. A clear picture of their findings has not yet emerged.

3.5 ODA

Two rigs were donated by Princess Alexandra on her recent visit to Pakistan for aiding the drought and famine relief effort for Thar. These rigs are to be used for 5 test bore-holes in areas selected by the government of Sind. It is estimated that a total of 15 bore-holes will be made in the next year.

3.6 JAPANESE GOVERNMENT

The Government of Japan has donated two mobile hospitals for the desert area. As these hospitals are on 2-wheel drive vehicles they cannot operate on sand tracks and as such are useless for the Thar region.

3.7 SAVE THE CHILDREN FUND (UK)

SCF (UK) expects to get involved in health and nutrition work and also to undertake a rural development programme in the south-eastern portion of the desert in collaboration with the government of Pakistan. The involvement of the SCF will be in keeping with the recommendations of this report.

4. DROUGHT CONDITIONS, LINE DEPARTMENTS AND DEVELOPMENT PLANS

So far, none of the work carried out in the desert by the line departments, national development agencies or international agencies has alleviated the drought conditions in the desert. Though investigations into various development possibilities are underway, there is no master plan to which they are related.

5. ON THE QUESTION OF WATER

5.1 FINDINGS OF UNICEF EXPLORATORY DRILLING

UNICEF's exploratory drilling in various parts of Thar have established that there is a layer of fresh water of about 4 to 6 feet at a depth of 120 to 200 feet. This aquifer floats on an extensive saline aquifer and because of its limited quantity can only sustain a low rate of pumping. At Mithi, where this aquifer has been exploited mechanically for the towns water supply system, it has been depleted and the people have gone back to their old wells for drinking water.

5.2 AIR-BORNE HYDROGEOLOGICAL SURVEY BY GERMAN TEAM AND WAPDA:

The survey is still in progress. Discussions were held by the assessment team with the German hydrogeologist at Chachro. He has confirmed the finding of the UNICEF exploratory bores. However, a deeper fresh water aquifer does occur at a depth of 600 feet in certain areas. It is too early to say whether this aquifer can be economically exploited.

5.3 PRESENT HAND-DUG WELLS

The people of Thar are aware of the presence of the rainwater aquifer at a depth of 120 to 200 feet and they exploit it efficiently through hand-dug wells. They are also aware of its limited quantity so they reserve those wells where there is an abundance of fresh water for human consumption. Wells with slightly brackish water are set aside for animal use. However, there are certain areas where the fresh water aquifer is so small in quantity that it disappears in early spring. This forces the population to drink highly saline water (3000 ppm) or bring water from long distances to their village. Such areas, however, are few and far between.

5.4 PROBLEMS OF SUPPLYING SETTLEMENTS IN THAR WITH POTABLE SUBSOIL WATER

Much emphasis has been placed by development agencies on the development of 'reliable' sources of potable water in the desert and extraction through mechanical means. In addition to the fact that uncontrolled pumping will deplete the rainwater aquifer, and that tapping the deeper aquifer may be uneconomical, it has to be remembered that almost 60 percent of the desert population lives in settlements of less than 500 and an additional 35 percent in settlements of between 500 to 1000. These settlements are spread over an area of 22,000 square kilometres. The supply of water to even a fraction of these settlements from a small number of boreholes that tap the deep fresh water aquifer would entail the creation of a piped water system whose development, operation and maintenance would be economically, administratively and socially not feasible

(see Appendix -32: Settlement patterns). The creation of such water supply systems, if they are to work, will have to be limited only to the larger towns.



SHALLOW WELLS IN A DRY TARAI AT VERIWAH



WOMEN PULLING UP WATER AS THE ANIMALS HAVE MIGRATED

5.5 WATER FOR AGRICULTURE:

As mentioned earlier, apart from a few limited areas, potable water for both humans and animals is available in the desert. The real problem created by the drought is of the non-availability of fodder for the animals. This problem can only be overcome if there is a year-round source of water for agriculture which is not dependent on rain. There are three possibilities for this.

5.5.1 The deep water aquifer

The results of the German team's hydrogeological survey indicate that there are large quantities of fresh water at a depth of 600 feet. The final results of the survey will have to be made available before it can be decided whether this source can be used economically for agricultural purposes.

5.5.2 The Left Bank Outfall Drain (LBOD)

On completion, the LBOD will carry 15,000 cusecs of saline water into the Rann of Kutch depressions, where it will evaporate. This water is enough to irrigate the whole of Thar. The question is, can this water be diverted to Thar? It is well known that a variety of vegetables and fodder can grow in highly saline water.

The feasibility of this scheme for Nagar, Chachro and Diplo talukas is being studied by WAPDA. However, before the scheme is implemented, its ecological implications must be fully understood and its effect on the fresh water aquifers in Thar carefully evaluated, otherwise we might have a Thar with agriculture but no reliable source of drinking water.

5.5.3 Dams and lakes

Another potential source of perennial water is from lakes created by erecting dams. This can only be done in the Nagarparkar area where there are rocky formations and large dry river beds. However, the water stored would have to be of sufficient quantity to withstand a drought of 3 years. In addition, it would have to be lifted mechanically and if that is to be economically feasible, electricity would have to be made available. The dam would also have to be properly designed. Three dams constructed during the Ayub era were washed away because of defective design, the result of insufficient research into local conditions. While they lasted, they were of great benefit to the local population which was able to grow a winter crop on the periphery of the stored water.

CHAPTER 7

RECOMMENDATIONS

1. PREAMBLE

1.1 FINDINGS OF THE TEAM: (GENERAL)

The findings of the assessment team detailed earlier in the report are briefly summarized below so as to give an overview of the situation in Thar.

1.1.1 There is no famine situation in Thar

The people in Thar have been impoverished due to drought conditions but one cannot say that the area is facing famine conditions. This is because the Tharis have been able to find jobs in the barrage areas, and can maintain their families through remittances. Many arid areas of Pakistan survive on such a remittance economy.

1.1.2 Drought and the cash economy

Drought is a recurring phenomenon in the desert and the old subsistence economy that made it possible for the desert people to survive dry years is dead. It is the cash economy, controlled by market forces, that has helped in tackling the problems created by the present drought.

1.1.3 Changes in the desert

The change from subsistence to a cash economy has brought about major changes in the desert.

- a) **The death of the old social order:** The old social order, and with it old relationships, have collapsed, and it is incapable of performing its traditional functions. This has weakened social cohesion and people now look to state agencies to fulfil their traditional requirements and new needs. The state agencies, on the other hand, find it difficult to fulfil these requirements because of limited finances, manpower problems and, above all, a poor communications network.
- b) **Changes in life styles:** Major changes have taken place in the dressing, eating and living habits of the people. These changes are the result of

trade and commerce links that the desert has established with the urban areas of Sind.

- c) **Changes in people's aspirations:** There is a great emphasis on education, health and transport. These are considered essential for social and economic mobility, which is a priority for an increasing number of Tharis.

1.1.4 Rangeland deterioration

Rangeland has been badly damaged in Thar due to the enormous increase in livestock. Its rehabilitation requires intensive management. Given the number of animals in the desert, this may not be possible, and fodder will have to be imported from the barrage areas in periods of drought, and cultivated in larger quantities in the good years.

1.1.5 Thar's mineral resources and handicrafts

There is a possibility of exploiting Thar's mineral resources and developing its handicrafts. However, infrastructure is not available for the former, and no scientific study has been undertaken for the latter.

1.1.6 Water for drinking purposes is not a priority

In almost all the settlements visited, increase in drinking water supplies for humans and animals was not a priority for the population.

1.1.7 Warning and advice regarding impending drought

Much of the problems created by the drought could have been averted if the desert population had been warned of it and had been advised on how to react to it. For example, it is certain that no animals would have died if they had been moved to the barrage areas earlier.

1.2 FINDINGS OF THE TEAM: (HEALTH AND NUTRITION)

- 1.2.1 Children in Thar in 0-5 age range are thin, but we do not know if this situation is worse than elsewhere in rural Sind. Female children and children of weaning age seem to be particularly badly affected.
- 1.2.2 Subsidised food sales and government relief measures have been effectively managed. Some vulnerable groups have not received relief on the scale necessary to meet their needs.

- 1.2.3 There is a very low uptake of health services in Thar, due to lack of basic facilities, shortage of female health staff and an irregular supply of drugs.
- 1.2.4 Two conditions were found in the population - night blindness and tuberculosis - upon which the drought may have some bearing.
- 1.2.5 Immunization coverage in Thar is extremely low.

2. CONCLUSIONS FROM THE FINDINGS

2.1 GENERAL

2.1.1 Infrastructure Required

The team's findings show that the economy of the desert has been integrated with that of the barrage areas and the cities of Sind. Grain and animals from the desert are sold in increasingly large quantities for cash, and the importation of city-produced goods is also increasing. However, the infrastructure required to facilitate this trade is not available. Consequently, the full advantages of this trade do not go to the desert population but to middlemen, transporters and money-lenders.

2.2.1 Research into Agriculture and Animal Husbandry

The changed demographic, social and economic conditions of the desert have made it impossible for traditional agricultural and animal husbandry practices to fulfil the needs of the desert people. For this, research into new methods which are compatible with the changing desert conditions is necessary. Extension services to take the results of this research to the people are also required.

2.2 HEALTH AND NUTRITION

- 2.2.1 As has already been stated under no acceptable definition of the word can the current situation in Thar be described as a 'famine.'
- 2.2.2 While the nutritional survey findings certainly portray the 1-to 5-year-old group as 'thin' we cannot assume that this is exceptional either for Thar or for rural Sind as a whole. However, in view of the rain failure of 1987, along with the other more long-term factors discussed in previous chapters which have affected the Thar economy, we can expect there to have been disruptions to the normal dietary patterns of different population groups. The precise nature of these disruptions needs to be identified, as it will have direct implications for food policy. The concentration of 1-to 2-year-olds in the under 12cm MUAC range may be significant. While it is impossible to state categorically on the basis of existing data why this

should be so, current weaning practices could well be to blame. A fall in nutritional status on weaning may be perfectly normal in Thar, but under current conditions this may be exacerbated by a reduced access to milk and *ghee*. If this is the case, the current food policy, based as it is on the sale of subsidized grain, cannot hope to have much impact on the condition of this most vulnerable group.

2.2.3 There is every evidence that subsidized food sales have been managed very effectively and have provided valuable support to the population, though as discussed above, further dietary information is urgently needed to ascertain which food types are required. It would be a costly mistake indeed if, for example, thousands of tonnes of wheat were provided at a subsidized rate when a hundred tonnes of butter oil would have provided more positive results in terms of nutritional status. The collection of such dietary information is a relatively simple matter and could be done by a single nutritionist in a one-week field trip. While awaiting such information, the interim measure of supplementing subsidized food sales with butter oil can be implemented immediately. The Ross Institute and other research bodies give average daily oil requirements as 40 grams per head per day. Working on the basis of an estimated current population of Thar of 240,000, total oil requirements are of the order of 288 tonnes per month. As the population is almost certainly consuming at least some oil, 200 tonnes is probably a realistic estimate of the shortfall, and this amount should be distributed now through existing channels, and adjusted later in the light of the findings of the dietary survey. Any temptation to distribute free food should be resisted, as this would disrupt economic activities which, despite declining wage rates and problems of procuring work in the barrage areas, are continuing to provide for the great majority of the desert population's subsistence. Many respondents reported that the use of the male voters list as the criterion for eligibility for *zakat* and other cash relief has resulted in many deserving families failing to benefit from relief, due to the absence of the father. Additional criteria should be applied to ensure that this group is reached.

2.2.4 The feasibility of additional methods of underpinning the population's access to food should be studied. Cattle sales continue to provide a major element of the Tharis' income and, at current rates, it is estimated that 50 percent of surviving Thari livestock will have been sold by the onset of the 1988 rains. The application of a minimum support price for Thari livestock could do much to bolster food entitlement and slow the depletion of the population's capital reserves.

2.2.5 The barrage area wage rate has fallen by 50 percent over the past year.

2.2.6 A small number of nutritional rehabilitation and education centres can be established immediately at taluka headquarter hospitals, BHUs and RHCs.

These centres (3-5 to begin with) could provide supervised therapeutic feeding to the severely malnourished along with nutritional education to the mothers. These should be day centres providing services to the immediate vicinity and not 'feeding camps'. The centres could provide excellent environments for the training of *daïs* in therapeutic feeding and nutrition education, as well as the training of medical officers in supervision and management of nutrition centres. They could also provide a means to gather much-needed information on weaning and general dietary practices. Once a handful of centres are running smoothly, doctors and *daïs* from other areas of Thar could undergo training in them, with a view to expanding the service. In the unlikely but potentially disastrous event of rainfall failure in 1988, and the apparently inevitable event of drought in future years, the accumulated experience in the running and management of such centres would prove invaluable. Another hoped-for effect - of establishing working relationships between doctors and *daïs* - could also be beneficial.

- 2.2.7 As part of the early warning system discussed elsewhere in the report, routine nutritional surveillance of the population should be carried out. Ideally, 200 children (100 boys and 100 girls) randomly chosen would be measured using the MUAC technique.

3. RECOMMENDATIONS

Based on an analysis of the findings it is felt that there should be two types of intervention in the desert. Firstly, a short-term intervention, consisting of establishment of a road network, an early warning system for impending drought and certain inputs into the health and nutrition sectors. And secondly, a medium-to long-term intervention, consisting of the establishment of a research and extension institute in the desert for undertaking pilot projects to discover appropriate models of social participation and the right type of economic and technical assistance required, along with further inputs for health and nutrition.

4. SHORT-TERM INTERVENTION

4.1 ROAD BUILDING

4.1.1 Advantages of roads

- a) **Economic advantages:** The building of roads will increase the sale price of animals and food grains in the desert. According to middlemen and the desert population, the price of animals, animal skins and wool around Mithi went up by a good 20 percent after the Naukot-Mithi road was completed. Because of a fall in transport prices, the selling price of *bajra*, *til* and *mong* also registered a small rise. In addition, the sale prices of manufactured items from the cities fell by about 10 percent. Since the Mithi-Naukot road has been built, the population of Mithi has increased from 8,000 to 22,000. The *bazar* has also expanded but this expansion could not be quantified by the assessment team. Roads will also make it possible for Thar's mineral wealth to be exploited properly, especially china-clay and granite.
- b) **Functioning of government departments:** One of the major problems facing the health and education departments and banks is the non-availability of manpower. This is because doctors, teachers etc. are not willing to work in inaccessible areas. The roads will open up the taluka headquarters to normal transport and to a great extent this problem will be overcome. Functioning of government departments will generally improve as better supervision and greater mobility will be made possible.
- c) **Middlemen:** Most middlemen operating in the desert are from taluka headquarters or the barrage areas, because of the presence of markets in these areas. Roads will encourage the development of sub-markets in other settlements and this will establish more equitable patterns of trade in favour of the local population.
- d) **Transport:** The Tharis are becoming increasingly mobile. This can be judged by the rate at which the desert transport system is increasing. As

discussed earlier in the report, transport costs will become one-third of present costs thus effecting considerable savings for the population. For example, the fare from Umerkot to Nagar will fall from Rs 50 to Rs 15 and the transport charges of cattle from Rs 120 to Rs 40.

- e) **Roads and drought relief:** The availability of cheap transport to move animals; the reduced costs of fodder imported from the barrage areas; increased and more equitable trade, will all follow from a proper road network and will minimize drought effects. Fodder price, for instance, will fall in Nagar from Rs 50 per maund to Rs 37 per maund.

4.1.2 Drought relief through a road building programme

- a) **Concept:** Road-building, if appropriately designed and organized, can provide employment to the desert population. This will increase their incomes and help them to overcome the difficulties the drought has created. Relief funds can be diverted for this purpose, thus serving a dual purpose: both providing relief and creating a badly-needed infrastructure for communications.
- b) **Need for an appropriate design and implementation procedure:** The normal manner of road-building through the highway department is time-consuming and expensive. It involves surveys, mapping, tendering and contractors. Profits are normally high and kickbacks are common. Roads constructed in this manner would cost about Rs 1.2 million per kilometre for a width of 7 metres. Thus a road of 400 kilometres linking all the taluka headquarters with Mithi and Umerkot would cost Rs 480 million and take about 3 years, at the very least, to complete. A number of technological options for road-building are available for sandy arid areas. One such option, of spreading a 4-1/2" sand-bitumen premix over the desert, is being followed in the new road-building schemes and was used for the Naukot-Mithi road. Its advantage is that it costs about Rs 550,000 per kilometre. The cost of labour and materials, worked out from the information collected at the site of the under construction road from Mithi to Diplo, is less than Rs 200,000 per kilometre. The rest is overheads, profits and kickbacks (see Appendix - 32: Breakdown of cost of under construction roads in the desert). However, since the sand under the premix is not contained by retaining walls, it is unlikely that these roads will be able to take heavy traffic for long. The road to Mithi from Naukot is already in a bad state.

4.1.3 Proposal for Road Building

- a) **Locations:** It is proposed that in the first phase, roads are built from a) Mithi to Nagar via Islamkot and Virawah, b) Virawah to Umerkot via Chachro and Khinsar, c) Mithi to Diplo. This works out to a total of 400

kilometres. In the second phase roads linking a) Chachro to Islamkot, b) Chore to Khokrapar c) Diplo to Badin, should be undertaken.

- b) **Technology:** A detailed study of technological options available should be undertaken and a labour-intensive technology rather than one involving machinery should be favoured. According to road engineering experts, the technology being currently applied in the desert is sound provided the sand bed is contained by brick or stone shoulders, and culverts and drainage channels are built. Tree plantations, which SAZDA intends to undertake, will further prevent sand erosion on the sides of the road. The main advantages of this technology is that it is cheap, requires no machinery, no stone or brick aggregate, no water, and little technical expertise. The cost of providing effective shoulders to the road in stone or brick, inclusive of 30 percent contractor's profits and 10 percent overheads would work out to Rs 200,000 per kilometre. This would increase the cost of the road to Rs 750,000 per kilometre, still 48 percent less than the price of a conventional road. The cost of the 400 kilometres of road required for linking the taluka headquartres would thus be Rs 300 million.
- c) **Method of implementation:** As per the calculations in Appendix - 33, the actual cost of labour and material on site for the under-construction roads in the desert works out to Rs 180,000 per kilometre. Yet the rate at which it has been contracted out is Rs 550,000 per kilometre. The method of implementation should seek to avoid this excessive profiteering and maximize the labour component. For this certain basic principles should be decided:
- Roads should not be built by the highway department but under a special works programme of the Relief Commissioner.
 - There should be no tenders invited for this work. The Relief Commissioner should set up an organization consisting of administrators, engineers and supervisors. Their salaries should be enhanced by a special Thar allowance. The use of students from engineering universities should be considered. Labour should be recruited from the villages near the construction sites and paid on a daily wage basis. A supply of stone and brick for making the shoulders of the roads will be required. The cost implications of contracting this out against the logistic problems of the works programme undertaking its supply; need to be studied in detail.
 - No physical surveys for road building are required. The roads should simply follow the existing tracks. However, engineers should take on-site decisions regarding easing out curves or building culverts for drainage. A handbook detailing simple designs and

procedures for such decision-making needs to be prepared, and the staff should be trained to use it.

- Road-building should begin at the maximum number of points so as to complete road construction in 12 months from the day of commencement. However, the points should be chosen at places where brick or stone can easily be made available for the shoulders of the road.
- d) **Construction time and labour required:** A total of 40 skilled and unskilled workers can complete 8 kilometres of road in 12 months, inclusive of building its shoulders. Therefore, at any given time, the road-building programme would give jobs to 3000 persons from the desert and disburse about Rs 25 million among them over a year.

4.1.4 Road Building Costs

As worked out in paragraph 4.3, the cost of building a premix-sand road connecting the taluka headquarters, inclusive of stone and/or brick shouldering, would work out to Rs 300 million. With savings on contractors profiteering etc. this cost could certainly be brought down by 30 percent (if not more) or to Rs 210 million. Recovery of money spent on these roads can be affected by introducing a toll on all vehicular movement.

4.1.5 Resource Persons for a Works Programme

From 1961 onwards, a massive rural works programme was undertaken through the Rural Development Academy for the building of roads, embankments and dams for what was then East Pakistan. The programme was implemented by organizing the people and giving them organizational and technical support and supervision. Dr. Akhtar Hameed Khan, now director of the Orangi Pilot Project, Karachi, was responsible for organizing this works programme along with Richard Patton. Drawing on the East Pakistan experience, Richard Patton conceived and organized a much larger programme for Indonesia. Both Akhtar Hameed Khan and Richard Patton are available, and it is suggested that they act as resource persons if this programme is implemented.

4.2 THE ESTABLISHMENT OF AN EARLY WARNING SYSTEM

An early warning system for impending drought conditions should be established. This system would have two components.

4.2.1 Monitoring of Meteorological, Agricultural and Trade Data

Fluctuations in the market price of grains and animals, and changes in yield per acre and immigration patterns, are all indicators of impending drought conditions.

If these are properly monitored and analysed, along with proper anthropometric research, an early warning for drought, and a forecast on the nature and extent of crops can be made. In addition, there is a considerable amount of data on rainfall in Thar. This should be scientifically analysed by experts to establish some sort of drought and rainfall pattern. To make early warning and crop forecasts possible, a small cell should be established under the appropriate government department.

4.2.2 The Bracknell Centre

The Bracknell Centre in England monitors weather conditions all over the world. By evaluating conditions in the Ethiopian highlands in February, and over the Bay of Bengal in April, a rain forecast for Thar can easily be made.

4.3 HEALTH AND NUTRITION

4.3.1 Nutrition

a) Short-Term

- Immediate supplement to subsidized grain sales or 200 tonnes of butter oil.
- Survey to establish which food types are needed and arrangements for their subsidized distribution.
- Feasibility study of support to livestock sale prices so that Tharis are able to realize their capital assets.
- Setting up a small number of nutritional rehabilitation and education centres. Main aims:
 - Training of *dais* and medical personnel in running and managing centres.
 - Information-gathering on weaning and dietary practices.
 - Establishment of working links between *dais* and doctors.
- Government and interested voluntary agencies should consider methods of targeting relief to benefit vulnerable groups and should implement measures to make it possible.

4.3.2 Health

a) Short-Term: (Up to six months to become operational)

- Increased budgetary allocation for drugs so that basic/essential drugs are available to the population. The cost for one year for a population of 300,000 is estimated at US\$ 65,000.
- Application of basic drugs list.
- Equipment and training for establishment of vaccination services at all fixed centres.
- Pilot 6-month immunization campaign in selected areas of Thar.
- Distribution of vitamin A. Cost of providing preventive dose (1 capsule per person every six months) would be US\$ 4,000.
- Increase of drug supply to TB clinics.
- Supplement to doctors and other health staff so as to encourage government servants, particularly women, to work in the desert.

5. LONG-TERM INTERVENTION

5.1 THE ESTABLISHMENT OF A RESEARCH AND EXTENSION ORGANIZATION

A research and extension organization should be established in Thar to tackle the long-term problems of the desert and to assist its equitable integration into the cash economy. It should be supported by an excellent monitoring and documentation section. This organisation should undertake a number of pilot projects to tackle the problems that have arisen due to social, economic and demographic changes. Such projects should consist of:

5.1.1 New varieties of seed

Research into and introduction of new seeds and cultivation techniques should be undertaken so as to produce more from available land resources.

5.1.2 Rangeland management

Rehabilitation of range-land should be undertaken as a pilot project. It should be linked to the programme of increasing agricultural production. This is necessary because range-land is not sufficient to sustain the existing animal population, and cattle, at least, will have to be fed from agricultural produce.

5.1.3 Cooperative marketing

The middlemen in Thar, because of their contacts with the markets in the cities, make a considerable profit in trade. Cooperative marketing has had a poor history in Pakistan. However, if it could be established in Thar, it would bring considerable economic benefits to members of the cooperative societies.

5.1.4 Social research and the creation of new relationships

Social research should be undertaken to institutionalize new relationships, with a view to strengthening the local bodies and making development viable. This will also increase the awareness of the people.

5.1.5 Thar's artisanal skills

Research into Thar's artisanal skills, the marketability of their produce, the problems faced in production etc., should be undertaken along with a realistic evaluation of their economic potential. If it is found that such a potential does exist, then improvements in the tools, methods of production and marketing, leading to an increase in production, should be undertaken. Modifications in the design and nature of produce should be introduced to suit market demand.

5.1.6 Thar's mineral resources

Private entrepreneurship should be encouraged to invest in the exploitation of Thar's mineral wealth. The provision of a communication infrastructure would be the first step towards it, followed by electricity.

5.1.7 Water management and exploitation of surface and subsoil water resources

This has been dealt with in detail in Chapter - 7, paragraph - 5. A clearer picture on this subject will emerge after the German team completes its hydrogeological survey and WAPDA completes its survey on the possibility of using the LBOD for agricultural purposes in Thar.

5.2 HEALTH AND NUTRITION

5.2.1 Medium-term: (Operational in 6 months to 2 years)

- Formulation of policy regarding drawing female health professionals to Thar and implementation.
- Formulation of policy regarding continuity of drug supply and implementation.

- Formulation and implementation of training programmes and syllabuses for dispensers, medical officers and senior medical officers.
- Development of supervision and support structures: DHO - SMO - MO - Technicians - Dispensers - *Dais* plus provision of equipment.
- Development and implementation of organizational policy for integration of health department, SAZDA, social welfare and District Council health-related activities.
- Evaluation of pilot EPI programme and development of long-term programme strategy.
- Expansion of TB clinics and integration of follow-up outreach work or dispenser's functions.

5.2.2 Medium to long-term: (May start in under 2 years but are long-term activities)

- Occasional training seminars for Union Councils in health development.
- Training of village health care workers.
- Development of community participation in community health and preventive health activities.

6. CONCLUSION

A number of areas in Pakistan have become unproductive as a result of deforestation, overgrazing, pressure of population, breakdown of the old social order and the absence of new institutions. The population of these areas now supplements its income by remittances from the cities or by employment as contract labour in irrigated areas. Dir, the northern reaches of Swat and the D.I. Khan district of the NWFP, are examples of this pattern. Makran is another, but in its case remittances come from the Gulf. If Thar is to be saved from a similar fate, then the long-term intervention plan must seek, as a priority, the creation of new and viable social institutions, without which no appropriate development can be sustained.

Israr Rana

APPENDICES

TERMS OF REFERENCE

STUDY FOR THARPARKAR FAMINE RELIEF MEASURES

1. PREAMBLE

Drought conditions in Tharparkar have created serious problems for the human and animal population of the desert. A number of relief measures have been suggested and some are being carried out through centres established in the desert settlements. However, it is felt that relief work should not consist of handing out doles of money and food to the people. It should somehow give relief to the people and at the same time carry out development which can help, in the long-term, in overcoming some of the problems of the desert. It is also felt that the needs of the animal population are as important as that of human beings because in the case of Thar the two cannot be separated.

One of the reasons given for famine conditions in the desert, by some observers, is a change in the desert's relationship with the barrage areas, and before the barrages were developed, with the flood plains of the Indus. Traditionally, the economies of the two areas complemented each other. The Tharis supplied labour for agriculture, dairy products, and artisanal skills to the barrage areas. Blacksmiths, tanners, weavers, potters etc. were all from the desert. The barrage areas, for their part, provided the desert people with pastures, fodder and refuge during droughts and bad seasons.

It has also been observed that the old social institutions and the agricultural economy in the desert have been influenced by market forces and the pattern and relationships of production have undergone a change. It is felt that the old system had established a sustainable equilibrium with the ecology of the area, which is now under attack.

In order to make an appropriate programme for famine relief for Tharparkar it is essential to understand the desert, its institutions, recent changes in its economy and ecology and the relationship of all of these with the overall situation in Sind. In framing the terms of reference, these factors have been kept in view.

II. RESEARCH AND EVALUATION

1. DATA COLLECTION

All available data on the desert should be collected and analysed. This data should consist of

- 1.1 Demographic data regarding both humans and animals and the changes that have taken place in their numbers, location of major settlements and the types of settlements;
- 1.2 Physical data: Location of pasture lands, agricultural areas, surface water reservoirs, underground water resources (both of sweet and saline water and the relationship between the two), roads, jeepable tracks, non-jeepable tracks etc., forests, trees and their traditional uses; manner of acquiring water, maintenance systems for wells, tarais and also their operation systems need special attention. How these have been affected over the years by social changes also needs to be recorded.
- 1.3 Production relationship; land tenure systems; artisanal skills; clan and/or other organizations; changes in these relations/organizations etc.;
- 1.4 Barrage/desert relationship; economic and social changes in them.

2. FIELD VISIT

A field visit consisting of about 7 to 10 days in the barrage and desert areas should be undertaken to determine the authenticity of the data available and fill in the gaps by interviews, meetings and observations. It is suggested that detailed meetings/ interviews should be held with transporters, middlemen and traders, as they are the agents of change in Thar.

3. ANALYSIS

Analysis of the above data should be carried out to identify the relationship between the famine conditions and: the drought; changes in social and economic relationships both in the desert and in the barrage areas; the urbanization of Thar's economy and its effect on the manner in which Thar's resources are utilized today as opposed to in the past.

4. IDENTIFICATION OF PROBLEMS CREATED BY THE DROUGHT

- Problems faced by the people due to the drought. The nature of these problems in relation to animals, food, living conditions. The geographical location where these problems are at their maximum and the nature of these locations with respect to communications/pasture lands/ agricultural areas.
- The manner in which the people themselves have responded to these problems and the social, economic and logistic problems they face.
- The nature of government response; its positive aspects, its shortcomings and its long term effect (social or otherwise) on the desert society.
- Exploitation of the situation by market forces. The identification of these forces and their manner of operation.

5. AN EVALUATION OF THE CONDITIONS

Based on the data collected and on the research and analysis carried out, the Thar situation needs to be evaluated properly and a relationship established between the famine; drought; demographic and economic changes and social dynamics.

III. RECOMMENDATIONS

Based on the research and evaluation carried out recommendations will be made for

1. IMMEDIATE RELIEF MEASURES

These measures should be appropriate to and promote Thar's long-term development. They should not make the Thari people permanently dependent on government assistance.

2. LONG-TERM SOLUTION

Nature of government intervention to tackle the Thar desert situation. This may involve introduction of elements which bring about a major change in Thars ecology and make it self-sufficient in fodder for its animals and in agriculture. The manner in which these changes and/or development is to be brought about should be compatible with government policy, the process of change in Thar itself and the finances available. They should also be compatible with Thar's political and its situation sociology.

IV. TIME PERIOD OF STUDY

Six to eight weeks.

ORGANISATIONS CONTACTED FOR DATA COLLECTION

1. Sind Regional Plan Organization.
2. Sind Arid Zone Development Authority.
 - a) Regional office at Tharparkar.
 - b) Hydrogeological wing at Hyderabad.
 - c) Head office at Karachi.
3. Bureau of Statistics, Planning and Development Department, Government of Sind.
4. Agricultural Census Organisation.
5. Geological Survey of Pakistan, Karachi.
6. Survey of Pakistan, Karachi.
7. Meteorological Department, Karachi.
8. Department of Agriculture, Hyderabad.
9. Bureau of Statistics, Hyderabad.
10. WAPDA.
 - a) Electrical wing - Project office, Hyderabad.
 - b) Water wing - Left Bank Outfall Drain project.
11. Department of Agricultural Economics & Rural Sociology, Agricultural University, Tando Jam (Sind).
12. District Field Office, Mirpurkhas.
13. Deputy Commissioner's office, Mirpurkhas.
14. Federal Bureau of Statistics, Karachi.

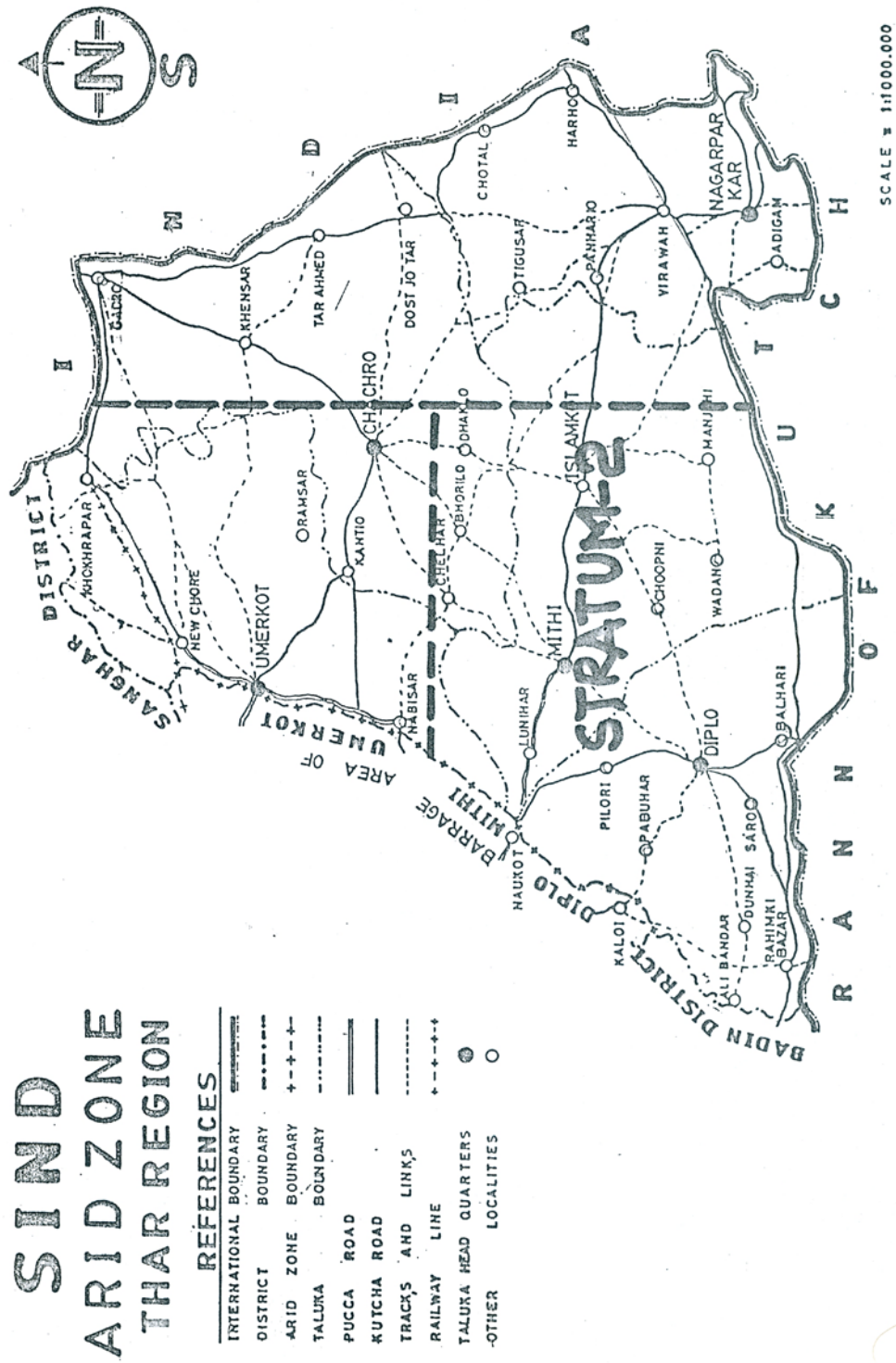
15. Public Health Engineering Department, Mirpurkhas.
16. Expanded Programme for Immunization.
17. United Nations Children's Fund (UNICEF), Karachi.

DOCUMENTS COLLECTED ON THARPARKAR

1. District Census Report Tharparkar 1961-1971 and 1983.
2. Changing Demography of Sind (1880s-1980s).
3. Socio-economic Study of Thar Desert (Agricon)
4. Basic Needs Five Year Plan (1983-84 to 1987-88).
5. Crop Acreage Statistics of Sind. Rabi and Kharif (1985-86) and (1981-82).
6. Agricultural Statistics of Sind 1987.
7. Agricultural Statistics of Sind 1977-78 and 1983-84
8. Report on Water Resources Survey Vol - 1. Government of Sind, PHED, UNICEF.
9. Report on Water Resources Survey Vol - 2. Government of Sind, PHED, UNICEF.
10. Development Statistics of Sind 1978; Bureau of Statistics PDD, Govt. of Sind.
11. Development Statistics of Sind 1986; Bureau of Statistics PDD, Govt. of Sind.
12. Pakistan Census of Agriculture 1980 ACO Statistics Division.
13. To Study the Role of Migratory Farm Labour in Agriculture.
14. Well Log/design and other relevant papers for Deep Wells Drilled by PHED, Government of Sind with UNICEFs Assistance.
15. Chart: Area, Population and Households in Arid Zone (SAZDA).
16. Health Facilities on Thar Region.
17. SDP: No. of Health facilities existing in Sind.

18. Details of Land Revenue with Cesses: Taluka-wise recovery from 1980 to 1986 in Thar Region.
19. Mineral Resources of Sind: Mr. Sispal Cr. Kella.
20. Position paper on Thar during drought days 1987 by the Department of Agriculture, Hyderabad.
21. Statement showing the livestock of Arid Zone areas/talukas of district Thar 1983-84.
22. Statistical Brochure of District Field Office Mirpurkhas for 1983-84, 1984-85, 1985-86.
23. Thar Region of SAZDA. Some basic facts and information.
24. Brief note on drilling bore hole at Chachro.
25. Boreholes: Latest by PHED 11-11-1987.
26. Socio-Economic Facilities in Rural Settlements having population of 500 and above persons by taluka and district.
27. Survey of Human Settlements 200-499 persons. Bureau of Statistics.
28. Survey of Human Settlements 500 and above persons. Bureau of Statistics.





Appendix - 6

FIELD TRIP OF DROUGHT ASSESSMENT TEAM PLACES VISITED, PERSONS MET

Date	Time	Place	Met with
6-12-87	07:30	Left Karachi for Mirpur Khas	
	10:30	Stop at Tando Allah Yar	Bhenja Blacksmith
	11:00	Stop at 12 miles before Mirpur khas at onion and radian	1. Nadir Ali Khwaja, transporter and recently elected councillor 2. Lorejee Kolhi, hari
	11:45	Arrival Mirpurkhas	
	12:00	Meeting at DC office Mirpurkhas	1. Abdul Khaliq Sarhadi, Reg. Director, SAZDA: chairman of the meeting. 2. Mir. Mohd ADM 3. Project Director Relief 4. ADM 5. DHO 6. DEO 7. AD Animal Husbandry 8. AD Local Govt. 9. WAPDA representative
	17:30	Mandi (market) for small animals (sheep and goats)	1. Jushi, butcher at mandi 2. Abdul Rafiq, labourer at mandi 3. Khalil Ahmed Qureshi, president, Cattle and Meat Association of Tharparkar 4. Rhora Qureshi: animal merchant.
	19:15	Cattle market. Night at Mirpurkhas	1. Chand Mohd. Cattle merchant. 2. Abdul Qadir : from Hirar village Nagarparkar, now running hotel Mirpurkhas
Date	Time	Place	Met with

7-12-87	0800	Left for Mithi	
	0900	Livestock market at Judho	<ol style="list-style-type: none"> 1. Bashir Ahmed , cattle merchant 2. Mohammad Ismail, cattle merchant from Hyderabad 3. Mohammad from Malkar (taluka Diplo) selling his cattle. 4. Abdul Aziz from Gharo Bazir (taluka Mithi), selling his cattle. 5. Moosa Khan from Village near Mithi. Selling his cattle 6. Nagjice Kolhi from village Dhano (taluka Nagar Parkar)
	11:30	Naukot	<ol style="list-style-type: none"> 1. Sons of Bharonal. Largest transporter in Naukot. 2. Mohammad Hussain, GMC conductor 3. Shamsheer of Qaim Khani, owner of Rajput Transport. 4. Riasat Ali Qaim Khani, President, Thar Desert Transport Employees Association.
	13:30	Arrival Mithi	
	14:00	Mithi	<p>Meet with taluka administration</p> <ol style="list-style-type: none"> 1. Abdul Razzak, Assistant Mukhtarkar 2. Ghulam Mohammad, Headmaster of Secdondary Boys School 3. Bal Chand, District Officer, Local Govt. 4. Allah Dino Khan, Education supervisor 5. Ashok Kumar , Representative of SAZDA
	18:15	Visit to Mithi Tarar and Carpet Centre.	
	19:15	Visit to grain	1. Chawan, grain merchant

		merchants in Mithi bazar	2. Petambar, grain merchant.
		Night at Mithi	
8-12-87	08:15	Left for Diplo	
	08:30	Two miles from Mithi. Discussion with road construction gang	1. Munshi (supervisor) of contractor Abdul Haq, who is constructing 4 miles of Mithi Diplo road. 2. Labourers (skilled and unskilled)
	09:15	Saghror	1. Mohammad Rahim, retired secondary school teacher. 2. Paro Mal, hari (tenant)
	10:45	Verijaph	1. Misri Mal Meghwar, councillor 2. Mohammad Yousuf primary school teacher 3. Pano Meghwar, hari (tenant)
	12:30	Arokhi (Ram Singh Sodho Village)	1. Lal Jee, UC chairman 2. Anchal singh Sodho, UC secretary
	15:15	Arrival Diplo	
	15:30	Diplo	Meeting with 1. Shah Mohammad Pirzada, town officer. 2. Haji Mohammd Ishaq Memon, member UC. 3. Medical Officer, taluka hospital 4. Mukhtarkar 5. Assistant Mukhtarkar. 6. 4 notables.
	18:15	Left for Islamkot	
	20:30	Arrival Islamkot	1. Nilhal Chand, ex-chairman UC 2. Mr. Raja, councillor
		Night at Islamkot	
9-12-87	09:00	Islamkot Bazar	1. Ram Kheso Mal, grain merchant 2. Chillo Ram, wool merchant 3. Pehlaj, wool merchant 4. Pertab Panjomal, goat hair merchant

	12:35	Soreh-Jo-Tar (Manghar Village) ten miles from Islamkot	1. Merchants of handicrafts, artisan 2. Artisans of Khata shawls, carpets, shoes.
	13:40	Left for Nagarparkar	
	14:45	Lunio	1. Wahid Dino, landlord. 2. Residents of the village.
	16:00	Sandhar (Vandio Para)	Inhabitants of the village
	17:00	Mokhai	1. Village residents 2. Mukhtarkar
	19:00	Arrival Nagar	Meeting with taluka administration 1. Mukhtarkar 2. Medical officer and two other doctors 3. Dr. Prem, health officer 4. Veterinary compounder 5. Clerk of National Bank at Chachro. 6. Headmaster, secondary boys school, Chachro.
		Night at chachro	
11-12-87	08:00	Rest House Chachro	Shoukat Ali, Tapedar; discussion on trees and their uses.
	09:00	Office of air-borne survey team from Federal Republic of West Germany	Meeting with senior staff member of hydrogeological survey
	09:45	Left for Umerkot	
	10:45	Chaper-Din-shah	Hakim Bajir, hari
	11:30	Khinsar	Sultan, Patel of Village
	12:20	Rohor	Village residents
	12:45	Baraba	1. Farid Kochro, hari 2. Abdul Wahid Soomro.
	14:30	Bhojrajio	Village residents
	16:00	Arrival Umerkot	

	16:15	Umerkot	Meeting with taluka administration 1. ADM 2. Health officer 3. Mukhtarkar
	18:00	GMC transporter, Umerkot	1. Seth Juma Khan, owner of transport company 2. Karamatdin, munshi of Seth Juma Khan
	18:45	Fodder market, Umerkot	Abdullah, fodder merchant
	20:00	Left for Mirpurkhas	
12-12-87	09:00	China-clay factory, Mirpurkhas	Mohammad Bux, one of the owners of the factory.
	10:30	Meeting at DC's Office	1. DC 2. LBOD representative 3. AD (AH) 4. Deputy Director, SAZDA
	11:45	Left for Karachi	
	15:30	Arrival Karachi	



Appendix - 8

RAINFALL FIGURES IN THAR

(in m.m.)

Station Year	Umerkot	Mithi	Diplo	Chachro	Nagarpar -kar	Chhore
1969	11	96	96	13	138	8
1970	253	413	1,048	354	721	326
1971	130	125	186	105	493	167
1972	91	198	109	NA	NA	109
1973	193	164	203	NA	315	173
1975	279	497	425	297	771	257
1976	302	254	195	107	239	310
1977	87	251	157	171	555	217
1978	378	345	231	273	357	397
1979	103	114*	260*	227	376	157
1980	37	-	-	109	276	61
1981	84	-	-	176	458	232
1982	147	-	-	225	368	202
1983	216	-	-	240	404	386
1984	166	208	195	274	493	280
1985	90	216	316	60	263	-
1986	37	85	108	86	76	-
1987	11	-	Nil	-	-	-

* Up to August.

- Sources:
- 1) Meteorological department.
 - 2) UNICEF Assisted Water Resource Survey 1979.
 - 3) Mukhtarkar's office at taluka headquarters.

Appendix - 9

RAINFALL DATA FROM WATER RESOURCES SURVEY 1979

(in m.m.)

Station Year	Umerkot	Nagarparkar	Chhore
1951	56	Nil	Average annual rainfall 1951-1958
1952	71	17	
1953	362	Nil	
1954	185	545	194
1955	216	Nil	
1956	425	Nil	
1957	64	5	
1958	121	334	
1959	1,505	893	
1960	853	Nil	
1961	467	1,046	
1962	184	205	
1963	164	-	
1964	361	247	
1965	213	440	
1966	-	203	
1967	-	385	
1968	-	50	

Source: Meteorological Department.

LAND UTILIZATION TABLE

Taluka	Geographical Area	(Area in Hectares)					
		Cultivated Area			Cropped Area		
		1983-84	1984-85	1985-86	1983-84	1984-85	1985-86
Diplo	404,427	53,722	56,166	56,167	37,918	41,528	40,033
Nagarpar-kar	419,044	179,238	181,046	181,046	111,768	113,335	109,956
Mithi	534,054	139,581	142,086	142,087	109,759	98,397	104,724
Chachro	724,341	289,978	300,369	300,369	180,590	182,641	177,414
Umerkot	428,864	150,995	152,831	112,362	105,053	99,701	102,084

Source: Statistical Brochure. District Field Office, Mirpurkhas.

CROP ACREAGE: DESERT AREAS OF THARPARKAR

(in Hectares)			
Crops	1981-82	1985-86	Percent Change
Wheat	1,081	3,665	+ 239.0
Pulses	1,347	6,314	+ 369.0
Gram	2,248	-	-
Fodder	67,484	13,739	- 79.6
Oil seed	24,590	16,508	- 32.9
Bajra	118,857	223,821	+ 88.3
Maize	15,300	6,967	- 54.5
Moong	16,091	9,229	- 42.6
Mash	2,585	2,491	- 3.6
Sesamum	13,087	5,574	- 57.4
Sugarcane	985	1,150	+ 16.7
Jowar seed	-	9,308	-
Total	263,655	298,766	+ 13.3

Source: Crop Acreage Statistics of Sind 1981-82 & 1985-86.

TALUKA-WISE CROP ACREAGE - DESERT AREA

Taluka	Year	Wheat	Rice	Jowar	Bajra	Maize
Diplo	1981-82	-	-	81	15,590	2762
	1985-86	2,830	1	11	10,089	155
Nagar-parkar	1981-82	-	1,093	10,155	25,121	749
	1985-86	21	-	2,762	38,453	2652
Mithi	1981-82	235	2	9,393	11,726	1276
	1985-86	214	-	-	51,350	396
Chachro	1981-82	-	6,922	9,862	41,717	10513
	1985-86	-	-	-	96,757	1329
Umerkot	1981-82	-	-	-	24,705	-
	1985-86	-	-	-	27,172	2435

Taluka	Year	Pulses	Barley	Gram	Fodder	Oil Seed
Diplo	1981-82	1,345	607	2,248	13,303	2,090
	1985-86	958	-	-	15,682	476
Nagar-parkar	1981-82	6,101	-	-	-	26,134
	1985-86	3,641	-	-	25,931	18,434
Mithi	1981-82	1,866	-	-	14,466	735
	1985-86	4,336	-	-	23,104	1,145
Chachro	1981-82	10,619	-	-	28,295	8,706
	1985-86	8,939	-	-	66,161	2,027
Umerkot	1981-82	-	-	-	11,275	-
	1985-86	160	-	-	6,513	-

Source: Crop Acreage Statistics of Sind 1981-82 and 1985-86.(in Hectares)

MIGRATION FIGURES PROVIDED OF THE DISTRICT ADMINISTRATION

Tulaka	Present population	Number of people affected	Number of people migrated	Number of people still residing in the desert	Number of people shifted to district Thar	Number of people shifted to other district
Chachro	208,000	208,000	104,000	103,815	95,000	9,000
Nagarpar-kar	122,000	122,000	61,000	60,932	17,000	44,000
Mithi	175,500	175,500	85,200	90,275	76,700	8,500
Diplo	96,500	96,500	48,000	48,488	18,000	30,000
Umerkot	63,000	63,000	32,000	31,000	27,000	5,000
Total	665,000	665,000	330,200	334,510	233,700	96,500

Source: Relief measures in calamity affected areas of District Tharparkar by Deputy Commissioner, Tharparkar.

MIGRATION CHARTS AS PER THE FINDINGS OF THE ASSESSMENT TEAM

Taluka	Villages	Estimated population	Migrated population	Normal migration
Diplo	- Sagroor - Verijaph - Ram Sing Sodha (Arokhi)	400 2,000 1,000	100 800 750	70 500 200
Sub-total		3,400	1,650 49 %	770 23 %
Nagarparkar	- Sandar (Wandia Pura) - Mokhai - Ranpur - Verawah - Pattea - Herar-detha	400 260 250 1,500 1,000 1,200	Nil 130 180 750 700 250	Nil ? ? 600 ? ?
Sub-total		4,610	2,010 44 %	40 %
Chachro	- Norojotar - Chopper - Dinshaw - Khinsar - Rohr	300 2,500 1,700 80	25 2,100 850 55	? 1,500 850 ?
Sub total		4,580	3,030 66 %	56 %
Umerkot	- Goth Boraba - Bhojra-Jeo	? 600	? 757	? 550
Sub total		600	757 95 %	550 92 %
Mithi	- Sorejotar - One para of Lunio - Kharo Bazir	? 225 ?	? Nil ?	? Nil ?
Sub total		225	Nil	Nil
Total Desert		13,415	7,265 54 %	44 %

**MIGRATION AND DEATH FIGURES OF LIVESTOCK
AS PER FINDINGS OF ASSESSMENT TEAM**

Taluka	Villages	Cattle			
		Cattle (Normal population)	Migrated cattle	Dead cattle	Normal migration
Diplo	- Sagroor - Verijaph - Ram Sing Sodha	200 3,000 1,500	190 2,650 600	Nil 300 400	
Sub total		4,700	3,440 73 %	700 15 %	
Nagarparkar	- Sandar - Mokhai - Ranpur - Verawah - Pattea - Herardetha	35 1,300 65 1,000 600 850	25 1,290 65 950 400 600	11 2 Nil Nil 100 200	Nil
Sub total		3,850	3,230 84 %	313 8 %	
Chachro	- Norojotar - Chopper Dinshaw - Khinsar - Rohr	1,200 2,000 1,500 200	850 1,300 1,000 100	300 600 200 80	
Sub total		4,900	2,350 66 %	1,180 24 %	
Umerkot	- Goth Boraba - Bhojra-Jeo	800 1,200	700 1,130	40 50	
Sub total		2,000	1,830 91 %	90 5 %	
Mithi	- Sorejotar - One para of Lunio	200 40	180 40	10 Nil	80 %
Sub total		240	220 92 %	10 4 %	
Grand Total		15,690 100 %	11,970 76 %	2,293 15 %	

Taluka	Villages	Sheep			
		Sheep population	Migrated sheep	Dead sheep	Normal migration
Diplo	- Sagroor - Verijaph - Ram Sing Sodha	300 2,500 1,500	100 1,250 900	200 1,250 600	
Sub total		4,300	2,250 52 %	2,050 48 %	
Nagarparkar	- Sandar - Mokhai - Ranpur - Verawah - Pattea - Herardetha	70 500 150 1,000 1,000 1,000	- 380 150 800 700 500	30 120 - - 300 500	
Sub total		3,720	2,530 68 %	950 26 %	
Chachro	- Norojotar - Chopper - Dinshaw - Khinsar - Rohr	1,200 2,500 1,500 2,000	850 750 1,000 600	250 1,750 500 1,400	70 %
Sub total		7,200	3,150 44 %	3,900 54 %	
Umerkot	- Goth Boraba - Bhojra-Jeo	2,000 4,000	1,200 2,000	800 2,000	
Sub total		6,000	3,200 53 %	2,800 47 %	
Mithi	- Sorejotar - One para of Lunio	600 1,000	400 900	200 100	
Sub total		1,600	1,300 81 %	300 19 %	
Grand Total		22,800 100 %	12,430 54 %	10,000 44 %	

Taluka	Villages	Goat			
		Goat population	Migrated goat	Dead goat	Normal migration
Diplo	- Sagroor - Verijaph - Ram Sing Sodha	700 5,000 3,500	300 3,000 2,650	- 500 350	
Sub total		9,200	5,950 64 %	850 9%	
Nagarparkar	- Sandar - Mokhai - Ranpur - Verawah - Pattea - Herardetha	130 1,500 350 3,000 4,000 2,500	- - 350 2,500 1,800 1,900	10 75 - - 275 250	
Sub total		11,480	6,550 57 %	600 5 %	
Chachro	- Norojotar - Chopper - Dinshaw - Khinsar - Rohr	3,600 3,500 2,000 2,000	1,750 1,500 800 1,000	100 875 200 350	50 %
Sub total		11,100	5,050 45 %	1,525 14 %	
Umerkot	- Goth Boraba - Bhojra-Jeo	3,500 5,000	2,000 3,000	250 400	
Sub total		8,500	5,000 59 %	650 7 %	
Mithi	- Sorejotar - One para of Lunio	400 2,000	140 -	60 200	
Sub total		2,400	140 9 %	260 11 %	
Grand Total		42,680 100 %	22,690 53 %	3,885 9 %	

**MIGRATION AND DEATH FIGURES OF LIVESTOCK
GIVEN BY THE DISTRICT AUTHORITIES**

Taluka	Population of cattle	Number of cattle died	Number of cattle shifted	Number of cattle still available
Chachro	620,000	30,000	528,000	62,000
Nagarparkar	380,000	11,500	330,500	38,000
Mithi	780,000	40,000	650,000	90,000
Diplo	460,000	22,000	380,000	58,000
Umerkot	140,000	10,000	120,000	10,000
Total	2,380,000	113,500	2,008,500	258,000

Source: Relief measures in calamity affected areas of District Tharparkar by Deputy Commissioner, Tharparkar.

ANIMAL AND MEAT PRICES AT THE MARKETS

	1985-86		1986-87	
	From Sind	From Thar	From Sind	From Thar
Animal Prices:				
Cattle	Rs 800 per maund	Rs 750 per maund	Rs 750 per maund	Rs 450 per maund
Goats	Rs 350-400	Rs 350	Rs 350-400	Rs 150-250
Meat Prices:				
Beef	Rs 18 per kilo	Rs 18 per kilo	Rs 18 per kilo	Rs 12 per kilo
Goats	Rs 32 per kilo	Rs 30 per kilo	Rs 32 per kilo	Rs 25 per kilo

PRICES OF FODDER AT DIFFERENT LOCATIONS IN THE DESERT

Fodder Price (Bhoosa):

Naukot : Rs. 32 per maund (40 kg).

Mithi : Rs. 36 per maund.

Diplo : Rs. 40 per maund.

Islamkot :

Nagarparkar : Rs. 45 to Rs. 50 per maund.

Gowar:

Rs. 350 to Rs. 400 per maund. Not available generally.

DETAILS OF WOOL AND ANIMAL HAIR PRODUCTION

1. FLEECE

- Fleece quantity from each sheep per year 1 kilo.
 - o 1/2 kilo in spring and 1/2 after the rains.
- Sale prices of fleece.
 - o Wandering middlemen purchase fleece at
 - * for spring fleece Rs. 15
 - * for after rain fleece Rs. 6
 - o Small town merchants purchase fleece at
 - * for spring fleece Rs. 20
 - * for after rain fleece Rs. 10
 - o Hyderabad and Karachi merchants buy from small town merchants at
 - * for spring fleece Rs. 32
 - * for after rain fleece Rs. 20
- Manufacture of wool on spinning wheel
 - o 1 kilo per day.

2. GOAT HAIR

- Hair produced by 1 animal
 - o 1/2 kilo per year. Hair is removed in March/April.
- Sale price of hair in shops in taluka markets : Rs. 10 per kilo.
- Sale price of manufactured thread in taluka markets : Rs 15 per kilo.
- Manufacture of thread: One person makes 1 kilo in 2 days.

WATER POSITION IN AREAS VISITED BY THE ASSESSMENT TEAM

Taluka	Villages	Water condition	Water position in normal years
Diplo	<ul style="list-style-type: none"> - Sagroor - Verijpaph - Ram Sing Sodha - Diplo town 	<ul style="list-style-type: none"> -Sweet -Sweet -Sweet -Became saline 	<ul style="list-style-type: none"> -Sweet -Sweet -Sweet -Becomes saline in April/May
Nagarparkar	<ul style="list-style-type: none"> - Sundar - Mokhai - Ranpur - Verawah - Pattea - Herar-detha 	<ul style="list-style-type: none"> -Sweet -Slightly brackish -Became brackish -Sweet. Will be brackish if it does not rain. -Brackish -Only one well sweet. Rest brackish and saline 	<ul style="list-style-type: none"> Sweet Sweet Become brackish in April/May Sweet in tarais Brackish Same position
Chachro	<ul style="list-style-type: none"> - Norojotar - Chopper Dinshaw - Chachro town - Khinsar - Rohr 	<ul style="list-style-type: none"> -Sweet but deep & difficult to take out -Undrinkable for animals -Brackish except in tarai wells - Sweet - Brackish 	<ul style="list-style-type: none"> Sweet Same Same Sweet Sweet after rains
Umerkot	<ul style="list-style-type: none"> - Goth Boraba - Mhojra-Jeo 	<ul style="list-style-type: none"> -Brackish -Brackish & saline 	<ul style="list-style-type: none"> Brackish(make tank for sweet water) Sweet for some time after rains (make tank for sweet water)
Mithi	<ul style="list-style-type: none"> - Islamkot - Surejotar - Lunio 	<ul style="list-style-type: none"> -Sweet -Sweet -Brackish water in tarais remained sweet only for 1 month 	<ul style="list-style-type: none"> Sweet Sweet Brackish, except in tarai well used to be sweet for 4 months

NUTRITION SURVEY METHOD

The choice of the method was largely prescribed by the lack of time to prepare and implement the study. No pilot study could be carried out and in many ways the present survey serves as a pilot study on which further, more detailed and thorough surveys can be based.

Mid Upper Arm Circumference (MUAC) measurement of the 1-to 5-year old population was adopted as the anthropometric technique to be used, in order that the sample be as large as possible.

One objective of the survey was to allow comparison between the reportedly less-and worse-affected areas. Consequently, the survey was divided into 2 strata. Stratum 1 comprised the area widely reported to be the worst-affected; roughly the eastern third of Thar, including Chachro and Nagar but excluding the rest of Nagarparkar taluka. Stratum 2 covered the south-western quarter of Thar in the talukas Diplo and Mithi. (See map on page). The north-western portion was not covered because of the time constraints and its thinly distributed population, although it is hoped that the area will be included in further studies. It should be noted that the exact delineation of the strata was largely arbitrary in nature and that for the purposes of future planning and monitoring more work needs to be done to ascertain economic and topographical criteria for stratum to stratum comparison.

Within each stratum, a 2-stage random sampling technique was employed, whereby all the villages were listed and numbered. The first sample village was selected by matching with a number taken from a random number table and subsequent villages were identified by counting off the sample interval based on the total number of villages divided by the number of samples to be taken. In view of the available time and staff, 10 clusters of 50 children were surveyed in each stratum (total of 1000 children).

The children in each cluster were chosen by ascertaining the centre of the village, randomly choosing a street or passage (by spinning a bottle on the ground or similar method), numbering each household on the street or passage and then choosing the household at which to start by choosing a random number less than the total number of households (usually by using the last digit on a banknote). Having measured the children in the first house, the next door household would be visited and so on until 50 children had been measured. In the field this method was difficult to respect as many parents offered their

children for measuring unbidden, but due to many factors, especially the small number of sample children to be found in each village due to migration, we feel that major biases were avoided.

While the MUAC measurements were being taken, the mothers of the sample children were interviewed using the questionnaire found in Annex . The aim of the questionnaire was to gather information on:

- Family size.
- Religion.
- Presence or absence of father.
- Sex and age distribution of children.
- Incidence of oedema and night blindness.
- Vaccination status.
- Infant mortality rates.
- Frequency of use of health facilities (formal and informal).
- Distribution of assistance.
- Borrowing.

N.B: The 1-to 5-year old population was chosen for the following reason:

- They are the most vulnerable group to food shortage, and declining access to food often manifests itself anthropometrically in this group first.

HEALTH AND NUTRITION: TABLES AND CHARTS

Table 1-A

FAMILY CHARACTERISTICS - RELIGION

Religion	Number of Families	Percentage
Muslim families	451	67.4
Hindu families	218	32.6
Total	669	100.0

Table 1-B

FAMILY CHARACTERISTICS - FAMILY SIZE

Size	Number of Families	Percentage
Below 6 persons	406	60.7
6 to 10 persons	246	36.8
Above 10 persons	17	2.5
Total	669	100.0

Table 1-C

FAMILY CHARACTERISTICS - AVERAGE FAMILY SIZE BY RELIGION

Religion	Mean	Standard Deviation
Muslim families	6.0	2.2
Hindu families	6.1	2.2
Entire sample	6.0	2.2

Table 1-D

**FAMILY CHARACTERISTICS - AVERAGE NUMBER OF CHILDREN
(by religion per household)**

Religion	Mean	Standard Deviation
Entire sample	3.7	1.8
Muslim families	3.6	1.8
Hindu families	3.8	1.8

Table 1-E

FAMILY CHARACTERISTICS - PRESENCE OF FATHER

	Number of Families	Percentage
Present	383	57.2
Absent	286	42.8
Total	669	100.0

Table 1-F

FAMILY CHARACTERISTICS - CHILDREN BY SEX

Sex	Number of Childrens	Percentage
Male	513	51.3
Female	487	48.7
Total	1,000	100

Figure 1-A, Children by age group

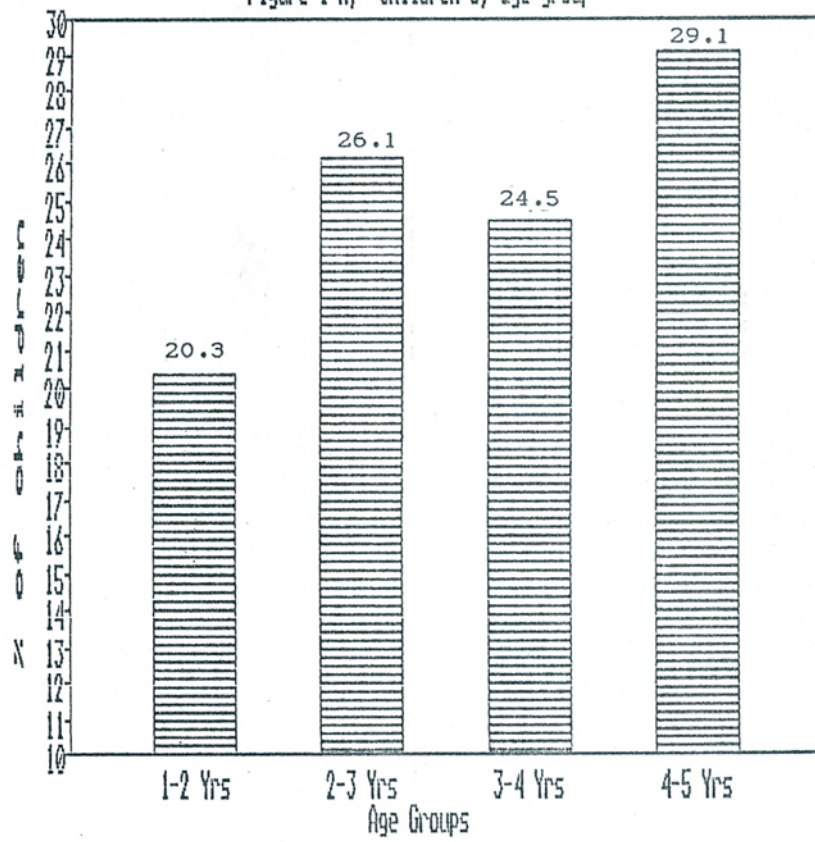


Fig. 2-A , % of Children in MUAC range [Strata 1]

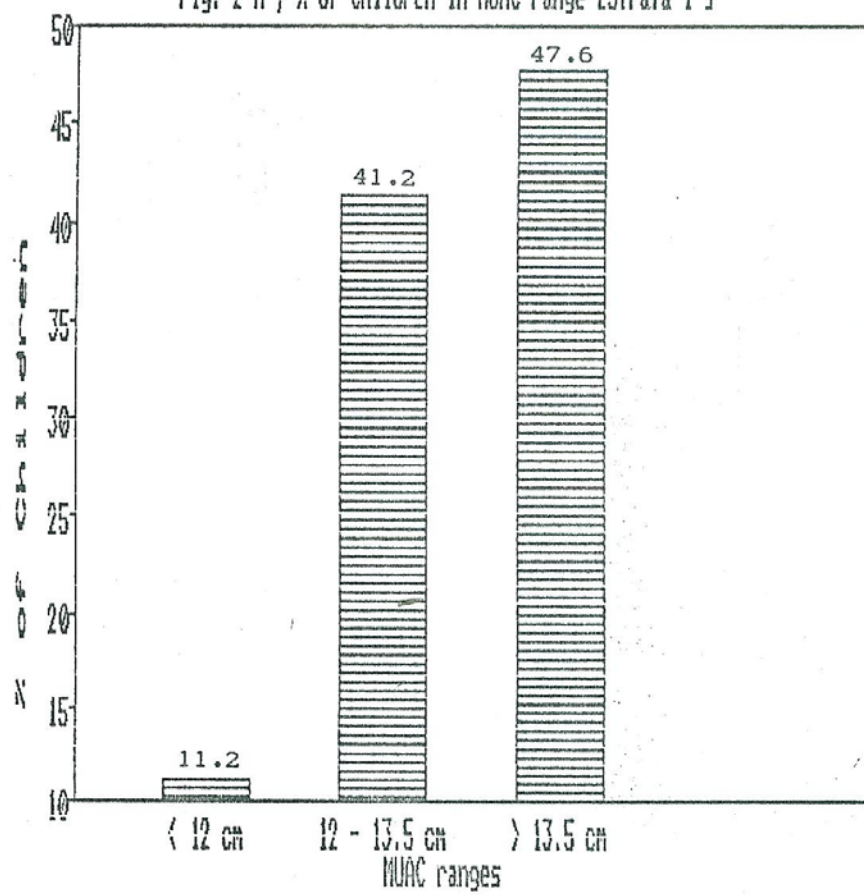


Fig. 2-B , % of Children in MUAC range [Strata 2]

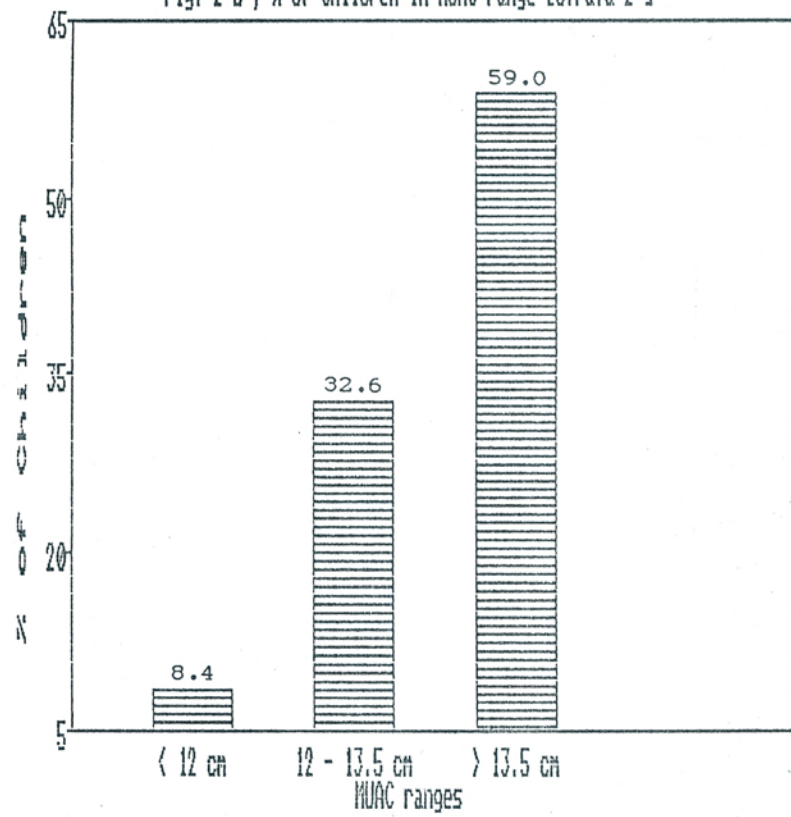


Table 2-A

**AVERAGE SIZE OF MID UPPER ARM CIRCUMFERENCE
(By Strata)**

Strata Number	Mean	Standard Deviation
One	13.33	1.27
Two	13.66	1.33
Entire sample	13.49	1.32

Table 2-B

Oedema

0.0% of children had
night
pitting ankle oedema.

Night Blindness

7.2% (72) of the sample had reported
blindness.

Table - 2C

Uptake of health facilities	Relief assistance	Borrowing
10.2% utilized health facilities	50.2% had received zakat. 74.3% of all Muslims received zakat. 0.3% had received other cash relief. 99.3% had received other relief.	31.1% of households reported borrowing.

Fig. 2-C NUAC ranges by age group [Strata 1]

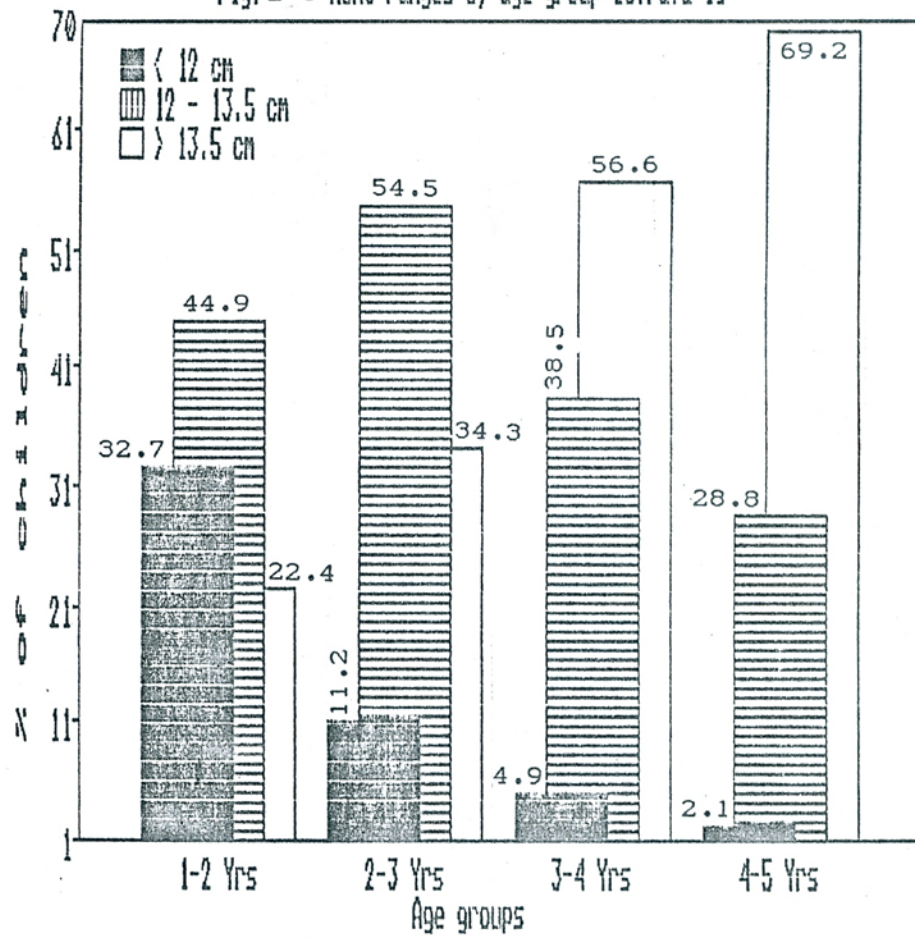
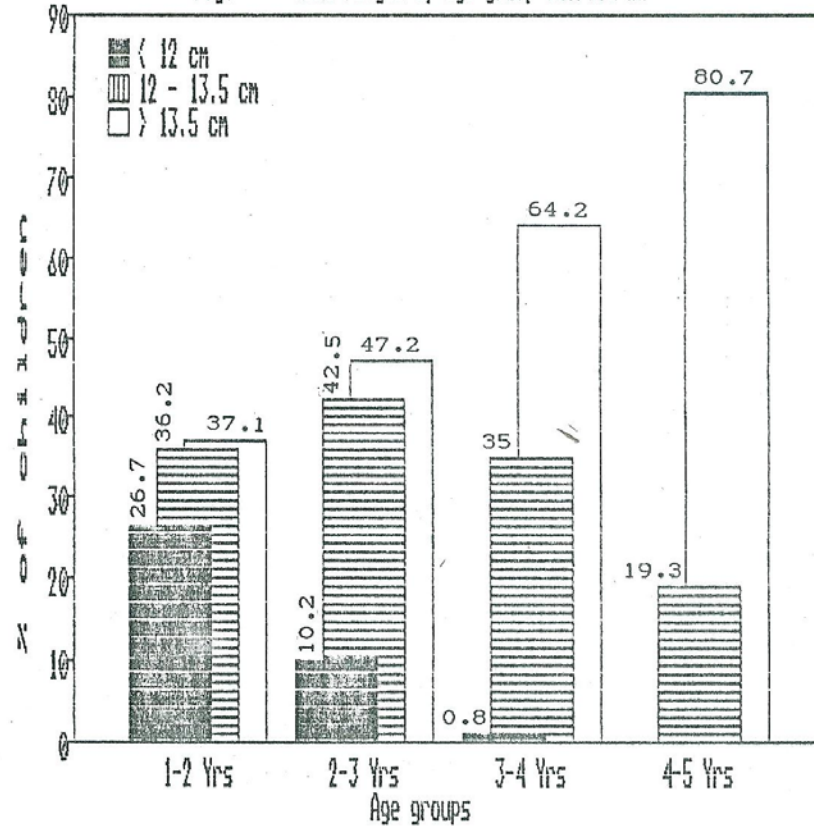


Fig. 2-D MUNC ranges by age group [Strata 2]



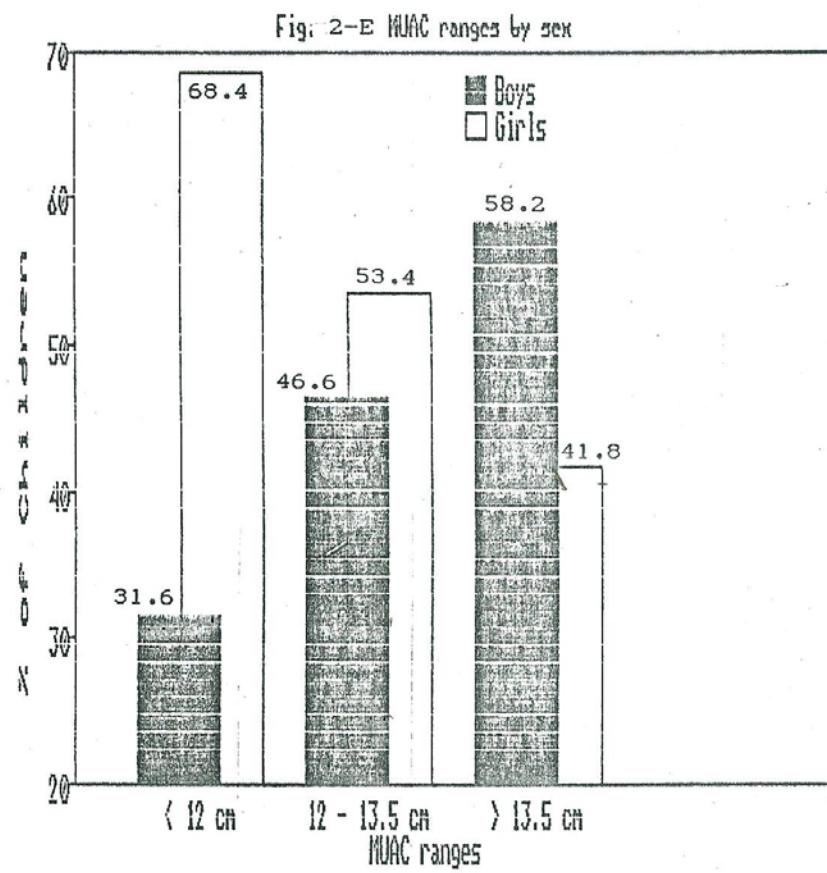


Fig. 2-F MUAC ranges by religion

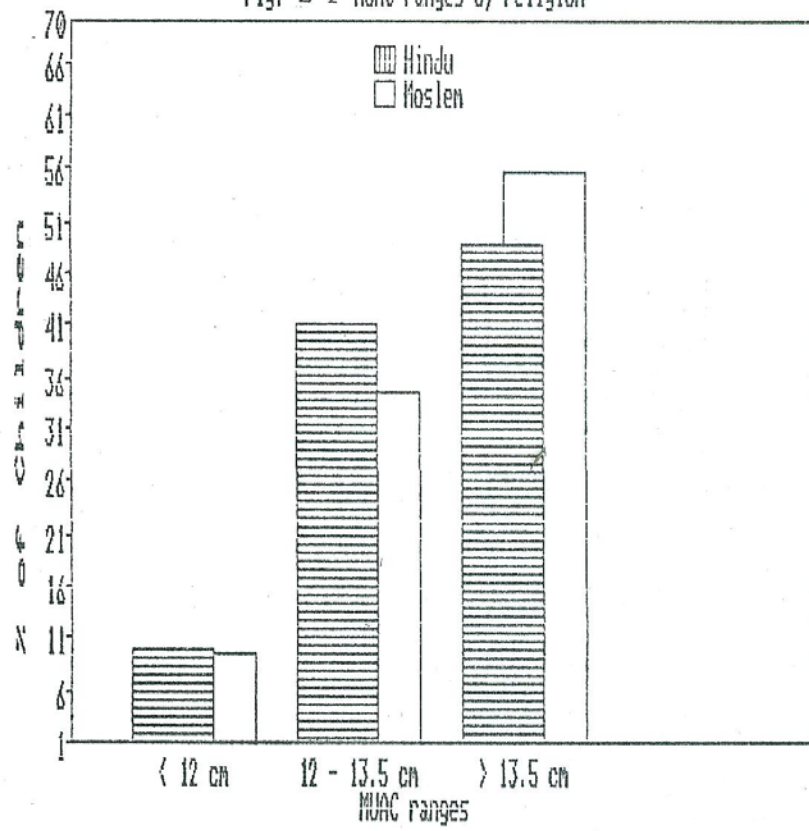


Fig. 2-G , MUAC presence of father

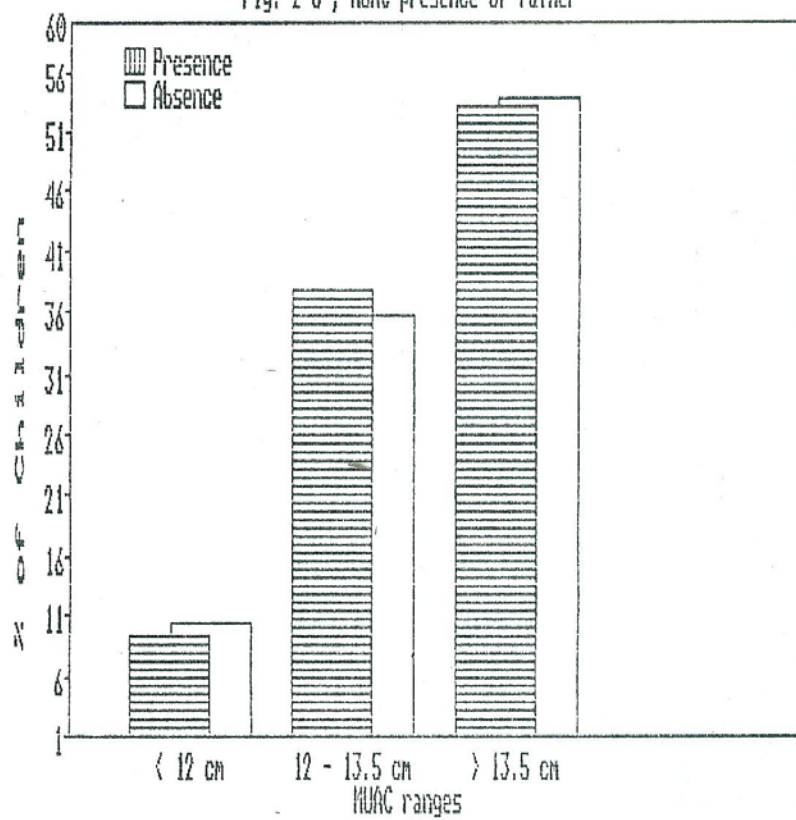


Fig. 2-H MUAC ranges by family size

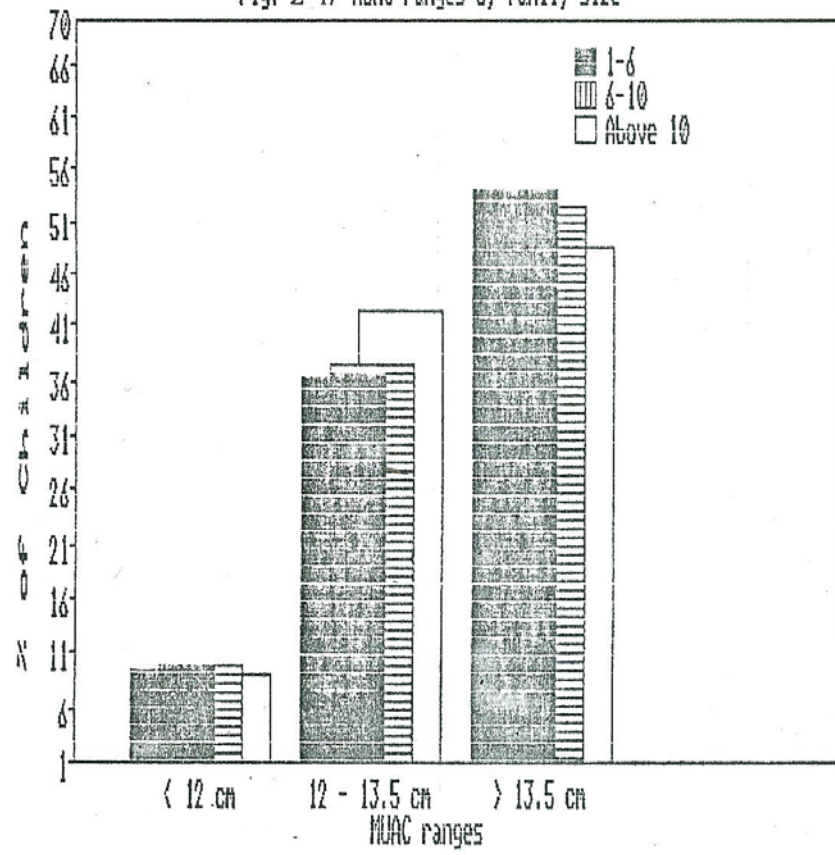


Figure 3-A, Night blind ness by age group

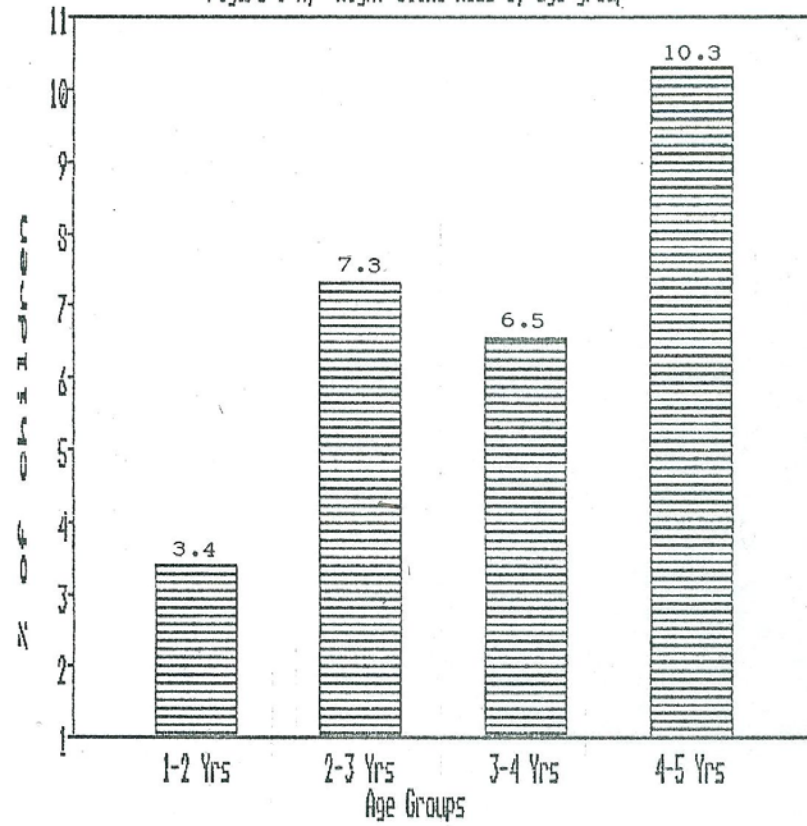


Fig. 3-B MUAC ranges by night blind ness

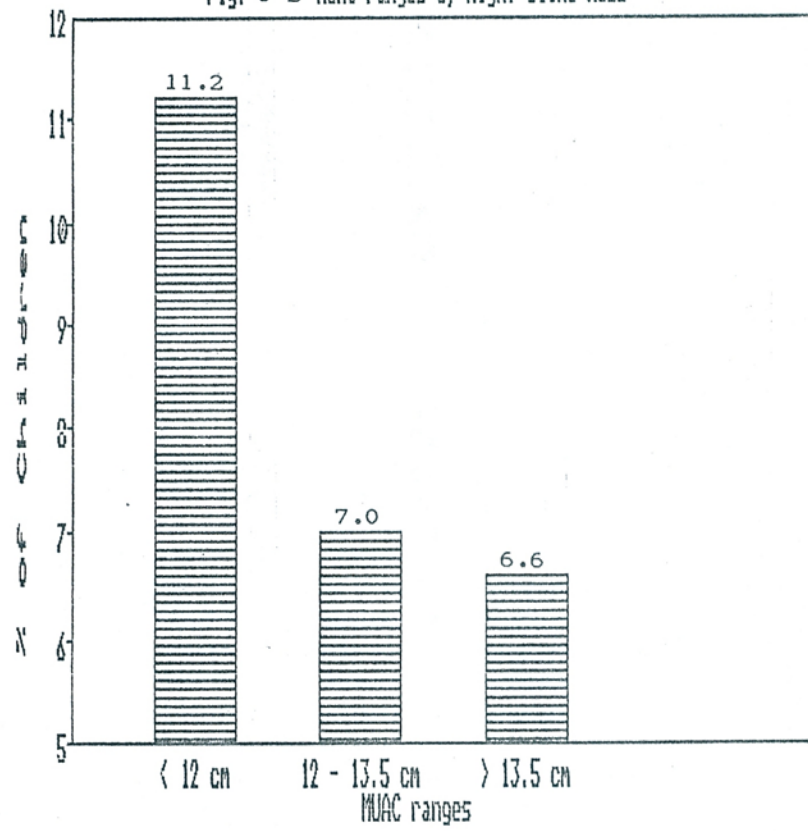


Table 3-A

IMMUNIZATION STATUS
(Percentages)

	Strata 1	Strata 2
Vaccination card present:		
Yes	0.6	16.2
No.	98.8	72.2
Lost	0.6	11.6
BCG scar:		
Given	1.4	41.8
Not given	98.6	58.2
Measles vaccine:		
Given	0.4	15.2
Not given	99.6	84.8
* DPT given:		
1st dose	0.2	0.8
2nd dose	0.2	10.0
3rd dose	0.2	5.4
* Polio given:		
1st dose	0.2	0.4
2nd dose	0.2	9.6
3rd dose	0.2	6.2
Fully immunized	0.2	4.8

* N.B: 1st dose is the % of children having received only 1 dose of vaccine.
2nd dose is the % of children having received 1st and 2nd doses.
3rd dose is the % of children having received all 3 doses of vaccine.

Appendix - 23

DEMOGRAPHIC DATA (HUMAN): GROWTH PATTERN

	1951			1961			1972			1981		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Diplo	-	36876	36876	-	42716	42716	-	74647	74647	6845	98583	105428
Nagar-parkar	-	61194	61194	-	73975	73975	-	65093	65093	-	104559	104559
Mithi	-	63944	63944	-	77518	77518	10211	103427	113638	18227	136204	154431
Chachro	-	87287	87287	-	96193	96193	4392	101587	105979	-	176567	176567
Umerkot	5142	80215	85357	13099	93492	106591	19496	140812	160308	35530	198102	233632
Total	5142	329543	334658	13099	383894	396993	34099	485567	519666	60602	714015	774617

Source: District Census Report of Tharparkar 1961, 1971 & 1983.

Appendix - 24

DEMOGRAPHIC DATA (ANIMALS)

Taluka	Cattle		Buffalo		Sheep		Goat		Total	
	1983-84	1980	1983-84	1980	1983-84	1980	1983-84	1980	1983-84	1980
Umerkot	56,297	70,977 -20.7%	38,190	9,732 +292%	44,982	25,690 +75%	70,037	120,432 -41.8%	209,506	226,831 -7.6%
Chachro	65,433	63,434 +3.1%	879	2,645 -66.8%	107,433	13,570 +692%	95,680	95,460 +0.23%	269,425	175,409 +53.6%
Mithi	52,573	62,673 -16%	1,993	3,574 -44.2%	45,349	30,349 +49.4%	148,664	102,834 +44.6%	248,679	199,831 +24.4%
Nagarpar-kar	50,690	50,799 -0.2%	539	3,550 -84.8%	44,569	20,469 +117%	143,976	101,739 +41.5%	239,783	176,557 +35.8%
Diplo	87,544	81,544 +7.3%	1,503	8,997 -83.3%	62,380	27,351 +128%	150,240	111,832 +34.4%	301,667	229,784 +31.3%
Total	312,546	329,427 -5.1%	43,104	28,498 +51.2%	304,713	117,429 +159%	608,597	532,297 +14.3%	1,268,960	1,007,651

Source: Animal Husbandry, District Tharparkar.

DATA ON GMCs: THEIR MAINTENANCE AND OPERATION

GMCs AT NAUKOT

1. Number : 100 - 80% of Thar are operating.
2. Fares : Naukot to Mithi Rs 5 per person.
Naukot to Diplo Rs 15 per person.
Naukot to Nagarparkar Rs 35 per person.
3. GMC rates from Naukot:
 - 3.1 Naukot to Nagarparkar (Mithi, Islamkot, Verawah).
 - 3.2 Naukot to Nagarparkar (Mithi, Islamkot, Verawah and via Dedhvero).
 - 3.3 Naukot to Adhigam (taluka Nagarparkar).
 - 3.4 Naukot to Diplo.
 - 3.5 Naukot to Vigito.
 - 3.6 Naukot to Chachro via Chedhar.
4. Government fares:

Government pays paisas 23 per bag per kilometer for relief grain.
5. Tonnage:
 - 5.1 Depends upon the engine power of GMC truck and type of load.
 - 5.2 A good engine carries 70 bags (7000 kg) of wheat with passengers 4000 kg.
 - 5.3 Bhoosa 80 maund = 3200 kg.
6. Kilometre per day average : 100 miles (160 km).
7. Maintenance costs: (per year)

7.1	Overhauling of engine	Rs 12,000
7.2	Tyre damage @ 4000 each	Rs 16,000
7.3	After every 160 km running excluding oil change & petrol.	Rs 400 from minor maintenance
7.4	Per annum	Rs 35,000

8. Capital cost:

- | | | |
|-----|--|--------------------|
| 8.1 | Auction price | Rs 30,000 - 35,000 |
| 8.2 | Chassis etc. | Rs 10,000 |
| 8.3 | Total cost of GMC with engine change, after repairing including chassis reinforcement - Rs 1.5 to 2 lac. | |

9. Changes in transportation after drought:

- a) Export of bajra, til, moong etc. stopped - mostly one-way traffic.
- b) Import of general commodities to rural areas reduced.
- c) Import of fodder and government supply of grain increased - benefiting GMC owners.
- d) Export of livestock to barrage land incurring many fold.

APPENDIX -26

GRANITE EXTRACTION: Abdul Hafeez Babalim's proposal

March 28, 1382

Mineral
Resources Company
7 Beauty House, Abdullah Haroon Road.
Karachi-3 Pakistan
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Telex 25122 TELK PK Attn. Mineral

GEOLOGICAL REPORT

NAGAR GRANITE

Introduction : Nagar parkar : Popularly known as Nagar is a town in the Tehsil Headquarter of Thar and administered through sub-division of Mirpur Khas.

Geographical

Location: Between 39 to 46 Longitude and
18 to 24° Latitude.

The area is defined under Survey Sheet No. 40 L of Survey of Pak
SE

Area applied: 2000 Acres: as per maps attached. This vast depression forms a small peninsula surrounded by Rann of Kutch by three sides.

The great tertiary depression coinciding the upheaval of the Himalayan from the Tethys Sea.

GEOMORPHOLOGY : The 'Rann' owes its present position to the Geological processes of the Pleistocene Age. This tract is saline and marshy and scarcely above the main Sea-level. It was once an inlet of Arabian Sea which is now silted up by the enormous volume of detritus poured into it since geological time.

As a whole Nagar Area is covered by 300 sq. miles and comprises of rugged isolated hilly tracts with splendid isolation of 'desert' composed of mud and silt. From the air, it presents wrinkled hills with plain and peni plain, cutting and side cutting effects of drainage. The scenery create the impression of bad—land-type landscape identical to that of Rajasthan/Sudan/Oman.

GEOLOGY: The highest trig station being of 1450 feet from main Sea—level. There are many evidences supporting the formation of Jurassic and to some extent preserving the succession upto Tertiary. However, the area is interestingly debatable. The Jurassic are overlain by Tertiary, Sedimentary— rocks mainly sand—stones in heterogeneous grain—size with different tones are commonly found. A broad band of -Jurassic rocks extends in an east-west along the whole length of Kutch with anticlinal folds, separated by synclinal depressions. The aggregate thickness of the formations, according to the Giants of Indian Geology is said to be of 6000 ft.

This formation extends upto NE Kathiawar covering upper portion of Rajasthan including Jesalmir and Bikaner.

March 28, 1982
GEOLOGICAL REPORT

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—2—

PETROLOGY: The basic and intermediate rocks are mainly composed of dolerite— diorite & syanite. At so many places, one can find perfect, intrusion of marine nature with miniature size ranging from x2' to 15x3' affecting the adjoining formations. The granite is intruded by a number of dykes and sills chemically disturbing the host—rock by turning them to darker in colour. On the other hand, dolerite **is** said to be of bigger grain size of porphry-type like that of South India.

The rocks above described are traversed by an extensive system of trap dykes and sills and other irregular intrusive masses of large dimentions producing fine to coarse grained granites. The conglomerates and pebble beds are weathered and formed pocket type deposits of silica removing the iron by under-ground water.

MINEROLOGY: Bunch of Quartz crystals with or without parent—rocks are usually found in the area having volcanic activities proving the crystalisation of silica in excess. In some cases, this silica has played **its** role as secondary infiltration. Products of hydro-thermal processes are common in the area.

APPROACHES & TRANSPORT ATIONS

The main trade—route is from :—

- a) Naukot (via Mithi)..Islamkot to Viravah.
- b) Umerkot to Chhachhro. . t. Vir'vah.
- c) From Badin via: Rahim-ki-bazar along he coastal—line upto Viravah.

Due to directional and continous flow of hot wind charged with fine and rough grains of weathered debris and depositing the same near the base of hills, the visibility naturally become abnormal. Hence the third route is normally adopted during the winter.

CLIMATE: Minimum temperature runs from 20C to 55C as its highest during the year.

VEGETATIONS: The average annual rainfall is not more than 1".
Comparatively good for seasonal crops of Juar and Bajra, producing long grass and desert shrubs, and typical type of herbs very ideal for medi—cures.

ANIMALS: Deers, Rabbits, Jarakhs, Jackels & Peacocks were once in abundance before parting. Deadly snakes and poisonous scorpions of extraordinary sizes are common particularly after the first shower of rain.

March 28, 1982
GEOLOGICAL REPORT

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—3—

LIVING: Seasonal agriculture, grazing of sheep & goats and collecting of herbs suitable for medicinal and pharmaceutical purposes are the main source of livelihood for the locals. During the draught, they are forced to migrate to nearby Districts.

GENERAL: Looking to the geomorphological features, the undersigned is tempted to suggest:—

Installment of Wind-mills to generate electricity for the development of many small scale industries. The adjoining barren land is composed of silt and mud up to 10,000." Advisable to collect the seasonal rain water into deep reservoir having atleast impervious strata. Development of Salt—industry producing iodine and epsom salt. However, it is encouraging fact that nowadays the Government machineries are very alert for the development of rural/barren areas by exploring underground water of Thar under UNICEF. The Provincial Government has assured to provide electricity to the most of part of Tharparkar within a couple of years. Construction of kot-Mithi road is in good progress. All the more so, the proposal of handing-over the mineral—rights to the respective provinces to be benefitted from their own mineral resources, are under active consideration of the Government.

**HISTORY &
SHORT NOTES**

ON GRANITE: Italy, since centuries is well known for its workmanship of statues in saccharoidal marble. No doubt, some workable deposits are located in North of Milan, and in Sardinia Island with blackish angular shaped dots & spots over the background of whitish quartzite, known as graphic Granite. But the majority of the granite is usually imported in the forms of chiselled blocks. Main suppliers being:—

S. Africa, India, Finland, Sweden and Norway and is sold in international market under different trade names like:— Black African, Indian Red/Green, Marine-pearl etc. The Rock (Granite) is usually tested over there on the contents of Quartz and Hardness.

All the operations from quarrying to processing are thoroughly mechanised.

In this way, a country depending more on Imports playing a vital role in employing nearly 5000 men in mining and 11+000 men in processing and thus earning foreign exchange to the tune of US \$_____

Our Granite can be proved superior to that of India, provided we developed it on modern scientific lines. Though its uniform texture and homogenous structure in different attractive colours are capable of taking super gloss of permanent nature.

-

In short, we have to learn much from Italy.

27 January 1982

**Mineral
Resources Company**

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Telephone 72 7 76 Cable : STARGULF
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The Secretary
Industries and Mineral Development
Government of Sind
KARACHI

Sub: MINING LEASE OF GRANITE LOCATED
NEAR NAGAR PARKAR Tharparkar
District - Sind

Sir,

Please find enclosed a map showing the limits of an area in which we are interested to carry out the mining operations for the extraction of Granite. The survey of the area indicated good chances of obtaining exportable Granite rocks within the limits proposed for the Mining Lease.

ABOUT OURSELVES:

We are a Company established and controlled by Foreign educated executives and financiers who are genuinely interested in promoting the hidden raw materials of our country and earn a considerable amount of Foreign Exchange. Our Management and Staff are serious in developing the Granite of Pakistan and introduce it in the international market. We have a capable team of experts of high calibre.

WORK DONE SO FAR:

Before approaching your good offices we have done a lot of spade work. The undersigned had taken a study tour of Italy and Europe in the last of 1981 and held negotiations with European Granite Quarrying Machinery and Processing Plant Manufacturers. Also held discussions with the prospective buyers who have shown their interest in purchasing our Granite in exchange of modern Quarrying Machinery. The following companies are the prospective buyers and machinery manufacturers who are interested in a joint collaboration with us:—

- 1) SENATEWISE LTD. ENGLAND
- 2) SAVEMA ITALY
- 3) HENRAUX ITALY
- 4) I.N.G. ITALY
- 5) SIEM MARIII ITALY
- 6) BRITT PRODUCTS ITALY
- 7) I.G.M. ITALY

All feasibility Reports, Correspondence and plan can be shown to your goodself on demand.

Page 2/. .
27 January 1982

**Mineral
Resources Company**
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Telephone : 72 7 76 Cable : **STARGULF**
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FUTURE AIMS AND OBJECTS:

We wish to compete with India who is the largest exporter of Red Rubin Granite from this region and earns a huge amount of foreign exchange through this source. We have also done some commercial intelligence work in this regard and discovered, there are several parties in Illikal South India (near Benglore) who are exporting over 10,000 cubic meters of Granite Blocks annually.

The work being done in India at present is through very old traditional method by employing thousands of workers at a time while we intend to use modern quarrying machinery, cranes, and Desert oriented Heavy Duty Trucks which will boostup our production capacity and in the first year of our operation we intend to export appx. 5,000 cubic meters and will gradually reach a production target of 20,000 cubic meters within 5 years time.

ULTIMATE OBJECTS:

Our ultimate objects are as under:—

- 1) Developing through modern machinery the Granite Quarries of Nagar Parkar.
- 2) Introducing and Promoting Nagar Parkar's Granite Blocks in the international market.
- 3) Installing a Granite Processing Plant in Sind area for the local needs and export of finished product i.e. single face polished Granite in 2 cm thickness.
- 4) Providing employment to local inhabitants of Tharparkar District and raising their standard of living.
- 5) Earning valuable Foreign Exchange for the Country.

CONCLUSION:

As is evident from above presentation we are serious and genuinely interested in taking up this task of exploiting our hidden mineral resources to the advantage of our Country's foreign exchange needs and developing another source of earning for the nation.

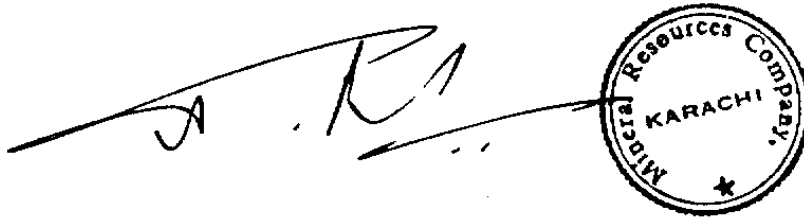
Page 3/. .
27 January 1982

**Mineral
Resources Company**
7 Beauty House. Abdullah 1-faroon Road.
Karachi-3 Pakistan
Telephone : 72 7 76 Cable : **STARGULF**
Telex 25122 TELK P1< Attn. Mineral

We would request your goodseif to kindly grant us Mining Lease of Granite in
Nagar Parkar area.

We assure you of our untiring efforts, services and cooperation.

Yours faithfull,
MINERAL RESOURCES COMPANY

A handwritten signature in dark ink, appearing to be 'A. R.', is written over a circular stamp. The stamp is from the Mineral Resources Company, Karachi, and features a star at the bottom.

Encl: As above

**Mineral
Resources Company**
7 Beauty House. Abdullah 1-faroon Road.
Karachi-3 Pakistan
Telephone : 72 7 76 Cable : **STARGULF**
Telex 25122 TELK P1< Attn. Mineral

THE PROJECT:

The Management after consultations with Italian Engineers have decided to implement the Granite Project after the execution of Lease into two phases:—

- a) The Quarry Project;
- b) Processing and finishing Project;

The Applicants have to do the following spade—work before setting the fines and starting the Project:

- Removal of shrubs and debris;
- Arrangement of labour quarters;
- Renovation and reparation of approach-roads to the proposed illness/Sites/points;

Blasting, drilling, chasing, channelling, chipping etc.,

Thus after clearing the debris (virgirs & by-products) we are sure to open the face of the lines/quarry.

All the above operations are likely to take approximately 4 to 6 months before the Mines are set i or mechanical as well as manual operations.

Installation of imported as well local machineries are likely to take nearly 12 months more.

So the Quarrying Project and its Sales iiii tow form has been evaluated and the profitability is recorded on the appendix attached with the Report.


-: Geologist.

FODDER AND WATER REQUIREMENTS OF DIFFERENT ANIMALS

Livestock	Wheat bhoosa per day (KG)	Concentrate cotton seed cake and bhoosa per day (KG)	Daily consumpti on of water (Gallon)	Gur (KG)
Goats	2	1/2	2	-
Sheep	2	1/2	2	-
Cows	5	1	8	1/2
Buffalos	5	1	20	1/2
Donkeys	5	1	8	
Horses	5	1	8	1/2
Camels	5	1	20	

Source: Water Resources Survey 1979.

Position paper on Thar during drought days Department of Agriculture,
Hyderabad.

THE DISTRICT ADMINISTRATION

- Deputy Commissioner 1
- Addl: Deputy Commissioner 1
- Asstt: Commissioner 5
- Mukhtarkar 9

DETAILS OF STRENGTH

Sub Division	A. C	Assistant	Clerk
Mirpurkhas	1	1	4
Degree	1	1	3
Naravelley at Umerkot	1	1	3
Mithi	1	1	4
Chachro	1	1	3
	5	5	17

MUKHTARKAR'S OFFICE

Taluka	Mukhtarkar	Asstt. Mukhtarkar	Clerks	Senior Tapedar	Tapedar
Umerkot	1	2	6	4	36
Mithi	1	2	5	5	10
Diplo	1	2	5	3	9
Chachro	1	2	5	6	16
Nagarparkar	1	2	5	4	10
	5	10	26	22	81

EDUCATIONAL INSTITUTIONS IN THAR

Name of Institution	Umerkot		Mithi		Diplo		Chachro		Nagarparkar	
	No.	Bed	No.	Bed	No.	Bed	No.	Bed	No.	Bed
Civil Hospital	-	-	-	-	-	-	-	-	-	-
Taluka Hospital	1	20	1	20	1	20	-	-	-	-
A-type RHC	1	8	1	4	-	-	1	10	-	-
MTD	1	-	-	-	-	-	-	-	-	-
B-type RHC	3	12	-	-	-	-	1	4	-	-
Maternity Home/MCHC	1	-	1	-	-	-	-	-	-	-
Govt. Dispensary	1	-	-	-	-	-	-	-	-	-
BHU	-	-	-	-	-	-	-	-	-	-
Sub Health Centre	2	-	-	-	-	-	-	-	-	-
Experimental Dispensary	1	-	-	-	-	-	1	-	-	-
Distt. Council Dispensary	14	-	11	-	8	-	21	-	11	-
Total	25		14		9		24		11	

Source: Statistical Brochure of District Field Office, Mirpurkhas.

ENROLMENT AND TEACHING STAFF BY SEX AND TALUKA

1985-86

Taluka	No. of Institution			Enrolment			Teaching staff		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
In Primary Schools									
- Umerkot	175	38	213	11850	2062	11912	312	75	386
- Mithi	155	25	180	5353	980	6333	251	52	303
- Diplo	89	15	104	3513	470	3983	174	34	208
- Chachro	182	34	216	3880	370	4250	259	26	285
- Nagarparkar	113	11	124	2752	34	2986	168	2	170
TOTAL	714	123	837	27548	3916	29464	1164	188	1352
In Middle Schools									
- Umerkot	7	3	10	556	374	930	43	21	64
- Mithi	2	1	3	869	93	963	12	6	18
- Diplo	5	-	5	233	-	233	32	-	32
- Chachro	2	1	3	80	62	142	14	6	20
- Nagarparkar	1	-	1	317	-	317	7	-	7
TOTAL	17	5	22	2055	529	2585	108	33	141
In High Schools									
- Umerkot	6	1	7	1632	410	2042	105	14	119
- Mithi	2	-	2	1017	-	1017	43	-	43
- Diplo	1	1	2	483	240	723	21	13	34
- Chachro	3	-	3	646	-	646	46	-	46
- Nagarparkar	1	-	1	158	-	158	12	-	12
TOTAL	13	2	15	3936	650	4586	227	27	254
In Colleges									
- Umerkot	1	-	1	452	-	452	12	-	12
- Mithi	1	-	1	320	-	320	8	-	8
TOTAL	2	-	2	772	-	772	20	-	20

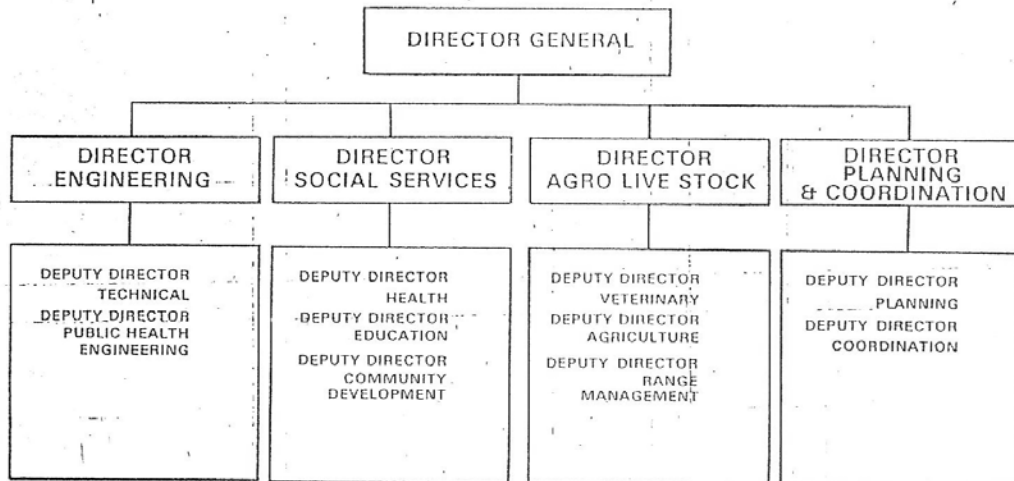
Source: Statistical Brochure of District Field Office, Mirpurkhas.

HEALTH FACILITIES IN THAR

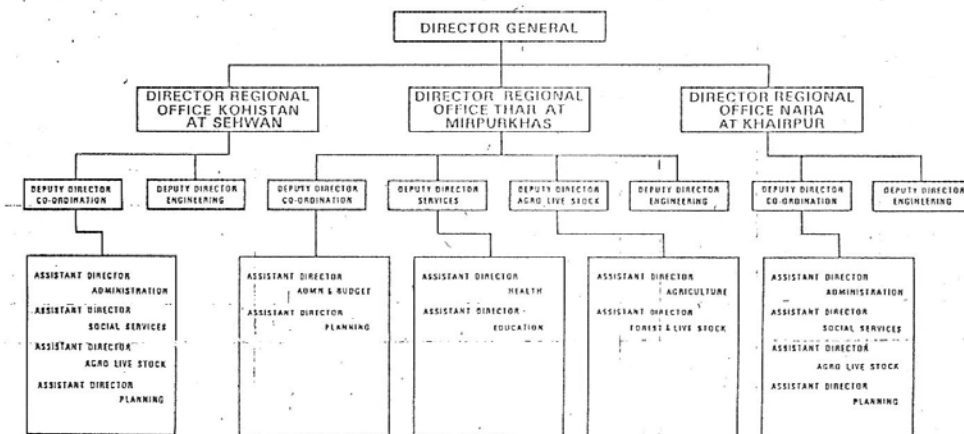
	Umerkot	Mithi	Diplo	Chachro	Nagar-parkar	Total
Doctors	34	10	17	10	1	72
Nurses	6	4	5	-	-	15
X-Ray Tech.	1	1	1	-	-	3
LHV Tech.	3	2	1	1	-	7
Lab. Tech.	1	-	-	-	-	1
Lab. Asstt.	1	1	1	1	-	4
Health Insp.	3	-	-	-	-	3
Compounders	12	6	5	4	-	27
Dressers	2	1	1	1	-	5
O.T. Assistants	-	2	-	-	-	2
Med. Tech.	-	-	2	1	-	3
Midwives	3	-	1	1	-	5
AMW	3	1	-	-	-	4
Dais	2	2	1	-	-	5

Source: Statistical brochure of District Field Office, Mirpurkhas.

SIND ARID ZONE DEVELOPMENT AUTHORITY (HEAD OFFICE)



SIND ARID ZONE DEVELOPMENT AUTHORITY (REGIONAL OFFICES)



SETTLEMENT PATTERNS

Talukas/Settlements		Numbers	Population	Percentage
Diplo 499 999	200-	125	38,857	62.38
		29	21,106	33.88
	500-	1	2,325	3.73
	1000			
Nagar- 499 parkar 999	200-	127	40,114	45.29
		47	30,600	34.55
	500-	11	17,823	20.12
	1000			
Mithi 499 999	200-	125	41,047	42.21
		68	45,640	46.94
	500-	8	10,549	10.85
	1000			
Chachro 499 999	200-	182	58,503	45.83
		65	43,226	33.08
	500-	20	26,928	21.09
	1000			
Umerkot 499 999	200-	179	53,253	51.35
		52	34,572	33.34
	500-	11	15,885	15.32
	1000			

Source : Survey of Human Settlements Population, Bureau of Statistics, Sind.

BREAKDOWN OF COSTS OF UNDER-CONSTRUCTION ROADS

1. Road Description:

22 feet wide. Sand is levelled with a tractor and then a premix carpet (1 bitumen : 6 sand) is laid over it.

2. Labour and volume of work:

To construct 80 feet length of road the following labour and equipment is required.

2.1 Labour:

- 13 unskilled workers at Rs 25-30 each per day
- one tractor driver at Rs 900 per month
- one supervisor at Rs 1200 per month
- one helper for driver Rs 800 per month

2.2 Equipment:

- one tractor at Rs 65 per hour inclusive of diesel
- one mixture machine, diesel-operated.

3. Materials required for 80 feet length of road:

3.1 Sand : available at site

3.2 Bitumen: 10 drums

3.3 Firewood : for melting bitumen: 18 maunds per day at Rs 18 to Rs 20 per maund

3.4 Diesel : for running a mixture machine: 4 gallons per day.

/Israr Rana/

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