

Drought Coping Strategies in Nushki District, Pakistan and their Policy
Implications

by

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B.Sc., Lahore University of Management Sciences, Pakistan, 1998

A Thesis Submitted in Partial Fulfillment
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Abstract

This study analyzes the drought coping strategies and decision making processes of households and communities in response to a long and severe drought that prevailed from 1997 to 2004 in Nushki District, Pakistan. The relevant information was gathered through a review of the available literature, analysis of government documents, relief agencies' reports and newspaper articles. The analysis suggest that households adopted similar patterns of drought coping relating to food acquisition, income generation activities, extension of credit and management of productive and non-productive assets in Nushki District as in other drought affected areas. However, the coping strategies relating to security of access to drinking water were a major pre-occupation of households owing to the scarcity of water in Nushki District and these constitute a departure from the pattern of coping strategies reported elsewhere in the literature. The study concludes by offering a critique of government's drought policy for its failure to address the issues of livelihood security. It recommends that the Government of Pakistan should adopt a long-term approach focussed on rehabilitation and recovery of livelihoods for mitigating the effects of drought and make significant changes in its water supply, agricultural and livestock development policies to reduce the vulnerability of households to the effects of drought.

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Dedication

To my parents for their support in all my endeavours

1. Introduction

1.1 Background

Nushki District, located in the western extremity of Pakistan's border with Afghanistan, suffered a prolonged dry spell from 1997-2004 during which annual precipitation fell to approximately 50% of its already meagre pre-drought levels. Streams dried up, underground water table fell drastically, and there was no surface water for drinking or agriculture in rain-fed areas. With each passing year more tube-wells, dug-wells and ponds dried up and little pasture remained for feeding the livestock. The dry spell had a devastating effect on the livelihoods of people in both the perennially irrigated and the rain-fed areas. Several people died, thousands of cattle-heads perished and a large number of people suffered from malnutrition and disease. Towards the end of the year 2000, the worsening drought precipitated distress migration of hundreds of families to irrigated villages and towns in search of water, food and employment (UN 2001; Lukmanji 2002; Islamic Relief 2000). Emergency relief activities undertaken by the government and international relief organizations prevented the development of a fully-fledged famine but the revival of people's livelihoods, especially those engaged in rain-fed agriculture and rearing of livestock, has not been adequately addressed.

1.2 Purpose of the Study

The purpose of this study was to document the effects of drought and analyze the dynamics of the coping strategies of affected households in Nushki District, Pakistan

with a view to examine how these related to patterns of drought coping elsewhere in Asia and Africa and to understand their implications for drought management policy in Pakistan.

The specific objectives of the study were as follows:

- i) To provide a detailed description of ecological conditions and livelihood systems in Nushki District that will provide the context or frame against which the effects of drought and the coping strategies of households could be understood.
- ii) To construct a narrative of the incidence of drought in Nushki District by documenting the effects of drought on households practicing different livelihood options and living in different agro-ecological zones in Nushki District.
- iii) To identify dominant themes emerging from the analysis of household coping strategies using a sustainable livelihoods framework and to examine the extent to which these corresponded to the patterns of drought coping observed elsewhere in Asia and Africa in the literature.
- iv) To examine the implications of the patterns of drought coping observed in Nushki District for drought management policy in Balochistan Province, Pakistan.

1.3 Justification for the study

Drought is a slow-onset creeping natural hazard that results from the interaction between precipitation deficiency (and other climactic factors) and the demand humans

place on the supplies of water and vegetation (NDMC 2005). Therefore, in order to better understand how drought affects the human population, several socio-economic factors need to be taken into account in addition to the climate and hydrology of an area. These include people's agricultural and other livelihood practices and methods of water harvesting for them and communities' histories of coping with reduced or untimely rainfall (Qureshi and Akhtar 2004). Given this context-specific nature of the incidence of drought, a close and detailed examination of a particular region like Nushki District can give insights into the incidence of drought that would not be available otherwise.

While the existing reports and surveys contain important insights and detailed qualitative and quantitative information for understanding the impacts of drought in Balochistan Province, Pakistan, most of these studies were conducted in the context of immediate relief assistance to drought victims. They were mainly commissioned by relief organizations such as Oxfam and United Nations (UN 2001; Oxfam 2001; Lukmanji 2002 and Oxfam 2003). Because of their focus on immediate relief assistance, they do not cover the livelihood systems of affected households in sufficient detail nor do they relate their findings systematically to the theoretical literature on drought. This study aims to fill the gap in the available literature regarding a social anthropological analysis of the 1997-2004 drought in Balochistan Province. By relating the response strategies of households in Nushki District to the patterns of drought coping reported in the literature, it also contributes to the understanding of droughts in general.

Moreover, barring Qureshi and Akhtar (2004), the existing policy literature on drought management and planning in Pakistan is not informed by a sociological understanding of droughts. Much of the research has been conducted by water sector experts and agricultural scientists whose primary emphasis has been on technological factors (Ahmed et al 2004). As a result, this literature does not pay adequate attention to the livelihood systems and the coping strategies of the affected households or attempt to incorporate their perspectives in drought planning. This study attempts to overcome these shortcomings by using a sustainable livelihoods framework that allows it to draw on the assets, capabilities and local knowledge of the households and communities in the study area. It is expected that the study will make a contribution to the policy debate on droughts in Pakistan and help elicit a more effective policy response from the national government and international relief agencies in helping communities in Balochistan cope with drought conditions.

1.4 Organization of the thesis

Chapter two reviews the literature on drought and coping strategies with the purpose of understanding the problematic of defining drought, tracing the genealogy of competing frameworks for understanding food and livelihood security, identifying the common patterns of coping responses reported in the literature and their implications for drought policy. Chapter 3 details the methodology and justifies the choice of a mixed qualitative-quantitative design for achieving the objectives of the research. Chapter 4 gives a profile of the study area. Chapter 5 provides a detailed account of the livelihood systems in Nushki District. Chapter 6 traces the emergence and progress of drought in Nushki District and documents the effects of drought on

households from different agro-ecological regions and practising different livelihood options. Chapter 7 analyzes the coping strategies of the affected households pertaining to securing access to water and food, engaging in alternate income generation activities and managing productive and non-productive assets in the face of worsening drought conditions. Chapter 8 identifies the dominant themes and patterns emerging from the analysis of coping strategies in Nushki District and contrasts these to the patterns reported in the literature on droughts elsewhere. Chapter 9 concludes the paper by giving a brief overview of the drought relief activities, critiquing the relief policy in the light of findings in Chapter 8 and suggesting alternative policy options for restoring the livelihoods of people in Balochistan Province, Pakistan.

2. Theoretical Framework and Literature Review

2.1 The Concept of Drought

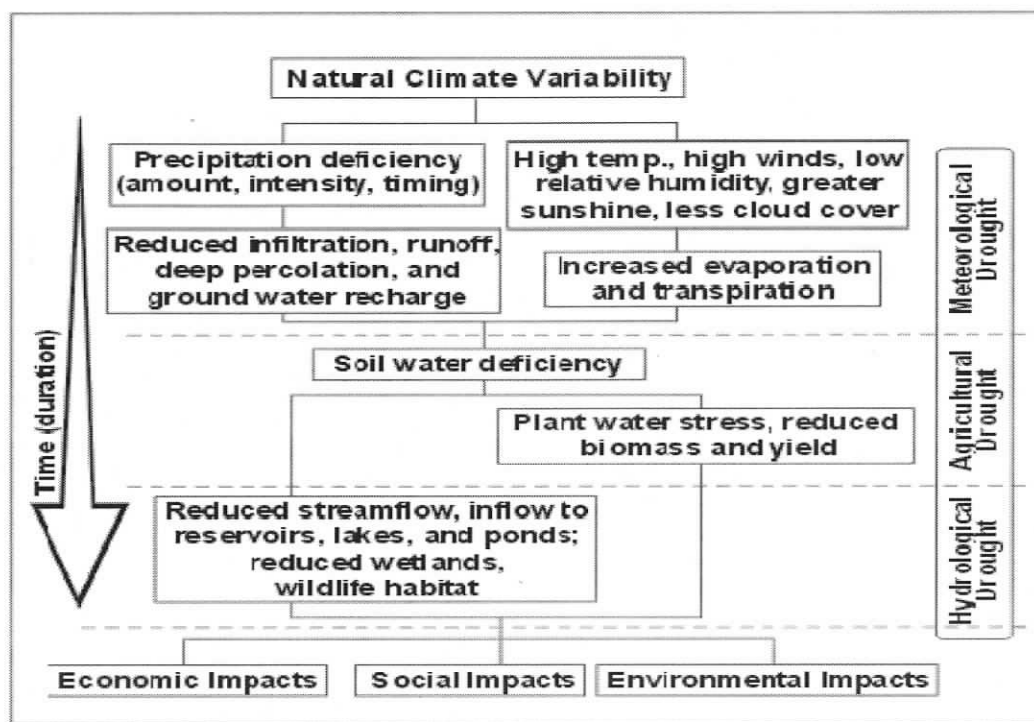
Drought is one of the most complex but least understood of all natural hazards. Generally drought is defined as the deficiency of precipitation (rainfall, snow, etc) over an extended period of time resulting in water shortage for some activity, group or environmental sector. It is usually considered relative to some long-run average condition between rainfall and evapo-transpiration in a particular area, considered as 'normal' (Qureshi and Akhtar 2004). However, average rainfall is an inadequate measure of rainfall characteristics in arid lands which experience variable rainfall within a year. As a result deviation from the long-term average rainfall alone gives an imperfect measure of drought (Wilhite and Glantz 1985). Drought is also related to the timing e.g. main season of occurrence or the occurrence of rain in relation to principal crop growth stages as well as the effectiveness of rainfall i.e. intensity and number of rainy days. Drought, unlike aridity, is a temporary climactic aberration. Nevertheless, arid regions tend to be more prone to drought on account of their meager supplies of water so that otherwise smaller deviations of rainfall from the normal may precipitate a drought in an arid region (NDMC 2005).

Moreover, drought cannot be viewed as merely a physical or meteorological phenomenon because its impact on society results from the interplay between a natural process (less precipitation than expected resulting from natural climactic variability) and the demands people place on water supply. These demands may be

direct as in the case of agricultural irrigation from local runoff water or indirect as in the case of livestock herding that is dependent upon rainfall to nurture vegetation that would meet the requirement of forage or pasture (NDMC 2005).

Therefore, depending on the context, different definitions of drought are used in the literature based on factors related to the climate, hydrology, requirements of agricultural water and socio-economic well being. Meteorological Drought refers to the degree of dryness in comparison to some normal or average amount and the duration of dry period specific to a region. Hydrological Drought is associated with the effects of periods of precipitation shortfall on surface or underground water resources. Its severity is often defined on a watershed or river basin scale. Agricultural Drought links various characteristics of meteorological and hydrological drought to their impacts on agriculture focusing on precipitation shortages, differences between actual and potential evapo-transpiration rates, soil water deficiency and reduced ground water among others. Lastly, Socio-economic Drought refers to the shortage or lack of access to essential economic goods and services, most commonly food, arising from a combination of elements of meteorological, hydrological and agricultural drought. Figure 1 illustrates the links between different kinds of drought (Wilhite 2000; Wilhite and Glantz 1985). Figure 1 illustrates the sequence of the effects of drought and how these relate to different definitions of drought.

Figure 1: Drought Impacts and Definitions



Source: NDMC (2005)

However, meteorological drought may not necessarily coincide with agricultural drought or the development of a famine situation and vice versa (Wilhite and Glantz 1985; Sen 1981). Wilhite (2000) uses the concept of 'hazard' and 'vulnerability' to distinguish between the physical (meteorological) and the social components of the risk to society from drought. Hazard refers to the risk of the occurrence of drought which depends on the geographical extent, duration and the intensity of the dry spell. There is very little that planners and policymakers can, in the short run, do about this¹. Vulnerability, on the other hand, refers to the society's ability or the lack of it to

¹ In the long run, policies aimed at controlling activities that contribute to global warming could be pursued which may reducing global warming and thereby decrease the likelihood of occurrence of large scale climatic fluctuations that result in droughts and floods. This may take decades and even then success cannot be guaranteed.

respond to the hazard arising from drought. It depends on social factors such as population, demography, technology and cultural behaviour. Vulnerability can be reduced through appropriate planning and preparedness (Wilhite 2000). It follows that the extent to which (meteorological) drought affects the human population and threatens to develop into a famine situation causing distress to a large number of people depends on how society is organized (Sen 1989).

Therefore, in order to better understand how drought affects the human population, several socio-economic factors need to be taken into account in addition to the climate and hydrology of an area. These include people's agricultural and other livelihood practices and methods of water harvesting for them; settlement patterns and social organization; communities' histories of coping with reduced or untimely rainfall; the nature of mechanisms they have adopted over the years in response to drought conditions; and their access to political, governmental, community and household power structures (Qureshi and Akhtar 2004). Given this context-specific nature of the incidence of drought, a close and detailed examination of a particular region can give insights that would not be available otherwise.

Moreover, access to and disposal of productive assets, means of livelihood such as land and livestock and availability and access to sources of water and pasture are embedded in the historically evolved cultural practices and local knowledge of the affected communities. Most of this knowledge and local cultural practices are not directly accessible to researchers as objective variables rather they are manifest in the way the affected communities make livelihood decisions during the times of drought and their (subjective) perceptions of the drought situation. Their perception of the

occurrence of drought and its effects, therefore, is likely to be different from the perceptions of national governments and international relief agencies which depend mostly on official climactic and hydrological data and stylized situation reports. Because different interpretation of the indicators and characteristics of drought generate different attitudes and perceptions of how to deal with a drought situation, it is important to understand the affected communities' perceptions of drought and situate it within its particular cultural context for drought planning and response to be successful (Knutson et al 1998).

2.2 Entitlement Failure and Food Security during Drought

Sen (1982) argues that in order to understand food crises, it is important to understand how people acquire their food. He uses the term 'entitlement' to refer to the set of alternative commodity bundles (including food) that a person can acquire through various legally sanctioned channels of acquisition. An individual's or household' effective access to food (and other essential goods) may arise from four broad categories of entitlements: firstly, from the opportunities for production and ownership e.g. own-food endowment; secondly, from opportunities to trade resources or products to obtain food i.e. exchange entitlements; thirdly, from selling one's own labour power; and, fourthly, from inheritance, transfers and gifts that others including the state give to the individual. Thus, in a market economy, the food entitlement F_j of household j is given by the following equation:

$$F_j = [q_j * p_j] / p_f$$

Where q_j is the amount of commodity j that the household can sell or consume, p_j is the price of commodity j and p_f is the price of food. Household j 's food exchange rate is given by p_j/p_f i.e. the ratio of the price of the commodity the household produces to the price of food. Thus from a policy or public action perspective, entitlements framework de-emphasizes overall food availability and instead stresses the options available to households for ensuring food security (Devereux et al 1998).

According to 'entitlements theory', households engaged in their own-food production will be forced to starve because of unfavourable entitlement relations if and when they are unable to obtain enough food from direct production and from selling their resources and products. This could, for example, happen to agriculturists when they have no harvest or a poor harvest and to livestock owners when their herds are depleted from drought and they are forced to sell the remaining livestock at throwaway prices. On the other hand, for households with no or insufficient self-produced food, starvation may result from the inability to get enough food in exchange for their products, resources and services (Sen 1982). The general conclusion of entitlements framework is that drought and other adverse events such as civil war are production or income shocks that threaten households' access to food. Households respond to these shocks by smoothing consumption over the drought period through the conversion of household assets into food (Devereaux 1993).

2.3 Sustainable Livelihoods Approach towards Understanding Drought

Review of empirical studies on coping strategies in Africa and South Asia, however, reveals that rather than smoothing consumption by outright sale of

productive assets, households engage in selective asset disposal and voluntary rationing of food, preferring to go hungry rather than compromise their future livelihoods by disposing of key productive assets (Devereux 1993; Corbett 1988; Jodha 1975). For example, affected households in Western Rajasthan, India, postponed the sale of assets until very late in the drought cycle, preferred to mortgage assets rather than sell them and out-migrated from their villages with their animals rather than sell them to maintain their current consumption levels during the drought in the 1970s (Jodha 1975). Similarly, in the famine of mid-1980s in Sudan, adults mixed sand with seed stock to prevent children from eating the seed and thus tried to protect their future source of livelihood (Maxwell 1998). Based on the insights from these studies, a growing body of literature has pointed to limitations in the 'entitlements approach' which bear upon the present study (Devereux et al 1998; Robinson 1994; Deardon and Cassidy 1990).

Firstly, entitlements may be poorly specified in cases where the ownership of land and access to water and pastures is communal rather than individual (Devereux 1993). For example, tribes and clans jointly own grazing rights to the rangelands and pastures in many areas of Balochistan Province. The right to graze animals on these lands is collective and not owned by particular individuals or households (Buzdar et al 1989)². This means that an economic analysis of households' food security based on an entitlement framework may not yield the desired insights into the drought situation. Secondly, entitlements may be provisional or incomplete such as in case of food and other essentials obtained on credit. Nevertheless this is an important survival strategy during times of drought. It enables the households to smooth consumption

² These practices are common to ethnic Baloch tribes in Pakistan, Iran and Afghanistan (Salzman 2005)

and income over good and bad years and across seasons and reducing the likelihood that assets will be exhausted in the wake of a poor harvest. Thirdly, Sen focuses too much on exchange and production to the neglect of transfers and other indirect entitlement mechanisms. These include, for example, formal state subsidies or pensions as well as the informal cultural networks and claims on resources based on kinship (Devereux et al 1998). Therefore, there is a risk that "...using a food security approach might impart a biased or partial understanding of poverty by neglecting such aspects as asset-holding or dependency, or might lead to over-emphases on consumption-oriented interventions which prove to be unsustainable." (Deardon and Cassidy 1990:82 quoted in Robinson 1994)

Recent empirical and conceptual literature has, therefore, advanced the concept of 'livelihood security' as a larger set of relations of which food security is a subset (Scoones 1998; Maxwell 1998; Chambers and Conway 1991). Scoones 1998 gives the following definition of a livelihood:

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base (Scoones 1998: 5).

The main components of a livelihood are personal capabilities, tangible assets such as stores and material resources (livestock, food grain, jewellery, cash, bank account, etc.) and intangible assets such as culturally accepted claims on the resources of one's kinsmen, tribal leaders, etc. or access to government and international relief institutions (Scoones 1998). Livelihood strategies are the ways in which individuals,

households and communities use their capabilities, assets and resources, and cultural or political claims to secure access to food. The risk of livelihood failure largely determines the vulnerability component of food insecurity. Therefore, people's efforts to deal with immediate shortfalls in access to food (coping) as well as strategies to adjust to longer term changes in the environment or the climate (adaptation) are part of their livelihood strategies (Maxwell 1998).

A good harvest is the best means of ensuring an adequate supply of food and other essential goods for agriculturists. This in turn is directly dependent on the timely and effective rainfall among other things (Fisher 1997). For pastoralists, livestock is the most important asset and its productivity is dependent on access to forage and water resources. Accordingly, water and forage are the most important resources for pastoralists and changes in their availability greatly influence pastoralists' livelihood security. Access to forage and water resources tends to decrease during a large scale drought with the result that pastoralists lose assets. The value of pastoralists' disposable assets, namely, animals and animal product, determines pastoralists' power to purchase goods. If the value drops to the extent that they can no longer purchase the food they need to sustain themselves, then pastoralists lose their food entitlement and drought turns into famine (Sommer 1998).

2.4 Household Coping Strategies

Although there are differences in households' responses to famine in different areas of the world, there appear to be some identifiable patterns in these responses. The

coping strategies are not adopted in a random or haphazard way. These depend on the resources available to the affected households, current and expected food prices, seasonal opportunities for wage employment and the collection of wild foods among others (Corbett 1988).

Firstly, there are differences between the adaptive or 'insurance strategies' and the 'crisis strategies' (Kebebew et al 2002; Corbett 1988; Jodha 1975). Because fluctuations and moisture deficiencies are a regular feature of the climate, pastoralist and agriculturist households and communities in arid lands have, over the centuries, developed coherent adaptive responses to cope with them. These include movement of livestock to pasture-rich areas where they have kinship ties or tribal bonds, manipulation of herd structure and livestock species (Umrani 2004; Fratkin 2004). Adaptive strategies refer to permanent changes in the way food is acquired or accessed and takes place over a longer time horizon. For example, after suffering a severe drought, pastoralists may diversify their livelihood activities by adopting a mix of agriculture and pastoralism (agro-pastoralism) if it affords them better food and livelihood security (Kebebew et al 2002). 'Insurance strategies' are adaptive mechanisms developed in response to the repeated exposure to the same non-acute risk such as intermittent years of poor harvest for farming families (Corbett 1988). These include, for example, the sale of non-breeding livestock, disposal of non-productive assets such as jewellery for cash, engaging in a mix of agricultural and pastoralist activities so that if one production activity fails the other may come good, bridging adverse periods with loans and obtaining seed and fertilizer on credit (Fisher 1997; Devereux 1993; Van Steenberg 1997).

'Crisis strategies', on the other hand, are developed to cope with unusually severe or unexpected threats to food security resulting in a potential famine situation. These threats to food security may arise from repeated crop failure, disruption of production or marketing by war or harmful price fluctuations due to speculation and hoarding (Corbett 1988). They are useful in the short-run but may not necessarily bring a change in livelihoods. These strategies may also not be economically and environmentally sustainable. Moreover, there are important differences in the options available to different socio-economic groups within a community to respond to food stress due to drought. The most vulnerable groups or households are those who struggle to survive even under normal circumstances. If there is sustained and chronic food insecurity, people may not be able to cope at all i.e. they will have exhausted their coping strategies. This may occur, for example, when pastoralist households lose all of their livestock (Kebebew et al 2002).

The specific coping strategies chosen by the households depend on and vary according to the following factors: i) the sequence of events that led to development of a famine situation; ii) local market conditions; iii) the normal sources of livelihood

of each household; iv) the comparative wealth or resource endowment of the household at the beginning of the drought. These factors tend to determine the options available to the household and prospective viability of a particular strategy. Moreover, the sequencing of household responses will also depend on the magnitude of the commitment of domestic resources involved and the degree to which the response is reversible. Households prefer to respond in a way that allows them to commit the least amount of domestic resources or assets and where the resources committed can be easily reversed or recovered in good years (Corbett 1988; Devereux 1993). Lastly, coping behaviour will also depend on the relative vulnerability of the livelihood system of the households. People in secure livelihood systems will resort to coping strategies only when necessary, as a part of a wider array of risk management. On the other hand, people in vulnerable livelihood systems will seek to use all available options at all times to increase their chances of survival. Within a particular livelihood system, the most vulnerable people are those who struggle to survive even under ordinary circumstances (Davies 1993).

A key component of the coping strategies is how households manage their assets during the drought cycle. These assets include small livestock (goats and sheep), oxen, cattle, personal possessions such as jewellery, radio, etc., agricultural tools and land. The assets can be broadly categorized in two classes. Firstly, there are assets that households acquire during non-crisis years as a form of saving and self-insurance such as small livestock and jewellery. Secondly, the key productive assets that are used for generating income such land, cattle, agricultural implements, etc. (Corbett 1988). However, the distinction between the two kinds of assets is relative and varies between different occupation groups and across different cultures. For example, prime

breeding livestock (cattle and goats) are key productive assets for transhumant herders in arid lands, but they would be self-insurance assets for settled agriculturists in perennially irrigated areas whose key productive assets are the land and the agricultural implements.

Moreover, these assets are also implicated in the system of social-cultural obligations prevailing in a given area or culture. For example, in the 1980s in Ghana, cows were kept for paying bride-price and radios were considered luxuries. This implies that households' management of scarce resources during drought is not based on economic considerations alone. Even under distress, households tend to pursue broader social objectives that relate to maintaining a dignified living according to their cultural norms (Devereaux 1993).

Based on a review of four case studies on droughts in Africa and drawing on the literature on droughts in India, Corbett (1988) classifies the coping strategies described above in three stages. Each stage has distinct responses and important consequences for the present and future survival of the household. Affected people initially rely on the established insurance mechanisms, then gradually dispose of key productive assets and, having exhausted the other strategies, resort to distress migration and may fall into outright destitution (Corbett 1988). In the first stage of drought cycle, households respond by parting with those assets that are stores of value or devices for self-insurance. This is combined with reduced food consumption, gathering wild foods, increasing petty commodity production, etc. They attempt to keep their key productive assets intact for as long as they can. However, if the drought continues, there comes a second stage at which households take the decision to part

with key productive assets. It is usually here that the distress sale of assets occurs which puts the household's livelihood at risk even though it ensures its survival in the present. In addition, the households may also lose assets involuntarily if drought leads to, among other things, increased livestock mortality. In the final stage, households lose virtually all of their assets and distress migration of the entire household in search of relief may be the only option left to them. Table 1 summarize the different stages of drought cycle and the coping strategies that households practice.

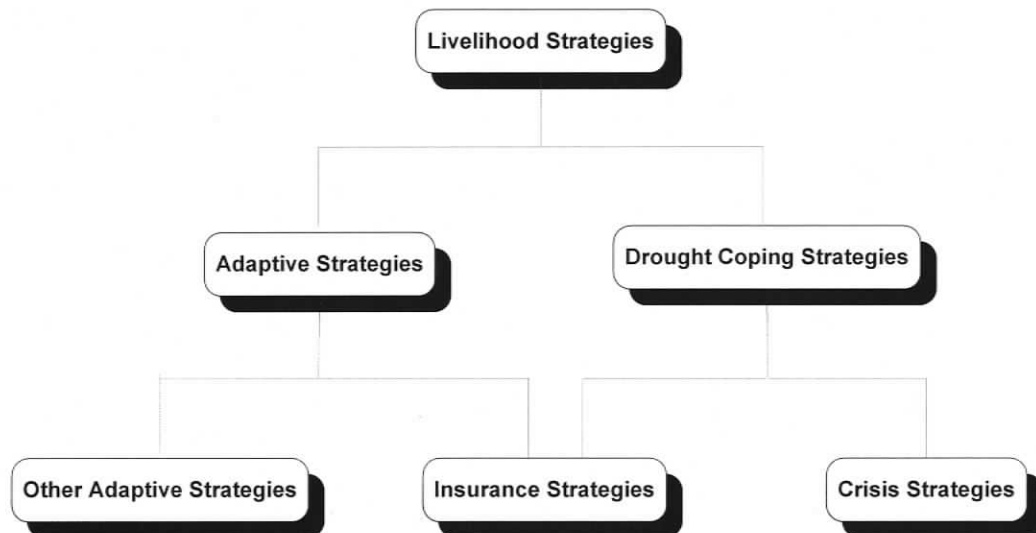
Table 1: The Sequential Use of Coping Strategies

Sequential Use of Strategies	Sample Strategies	Characteristics of Strategies
STAGE 1 Insurance Mechanisms	changes in cropping pattern sale of small livestock reduction in current consumption sale of possessions e.g. jewellery	risk minimization loss management low commitment of domestic resources
STAGE 2 Disposal of Productive Assets	sale of breeding and prime livestock sale of agricultural tools and sale or mortgage of land credit from merchants and moneylenders reduction of current consumption	high commitment of domestic resources
STAGE 3 Destitution	distress migration	failure to cope

Source: Davies 1993 (adapted from Corbett 1988)

In sum, coping and adaptive responses to drought are interlinked and these are part of the livelihood strategies of the affected people in drought prone areas. Initially households may rely on established insurance mechanisms to cope with droughts. These 'insurance strategies' are part of the long-term adaptation to their social and ecological conditions. However, as drought conditions worsen, households are forced to resort to 'crisis strategies' that may not be part of the normal repertoire of their livelihood strategies. Figure 2 provides a conceptual map of coping strategies.

Figure 2: Conceptual Map of Drought Coping Strategies



2.5 Relevance of Household Coping Strategies for Drought Policy:

There are a number of reasons why drought policies pursued by national and regional governments and international relief agencies must take account of and recognize the

importance of household coping strategies reviewed above. Firstly, these reveal the households' primary goals and their rationale in coping with drought as reflected, for example, in their management of assets and control of food consumption. Secondly, this approach helps policymakers to envision households as active drought managers rather than passive recipients or targets of drought policy and enables them to learn important lessons from them regarding the management of drought (Jodha 1990). Thirdly, the assessment of households' capacities, assets and local knowledge allows policymakers to see the larger picture and integrate both the drought relief policy as well as agricultural and livestock development policies more closely with the livelihood activities of the local people (Jodha 1990; Scoones 1998). Lastly, this approach may help reveal the broader social and cultural objectives that most households tend to pursue even during a drought situation such as trying to maintain a culturally appropriate living which may help policymakers to tailor the relief policy to the needs of the affected people (Jodha 1975; Devereaux 1993).

As the review of literature in section 2.4 suggests, coping strategies of affected households are primarily driven by their concern to maintain their sources of income in the foreseeable future even as they struggle with difficult immediate circumstances. Therefore, drought relief policies aimed at the protection of present consumption that are implemented only after the households have exhausted their coping strategies such as sale or mortgage of assets and out-migration may prove self-defeating in the long-run and contribute to the pauperization of the affected households. If policymakers ignore the primary goals of the affected households' coping mechanisms and withhold relief until the agriculturists and pastoralists have completely lost control over productive assets that are the sources of future income, the resulting relief effort is

less likely to restore the livelihoods and facilitate recovery of the households from the effects of drought (Jodha 1975).

Moreover, coping strategies such as households' use of 'insurance strategies' in the early phases of drought, as described in Table 1, and their reliance on assets accumulated in good years suggests that actions and decisions that are taken well before a drought situation develops have important consequences for the welfare of households during and their recovery after the drought. This implies that the policies in critical sectors such as water supply, agriculture and livestock that are pursued in normal years, through their influence on the households' income generation and asset-building activities, can have significant effects on the well-being of households during a drought situation (Jodha 1990). Analysis of coping strategies, therefore, enables policymakers to incorporate agriculturists' and pastoralists' perspectives and insights in the pre-drought policy process which can help reduce the vulnerability of the households to drought related stress.

Since coping strategies are part of the livelihood mix of households, their analysis increases our understanding of the assets, capabilities and local knowledge of the affected people and enables policymakers to formally integrate the drought management policies and the overall framework of socio-economic development being followed (Jodha 1990). For example, if the government builds water storage dams to respond to water scarcity during drought without integrating this policy with the conservation of the rangelands, this policy is likely to be ineffective, because depletion of vegetation cover will lead to mudslides that are likely to silt up the storage dams thereby reducing their effective life. An analysis of coping strategies

may help correct this anomaly in public policy by detailing the effects of drought on rangelands and pointing out ways to arrest this decline.

Lastly, relief policies pursued by national governments and international agencies often fail to notice that households attempt to pursue broader social and cultural objectives even during a drought situation (Devereaux 1993). They tend to focus on households as consumers of food and the non-food and cultural needs of the households do not receive adequate attention. These policies therefore, may come in conflict with the affected households' desire to maintain a culturally appropriate living. For example, it has been often observed that households try to sell part of the foodstuffs received as food aid in the market to obtain cash. This happens because either the foodstuffs are not part of the normal diet of the household and have low acceptability among the affected population or because the households wish to buy other necessities with the cash obtained from the sale of foodstuff. Drought managers erroneously take this to mean that households no longer require a lot of food aid (Reed and Habicht 1998). Analysis of their coping strategies can help correct misperceptions like these by revealing the social objectives of the households and allow policymakers to cater to these in the design of relief policy.

Therefore, analysis of household and community-level coping and adaptive strategies, their dynamics through time and identification of the access of groups or classes of households to the resources essential for the security of their livelihoods is important for the national and regional governments and international relief agencies to prepare for and respond effectively to a drought situation.

3. Methodology

The primary goal of this study is to (re-)construct a narrative of the drought in Nushki District and to infer dominant themes and patterns of drought coping from this narrative that may have important implications for drought relief policy. The secondary goal is to provide a detailed account of the study area and the livelihood systems which would act as a frame or context against which the development of drought conditions and household coping strategies can be analyzed. The study relies on the analysis of secondary data which include government documents, international relief agencies' drought situation assessment reports, nutritional and food security surveys, newspaper reports and meteorological data relating to the drought period 1997-2004 to achieve its objectives. The study employs both qualitative and quantitative methodologies to construct a detailed and reasonably accurate narrative. While a qualitative approach would have been more suitable for a study of this kind, several limitations such as lack of time and financial resources precluded the possibility of a detailed qualitative field study. Nevertheless, qualitative accounts of the events from newspaper reports, field surveys and situation assessment reports are used throughout the study to convey the emic perspective. Accordingly, an effort has been made to evaluate critically both qualitative and quantitative data sources and point out contradictions and possible misstatements where they occur.

3.1 Justification for Adopting a Mixed Qualitative-Quantitative Research Design

A mixed qualitative-quantitative approach is well suited for this study because it allows the researcher to analyse a larger amount of data, enables the triangulation of

data sources to provide a more accurate account of drought conditions, and makes it possible to highlight the significance of different coping strategies without taking away from the analysis of their social-cultural specificity. The available secondary sources on the 1997-2004 drought in Balochistan Province are limited. Therefore, exclusive reliance on a purely quantitative or purely qualitative strategy will have excluded a large amount of data from consideration which could seriously undermine the accuracy of this study. Using data from both qualitative and quantitative sources enables the researcher to construct a sufficiently thick narrative for the analysis of coping strategies.

Qualitative strategies are well-suited to achieve the research objectives of this study because it aims to understand the drought in Nushki District in terms of its meaning to the affected people, trace it as a process taking place in a particular geographical, cultural and ecological context and the responses of those affected by the drought in that particular context. This approach enables the researcher to reveal the meaning of events for participants in the study, understand the particular context within which the participants act, gain an insight into the processes by which events and actions take place and develop an understanding of causal mechanism at local level (Maxwell 1996).

Quantitative strategies, on the other hand, assist in establishing a baseline for comparison between pre-drought and post-drought conditions and thereby provide crucial insights into the emergence of drought conditions and help delineate its effects. In addition, they enable the researcher to understand the differential impacts of drought on households, the patterns of drought coping and the relative importance of

different coping strategies. Meteorological data from climactic databases and satellite images help chart the course of the physical effects of drought as reflected in the lack of rainfall and consequent decline of water and pasture sources. By comparing these data to historical averages, this study is able to ascertain the relative severity of (meteorological) drought. Secondly, these data allow the researcher to compare the effects of drought between rain-fed and irrigated areas and between agriculture and livestock sectors. Lastly, these enable the researcher to outline the broad patterns of drought coping.

3.2 Research Participants and the Units of Analysis

The inhabitants of Nushki District, Balochistan Province will comprise the research population and households will be the primary units of analysis for the purposes of this study. However, the study will attempt to highlight the extent of households' embedded-ness within the communities and tribes where relevant. A household is defined as a group of persons, usually related by blood, who share the same hearth or live in the same premises_ whether they live in a settled dwelling or move their dwelling place seasonally.

Households are the most appropriate units of analysis for this study because important economic, social and political decisions are made in Nushki, and in Balochistan Province generally, at the household level. For example, family members in pastoralist families jointly perform different tasks related to the rearing of livestock: young boys or girls graze the goats and sheep, women milk them, men do the more arduous tasks such as shearing the sheep and slaughtering and flaying the

skins of goats, and older women weave blankets and other articles of use from wool or goat's hair. As a result, members of a household share common experiences and perspectives.

3.3 Sampling Methods

The study only examines the available sources and documents and no primary data collection is involved. However, to the extent that the study focuses primarily on documents, studies and archives dealing with drought affected households and their actions, it may be seen as adopting a purposive sampling approach.

3.4 Data Collection Strategies

The relevant information has been obtained from the analysis of government archives, drought updates of relief agencies and food security and nutrition surveys. While this researcher very much wanted to conduct a field study, it could not be undertaken due to financial and time constraints.

4.3.1 Qualitative Strategies Employed

The qualitative strategies employed in this study include the use of extended quotations and accounts of affected people from the available field surveys and relief agencies' reports, the analysis of newspaper articles and reports pertaining to the drought period and the author's personal reflections and observations on the

local customs and events during the drought period. The study relies on the use of qualitative information from existing field surveys. While majority of these field surveys were primarily quantitative they, nevertheless, contain a wealth of qualitative information gathered in focus group discussions and individual interviews. These relevant passages in these surveys provide detailed accounts of drought conditions as observed by the researchers and drought relief workers and help construct a vivid picture of the drought as perceived by the affected households and communities. Secondly, close to a hundred newspaper articles were reviewed for the purpose of this study and a number of stories and accounts of the affected people have been reproduced from them. Lastly, the researcher has tried to add a personal perspective by bringing his prior knowledge of Baloch culture and the livelihoods of people in Nushki District, and his experiences and observations during the drought period to bear upon the study. The researcher was involved in drought relief activities in Nushki District (then an administrative sub-division of the larger Chagai District) from 2001 to 2003 as District Officer Planning and Finance and as District Revenue Officer.

3.4.2 Quantitative Strategies Employed

Quantitative data form the backbone of this study. These include the results from available quantitative field surveys, precise figures on meteorological and ecological conditions from satellite images and climactic databases, and information from population and agricultural census reports and other government archives. These sources contain data on a number of variables that help describe the livelihood mix of the population, the emergence of drought conditions and their effects on different

occupational groups and in different agro-ecological regions of the district. Most of the data comprises simple statistics, tables and graphs. Table 2 summarizes the different quantitative measures employed to describe the aspects of drought situation and coping strategies in Nushki District.

Table 2: List of Variables Describing different Phenomena/Aspects of Drought

Aspect/Phenomenon	Descriptive Variables
Livelihoods	Distribution of the Labour Force
	Land and Livestock Ownership
	Cropping Pattern
	Distribution of Livestock
Ecology	Historical Rainfall Pattern measured in mm
	Normalized Vegetation Difference Index (NDVI)
	Vegetation Difference Maps
Effects of Drought	1997-2004 Rainfall measured in mm
	1993-2001 Rainfall measured in mm
	Wheat Production (by mode of irrigation)
	Area Sown under Wheat (by mode of irrigation)
	Percentage of Drought-affected areas in 2001
	Damage to Crops in Rain-fed Areas
	Decline in the Number of Livestock
	Decline in the Prices of Livestock during Drought
	Average Current Livestock Ownership and Loss of Livestock per Household 1997-2001
Household Coping Strategies	Strategies for Coping with Food Shortages (Number and Percentage of Households Engaged in)
	Main Sources of Income for Households during Drought (Number and Percentage of Households Engaged in)
	Number of Meals Taken in Past 24 Hours (Number and Percentage of Households)
	Kinds of Food Eaten in Past 24 Hours (Number and Percentage of Households)

3.5 Strategies to Deal with Threats to Validity and Reliability

The traditional positivist measures of validity and reliability employed in quantitative research or variable oriented qualitative research are not appropriate for evaluating this study because it is context and culture specific and the generalization of the study's conclusions to other settings is not its primary objective. Instead it uses a social constructivist definition of validity and reliability more suited to the mixed qualitative-quantitative approach and the purposes of this study.

Validity is defined as the extent to which the data are plausible, credible and trustworthy; and thus can be defended when challenged (Maxwell 1992; Patton 2002). Maxwell (1992) defines three types of validity issues in qualitative research: descriptive validity, interpretive validity and theoretical validity. Descriptive validity refers to the accuracy of what is reported by the researcher such as the events, the objects and the behaviours. For example, that what is reported actually happened. Interpretive validity refers to the degree to which the research participants' views, thoughts, feelings and intentions and experiences are accurately understood by the researcher. Theoretical validity refers to the extent to which the theoretical explanation developed fits the data and is therefore credible and defensible (Maxwell 1992).

This study relies on the author's extended exposure to the research area and direct interaction with the research participants, close adherence to source documents, triangulation of data sources (such as relief agencies' reports and surveys, newspaper articles and agricultural, livestock and rainfall statistics) and reflexivity to ensure that the results are reliable and valid (Maxwell 1992; Ervin 2005). Firstly, as mentioned

earlier, the author has spent an extended tenure in the area and has worked with the local people during the drought situation so that he is familiar with the situation under study in spite of the limited data sources available. Secondly, an attempt has been made to cross-check information and conclusions from different documentary sources such as government reports and drought updates of relief agencies although the study relies more heavily on the latter. Lastly, the study recognizes the author's own position as a member of the culture and area under study and his unique biases as a person interacting with the local people from a position of power as a government officer so that readers can make a better judgment about the study's conclusions.

However, to the extent that the study uses data that are already processed and interpreted by other persons, it is not possible to counter threats to validity as well as would be possible in the case of a field study. Perforce, a weaker standard of descriptive, theoretical and interpretive validity has to be applied.

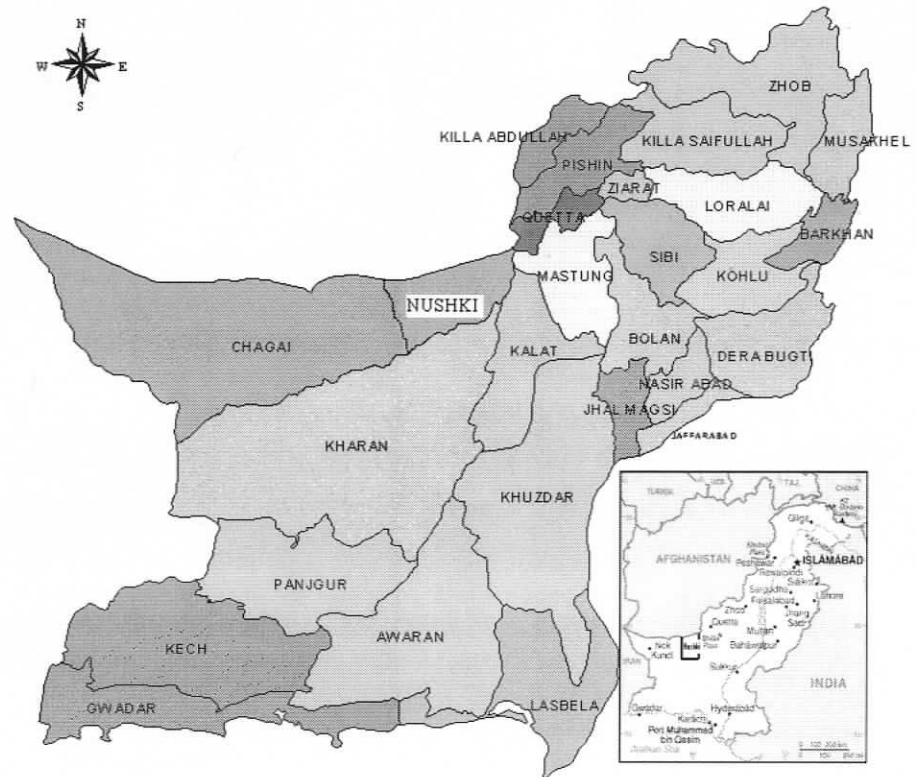
4. Profile of Study Area

4.1 Demography and Social Organization

Nushki district is an administrative unit of Balochistan Province of Pakistan. Located at the western end of the country's border with Afghanistan, the district is bounded on the north by the desert region of Afghanistan called *Registan*, on the east by the Sarlath hill range and Mastung District, on the south by Kharan District and on the west by Chagai District. The area was notified as a separate district in 2003 and was formerly a sub-division of the larger Chagai District. The population of 98,030 individuals is sparsely distributed with an average population density of 7 persons per square kilometre (Government of Pakistan 1998)³. The small urban population, 25% of total, is mainly concentrated in the district headquarter town of Nushki whereas 75% of people live in rural areas. Most people in Pakistan and the international media remember Nushki/ Chagai District as the place where Pakistan conducted its first nuclear tests. Local people in Nushki District, however, consider the nuclear blasts a calamity and many feel that the effects of the nuclear explosions contributed to the intensity of the drought (Maalik 2003; Sharif, M.A. 2000).

³ While an attempt has been made to gather data specific to Nushki district, most studies and surveys refer to the erstwhile Chagai District because Nushki District is a recent administrative creature.

Figure 3: Map of Balochistan Province Indicating Location of Nushki District



Source: Adapted from Government of Balochistan (1998). Nushki-Chagai District boundary has been drawn by the author based on his knowledge of official records and is approximate.

The district is divided into 8 Union Councils. These are elected local governments that manage development activities at the local level. Moreover, the head of each Union Council is also a member of the District Council and casts his or her votes to elect the District Nazim whose function is akin to the Mayor. The District Nazim is elected head of District Administration which constitutes several departments providing social and economic services such as policing, revenue, health, education, public works, provision of drinking water supply, agricultural development and

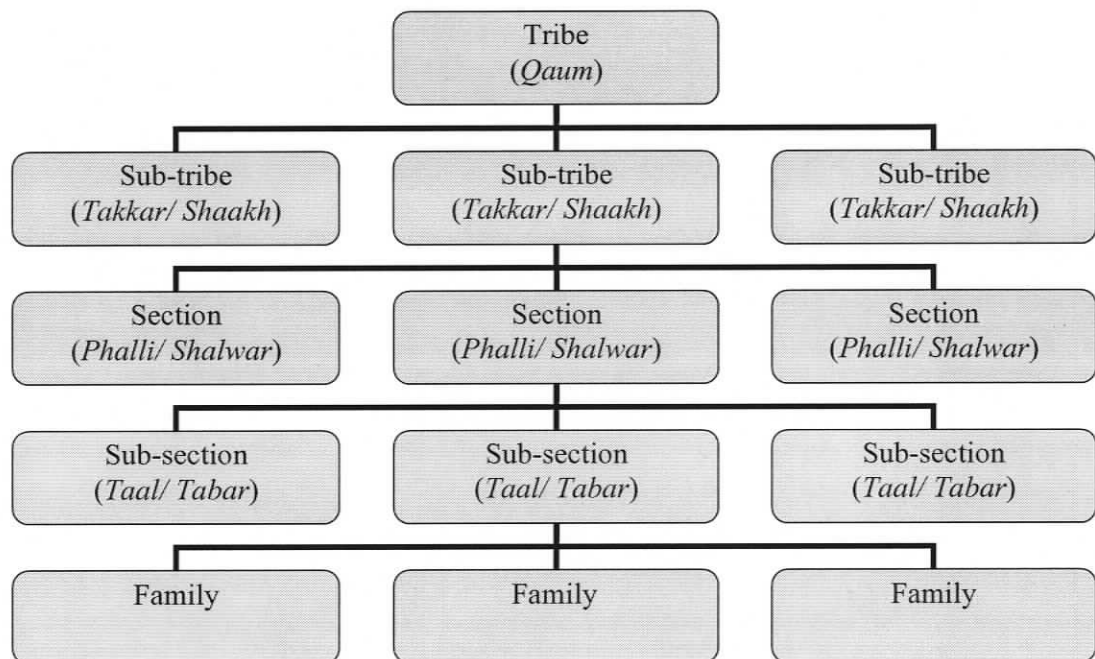
livestock development. He runs the administration of the district and makes policy decisions which are implemented by the government officials in the district. However, this system was introduced in August 2001 and is relatively new. Prior to August 2001, Provincial Government appointed career bureaucrats as Political Agent who were responsible for developmental as well as relief work and local governments had little say in the affairs of the district.

The majority of tribes in the district belong to Baloch, Brahvi and Pashtun ethnolinguistic groups. Among the principal tribes in the district, Mengal, Muhammad Hassani and Sasoli tribes speak Brahui; Badini and Jamaldini tribes speak Balochi; and the Bareach tribe speaks Pashto. Baloch and Brahvi are closer to each other and trace their descent from the same legendary ancestors. Almost all tribes profess Sunni Muslim faith except for a small Hindu community that is primarily engaged in commercial activities in Nushki town. Also a large number of people are bilingual and some, notably the Pashto speaking Bareach tribe, are even tri-lingual (Government of Pakistan 1998). Nushki and the adjoining Chagai district are also home for approximately 53,000 Afghan refugees who migrated during the Soviet invasion of their country and settled here but they are not included in the official census (Islamic Relief 2000). They have put additional strain on the resources and economy of a region that was not very prosperous and well developed in the first place (personal observation in the field).

The majority of the people in the district are organized socially into patriarchal tribes based on perceived lineage from a common ancestor and submission to the authority of the tribal chief. The hierarchical system of authority flows downwards

from the *Sardar* or tribal chief (Government of Balochistan 1998). Each tribe (*Qaum*) is divided into clans (*Takkar/Shakh*) which in turn is divided into sections (*Phalli/Shalwar*) and sub-sections (*Taal/Tabar*) (Buzdar et al 1989; Scholz 2002).

Figure 4: Social Organization in Nushki District



Source: Based on Buzdar et al (1989)

The Sardari system of Brahvi tribes is similar to that of Baloch, but is somewhat more flexible with the power and adjudicative authority of the tribal chief often resting more on inter-personal networks than on formal hierarchy. The tribal system in Nushki District is considerably weaker than that in the eastern parts of Balochistan

Province in that the tribal chiefs no longer retain any political authority but ethnic and tribal identity remains a potent force for both individuals and groups. Nomadic pastoralists, who live away from towns, take the traditional Balochi code of honour (*Mayaar*) more seriously than the people in settled areas.

Moreover, due to the increasing intrusion of external powers and the central governments into the affairs of Baloch tribes from the colonial period onwards (ca. 1872-1972), significant changes have occurred in the tribal system which have generally weakened the traditional authority of the tribal chiefs. To counter this decline in the traditional sources of authority, many tribal chiefs have sought to align themselves with the policies of the various governments and thereby tried to extend their authority by monopolizing the control of elected institutions at the local, regional and the national level⁴. Thus, the tribal chief's role has been altered over the last century from one of defender of tribal independence and upholder of tribal traditions to one of mediator between the tribe and the state (Scholz 2002; Government of Balochistan 1998; World Bank 2003).

This tribal setup has given rise to a variety of mostly kinship based customs of cooperation that are especially strong in rural areas. These include the practice of collective labour (*Ashar* or *Hawachk*) at harvest time or other periods of peak labour needs, the granting of financial assistance (*Bijar* and *Pursi*) to fellow tribesmen in times of need and irrigation committees managed by the villagers (Government of

⁴ In the post-independence Balochistan, this has given rise to a political economy of patronage whereby the local tribal elites seek to align themselves with the government or the political party in power and then channel government funds and development schemes in a way that rewards their political supporters. For example, in the education sector, schools are built for job and profit opportunities: the contract for building the schools are awarded to well-connected individuals loyal to the ruling politicians and teaching jobs and postings are awarded to the political supporters of the local elite (World Bank 2003; Personal observations in the field as District Officer Planning & Finance).

Balochistan 1998; Van Steenberg 1996). These community obligations are met on a reciprocal basis and relatives, lineage, tribesmen and fellow villagers take precedence over the outsiders. These historically evolved institutions have served important functions for the communities in many areas. Flood irrigation systems, entailing construction of minor earth filled dams, were built and rehabilitated by the beneficiary communities - all water users of these schemes contributing labour and funds according to the size of their landholding. Similarly, *karez* management was performed by the beneficiaries by pooling their resources of labour and money in an arrangement variously known as *Gham*, *Mir-i-Aab* or *Sarreshta* (Government of Balochistan 1998; personal observation in the field as District Revenue Officer⁵).

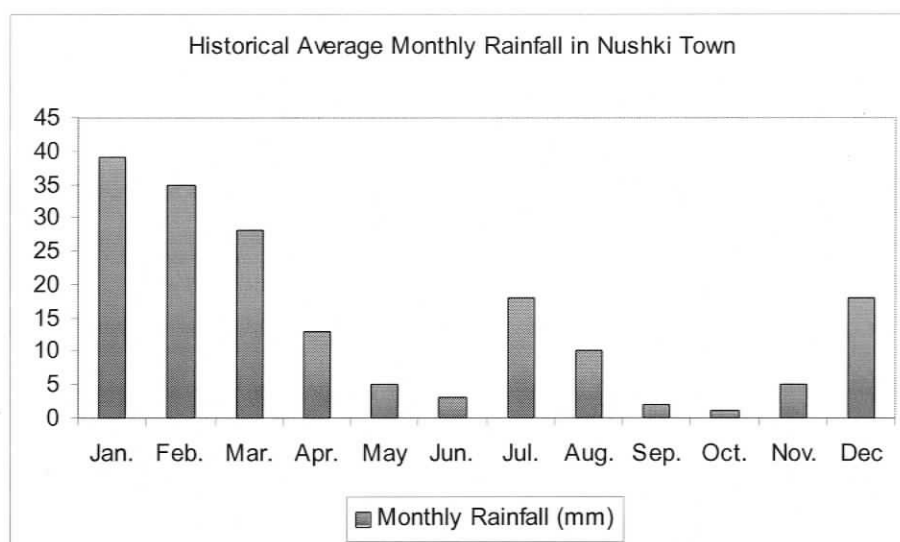
Wheat is the major staple food. *Atta* or whole-wheat flour made into *roti* (bread) is the typical bread consumed with most meals. Pulses are eaten in the form of *dahl* i.e. lentils cooked into a curry. Meals are generally taken three times a day. Breakfast may consist of *roti* and tea or only tea. Tea is usually taken without milk and is called *Qahwa* or *Sulaimani*. Also green tea (*Sabz-chai*) is usually taken several times a day. Lunch is the main meal commonly and consists of *roti* taken with vegetables or meat or pulses cooked in the form of curry. Dinner may be a repeat of lunch with slight variations. Meat is eaten in greater or lesser quantity depending on the relative affluence of the household. On festive ceremonies such as marriages goats and sheep are generally slaughtered to celebrate the occasion. Milk taken is that of goats, sheep and camels. Curd is the basis of most of the food preparations (Government of Balochistan 1998).

⁵Many details of irrigation practices are also contained in the sections of Land Records of Nushki District titled *Rivaj-e-Abpashi* and *Wajib-ul-Arz*.

4.2 Climate, Topography and Ecology

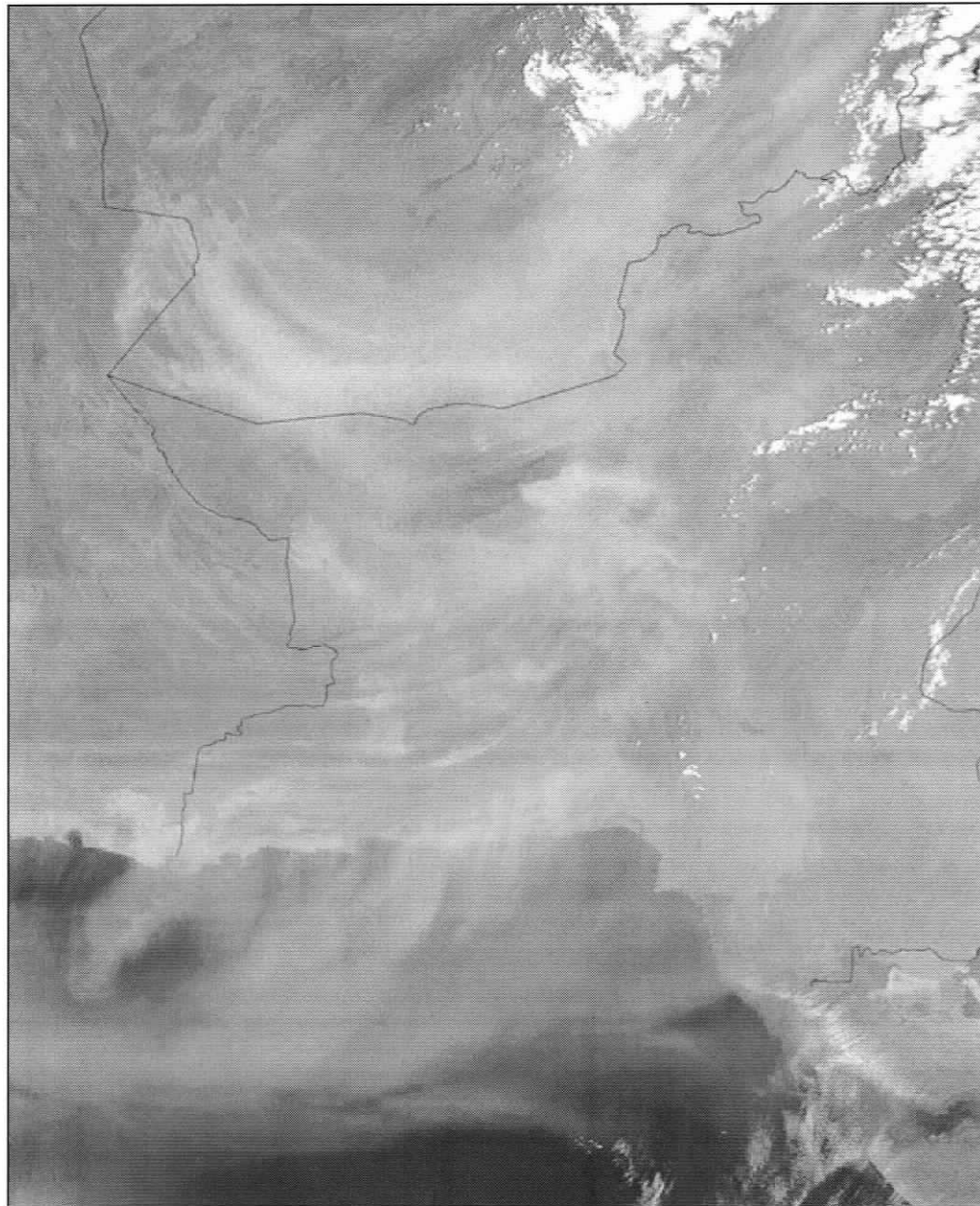
The district falls in the Desert sub-region of Dry Western Plateau agro-ecological zone of Pakistan characterized by low and erratic rainfall (Appendices A & B; Qazi 2004). It has hot hyper-dry summers that extend from April to September with average maximum temperatures of 36.5 °C and cold dry winters with average minimum temperatures of 14 °C and 176 mm of annual rainfall (Appendix D). However, there is large variation in temperatures between summer and winter with summer maxima of 48 °C and winter minima of 0 °C. Most of the rainfall occurs in winter since the region falls outside the monsoon range. Huge dust storms originating from *Dasht-e-Lut* region in Iran or from the *Registan* region in Afghanistan engulf the area in the summer disrupting vehicular traffic, disturbing daily life and causing damage to property and crops (Personal observation and conversations in the field).

Figure 5: Historical Rainfall Pattern in Nushki Town



Source: Based on Data from Weatherbase.com

Figure 6: Satellite Image of Dust Storm over Balochistan Province, Pakistan and Afghanistan

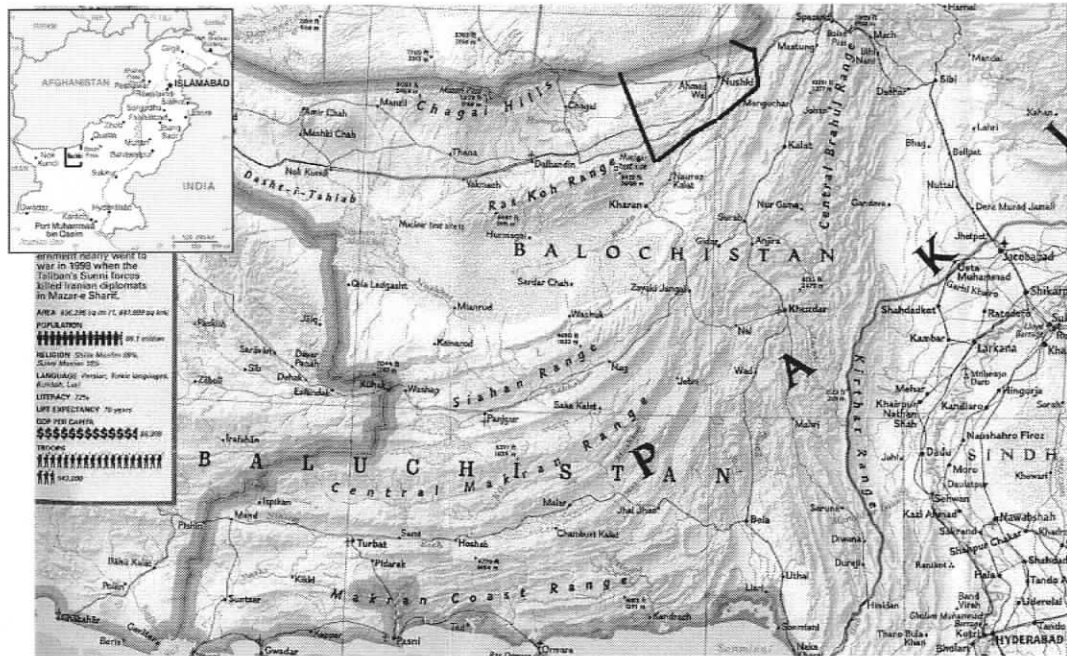


Source: NASA Earth Observatory

(http://earthobservatory.nasa.gov/NaturalHazards/natural_hazards_v2.php3?img_id=12104)

The physical features of the district may be classed broadly under three heads, i.e., the highlands, the plains and a small sandy region (See Figure 7). The highlands comprise the Sarlath range in the eastern portion of the district and the Ras-Koh hills (the highest mountain in the district) on the south-west border. The Daak plain lies from northeast to southwest between Nushki town and Chagai village and consists mainly of alluvial soil interspersed with tracts of sand and intersected by a low range of stony hills known as the Bilau range. This range runs from east to west, from Nushki to Dalbandin. The sandy region comprises an extension of *Registan* into the district on the North and a series of sand dunes traversing the district approximately in the middle and extending in an East-West direction. The soil of the district is moderately coarse textured, excessively drained, highly calcareous and low in fertility (Government of Balochistan 1998).

Figure 7: Topography and Drainage Patterns in Nushki District



Source: Adapted from National Geographic 2001 ((Nushki District boundary drawn by author by hand based on his knowledge of District Land Revenue Records and is approximate)

There are innumerable channels and hill torrents which originate from the mountains and flow during rains. Very little water, however reaches the seasonal lake basin Hamun-i-Lora. The Khaizer or Joo-e-Nushki is the only perennial stream in the district. It had a perennial flow of water before the recent drought which was small during summer but about 5 to 6 m wide during winter. The depth normally is about 30 cm. The other main water body in the district is the Pishin Lora river which has a seasonal flow. The Pishin Lora, known in Nushki as the Bor-Nullah, after passing through Pishin district in Pakistan and Shorawak region in Afghanistan, emerges in the Dak plains of Nushki near Buland Wal and its seasonal flooding is the main source of irrigating the crops in this rain-fed area (Government of Balochistan 1998).

While permanent vegetation is scarce and is to be found only in the beds of perennial streams, the winter rains and intermittent showers produce an abundant albeit short-lived supply of grasses such as White Artemisia (*Artemisia herba-alba* Asso.), *Moger* (*Atriplex Dimprphostegium*), *Kash* (*Sacchorum Siliare*), *Righth* (*Suoeda Monica*), *Shanaluk* (*Allium Rubellum*) in the rangelands⁶ that can provide up to 60% of the nutritional requirement of sheep and goats. Also there are a lot of shrub-like trees such as *Khanjak*, (*Pistecia Khanjak*), *Ghaz* (*Tamarix Articula*) and *Taghaz* (*Haloxylon Amodendron*) and bushes such as *Hashwarg* (*Rhozya Stricta*), *Pog* (*Calegnum Polygonaides*) *Cotor* (*Stockcia Brohinca*), *Lara* (*Salsola Kali*), *Kandar* (*Alhogi Camalorum*), *Barshonk*, *Karwankush*, *Narronk* (*Salsola Arbuscula*), *Tusso* (*Gaillaina Aucheri*) that provide forage for goats and camels (United Nations N.D.; Oxfam 2001). The remaining forage requirement of livestock is met by feeding them on the stalk and stubble of the crops in rain-fed areas and on the leaves, dropped fruit, weeds, etc. from the orchards in the irrigated areas. Because of the variable rainfall and topography of the district, availability of forage differs from season to season and from place to place. This encourages an opportunistic search for pasture among pastoralists (United Nations 2002).

⁶ Rangelands are those lands including mountain slopes on which the native vegetation is predominately grasses, grass-like plants or shrubs.

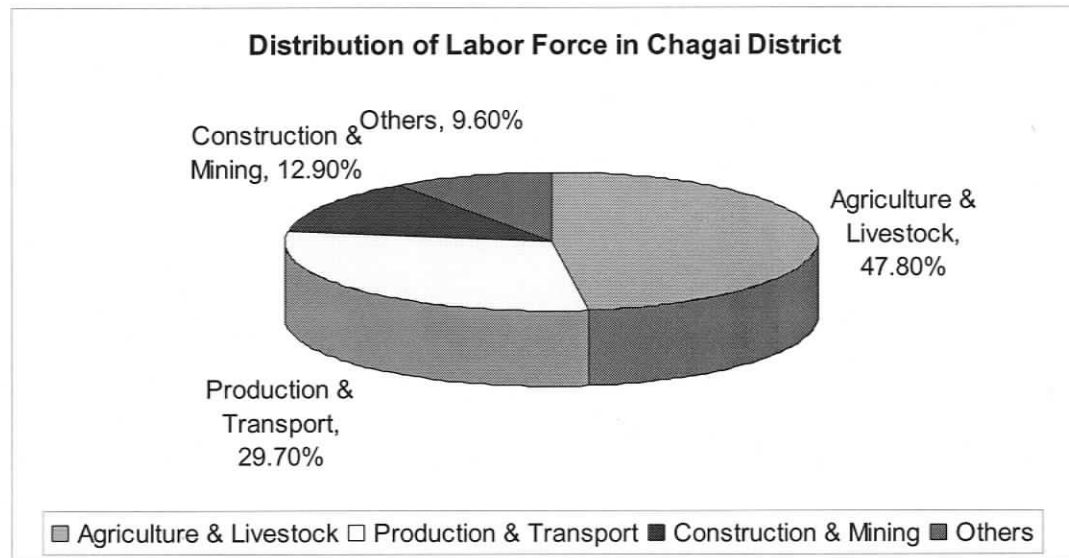
5. Description of Livelihood Arrangements

God is powerful but a sheep is also a mighty being.

(Balochi proverb in praise of livestock)

The majority of the district's inhabitants are dependent on agriculture and livestock rearing, transportation, construction and mining enterprises, and illegal smuggling of goods across the borders with Iran and Afghanistan for their livelihood. Agriculture and livestock rearing is the mainstay of the district's economy. A significant number of people are employed in the transport and construction and mining sectors. However, most workers employed in construction and mining come from outside the district and other provinces of Pakistan. Wheat, barley, sorghum, millet, watermelons and cotton are the major crops. Livestock owners mostly rear small ruminants, sheep and goats of *Rakshani* and *Balochi* breeds that thrive on the seasonal vegetation in the rangelands (Government of Balochistan 1998; Sharif et al 2000). Figure 8 shows the relative distribution of the labour force in the district.

Figure 8: Relative Distribution of the Labour Force in Chagai District



Source: Government of Balochistan (1998)

However, this estimate of the distribution of labour force appears to underestimate the contribution of agriculture and livestock rearing to the local economy. Lukmanji's (2002) survey of agricultural land and livestock ownership gives a better idea of the extent to which households in the district are dependent on agriculture and livestock rearing for their livelihood. Table 3 presents the percentage of individuals who own land and livestock in Chagai/ Nushki District. It is clear from these data that around one third of the people depend on agriculture and three fourths of them depend to some extent on livestock rearing for their livelihood. Only one fifth of the population does not own any agricultural land or livestock and hence does not depend directly on these activities in any way for its livelihood.

Table 3: Household Ownership of Agricultural Land and Livestock in Nushki District

Status	Numbers	Percentage
Agriculture Land	285	35.2
<i>Own</i>	261	91.2
<i>Rented</i>	24	8.4
Any livestock, poultry	606	74.8
Livestock and agriculture	159	19.6
No agriculture or livestock	157	19.4
Agriculture only	91	11.2
No information	50	

Source: Lukmanji (2002)

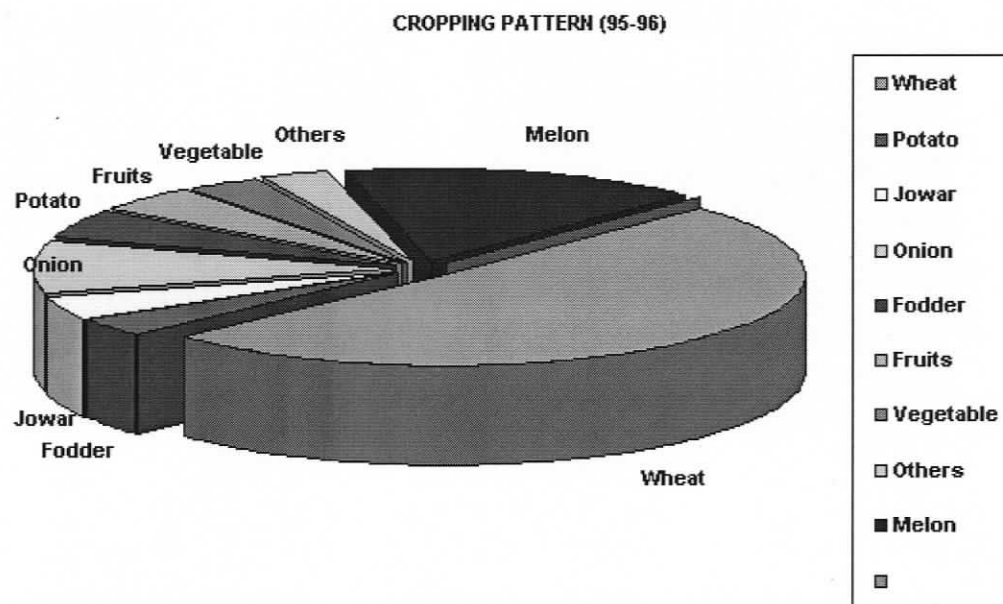
Moreover, there are significant differences between existing studies and surveys regarding the actual distribution of the individuals and households that are employed predominantly in the agricultural, livestock and mixed activities. For instance, Lukmanji (2002), quoted above, suggests that a majority of households are dependent on livestock. Qureshi and Akhtar (2004) on the other hand report that, in the rain-fed areas of the district, about 65% households were engaged in mixed agriculture-livestock activities and only 6.7% and 15.0% households, respectively, were engaged in agriculture and livestock rearing. Although this estimate pertained to rain-fed areas only and there was a gap of one year between the two surveys, given that rain-fed areas comprise the bulk of the district- about 69% of agriculturists engage in rain-fed farming-, there should not be such a large difference in their classification. The most

plausible explanation for this discrepancy is that there is a significant overlap between the livelihood activities of households engaged in agriculture, livestock and related activities in Nushki District. As a result, depending on the context, the same household or individual may have been categorized as employed in agricultural, livestock or mixed activities sectors.

5.1 Agriculture

Along with livestock rearing, agriculture is the mainstay of the district's economy. The major crops grown in the district are wheat, sorghum, vegetables, potatoes, onions, watermelons and fodder. Wheat is the predominant crop grown in the area and it is a source of food and income. Wheat and vegetables are grown in the winter cropping season whereas sorghum, potatoes, onions, watermelons are grown in the summer cropping season. In addition, fruit such as almonds, peach, plum, apple, grapes and apricot are grown on a small scale in the perennially irrigated valleys of Keshingi and Reko. A large proportion is consumed locally and the surplus crop is sold for cash (Government of Balochistan 1998; Lukmanji 2002). Figure 9 shows the cropping pattern in the district before drought.

Figure 9: Cropping Pattern in Nushki/ Chagai District 1995-96



Source: Government of Balochistan (1998)

5.1.1 Methods of Irrigation

Cultivation of crops in the Nushki district is divided into rain-fed or dry-land farming and perennially irrigated cultivation systems. Rain-fed farming depends on seasonal surface water flows from local rains as well as rainfall in the distant catchment area of the Pishin Lora river basin (including areas of Pakistan and Afghanistan). Perennially irrigated farming comprises harvesting of underground water through traditional *karez* water channels and modern electric or diesel operated tube-wells. According to Lukmanji (2002), 31% of the agriculturist households in the district were able to cultivate their lands through perennial irrigation (tube-well/ Karez) whereas 69% were dependent on rain-fed farming.

Rain-fed cropping in turn is sub-divided into *Khushkaba* and *Sailaba* systems of farming on the basis of the method of harvesting run-off water. Under the *Khushkaba* arrangement, irrigation depends on direct rainfall onto the fields or localized runoff from hill slopes within a small catchment area. Water is captured by constructing small embankments or bunds around the field (Van Steenberg 1997). In the larger *Sailaba* or spate diversion system, land is irrigated by diverting seasonal floodwaters and temporary streams carrying water from a large and distant catchment area (FAO 1995). However, the dividing line between the smaller spate diversion systems and some of the larger runoff complexes is often arbitrary (Van Steenberg 1997).

Sailaba or spate diversion irrigation requires the construction of an earthen diversion weir across the torrent with large channels on one or both sides of the river to convey flood water across large distances (Qazi 2004). The site of the weir is usually selected at a point where the gradient of the flood torrent is not so steep that its momentum becomes uncontrollable. The main *Sailaba* diversion structure in Nushki district is constructed across Pishin Lora river a few kilometres from Anam Bostan settlement in Dak Plain and has a command area of several thousand acres (Government of Balochistan 1998).

These diversion structures and the water conveyance system have traditionally been constructed by the beneficiary communities themselves, making use of human and draught animal labour. The communities used to divide the labour contribution towards system development in proportion to the land holding in the command area or their respective water shares. Farmers construct fields by making embankments or

bunds to store the flood water. These embankments are 4 to 8 feet high depending upon the soil type, share in water and various other factors (Qazi 2004).

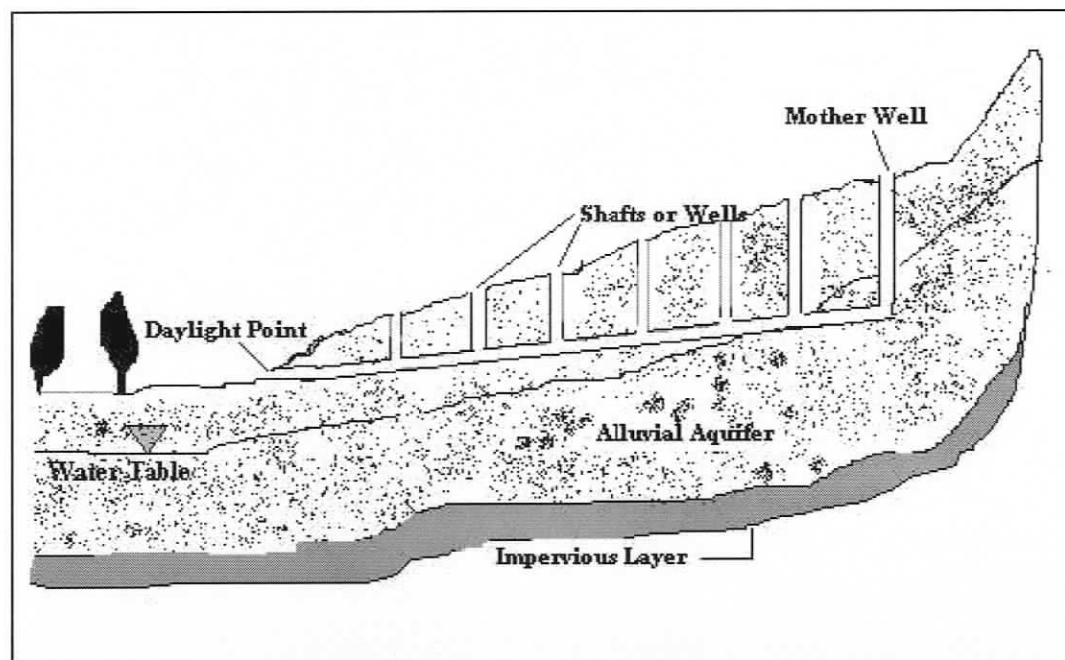
Depending on the amount of water available the *bunds* on *sailaba* land are broken and the water is further diverted to lower lying fields under a water rights system locally called *Sar-e-warkh*. The water rights in the irrigation command area of Pishin Lora are defined along tribal lines: Mengal and Badini tribes have their lands in the upper Dak plain and have the first right to flood waters. After irrigating their fields, they let the remaining waters irrigate the lands of Jamaldini tribe in lower Dak plain. Excess drainage collects in the seasonal lake of Zangi Nawar. Larger flows breach Zangi-Nawar and collect in the Hamun-e-Lora basin near Chagai village (Personal observation, conversations with local farmers, descriptions in the District Land Revenue Records and Irrigation Department Reports).

Winter is the principal crop growing season in rain-fed areas as the district receives most of its rains between December and March. The rains peak in January and February and tail off in April (Fig 2). Water is stored in these fields and crops are sown when fields dry. Soil moisture is also preserved by shallow ploughing, locally called *langhar*. This reduces the soil's exposure to the sun by turning the moist soil upside down (Personal observation and conversations with farmers). The sown crops thrive on the moisture stored in the soil and there is no further irrigation except for the rains, if any occur. The total area that can be cultivated will entirely depend on the total amount and distribution of the rainfall received in a particular season. Heavy rainfall in short periods will damage the system and may result in total loss of the runoff water. In both *khuskaba* and *sailaba* arrangements, crops may need a second

albeit smaller watering in spring to ripen and allow the grains to fill up. They are also very labour intensive (Qazi 2004).

In the perennially irrigated areas, underground water is harvested by tube-wells, hand-dug wells and *karez*s (Figure 10). Under the *karez* system, the groundwater is tapped by hand-dug wells at favorable spots higher on the alluvial fans and led through underground channels to irrigate the fields on the less gravelly lower slopes of the fans or in the plains (Qazi 2004). Due to the lowering of the groundwater level many *karez*s are dry and have been replaced by drilled tube wells that can tap water from lower depths. Main crops are vegetables such as tomatoes, onions, potatoes, turnips; fruits such as pomegranates, etc. but also other crops as maize and fodder are grown (FAO 1995).

Figure 10: Long Section of a *Karez*



Source: Qazi (2004)

Tube-wells have increasingly replaced *karez*s as the main source of irrigation in the perennially irrigated areas. These are of two kinds based on the technology used in drilling the well: open wells dug through human labour, also called dug-wells, (from which water is then extracted mechanically) and machine drilled tube-wells. Powered by electricity or diesel engines, tube-wells extract more underground water than would be possible under the *karez* arrangement, have smaller labour requirement for maintenance than the *karez* and allow for commercially oriented water-intensive agriculture. Accordingly, tube-well owners also tend to practice wage-labour tenure as opposed to share-cropping more often than other farmers. However, more traditional land tenure arrangements like share-cropping continue to be employed. The incentives offered by government in the form of subsidized drilling and fixed monthly electricity rates have made these very attractive for individual farmers although their consequences for water conservation and social cohesion have been disastrous (Qazi 2004; Choudhry 2002).

5.1.2 Land Tenure

The land tenure arrangement practiced on majority of lands employing *sailaba*, *khuskaba* and *karez* irrigation is share-cropping and self-cultivation. The tenancy arrangements are mainly of two kinds: regular tenants (*bazgar tabi-marzi*) and owner-tenants (*bazgar lathband*). The former kind of tenants (*bazgar tabi-marzi*) must surrender half the produce of standing crop to the landowner, do not have title to land or any say in its sale and can be expelled from the land on charges of felony. The latter type of tenants (*bazgar lathband*) only give one fifth of produce of the standing

crop to the landowner, must be consulted by the landowner before sale of the land and cannot be expelled from the land unless it is proved that they have wilfully not cultivated the land for several years (Personal observation and District Land Revenue Records). This latter tenancy arrangement is commonly practiced on land irrigated by the *khushkaba* method and appears to be a cultural hedge against the flight of labour from the area which may jeopardize the operation of the dry-land farming system (Van Steenberg 1997)⁷.

5.2 Pastoralism

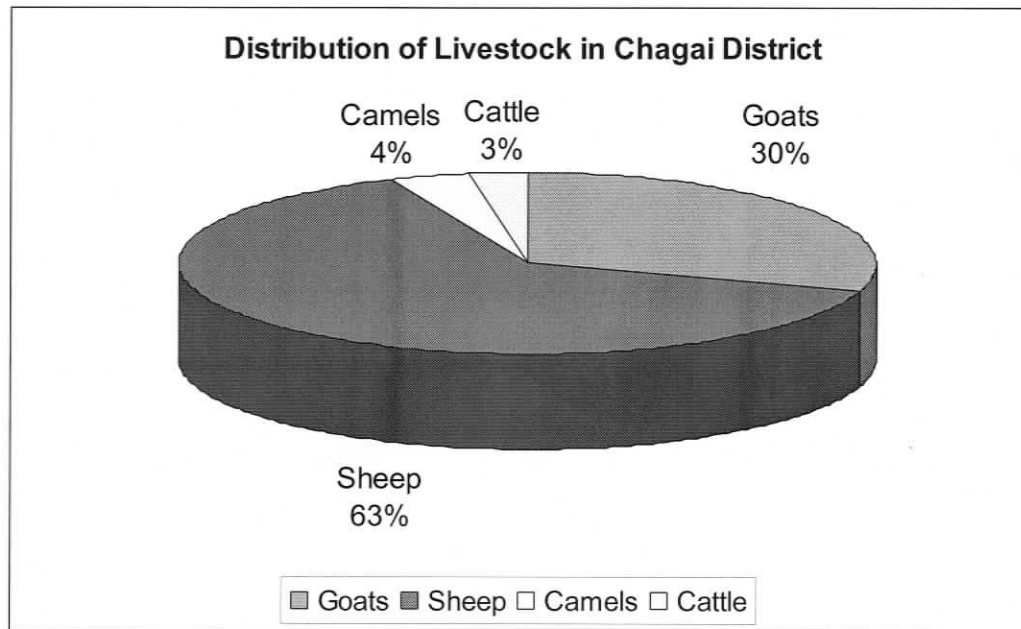
A large number of people in the district practice varying degrees of *pastoralism*, namely, raising of livestock on open ranges and 'natural' pasture as opposed to their rearing on a ranch or farm or around fixed feeding stalls (Salzman 2005)⁸. In the vernacular language they are called *Maaldar*. They are distinguished from the agriculturists who are called *Zamindar*. However, in actual practice, crop raising and livestock-rearing form two ends of a continuum of livelihoods (Personal observations in the field and conversations with the local farmers). According to official records, there were 278,782 heads of goats, 195,716 heads of sheep, 26,493 heads of camels and 2,649 heads of cattle in Nushki and Chagai Districts in 1996 (before the onset of

⁷ This practice appears to be related to the development and differentiation of the pastoral economy in Balochistan. A wealthy transhumant pastoralist would entrust the care of his lands in Nushki to a destitute person, who did not own enough animals to undertake the yearly migration to the plains of Kacchi, and the owner would claim his share of the produce, usually one fifth of the standing crops, upon return from the plains back to Nushki (Bonfiglioli 1995).

⁸ There is significant debate in the relevant literature over the precise definition of the term 'pastoralist' and its sub-categories. Salzman (2005) reviews some of these debates and Bonfiglioli (1995) discusses its sub-categories as they relate to Balochistan. In any event, these terms are mere simplifications of a complex and dynamic reality and it is difficult to delineate the exact lines dividing the various livelihood systems and their sub-systems (Bonfiglioli 1995).

the drought). As Figure 11 shows, the majority of the livestock owners are dependent on small ruminants (goats and sheep) and camels for their livelihood.

Figure 11: Relative Distribution of Livestock in Nushki/ Chagai District



Source: Oxfam (2001)

The animals are raised for multiple purposes. These include: obtaining milk and milk products such as butter, yogurt (*lassi*) and cheese (*panir*); meat for own consumption; wool and mohair for use in making rugs, bags, ropes, etc.; hides for making domestic containers (*mushk*) and shoes (*chawat*); and sale or barter of animals for getting cash or obtaining other necessities such as grain in kind. Some people, mostly in irrigated areas, also raise cows for milk purposes. Camels are raised for

farming and transportation purposes (Government of Balochistan 1998; Buzdar et al 1989). Donkeys and mules are also used as pack animals.

The livestock owners' goal is to maintain or increase the size of their flocks rather than increase income. They usually sell male animals or the infertile animals for obtaining cash and try to preserve the breeding and lactating female animals which provide them with milk and increase their flock size through calving (Mahmood and Rodriguez 1993; Buzdar et al 1989).

5.2.1 Grazing Practices

Pastoralists practice various grazing arrangements including sedentary agro-pastoralism, short-range nomadism and long-range transhumance (Scholz 2002; Muhammad 2002; Buzdar et al 1989)⁹. Short-range nomadic and long-range transhumant pastoralists own larger livestock herds than agro-pastoralists because they are highly mobile and, consequently, are able to draw on pasture and water resources in distant areas. On average, transhumant pastoralists (*Maaldar*) owned a herd of 203 goats or sheep per household whereas sedentary agro-pastoralists owned a herd of 137 sheep or goat per household in Nushki District before the drought (Lukmanji 2002).

Sedentary agro-pastoralists are basically agriculturists who own a sizeable number of animals as well. The erratic conditions of rainfall and seasonality of vegetation

⁹ There are no true nomads among the Baloch and Brahvi tribes in Nushki District. However, some Afghan nomads, locally called *Powindah*, pass through and camp in Nushki District together with their animals on their way to the plains of Kachhi and Sindh.

noted above do not allow many farmers, especially those in the rain-fed areas, to rely on crop-production as the sole source of their income. Farmers keep goats, sheep and camel as an insurance or hedge against the risk of crop failure, as a form of saving and investment, and as a source of supplemental income. There is a two way interaction between livestock raising and crop production: crop residues such as stalks, stubble and straw are an important source of feed for livestock; the livestock, in turn, provide draft power, for example in ploughing and levelling the fields, and manure for crop production. They graze their animals on their own fields or within a very small radius of the settlement where they live (Aujla et al 1998; Buzdar et al 1989).

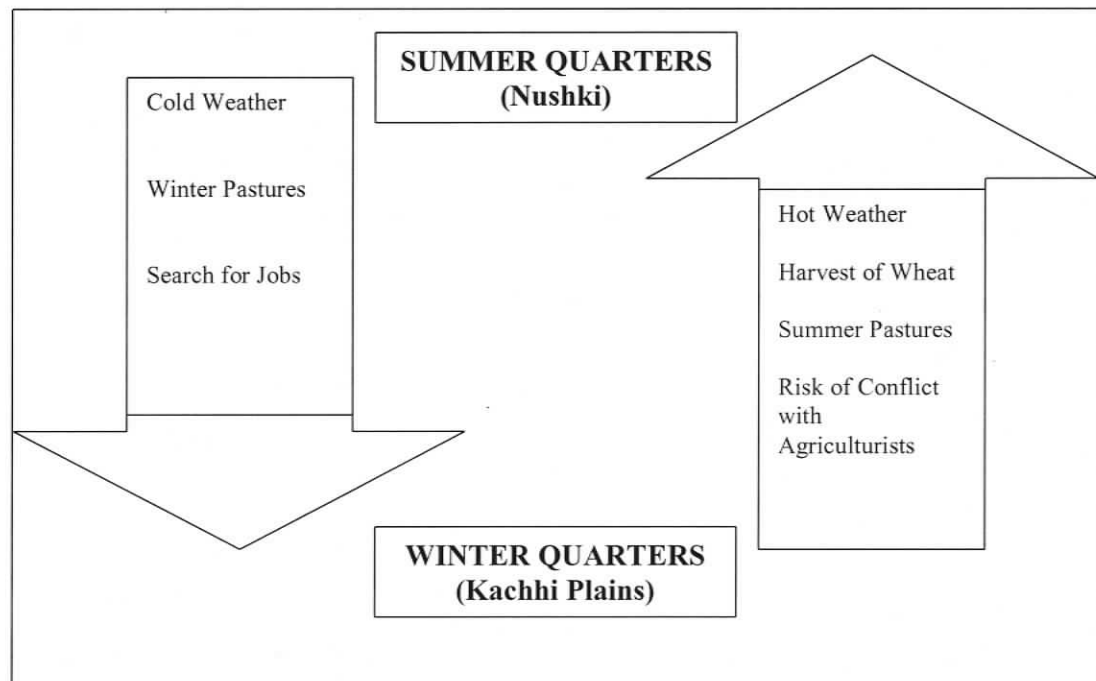
Short-range nomadic pastoralists keep moving within the district and adjoining areas from one waterhole to the other in an opportunistic search for pasture¹⁰. While they also engage in raising crops on a small scale, mostly as tenants or hired labourers, it is insufficient to meet their needs (Government of Balochistan 1998; Buzdar et al 1989).

Long-range transhumant pastoralists, on the other hand, take their animals to the far away Kachhi plains (comprising Bolan and Sibi districts) in Southeastern Balochistan. They traverse the huge intervening mountain ranges in search of rangeland during winter and bring their livestock back to Nushki in spring. With the improvement in the road network in recent years, well-to-do pastoralists now hire tractors, heavy trucks and pick-up trucks for transporting their animals and belongings. Pirkani and Muhammad Hassani are two prominent tribes in Nushki who engage in transhumance. They stay in the plains for 4-6 months where they either work as tenants or they rent

¹⁰ This could also be called short-range transhumance but the term 'short-range nomadism' is used to distinguish it from regular transhumance.

the land from local landowners to feed their livestock in return for a small fee. The timing of their return to the highlands coincides with rainfall in Nushki. As soon as they receive news of rainfall in the highlands, they embark on their return journey with the purpose of working on the land, tending to crops and taking advantage of the favourable grazing conditions (Muhammad 2002; Buzdar et al 1989; Bonfiglioli 1995)¹¹. Figure 12 illustrates the pastoralists' reasons for seasonal transhumance.

Figure 12: Pastoralists' Reasons for Seasonal Transhumance



Source: Bonfiglioli (1995)

¹¹ There is a political background to the pastoralists' winter transhumance to the plains of Kacchi whose detailed discussion is beyond the scope of current study. The Brahui tribesmen of central highlands and the western plateau were granted rights to the ownership of lands in the plains of Kachhi by Nadir Shah, the ruler of Afghanistan, in 1739 in return for their assistance to him in a military campaign against the native Baloch and Jamot residents of the plains. The practice of winter transhumance, establishing camp and cultivating the lands in Kachhi plain followed this (Bonfiglioli 1995).

The main difference between short-range nomadism and long-range transhumance is that with the first type there is no fixed pattern of movement and with the second there is a seasonal pattern of movement along historically evolved, well-defined routes and semi-residence in the south-eastern plains of Bolan and Jhal Magsi districts. Among most tribes and sub-tribes there is a permanent area of residence or camping in the plains of Bolan district¹² (Bonfiglioli 1995).

5.2.2 Culturally Specific Uses of Livestock

While the livestock are an economic good, they are heavily implicated in the day to day social and cultural obligations of the households and communities in Nushki District. The local communities use them as a yardstick for measuring the relative prosperity and the status of a household in the village. Well-to-do families are recognized by the number and size of the livestock herds they own. People consider a household with the maximum number of livestock in the village richer irrespective of the 'value' of the animals owned (Oxfam 2001). In addition, goats and cows are used as sacrificial animals on the occasion of the Muslim festival of *Eid-ul-Adha*.

Moreover, the animals are used as a form of currency to pay debts, to contribute one's share to a social obligation such as at a wedding feast or in paying bride-price (*Lab*). They are also used as collateral to obtain credit. They are loaned to one's kin and tribesmen who have lost their animals due to a natural calamity or a personal tragedy. Animals may also be loaned to establish and strengthen family and clan ties

¹² However, the pastoralists' original residence within Nushki district is more permanent than the other residence.

and to secure the support of one's tribesmen. In this way, livestock are part and parcel of the reciprocal social arrangements of the pastoralists (Buzdar 1989).

5.3 Conclusion:

A number of themes emerge from the description of livelihood systems in Nushki District. Firstly, livelihood diversification is a key element of the survival strategies of agriculturists and pastoralists in Nushki District. There are a number of ways in which households in Nushki District diversify livelihoods: by adopting a mixed agro-pastoral livelihood and by switching between agriculture and livestock rearing. Many households combine farming with raising a sizeable number of livestock and thereby take advantage of complementarities between agriculture and livestock rearing¹³. On the other hand, transhumance pastoralists, especially those with fewer animals and smaller or less fertile landholdings, have flexible livelihoods in that they take advantage of the work opportunities in the agricultural sector and the grazing opportunities offered by favourable climactic conditions in the upland Balochistan and lowland Kacchi plains to make a living.

Secondly, mobility within their area of residence in Nushki and between Nushki District and the southern plains of Kachhi and Sindh is an important element of the economic survival of pastoralists, and agriculturists, especially those who do not own enough land and have to work as tenants on other people's lands. Short-range nomadism allows pastoralists to access water and forage resources in the immediate

¹³ A very common example is the grazing of livestock on the stalk and stubble in a wheat field or on dropped leaves or fruit in an orchard. The livestock get extra feed to supplement their grazing on the rangelands and the manure of livestock increases the fertility of the wheat field or the orchard.

vicinity of Nushki District which would not be available otherwise. Seasonal transhumance allows them to take advantage of favourable conditions for grazing and to avail employment opportunities in both Nushki and the Kachhi plains.

Lastly, cultural mechanisms such as informal¹⁴ tenure arrangements, customs of cooperation (*bijar, pursi, hawachk*), rules pertaining to the operation of spate irrigation (*sailaba*) and *karez* irrigation systems have played an important, albeit declining, role in the livelihoods of agriculturists and pastoralists. These arrangements draw on and reinforce the cultural values of fidelity and loyalty to one's lineage and hospitality to all cherished by the communities.

Following Van Steenberg's work elsewhere in Balochistan Province, I will argue that the occurrence of these themes is not a coincidence (Van Steenberg 1997). They reflect, among other things, the adaptation of communities in Nushki District to climactic and ecological variability and to the recurrent risk of crop failure or depletion of livestock herds. As Qureshi and Akhat (2004) report, there is a risk of crop failure every 2-3 years in rain-fed areas of Nushki District¹⁵. In such an uncertain environment it makes sense to have diversified livelihoods and collective self-insurance mechanisms that will reduce the likelihood of the total collapse of a household's economy in the event of external shocks such as poor or untimely rainfall, floods or from having to meet heavy social obligations arising on account of tribal disputes.

¹⁴ Informal mechanisms refer to those institutions or arrangements that are not recognized formally by the government or protected by statute.

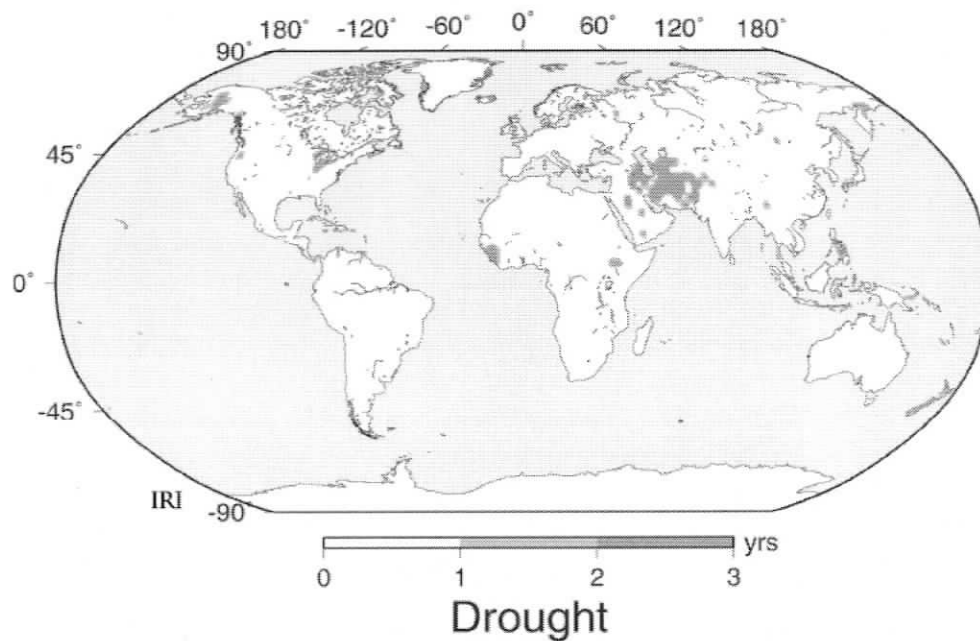
¹⁵ Qureshi and Akhtar (2004) conflate this phenomenon of routine crop failure or poor harvest with drought which, as defined earlier, is a long-run phenomenon involving repeated crop failures.

6. Effects of Drought

6.1 Chronology of (Meteorological) Drought:

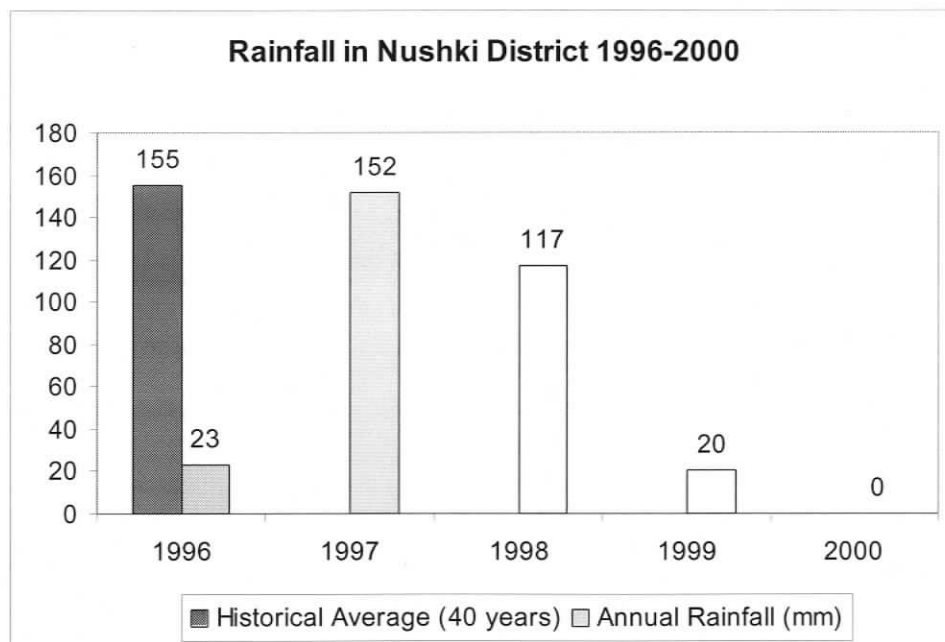
From 1997-2004 Balochistan Province, Pakistan and many other parts of Southwest Asia suffered a prolonged dry spell during which annual precipitation was drastically reduced. This precipitation deficit was related to “large-scale variations in the climate across the Indian and the Pacific Oceans, including the recent ‘La Nina’ in the eastern Pacific” (Agarwal, Barlow, Cullen and Lyon 2001). Figure 13 shows the global extent of the dry spell. Nushki District, Pakistan, was one of the most severely affected areas (UN 2001). Appendix C shows the relative intensity of drought in different districts of Balochistan Province. The initial onset of drought conditions can be attributed to the rainfall deficiency over the period 1993-2000 compared to the long term historical average for Nushki District in the last 40 years. Appendix C shows that there were six years of poor rainfall in the eight year period 1993-2000 (UN 2001) and Figure 14 shows that rains were below normal throughout the five-year period 1996-2000.

Figure 13: A Global Perspective of the Intensity of Drought (Number of Consecutive Years till 2001 with High Precipitation Deficits)



Source: Agarwal et al (2001)

Figure 14: Rainfall Deficiency in Nushki District 1996-2000



Source: UNDP (N.D.)

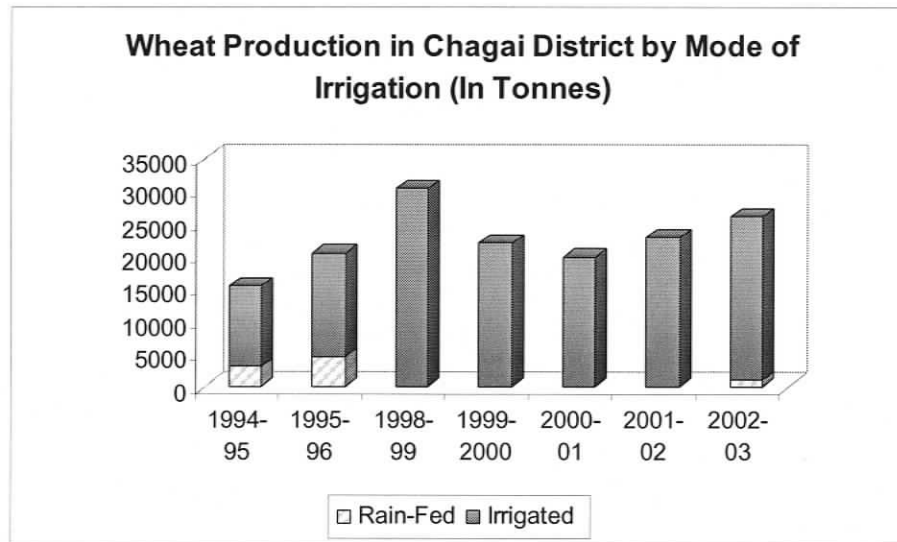
Detailed analysis of monthly rainfall data from US National Climate Data Center (NCDC) reveals that during the twelve year period 1993-2004 there were 35 months of below normal rainfall out of the 48 winter months from December to March- the principal crop growing season in the district (Appendix E). There were no rains at all in the year 2000. Also while some rains occurred in the local area as well as the catchment area of Pishin Lora stream, notably in 2003, these came too late and fell in a relatively short and intense burst. The resulting flow of run-off water breached and washed away the field embankments that were already brittle and weak from continuous dryness and the lack of maintenance (Author's personal observations in the field). This situation continued till the return of normal rains in January 2005.

6.2 Effects of Drought on Agriculturists

As a result, livelihoods of agriculturists and agro-pastoralists, especially in rain-fed areas of the district, were severely affected. Almost no crop of wheat, sorghum (*jowar*) and millet (*bajra*), the staple grains, could be raised on the rain-fed lands from 1998-2003 and grain production in the *karez* and tube-well irrigated areas was significantly reduced (Government of Balochistan 2000; Government of Balochistan 2001; Government of Pakistan 2003). Farmers also lost their livestock because there was no fodder to supplement the feed of the animals¹⁶. Figures 15 and 16 show the decline in the cultivation and output of wheat, the major food crop in the district.

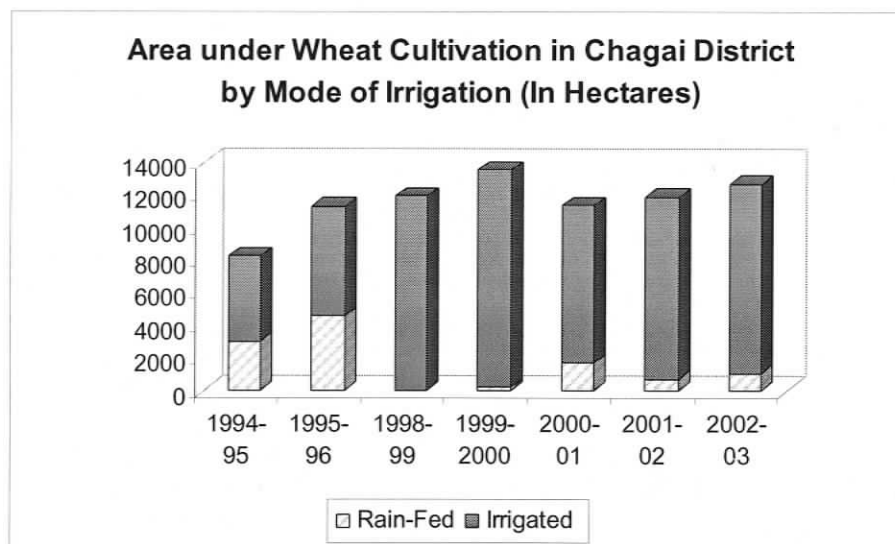
¹⁶ As noted earlier, most agriculturists also raise a small number of sheep and goat to supplement the income from farming and to obtain milk and milk products.

Figure 15: Changes in Wheat Output from 1994-95 to 2002-03 (excluding 1997, 1998)



Source: Data from Government of Balochistan (2000), Government of Balochistan (2001) and Government of Pakistan (2003)

Figure 16: Changes in the Area under Wheat Cultivation from 1994-95 to 2002-03 (excluding 1997)



Source: Data from Government of Balochistan (1998), (2000) and (2001)

This is also corroborated by an account of Red Cross relief workers' discussion with a village elder in Daak area:

“‘I had fields of watermelons this big’, he gestures with his arms, “and Yaseen here, had apple orchards,’ he motions to his friend. ‘But now we have nothing left.’ ” (Maalik 2003)

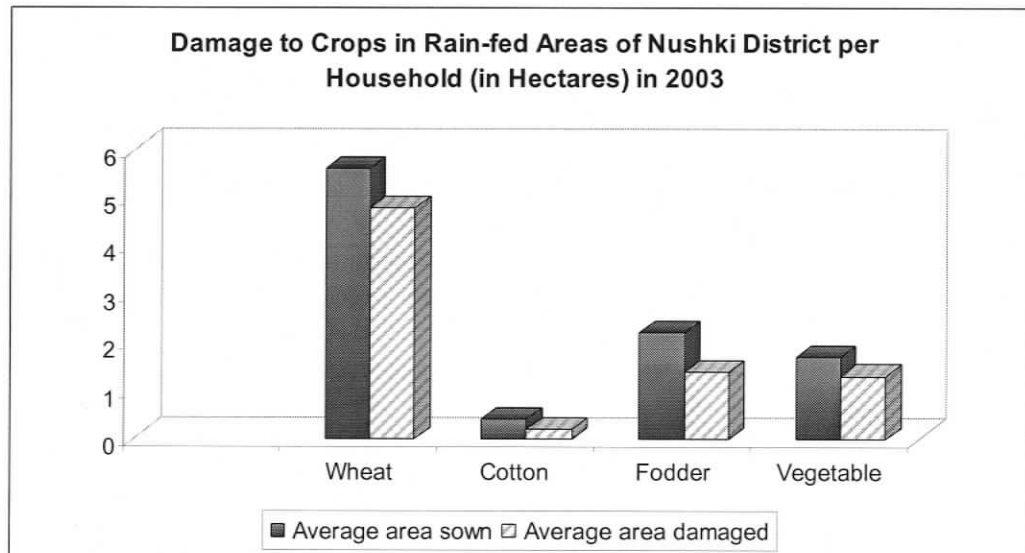
The relatively small differential in overall wheat production in the drought years should not mislead us regarding the actual effect of drought on the livelihoods of people in the agriculture sector. Most of the irrigated wheat production is concentrated in a few pockets in the district, predominantly in Mall and Keshingi Union Councils and around the town of Nushki¹⁷. The lands in these areas are irrigated by tube-wells which are owned by wealthy and politically influential landowners rather than the community. On the whole, out of the households which owned any agricultural land in the district, only 31% of household were able to raise any crops on their land (Lukmanji 2002; Researcher's personal observations as District Officer Planning and Finance).

These data clearly show that the severity of the drought was different in rain-fed and perennially irrigated areas of the district. Figure 16 shows that while the area under cultivation for wheat was drastically reduced in rain-fed areas of Nushki, the area under cultivation in irrigated areas shows a slight increase. Similarly, Figure 15 shows that the production of wheat was almost negligible in rain-fed areas whereas in

¹⁷ This can be seen as a case of faulty or inappropriate application of agricultural technology. Nushki district, in general, is water-deficient with only a few pockets of water-surplus areas along the valley bottoms and slopes of mountain ranges. However, government's agricultural policy focuses on these few areas to the neglect of the large areas of the district that depend on rain-fed agriculture.

the irrigated areas there was a relatively small decline in production. This conclusion is also supported by the results from Qureshi and Akhtar (2004)'s field survey in Balochistan¹⁸. It reports that out of an average of 5.6 hectares of wheat sown per household in rain-fed areas, 4.8 hectares did not produce any harvest. This means that on average a household in rain-fed area had no harvest on 86% of the areas they had sown. Figure 17 shows the damage to crops per household in rain-fed areas of Nushki District.

Figure 17: Damage to Crops in Rain-fed Areas of Nushki District per Household



Source: Data from Qureshi and Akhtar (2004)

Moreover, data in Table 4, which shows the relative severity of drought in different Union Councils (municipal jurisdictions) of the district based on the assessment of District authorities in Nushki District in 2001, suggest that the most severely affected

¹⁸ The field survey covered 10 villages in Balochistan Province out of which 8 villages were located in Nushki District and two in Pishin District. All the rain-fed villages were located in Nushki District (Qureshi and Akhtar 2004).

areas in the district were those that were rain-fed or had a mix of rain-fed and irrigated cropping systems such as Keshingi and Daak.

Table 4 Drought Affected Areas in Nushki District

Union Council	% area affected in 2001
Daak	100
Keshingi	80 – 90
Nushki	40 – 50
Mal	20
Reko	35

Source: Lukmanji (2002)

6.3 Effects of Drought on Pastoralists

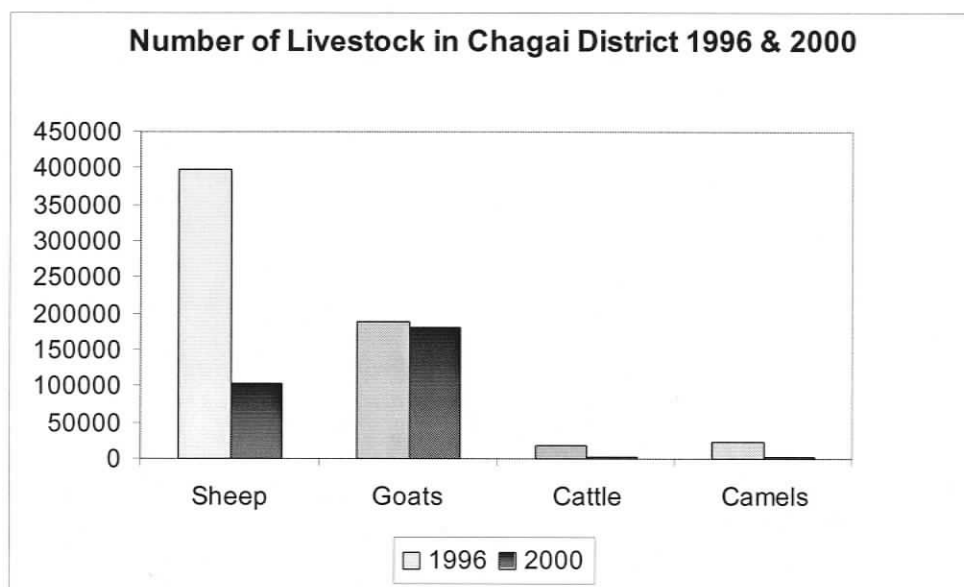
The dry spell also had a devastating effect on the vegetation in the area. Analysis of satellite maps of vegetation from FAO/SPOT-3 suggests that, taking the month of April 1998 as the base, there was progressive decline in vegetation in Nushki District from 1998 to 2000 (Appendix G). Similarly, analysis of the monthly Normalized Difference Vegetation Index (NDVI) for 2003-2004 suggests that the vegetation cover in the area was lower than the long-term historical mean (Appendix F). Moreover, a drought assessment team fielded by the United Nations in June 2000 noted that in the most severely affected districts in Balochistan Province, including Nushki District, whatever little vegetation remained on the rangelands, had dried up due to the very high temperatures and had thus become unpalatable for livestock (UN 2000a).

6.3.1 Malnourishment, Diseases and Mortality:

The loss of vegetation coupled with the decline in animal fodder from agricultural sources meant that even the minimal forage/ feed requirements of the livestock could not be met. As a result, the animals became malnourished and weak. This led to a progressive increase in disease and death in the livestock population and a decline in the fertility of breeding animals¹⁹. Among the livestock population in most drought affected areas of Balochistan Province, including Nushki District, two breeding seasons (2001 and 2002) had been completely lost because of low fertility as the breeding female animals could not conceive due to shortage of pasture and poor health. Some livestock owners went to the extent of sharing their own bread with the animals in order to save their breeding animals but to no avail (UN 2002). According to some livestock owners, due to shortage of vegetation 80% of their livestock including goats and camels either perished or they sold them at very low prices. The average size of sheep and goat herds per household declined from 1-200 before drought to 1-50 (Lukmanji 2002). For instance, one livestock owner from Daak area in Nushki reported in 2001 that he owned a herd of more than 400 animals three years ago, but now only 10 animals were left. Overall, the entire livestock population in the district was affected by the drought and about 180,319 heads of livestock perished in Nushki/ Chagai District from 1996 to 2001 (Oxfam 2001). Figure 18 shows the official data on the reduction in the number of livestock in the District.

¹⁹ The livestock mainly suffered from liver-fluke and lung-worm diseases (Oxfam 2001)

Figure 18: Livestock Mortality in Nushki/ Chagai District 1996-2000 (Total Number)



Source: Oxfam (2001)

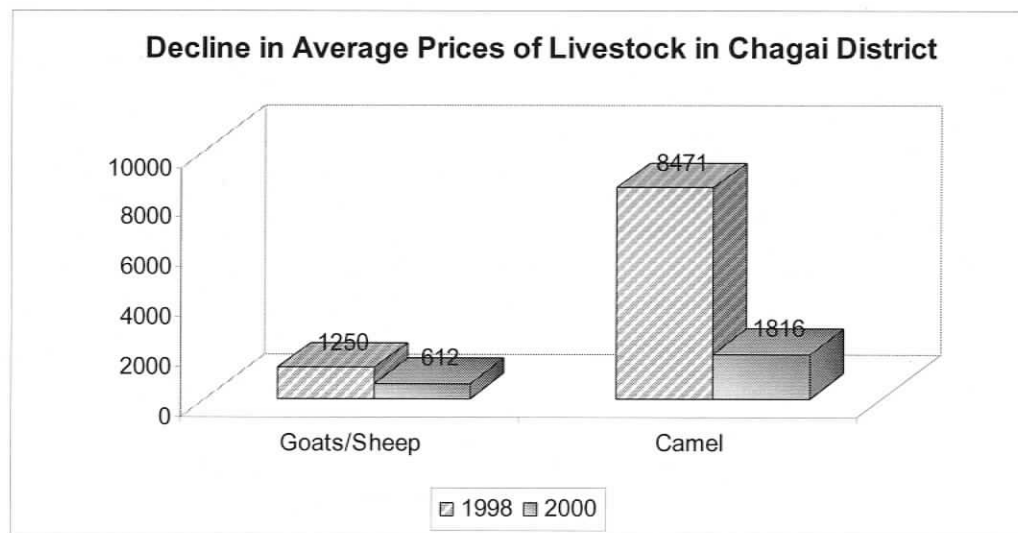
The plight of pastoralist households is corroborated by the account of Red Cross relief workers in Nushki District who saw groups of up to 100 families gathering around the one well. They had lost all their livestock apart from a few camels, goats and sheep. In normal circumstances, this number of animals would provide sustenance to only two or three families but now a 100 families depended on them (Long 2003).

6.3.2 Decline in Prices:

Malnutrition and disease also led to reduction in the live weight of animals which is the chief determinant of their market price in Balochistan (Rodriguez et al 1995). The

resulting fall in market prices significantly reduced the income of pastoralist households. Figure 19 shows the relative decline in the prices of livestock during the drought. People were forced to sell their livestock on such a low price because they had no other means to fulfill their food needs²⁰. The data graph shows that no death of cows was reported. This may have happened because very few households in the district own cows. These are considered a luxury in Nushki District and only well-to-do people and those living in irrigated areas are able to raise their own cows. Thus cows may not have been affected by drought as much as goats and sheep.

Figure 19: Decline in the Prices of Livestock in Nushki/ Chagai District 1996-2003



Source: Qureshi and Akhtar (2004)

Some pastoralists reported that they were forced to sell their animals at one quarter of the price prevailing before the drought (Qureshi and Akhtar 2004). This is corroborated by evidence from an emergency situation report of Islamic Relief in May

²⁰ It should be noted, however, that these prices prevailed at the time of Qureshi and Akhtar's field survey that was conducted in late 2003 and that the prices at the peak of drought in May 2000 would have been much lower.

2000. The report indicates, on the basis of interviews with livestock owners, that the average price of goats dropped to less than PKR 300 per live animal whereas the pre-drought average price was around PKR 1000-1500 per live animal (Islamic Relief 2000). Similarly, livestock owners indicated that their animals were in better health and fetched higher prices in 2001 than in the preceding three years from 1998 to 2000. Moreover, they explained that the decline in prices was relatively small in the initial stages of the drought, around 10-30%, but it became very steep as the drought continued (Oxfam 2001)

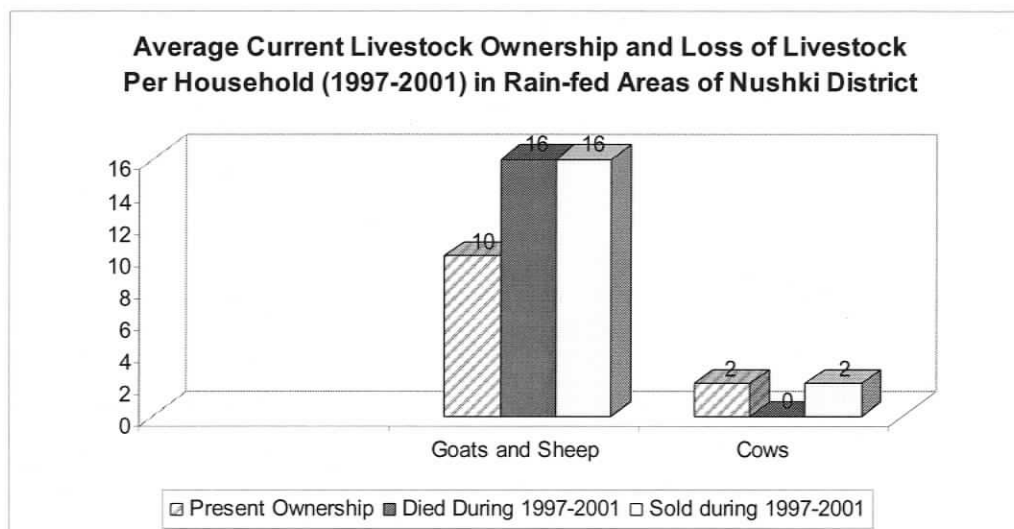
6.3.3 Decline in Production of Milk and Milk Products:

Lastly, domestic production of milk from sheep and goat decreased by 70-80%. The decline in milk production meant that pastoralist households-especially those in the rain-fed areas- lost an important source of their daily food (UN 2000a; UN 2002; Qureshi 2004).

6.3.4 Difference in Drought Effects in Rain-fed and Irrigated Areas:

Livestock owners in the rain-fed areas, especially those living in desert of *Reg* region, were hit hardest by the drought. Figure 20 shows the extent of livestock lost by pastoralists in rain-fed areas.

Figure 20: Loss of Livestock in Nushki District through Mortality and Distress Sale



Source: Data from Qureshi and Akhtar (2004)

In the irrigated areas, no loss of cattle was reported. The *karez* system and the presence of groundwater for irrigation shielded, to a large extent, the agriculturists and pastoralists against the effects of drought conditions. There was no large scale shortage of fodder or vegetation in irrigated areas compared to the rain-fed areas. (Qureshi and Akhtar 2004)

6.4 Effects of Drought on the Health and Nutritional Status of People

A survey conducted by Oxfam in 2002 found out that the prevalence of ‘global malnutrition’ indicated by nutritional odema²¹ was 15.9% in the children in Nushki District which was above the threshold of malnutrition for a famine situation set by

²¹ The survey researchers checked for nutritional odema by applying gentle thumb pressure to the top of the child’s foot and waiting for a count of three. The thumb was then released and the foot was checked for evidence of pitting. If pitting occurred on both feet of the child, he/she was considered to have nutritional odema. The results for this statistic indicated a confidence interval of 95%.

the United Nations. (Lukmanji 2002). However, this survey was conducted in August 2002 approximately 2 years after the peak of the drought period in May 2000. By that time significant amounts of emergency food aid had already been distributed in the district by the Provincial and Federal Governments and the international relief agencies. It is therefore, reasonable to infer that the levels of malnutrition in the preceding years were significantly higher for both adults and children. The evidence of malnutrition in children can be related to the severe decline in the production of milk and milk products mentioned earlier since milk is the staple diet of children in rural areas (Qureshi and Akhtar 2004).

Overall, 10 cases of death from starvation were officially reported in the district by May 2001 (Oxfam 2001). However, this figure is suspect since officials in Pakistan usually tend to be conservative in giving estimates of the casualties from an emergency. According to initial newspaper reports, 20 people had died in Chagai-Nushki region by the first week of May 2000 when people started migrating from their villages to the nearby towns (Daily Dawn, May 05, 2000). Later on, between the months of May and August, 2000, another 200 people died after arriving at the Siah Koh relief camp in Nushki from diseases related to malnutrition (Daily The News, August 27, 2000).

6.5 Effects on the Delivery of Essential Social Services:

Migration of large numbers of households and unavailability of water also affected the delivery of essential social services such as health and education. Many schools

and healthcare facilities, especially in remote villages, were forced to close due to unavailability of teachers and doctors who were unwilling to work in these areas because of lack of water and long hours of travelling from urban centers (Lukmanji 2002).

6.6 Effects of Drought on Women:

In addition to the effects of drought conditions on the entire household, women faced particular difficulties which merit a separate discussion. This is necessary because much of the work that women do and many of the difficulties that they face tend to remain hidden due to the literal and the metaphorical veil that Baloch society keeps over them.

Women had to walk longer distances to fetch water as the nearby sources of water such as communal wells and ponds had dried up in many villages. Some had the luxury of bringing water on a donkey but others had to carry it on their heads. On average women had to make a one hour roundtrip to fetch water whereas about 25% of them had to make roundtrips of two hours or more. The longer distances also limited the amount of water that could be carried in a single trip and women were required to make more trips to the watering point in order to fetch enough water. For instance, in one village in Keshingi Union Council, one woman explained that she had to walk more than six hours to make one water trip (Siddique 2004). Similarly, they had to walk longer and spent more time to bring fuel-wood. They also had to pitch in by making embroidery and handicrafts to bring some money for the household (Lukmani 2002; Oxfam 2001; Qureshi and Akhtar 2004).

This meant that women were able to devote little time to childcare duties such as breastfeeding, cooking of food, feeding of children and spending time with children which are considered their primary responsibility in Baloch society. Given the presence of more than one under-five children in many households, the absence of women to supervise their children would have increased the exposure of these children to unhygienic conditions resulting in greater morbidity. The environment of the households in rural areas is not very hygienic even under normal circumstances. Moreover, women had to look after the household on their own in the absence of the men who had left for cities to look for work. This situation would be further compounded by increases in domestic quarrels between husband and wife due to lack of employment opportunities and the pressure to feed and take care of the children under these circumstances (Lukmanji 2002).

In rare instances, people tried, in desperation, to marry off their young daughters to a family outside known relatives or kinsmen in order to get the bride-money or *Lab* to help the remaining family survive. One household even tried to sell their daughter as a domestic servant although the community prevented this act by providing charity to the affected family (Associated Press 2000; Islamic Relief 2000). These girls would face a very uncertain future in their new household.

7. Household Coping Strategies

While the drought affected almost the entire district, it affected people from different areas and livelihood groups in different ways. Consequently, the affected households and communities responded to the emerging drought conditions in different manners.

7.1 Securing Access to Water:

Water is a critical limiting factor for human inhabitation in the arid desert environment of Nushki District. In addition to unavailability of water for irrigating crops, supply of water for drinking and domestic use was also greatly diminished during the drought. The main source of drinking water for Nushki town, the *Joo-e-Nushki* stream, dried up in 1997. It had an intermittent flow during 1997-2004 and the government had to construct supplemental water supply schemes, mainly by digging new tube-wells, to restore the supply of drinking water to households in Nushki town. The households in rain-fed areas suffered even more because there were few permanent sources of water such as tube-wells and dug-wells and a large number of people depended on traditional open surface water storage ponds, locally called *Nawar*, which had dried up due to lack of rainfall (Oxfam 2001). Their plight was further compounded because of the malfunctioning of the few government installed water supply schemes in the area due to the declining water table (Personal observations in the field).

As a result household members, mostly women and children, had to travel longer distances to fetch water. In some villages, a few adults would stay behind to look after children while everyone else in the village went on 'water trips' to another village because it would take 6 and sometimes 10 hours for a roundtrip. When even these strategies failed, households migrated to a place where water was available. For instance, about 16 households in a village near Nushki town migrated from their homes to settle by the side of a tube-well in another settlement. Similarly, in Dalbandain area, which is adjacent to Nushki District, about 100 households migrated to a railway station where water was brought in water trains (Lukmanji 2002; Oxfam 2001).

7.2 Reduction in Food Consumption:

The most common response to drought stress in Nushki District appears to be a reduction in food intake. Households ate fewer meals in a day and their meals comprised cheaper food items. As Table 5 shows, some two thirds of households ate two meals or less in a day and about a third ate one meal a day whereas they would normally eat three meals a day. Adults in many households worked till noon-time surviving on a cup of black tea taken without milk. They also ate simpler meals and substituted lower quality and cheaper food items for better quality and thus more expensive food items (Lukmanji 2002). Before the drought household diet comprised milk, yogurt (*lassi*), butter, cheese (*panir*), vegetables, lentils and bread (Oxfam 2001; UN 2002). However, as Table 5 shows, during the drought the meals were reduced to tea and *roti* (flattened bread) for a majority of the households. Some households were able to supplement this basic combination with milk and lentils. Similarly, many

households used low quality molasses sugar (*Gur*) instead of white sugar to sweeten the tea. Although there was very little differential in the prices of *Gur* and sugar, households preferred *Gur* over white sugar because it dissolved more slowly in the tea and hence less quantity was consumed thus reducing the households' expenditure on food (Oxfam 2001).

Table 5: Number of Meals Taken in the Past 24 Hours

No of meals	Number	
	Households	%
0	1	0.01
1	237	29.4
2	306	38.0
3	259	32.1

Source: Lukmanji (2002)

Table 6: Kinds of Food Eaten in the Past 24 Hours

Type of food	Number Households	%
Eggs	34	4.2
Lentils	414	51.4
Meat	41	5.0
Milk	211	26.1
Nan/Roti	807	99.9
Rice	4	0.5
Tea	772	95.5
Vegetables	83	10.2

Source: Lukmanji (2002)

Some people also resorted to gathering and eating fruit and leaves of wild plants such as '*gorbrush*' that survived the drought (UN 2002).

Many households also started selling milk and milk products such as butter and yogurt that they usually reserved for their own consumption in the nearby towns. Although no comparable study on pre-drought nutritional status of households in the district is available, recent nutritional assessments show large scale prevalence of malnutrition in the district, especially among women and children, indicating negative effects of such practices on pastoralists own families' nutrition status (Lukmanji 2002; Oxfam 2003).

7.3 Alternate Ways of Securing Food:

There were significant changes in how households acquired and paid for their food during the drought period. Before the drought, most affected households were able to get enough food from their own produce or livestock and from the income from sale of livestock and/or agricultural produce. However, during the drought, when people were asked how they are going to get their food, only 38% of households were in a position to purchase their own food from the market. The majority of the households would either sell their remaining livestock (16.4%) or borrow from the shopkeepers (33.2%). A few households expected to get food aid (2.5%), split their families i.e. send family members to relatives such as in-laws (3.5%), resort to begging (2.5%) or wait for God to do something (1.9%). Splitting of family implies migration as the male head of the household leaves his wife and children in care of relatives and tries to look for work in the local towns or provincial capital of Quetta or as far as the neighbouring province of Sindh (Lukmanji 2002). Table 7 summarizes these results.

Table 7 Strategies for Coping with Food Shortages (Number and Percentage of Households)

Coping Mechanism	Number	%
Remittances/Gifts	16	1.8
Sale of more livestock	142	16.4
Splitting of family	30	3.5
Begging	22	2.5
Borrowing	288	33.2
Food aid	22	2.5
Purchase	330	38.1
Depend on God	17	1.9

Source: Lukmanji (2002)

While no one mentioned migration as an option, elders in some villages confided with relief workers that this would be the last option if the drought continued (Lukmanji 2002). This suggests that distress migration is the most undesirable option for the residents in Nushki District in coping with drought and it indicates the failure of all the other coping strategies.

7.4 Alternate Income Generation Activities

Due to the failure of the traditional sources of livelihood, namely, agriculture and livestock, households had to look for alternative ways of generating income to meet their food and non-food needs²². Lukmanji (2002)'s field survey presents the details of the kinds of work households were doing in July 2002 for making a living. While there is no commensurate baseline for comparison from previous years to track the changes in incoming generation activities, we can still do an approximate comparison based on the pre-drought distribution of labour force among different activities described in section 5.3, by using the available data on land and livestock ownership as a proxy for the reliance of people on these activities for generating income before the drought, and by using results from other qualitative surveys on drought. Almost half the population in the district earned its income from agriculture or livestock before the drought and three quarters of the population owned some agricultural land or livestock (Government of Balochistan 1998; Lukmanji 2002; Oxfam 2001). In the rain-fed areas, 93% of households owned some livestock (Qureshi and Akhtar 2004). Therefore, it will be reasonable to conclude, in the absence of civil strife or any other

²² Their situation was further compounded by the disruption of illegal smuggling activity, an important source of livelihood for many households in Nushki District, as a result of the tightening of Pak-Afghan border in the wake of terrorist attacks of September 11, 2001.

major change, that a significant shift in income generation away from these two activities would constitute a response to the drought conditions.

As Table 8 Shows, almost half of the household in the district engaged in casual work as labourers in 2002. They mainly worked on public works schemes where they were engaged in activities such as stone crushing for building new roads and digging work for laying pipelines, as porters (coolies) and other manual labour in the market in Nushki and as hired labour on the agricultural farms in tube-well irrigated areas. Daily wage for this kind of work ranged from 50 to 100 Pakistani Rupees (PKR) whereas the pre-drought wage was PKR 100. Conversely, the number of households who earned their income from selling crops or livestock declined to approximately 13%.

Table 8: Main Sources of Income for Households during the Drought

Source of Income	Numbers	%
Small business	83	9.6
Casual work	433	49.9
Salaried employment	158	18.2
Sale of crops	67	7.7
Sale of livestock and products	43	5.0
Gifts	12	1.4
Sale of handicrafts	26	3.0
Wood selling	19	2.2
Religious leader – donations	26	3.0

Source: Lukmanji (2002)

Sale of fuel-wood was another popular activity for coping with drought related stress. Communities were cutting wood and selling it in the local market to earn some income throughout the period 1997-2002. This was a very arduous task which involved travelling with a camel or a donkey for two to six days across the border

with Afghanistan and back²³. The wood was sold in the market in Nushki for the meagre sum of PKR 40-45 per 40 kg. A person could collect 200 kilogram of wood in a single trip and would, therefore, earn between PKR 40-100 per day (Lukmanji 2002; Oxfam 2001). This researcher also observed some people returning with camel loads of animal bones from on their way back from Afghanistan in April 2002 who informed him that they intended to sell them in the market in Nushki.

These activities paid very little because the wage rates had been driven down by the large influx of unemployed people in Nushki town and surrounding areas. They also took a heavy toll on the health of a people already weakened by scarcity of food. For example, those who went to Afghanistan in search of wood had to walk for days in the desert heat and others who worked in stone crushing faced danger to their eyes from the splinters and to their lungs from the stone dust (Lukmanji 2002; Oxfam 2001; Oxfam 2003).

Similarly, many women engaged in the making and the sale of handicrafts for supplementing the family income (Qureshi and Akhtar 2004). Traditionally, women did needlework in their spare time and prepared embroidered clothes, bedding, kerchiefs, etc. for the future wedding of their sons, daughters, sisters or cousins but the drought conditions forced them to do so for earning money (UN 2002; researcher's personal observations as member of a Baloch family). Because they could not engage in regular agricultural work due to drought, they used the extra time to make embroidered clothes and mats for sale. However, embroidery work is very

²³ Oxfam (2001)'s survey, which was conducted around 2001, mentions a roundtrip of 2 days for collecting wood whereas Lukmanji (2002) mentions a round trip of 6 days. Perhaps the difference can be attributed to the declining availability of wood from 2001 to 2002 as the more easily available groves of wood would have been depleted thereby forcing the woodcutters to travel longer distances.

time-consuming, requires a lot of focus over lengthy periods of time and is likely to lead to poor eyesight. Moreover, women received very little money for their hard work due to reduced purchasing power of the people in the area and exploitation of their situation by the middleman (Lukmanji 2002).

7.5 Increased Reliance on Credit:

While borrowing was noted earlier as one of the options for coping with drought, it merits a separate discussion because of the heavy reliance of the affected people on credit in times of drought. As mentioned earlier, 33% households indicated that they would resort to borrowing to obtain food if the drought continued in 2002 and (Lukmanji 2002). Similarly Oxfam (N.D) mentions that obtaining food items from borrowed money was a regular activity in drought affected areas. In addition to food items, purchases related to livestock such as fodder were the other major expenditures paid for with borrowed money. Clothes, medicine and marriage feasts were also paid for through borrowing. However, it should be noted that the last mentioned items/events were considered a luxury in the times of drought and expenditure on these was either reduced or delayed as much as possible. For instance, Oxfam (2001) reports, quoting the local tailor-master in a village in Daak area, that people had been buying one suit of clothes for the entire year whereas previously they bought three suits or more. Similarly, Lukmanji (2002) mentions that there was only one family among the several villages where Oxfam was providing food aid that had held a wedding ceremony recently. Oxfam (2001) provides a detailed account of this phenomenon:

Almost each family in the area is borrower of landlord, *karyana*²⁴ store, cloth merchant, medical store, fodder provider, seed and urea shop and other routine consuming items provider. Loan credit has a range of Rs 30,000 – 1,00,000. This indicates a huge debt burden for families with almost no income generating options to generate the necessary funds for repayment (Oxfam 2001: 42).

7.6 Disposal of Assets:

Disposal of productive and non-productive assets was an important component of drought coping strategies in Nushki District. However, given the paucity and sketchiness of the available information, a detailed analysis and classification of asset management by the affected households is not possible and only a brief discussion will be attempted here.

Livestock was the main asset of pastoralists and agro-pastoralists in Nushki District. The data in section 6.3 indicate that livestock owners engaged in distress sale of animals for obtaining food and cash. This is corroborated by the evidence that sheep and goat were sold at highly unfavourable prices. Moreover, the sale of livestock took place throughout the year as opposed to the regular peak seasons. The normal peak livestock sale periods in upland Balochistan are from February to July and from September to November when pastoralists embark on winter transhumance to the lowlands of Kachhi and Sindh (Mahmood and Rodriguez 1993).

²⁴ A '*karyana store*' is a retail shop where one can buy common food and non-food items of household use.

Nevertheless, pastoralists tried to safeguard their livestock, which were their main source of livelihood, in the face of worsening drought conditions as best as they could. They tried to avoid the sale of their animals even when they did not have enough pasture and water. Rather than use their animals for meeting their food needs, they shared their own bread with the animals in an effort to save them from starvation (UN 2002). Many migrating households brought their sick and diseased animals with them to the relief camps rather than abandoning or eating them (Lukmanji 2002; Oxfam 2001)²⁵. However, non-productive assets such as cash reserves and jewellery, etc. were more readily sold to meet food demands as indicated by the depletion of these assets (Oxfam 2001).

7.7 Distress Migration:

The worsening drought conditions precipitated distress migration of hundreds of households in May-July 2000 to the urban centers of Nushki and irrigated areas of Mal. In addition to the out of season distress migration, the traditional winter transhumance to lowlands of Kachhi District and Sindh Province also became intensified. By May 2002, almost 50% of the households in the worst affected areas of the district, namely, Union Councils Daak, Inam Bostan and Keshingi, had moved out of their villages or traditional camping areas in search of water, pasture and jobs. 25% of the settlements in these areas had been completely abandoned whereas in the remaining 75% of villages some households had left. Most of these households came from the rain-fed areas which, as mentioned earlier, were hit hardest by the drought

²⁵ This caused much consternation among the government officials and relief workers managing the relief camps who found it difficult to understand why these people were holding on to sick and diseased animals that the camp managers considered a threat to public health (Oxfam 2001).

(Lukmanji 2002; Oxfam 2001)²⁶. Moreover, the majority of the migrating families were livestock owners (transhumant pastoralists) from the desert of Reg on Pak-Afghan border and others who worked primarily as hired labour on rain-fed land (Long 2004; Maalik 2003; Personal observations and field visits to the drought relief camp in 2002). However, those households who had a family member in the employ of the government were relatively resilient to drought related economic stress because government employment provided a permanent, stable source of income in an area where opportunities for private sector employment are very limited (Qureshi and Akhtar 2004).

Households in Nushki District migrated to other areas for different reasons and at different times. The failure of rains and scarcity of water was described as the primary reason for migration. Loss of employment, search for alternate employment opportunities, lack of pasture for livestock and food scarcity were the other important reasons for migrating to other areas (Qureshi and Akhtar 2004; Lukmanji 2002).

It is important to distinguish between different types of migrations that occurred in Nushki District during the drought. These include: the migration of male members of family in search of labour and employment opportunities; sending wife and children to relatives in irrigated areas; and the migration of entire family with its belongings to a place where it has no relatives or established social bonds and is entirely dependent on the charity or goodwill of the villagers or townspeople. These indicate differing levels of drought stress, food insecurity and control over livelihood options.

²⁶ The lands in Union Council Daak are entirely rain-fed whereas there is a mix of rain-fed and irrigated cultivation in Union Council Keshingi.

Migration in search of employment opportunities in urban areas was a widespread during the times of drought. The prevalence of extensive male absenteeism in the villages and traditional camping grounds attests to this phenomenon (Oxfam 2001). This option indicated the availability of enough resources such as credit or support from relatives or village community so that the family could survive on its own. It would, however, be more readily available to agriculturists or agro-pastoralists who expected some regular income from seasonal cultivation than to the transhumant pastoralists who relied on selling livestock and livestock products and hence their sources of future income were less reliable. This is corroborated by reports that livestock owners in Nushki District could not obtain credit because they had lost their animals which were their only collateral for borrowing money or obtaining foodstuff on credit (Oxfam 2003).

These migrants usually sought work in the Nushki town and the provincial capital, Quetta. A few people in Daak and Keshingi Union Councils found some opportunities as agricultural workers outside Balochistan Province in the irrigated areas of Sind and Punjab Provinces. This migration was in addition to the traditional winter migration- which had also become intensified due to drought- to the plains of Bolan District and the neighbouring Sindh Province (Oxfam 2001).

The option of splitting the family and sending women and children to relatives or in-laws in irrigated areas was a tougher decision and this option might not have been available to many families anyway. The person sending his family incurs a significant social debt even when he does not incur a monetary obligation. In fact, given the choice, many people would rather go in monetary debt than expose themselves to the

loss of social esteem. This is corroborated by the evidence from existing field surveys. Lukmanji (2002) reports that when asked what they would do if the drought conditions did not ease, only 3.5% households in Nushki District indicated that they would split the family as opposed to 33% who said that they would borrow money. Similarly, Qureshi and Akhtar (2004) report that in rain-fed areas, only 16% of respondents indicated that they would send the family to relatives in irrigated areas. Given the extreme severity of drought in rain-fed areas, it appears that fewer people considered sending family members to in-laws or relatives a feasible or desirable option.

The migration of the entire family with its belongings, on the other hand, indicated the total failure of coping strategies and lack of any other option available to the household. It was also the most undesirable option for the households in Nushki District. Essentially, the household members would be at the mercy of circumstances and the charity and goodwill of townspeople or village people in the locality or place of refuge. Lukmanji (2002) reports that no household mentioned out-migration as an option when asked what they would do if drought conditions did not ease. Nevertheless, elders of the villages indicated in informal conversations that this would be the last option for them. Moreover, most of these surveys were conducted belatedly when a significant number of people had already left their villages and traditional camping grounds and those people who were interviewed had somehow managed to remain in their villages in spite of the drought. Their view, therefore, may not be indicative of the opinions or conditions of the most vulnerable households who had already migrated by this time. It would, therefore, be safe to conclude that

migration, however undesirable, was a significant coping strategy for people in Nushki District.

8. Conclusion

The effects of drought on livelihoods and the use of coping strategies by households in Nushki district appears generally to conform to the pattern reported in the literature on droughts elsewhere but also differs from it in some respects because of the specific social, political and ecological conditions prevailing in the area. Although it is difficult to establish an exact sequence of various responses because of the paucity of available data, it is still possible to present a broad outline of the key themes that emerge from the results of the analysis reported in chapters 6 and 7. A more detailed study involving long-term field research would be required to establish conclusively whether households engaged in sequential use of coping strategies in Nushki District and what the exact sequence was.

Firstly, the analysis of the development and the effects of drought suggest that while the lack of rainfall and its untimely incidence, caused by the *La Nina* climactic disturbances, was the prime mover in creating a famine situation in Nushki District, the social incidence of drought was mediated by a number of factors such as technology, occupational category of affected households and responsiveness of government and civil society institutions to the drought. For instance, agriculturists who relied on mechanised agriculture driven by the use of government subsidized tube-wells were able to weather the drought more easily as compared to pastoralists and rain-fed (*Khushkaba* and *Sailaba*) farmers. Similarly, people who were employed in the government and thus had a permanent source of income were not severely affected by the drought. Moreover, compared to droughts in parts of Africa, the

drought in Nushki resulted in fewer casualties in the human population because of effective, albeit delayed, government and civil society response. The relief effort was championed at the highest level of government and large cadres of military and civil bureaucracy together with international aid workers and private charities were pressed into the service of the victims of drought. This meant the difference between life and death and between a limited livelihood option and outright destitution for a large number of households in Nushki District. A vibrant and relatively unconstrained regional and national press acted as a catalyst in this process by providing early indicators of the approaching disaster and acting as a watchdog and a critic of the subsequent relief effort²⁷.

Secondly, the coping behaviour of households in Nushki District reveals that they had a long future horizon in their minds even as they struggled to deal with the immediate crisis of falling incomes and food insecurity. They tried very hard to preserve their productive assets such as land and livestock, even at the cost of foregoing their own food consumption, as long as they could do so in order to safeguard their future sources of income which could eventually assist them in recovering their livelihoods in the post-drought scenario. The vast majority of households resorted to borrowing for securing food or tried to eat as little food as possible rather than dispose of their land and livestock. Where they were forced to dispose of their assets, they preferred to dispose of less productive assets such as jewellery more readily than the productive assets. However, in case of extreme death and disease, when it became imminent that animals will die, they tried to salvage

²⁷ As of June 2001, 1402 press reports and 50 articles on drought were published in seven major newspapers. Drought was covered 122 times on the national television. Around 25 programs and talk shows on television and radio focused exclusively on drought. 105 delegations including 37 foreign ones were received and briefed about the drought (UN 2001c).

whatever value they could by selling them. Nevertheless, they tried to retain a core of breeding animals and took these with them to the relief camps even when they were forced to migrate. These results are consistent with the coping behaviour of drought-affected households documented elsewhere in Asia and Africa (Jodha 1975; Corbett 1988; Devereaux 1993).

Thirdly, households responded to the decline in their normal sources of income by drawing on their traditional skills, capacities, knowledge and resources as well as doing new kind of work. The extension of traditional skills and normal adaptive strategies included cutting and sale of firewood in the towns, sale of livestock products in nearby towns, sale of embroidered clothes and migrating to areas where water and pasture were more readily available. New strategies involved collecting and selling animal bones, engaging in stone crushing and digging in public works projects and migrating to faraway towns such as Quetta in search of work. However, there was no governmental recognition and support of the traditional knowledge, skills and capacities as evidenced by the poor management and degradation of rangelands even before the drought, lack of any specific policy targeting the needs of transhumance pastoralists, and the absence of a support mechanism for marketing of milk and milk products and traditional embroidery work of rural women. Consequently, these strategies could not tide the affected people over the drought period. Newer strategies such as working on government sponsored public works projects in stone crushing and digging helped the households but they also had serious negative effects on the health and well-being of the individuals.

Lastly, the coping behaviour of households suggests that the extent of vulnerability of people to drought was different in different areas of Nushki district based on agro-ecological conditions and on the people's primary occupations. Majority of the households which were forced to migrate in distress, the least desirable and most extreme option for people in Nushki District, belonged to the rain-fed areas comprising Daak and Inam Bostan Union Councils. The people in these areas were the most vulnerable due to their reliance on rain-fed agriculture, seasonal flows of surface water and extremely limited groundwater sources. Even under normal circumstances, there is a risk of crop failure or poor harvest in these areas every two or three years (Qureshi 2004). These areas were followed by Union Council Keshingi which had some perennial sources of surface water and limited groundwater sources. These sources of water dried up as the drought conditions worsened.

In addition households which relied primarily on transhumant and short-range nomadic pastoralism for their livelihoods, especially those living in the desert of *Reg* on Pak-Afghan border, appear to be the most severely affected (as evidence by their large presence in the migratory population and the relief camps) because their traditional skills had little purchase outside of livestock and agriculture. They specialized in raising livestock and working occasionally in agriculture when conditions were not favourable for livestock. Their skills, attitudes and social connections made it extremely difficult for them to take advantage of whatever little opportunities were available in the nearby towns. On the other hand, their traditional strategy of moving to less severely grazed areas of rangelands proved inadequate because of the depletion of the rangelands and encroachment of agriculture on marginal lands (Buzdar 1989 and 1997). Therefore, the results of analysis appear to

support Davies' conclusion that coping strategies of households are linked to the relative vulnerability of different livelihood systems. The most vulnerable households are those that struggle to survive even under ordinary circumstances. They are not able to adapt to the changing circumstances and hence their capacity to cope with drought or famine is constrained (Davies 1993).

However, the declining availability of water for human and livestock consumption forced households in Nushki to migrate even where they may not necessarily have reached a situation of destitution. Lack of water was reported as the primary reason for migration by households in Nushki District over and above the loss of employment and the lack of pastures for livestock. This appears to be a deviation from the coping sequence described in the literature on drought (Corbet 1988; Devereaux 1993). Coping strategies related to water security reveal that people in Nushki District would go to any length to secure water because of its severe scarcity. This should come as no surprise since in the hyper-dry environment of Nushki District water means life and it is difficult to secure even in ordinary circumstances. Most villages and settlements in the District sprang around wells, ponds and underground water channels, locally called *Chah*, *Nawar/ Dhand* and *Karez* respectively, as revealed by place names such as Zaro Chah, Essa Chah, Zangi Nawar, Badro Dhand, Badal Karez. In the light of these results, it would be reasonable to conclude that water security in drought prone hyper-arid lands merits a separate analysis in future research on drought and this issue should be treated at par with food security.

9. Policy Implications

9.1 Overview and Salient Features of the Relief Effort

The Government of Pakistan and international NGOs responded to the drought situation Balochistan Province including Nushki District when symptoms of the looming crisis started surfacing around February 2000. Their attention was drawn by the local press which reported that that people in the remote Aranji area of Khuzdar District were succumbing to a strange disease whose cause was unknown. Subsequent investigations revealed that they were dying from starvation and from infections as they had been forced to eat the leaves and fruits of wild trees and lived in close proximity with infected and diseased goats and sheep (UN 2000a). In Nushki District, the relief effort was launched in May 2001 when people had started migrating with their belongings to Nushki and other towns where they could find some permanent water and prospects of employment.

However, once started, the relief effort, barring coordination issues, logistical problems and leakages owing to administering of aid to a sparsely distributed population, was carried out relatively well²⁸ (UN 2000a; Qureshi and Akhtar 2004; Lukmanji 2002). Government of Pakistan made the drought a national priority. The Provincial Government declared all the affected areas as 'calamity hit area' and they were made exempt from taxation. It also set up drought relief

²⁸ There were several incidents of pilferage in the aid supplies, distribution of food aid to political favorites and duplication of food aid so that some household received a lot of aid and others received very little. However, compared to the total volume of the aid flowing in these incidents were neither widespread nor material. Also the leakages in the aid distribution chain were not substantial in view of the corruption and mismanagement in the local bureaucracy under normal circumstances.

camps in Nushki and other severely affected areas of the Province. The Federal Government provided PKR one billion (US\$ 19.5 million) to the Province for immediate relief assistance and another PKR 1.5 billion (USD 29.3 million) was reserved as emergency fund pending the failure of rains. It also directed the commander of the logistics division of Pakistan Army troops stationed in the provincial capital Quetta to assist the provincial authorities with logistical and distributional matters. The international community provided funds in excess of USD 8 million for emergency relief. In Nushki District, the main relief camp was established at Kisankoori about 3 kilometres outside of Nushki town. United Nations bodies such as WFP, FAO, UNICEF and UNFPA, international charities such as Oxfam, International Committee of the Red Cross and the Red Crescent (ICRC) and Islamic Relief sent tents, food and medical supplies as well as relief workers. National charities and private individuals from different parts of Pakistan sent truckloads of rations (UN 2001b).

The immediate focus of the relief effort was on provision of food items, feed and urea concentrate for the animals, essential medical supplies and provision of drinking water. At the same time, the government also adopted, in consultation with international donor agencies, a long-term rehabilitation and recovery strategy in Balochistan Province, including Nushki District, under the Drought Emergency Response Assistance (DERA) and Drought Impact Mitigation and Recovery (DIMRIC) programs as well as under the ongoing Poverty Alleviation Program. The bulk of the projects under these two programs comprised water supply schemes, construction of new water reservoirs and dams, rehabilitation of *Karezes*, expansion of animal health facilities and construction of new roads

linking villages with main roads and towns. In addition the Provincial Government as well international NGOs like Oxfam and UN agencies initiated a series of food security surveys and situation assessments to monitor the drought conditions in the District which were intended to act as early warning mechanisms (UN 2000c; UN 2000d; UN 2001b).

9.1 Critique of Drought Management Policy

While both the short-term food aid and long-term infrastructural development efforts were helpful in providing some relief to the affected households, there were a number of important elements that were missing from the government's relief and recovery policy which are likely delay the recovery of the affected households from the effects of drought.

- I) The government and international relief effort came after the farmers and pastoralists had already lost their productive assets through mortality and distress sale. This situation appears to have resulted from a lack of understanding of the coping mechanisms of households and the adoption of a reactionary approach to addressing the problems resulting from drought conditions. The media and the government paid attention to the problem only once it reached crisis proportions and became prominent enough to generate headlines for the newspapers and cause embarrassment for the government. Because drought is a slow-onset and creeping natural hazard, it had silently wreaked havoc on the livelihoods of a large number of households in Nushki District for four years before the media and

subsequently the government actually realized that a crisis situation was developing. As a result, most households who arrived in the relief camps were in a state of destitution and of mental and physical shock. This made the prospects of their recovery very difficult. This is also supported by evidence that scores of people died soon after arriving in the Siah Koh relief camp in Nushki.

- II) There was no comprehensive and integrated program for rehabilitating the livelihoods of farmers and pastoralists who had lost their productive assets. The government mainly relied on providing employment through short-term public works programs. International relief agencies such as Oxfam and Islamic Relief also initiated food for work programs in small clusters of villages. These programs were short-run, had limited geographic and demographic outreach and did not have the capacity to absorb the large number of people who had lost their incomes from drought. They did help a limited number of households in Nushki District but the majority of households were left on their own to eke out a living. Also, while some efforts were made, led by experts from FAO, to provide seed and fertilizer to the farmers, these were on a very small scale and could not meet the demand of the people in the area (Lukmanji 2002; Qureshi and Akhtar 2004; Personal observations as District Officer Planning and Finance). Similarly, no program existed for restocking the depleted herds of pastoralists by providing them with live animals or by extending soft loans

to them²⁹. Finally, the concerned agencies implemented these programs largely in isolation from one another and there was little effort to integrate these activities into an umbrella drought mitigation plan.

- III) Little effort was made to draw on the assets, capabilities and knowledge of the farmers and pastoralists in these programs. There was no comprehensive plan for developing and supporting alternate income generation activities such as traditional skills for making embroidery, handicrafts, mats, etc. and for marketing embroidery products. Little government support exists for processing and marketing of milk and milk products at the household level. There is some government support for establishing poultry farms but only more influential and wealthy people are able to benefit from it as there is no extension network to inform and help local people take advantage of these opportunities.
- IV) Very little attention was paid to the special needs of nomadic and transhumance pastoralists who were on the move most of the time or were trying to settle wherever they could find water. They required fodder, feed and medication for their animals. This was especially important for those pastoralists who were migrating to the plains of Kachhi and Sindh since the availability of water and forage on the migration route had become negligible. More generally, pastoralists tended to lose out on government initiatives for drought relief and recovery because of their isolation from

²⁹ The Provincial Government has belatedly initiated a program for providing live animals to pastoralist households in 2006 but no distribution has actually taken place as of now.

main towns and cities and lack of any networks or support among the district bureaucracy.

- V) The government has done a commendable job in constructing a large number of piped drinking water supply schemes in the district thereby reducing water insecurity. Between 1999 and 2003, the number of water supply schemes in the district almost doubled. However, under World Bank and Asian Development Bank initiatives, responsibility the operation and management of many of these schemes was handed over to the beneficiary communities who were expected to foot the bill of electricity and minor repairs (Personal observations as District Officer Planning and Finance). This was an unrealistic expectation since the local communities, whose resources were already stretched by the longest drought in recent history, were in no position to manage this. As a result, most of these water supply schemes either shut-down or were facing serious problems (Qureshi and Akhtar 2004; Ahmad et al 2004; Personal observations as District Officer Planning and Finance). This appears to be an abdication of the social responsibility from the government at the behest of multilateral donor agencies and it resulted in serious problems of water security for many communities in Nushki District.
- VI) Lastly, the overall agricultural development policy of the government appears to be focussed on the promotion of high yield varieties of crops and fruits driven by water-mining on a large scale, a policy which is neither sustainable nor does it respond to the needs of the most vulnerable households in the district. Groundwater resources in Nushki and the rest of

Balochistan Province are limited. This was amply demonstrated during the drought as water table fell by more than 500 feet in some areas of the District and there were constant demands from the local communities for additional public funds to drill deeper tube-wells (Personal observations in the field as District Officer Planning and Finance). While Nushki District still has surplus reservoirs of water, the rate at which water is being mined is far in excess of the rate at which the reservoirs are replenished. It will only be a matter of time before Nushki, like some other districts in Balochistan, becomes a groundwater deficit area.

This policy also does not cater to the needs of the most severely affected people who happen to reside in rain-fed areas such as Inam Bostan and Daak Union Councils where groundwater extraction for agriculture is not a feasible option³⁰. At the same time, this focus on modern technologies is drawing people away from traditional means of harvesting surface and underground water sources such as *Sailaba*, *Khushkaba* and *Karez* irrigation. This is contributing to the decline of these traditional technologies and the norms of cooperation associated with them because operation and management costs in terms of money as well as human and draft labour keep increasing in the absence of fewer beneficiaries and contributors (Van Steenberg 2000). As a result, the people in the rain-fed areas of the district, who are most vulnerable to the effects of drought, are left out of the consideration of government's agricultural and livestock development policies.

³⁰ Groundwater aquifers are more accessible in the valley bottoms and piedmont slopes than in the rain-fed plains.

9.3 Policy Recommendations for Drought Management

9.3.1 Development of Institutional Mechanisms for Drought Early Warning

Provincial government and the international agencies need to strengthen the relief work institutions and early warning mechanisms in place at the District and the Provincial level so that they are not caught by surprise by an emerging drought situation. The establishment of a reliable mechanism for predicting drought conditions is a moot point and there is little consensus in the available literature regarding universal, effective and reliable criteria for predicting a drought situation. However, this should not prevent the government and the international relief agencies to make an effort for gathering relevant information that would help in making timely and informed decisions for initiating relief activities. This study recommends gathering of timely information from multiple sources and discussing the implications of this information in an open manner to ascertain drought conditions and generate a consensus between various stakeholders such as the Federal and Provincial Governments, international relief agencies and UN bodies, and the District Local Government for planning and initiating relief activity.

At the Provincial level, the office of the Relief Commissioner should be revamped and strengthened by providing it with support staff, communication systems and adequate vehicular mobility to cover the vast extent of Balochistan

Province³¹. At the District level, the food security and nutritional surveys should be conducted regularly in the drought-prone districts. International relief agencies such as Oxfam and Islamic Relief have the technical know-how and skilled personnel in this respect whereas the Provincial and District Local Governments have logistical facilities and a vast network of government officials and field officers on the ground. The resources of the government and international relief agencies should be pooled so that a larger area and more districts can be covered by food security surveys than is being done at moment. The design of these surveys should also be modified to target vulnerable groups such as *Sailaba* and *Khushkaba* farming households and transhumance pastoralists in the interior of the mountains and the desert. In addition to formal nutritional and food security criteria, the opinions and local knowledge of pastoralists and farmers regarding drought conditions should be given more space in these surveys and reports. Moreover, the moribund Drought Management Committees at the District level have to be activated. There should be regular meetings and exchange of information between public managers in the District Revenue Office, Public Health Engineering Department (PHE), Irrigation Department, NGOs working with the vulnerable households such as Oxfam and Islamic Relief, and the elected members of the District Local Government. These meetings should take place under the auspices of District Coordination Office (DCO) to discuss the results of these surveys and make adequate preparations for relief if and when required. These Committees should also be vertically integrated with the office of the Provincial Relief Commissioner which, in turn, should exchange information with

³¹ During the last drought, the Provincial Relief Commissioner did not have adequate communication and vehicular support making it difficult for him to visit the affected areas and ascertain the facts on ground.

the Meteorological Department and the Federal Relief Commissioner on a periodic basis.

9.3.2 Move from a Crisis Management to a Livelihood Strengthening Approach

The government should move away from a 'crisis management' approach towards the drought and adopt a proactive stance by strengthening the livelihoods of the most vulnerable groups well in advance. This would involve tailoring the government's agricultural development policy to support the *Khushkaba* and *Sailaba* farmers and pastoralist households. The government should encourage the development and use of drought resistant varieties of crops such as wheat with significant stalk and straw content that would allow the rain-fed farmers to take advantage of the complementarities between livestock rearing and dry-land farming. While the Arid Zone Research Institute (AZRI) in Balochistan is already working along these lines, there is a need to support the institute's research by putting in place an extension network so that benefits of this research reach the farmers and pastoralists in rain-fed areas. Also more research is required into the socio-economics of *Sailaba*, *Khushkaba* and transhumant pastoral livelihood systems for tailoring laboratory research to the needs of farmers (Qureshi and Akhtar 2004).

9.3.3 Support for Alternate Income Generation Activities

The Provincial government and international NGOs should support alternate income generation activities that draw on the local knowledge, skills and

capacities of farmers and pastoralists in Nushki District. There is a lot of demand for embroidery, mats, milk and poultry products locally as well as at the Provincial level. Moreover, as the analysis of coping strategies suggests, household members, especially women, have the knowledge, skills and the capacity to adopt these activities as supplemental sources of income without spending a lot of time away from agriculture or livestock rearing. However, they require a dependable supply of inputs or raw materials at the village level, adequate network for marketing of their products in nearby towns and in the Provincial capital Quetta and a collective organization that gives them some bargaining power or leverage with the buyers (Sustainable Development Networking Program Pakistan N.D.).

Similarly, the desert and plains of Nushki District are rich in exotic species of reptiles (lizards and snakes) which fetch very high prices with collectors in Europe and North America. At present, mostly outsiders are involved in illegal poaching and selling of these precious animals thereby endangering their survival. IUCN is working on a conservation initiative involving limited hunting and trophy collection of these animals with the help and consent of the local communities in Nushki District. Initiatives like these can provide the communities with additional sources of income while protecting the environment at the same time.

9.3.4 Tailoring the Provision of Social Services to the Needs of Pastoralists

Government and civil society organizations should pay special attention to the needs of nomadic and transhumant pastoralists as they are the most vulnerable

societal group in terms of livelihood security. Because of the non-transferability of their skills outside agriculture and livestock, they suffered heavily during the drought. Even under normal circumstances, they are not able to take advantage of governmental provision of social services such as health and education as well as agriculture and livestock development activities due to their camping in distant areas, lack of literacy and access to district bureaucracy and their seasonal mobility. The Provincial Government and NGOs should consider innovative ways of providing social services to this vulnerable group such as mobile clinics, tent schools and alternate summer and winter service clusters (Bonfiglioli 1995).

9.3.5 Giving Priority to the Management of Rangelands

Provincial and Federal governments should make the rehabilitation and sustainable use of rangelands, forests and fuel-wood sources a top priority in the development agenda for Balochistan province and for Nushki District because they are the single most important ingredient in the coping strategies of the affected households. A kind of apathy regarding rangelands appears to prevail in official quarters because, supposedly, these ranges are used by unimportant tribal and pastoral groups. So much so that the government does not even recognize the rangelands to be the common property of the concerned tribes (Buzdar 1988; Government of Balochistan 1967). This attitude must be reversed in order to reduce the vulnerability of drought affected communities who rely on these lands.

This will require a formal recognition and strengthening of common property land tenure and tribal institutions pertaining to the use of rangelands (Buzdar et al

1989; Buzdar 1988). State officials and tribal leaders can be assigned joint responsibility for these. However, the present status quo over the management of rangelands should not be allowed to continue. It has resulted in extensive depletion of natural resources and the degradation of rangelands appears to be reaching a point of no return (Government of Balochistan and IUCN 2000; Buzdar 1988).

9.3.6 Investing in the Development and Maintenance of Drinking Water Supply

This point cannot be overemphasized. The government should put greater effort into the maintenance of existing drinking water supply sources and building of new water supply schemes. Despite the Provincial and District Local Government's investment into building of new water supply schemes in recent years, less than half of the people in the district had access to reliable sources of drinking water in 2002. A large number of people (40%) still depend on shallow dug-wells for obtaining drinking water (Lukmanji 2002). Not only are these dug-wells unsafe sources of water but also they are more likely to dry up during a drought and put the water security of the communities at risk.

The government should also explore alternative water and energy resources for households that have smaller recurrent costs and which help in arresting the overexploitation of resources in the rangelands. The use of windmills for extracting groundwater from wells in Nushki District and elsewhere in

Balochistan Province, barring minor hiccups, has produced very good results³².

This scheme should be extended to other villages in drought-prone districts where it is feasible.

9.3.7 Providing Fuel and Energy Alternatives to the Communities

The government should adopt a multi-dimensional approach for developing safe, simple and affordable alternatives to wood for meeting household energy and fuel needs in Balochistan Province. Provision of Liquefied Petroleum Gas (LPG) cylinders at affordable rates, the extension of present network of piped natural gas, and development of a safer mechanism for the household use of existing coal resources and exploration of solar energy products for cooking and warming houses should be given serious consideration. There is tremendous pressure on the rangelands in Nushki and other districts in Balochistan due to the household demand for fuel-wood. Combined with a vigorous social mobilization and awareness campaign, this will help reduce the cutting of trees for fuel-wood, allow the regeneration of trees and shrubs and make more resources available to the households during a dry spell.

³² Some problems arose due to unfamiliarity of the villagers with the technology and inability to carry out minor repairs. These can be addressed by providing onsite training to a member of the community in handling these repairs and doing follow up visits to ensure the efficacy of the training.

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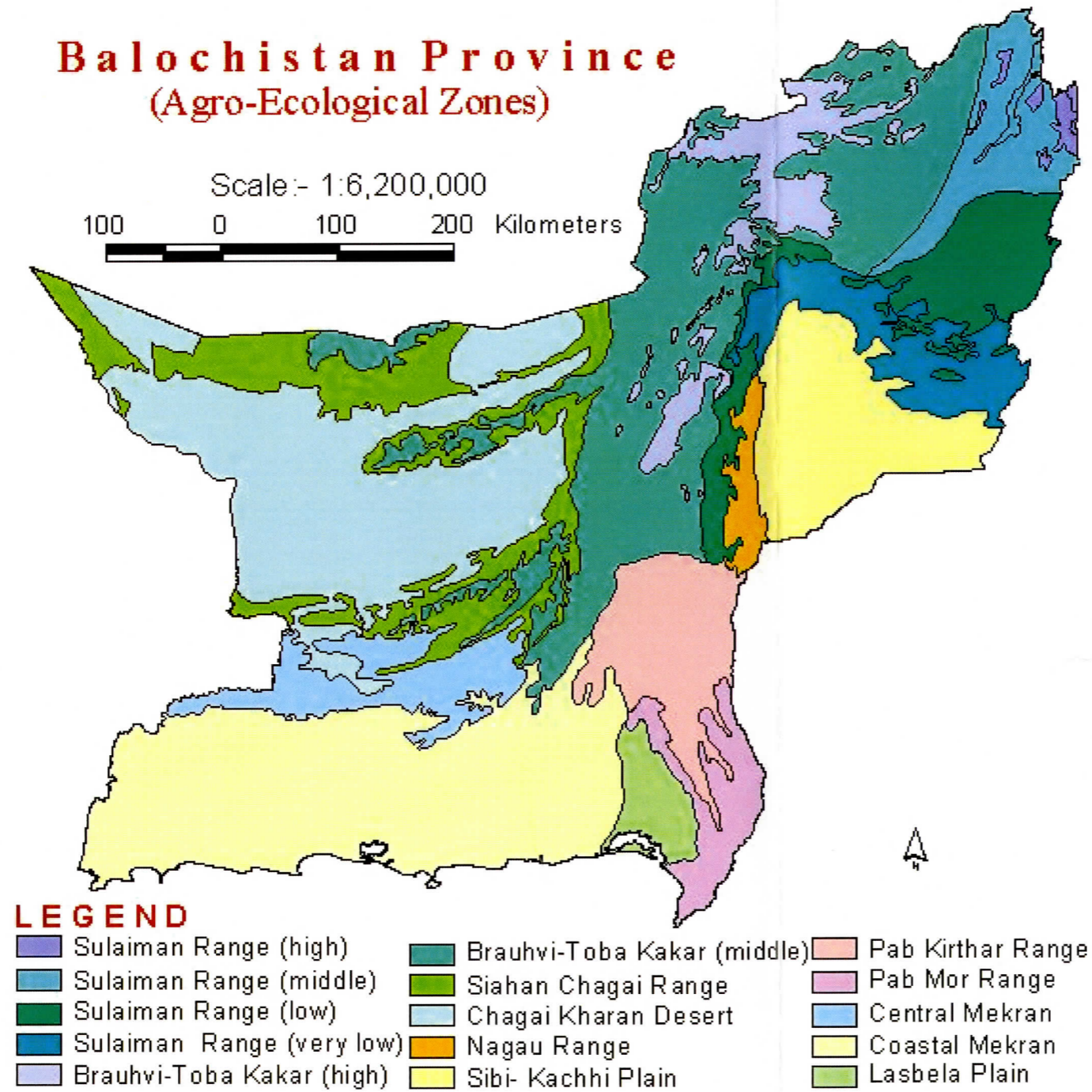
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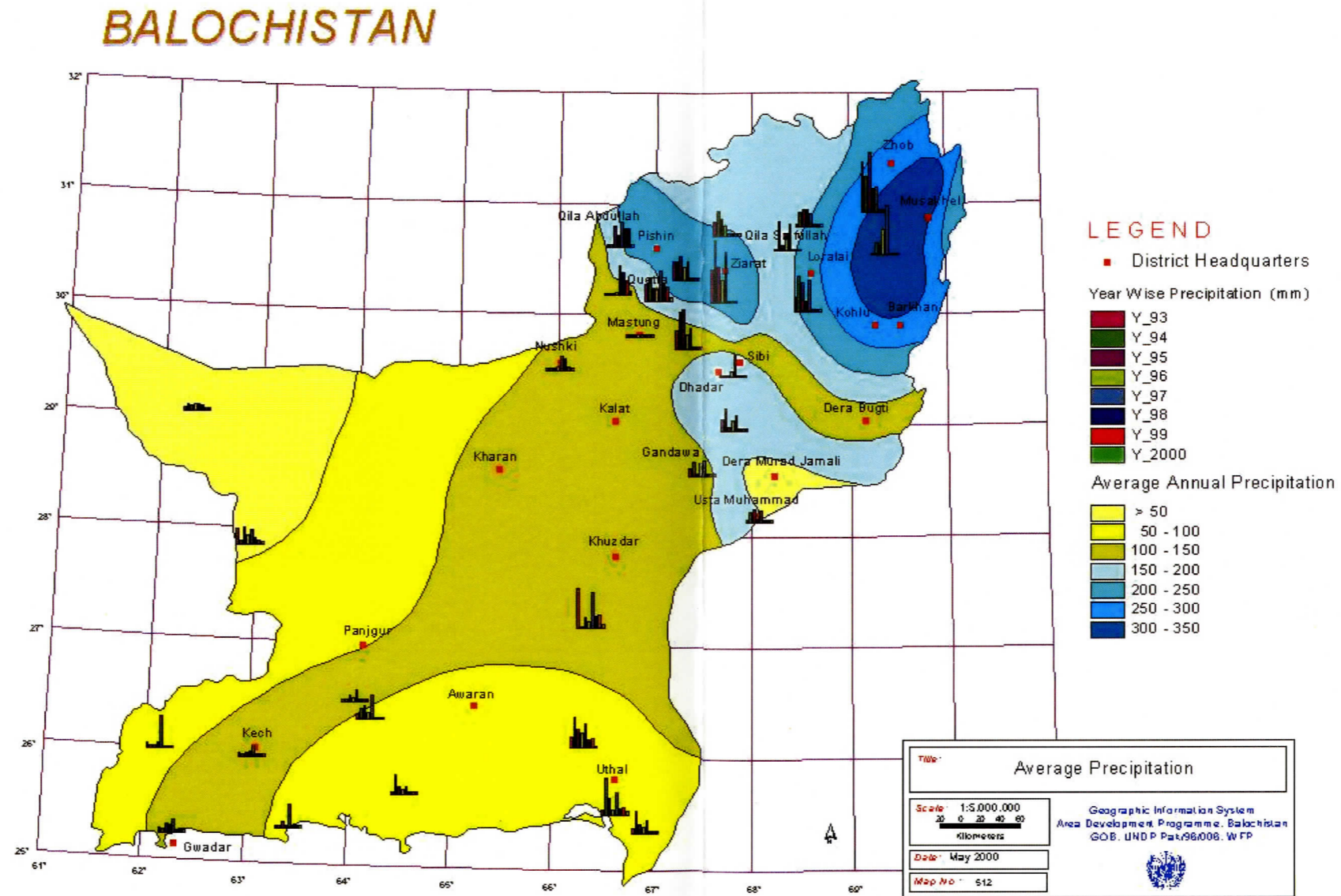
APPENDIX A

Agro-ecological Zones of Balochistan Province (Qazi 2004)



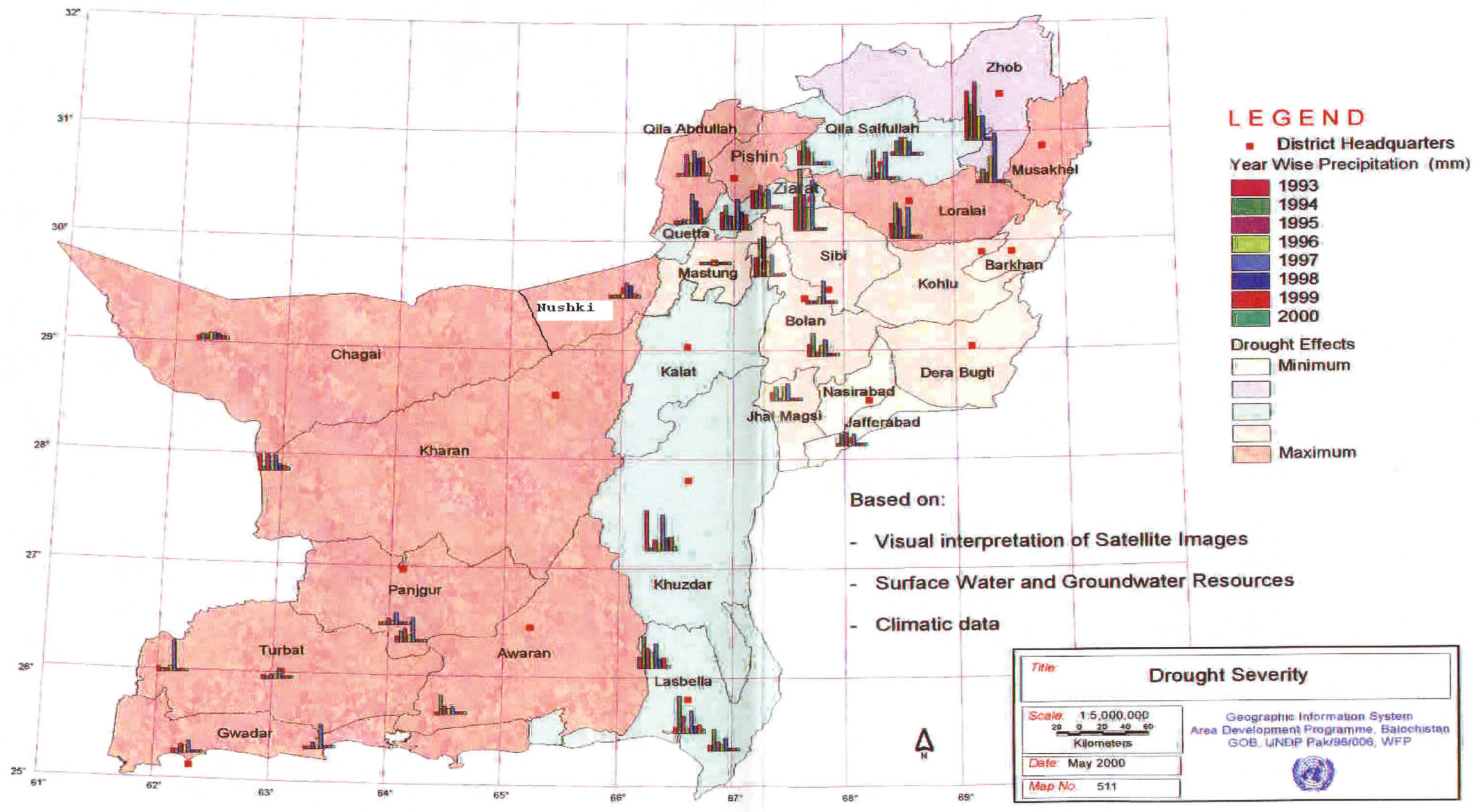
APPENDIX B

Precipitation Zones of Balochistan Province (Qazi 2004)



Appendix C: Drought Severity and Rainfall in Balochistan Province 1993-2000

BALUCHISTAN



Source: UN 2001 (Nushki-Chagai district boundary drawn by author by hand based on his knowledge of official land records and is approximate)

APPENDIX D

Historical Mean Monthly and Annual Rainfall in millimetres for Nushki Town

Nushki, Pakistan

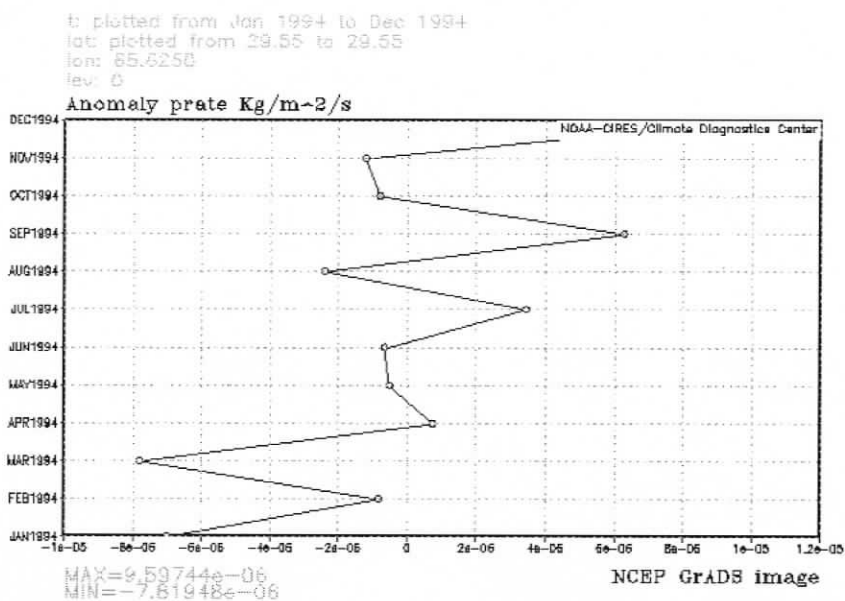
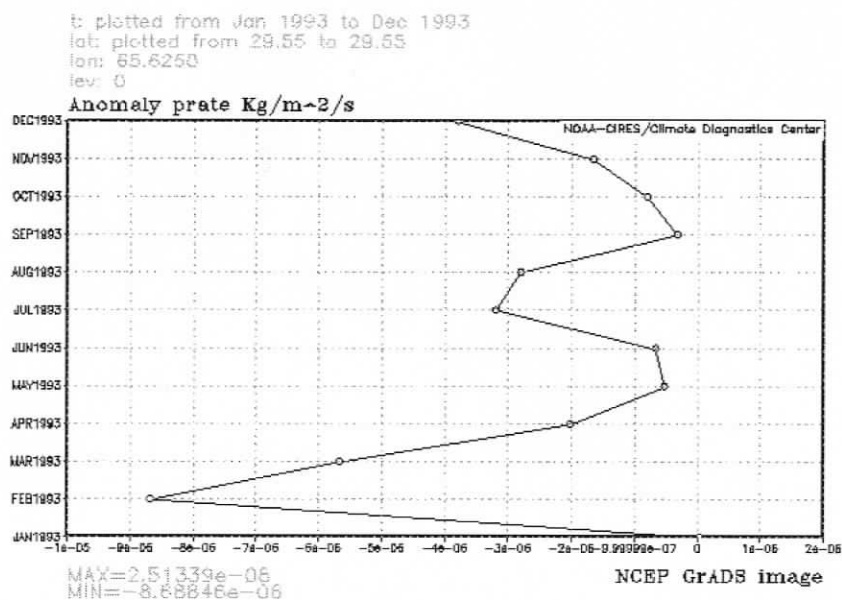
Elevation: 1041 meters Latitude: 29 34N Longitude: 066 01E

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
39	35	28	13	5	3	18	1	2	1	5	18	176

Source: Weatherbase.com (based on raw data from US National Climate Data Center)

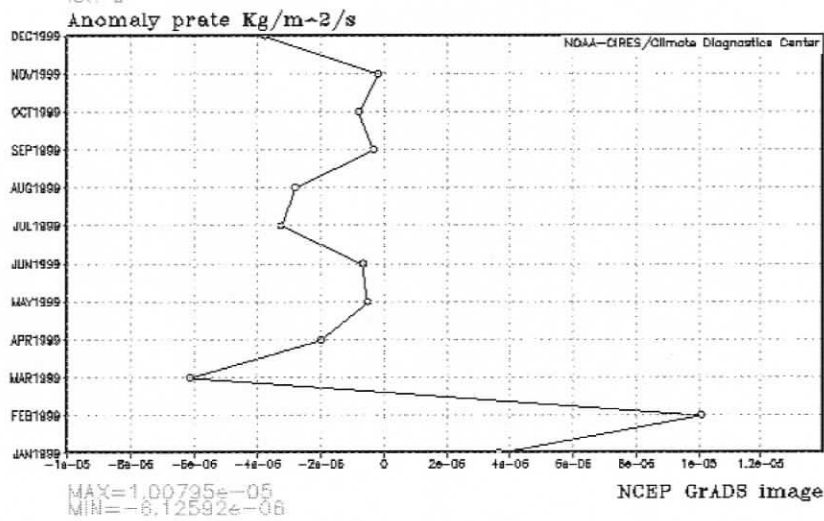
APPENDIX E

Deviations from Historical Mean Monthly Precipitation in Nushki Town 1993-2000

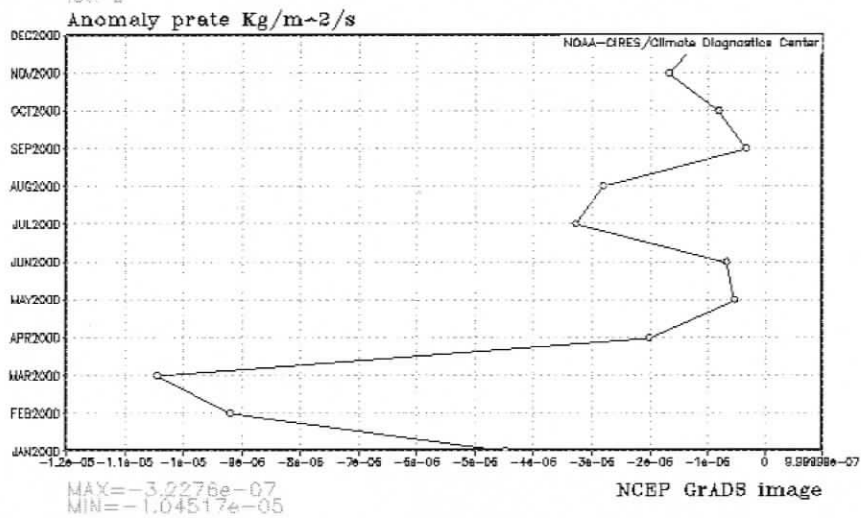


APPENDIX D (Contd.)

t: plotted from Jan 1999 to Dec 1999
lat: plotted from 29.55 to 29.55
lon: 65.6250
lev: 0

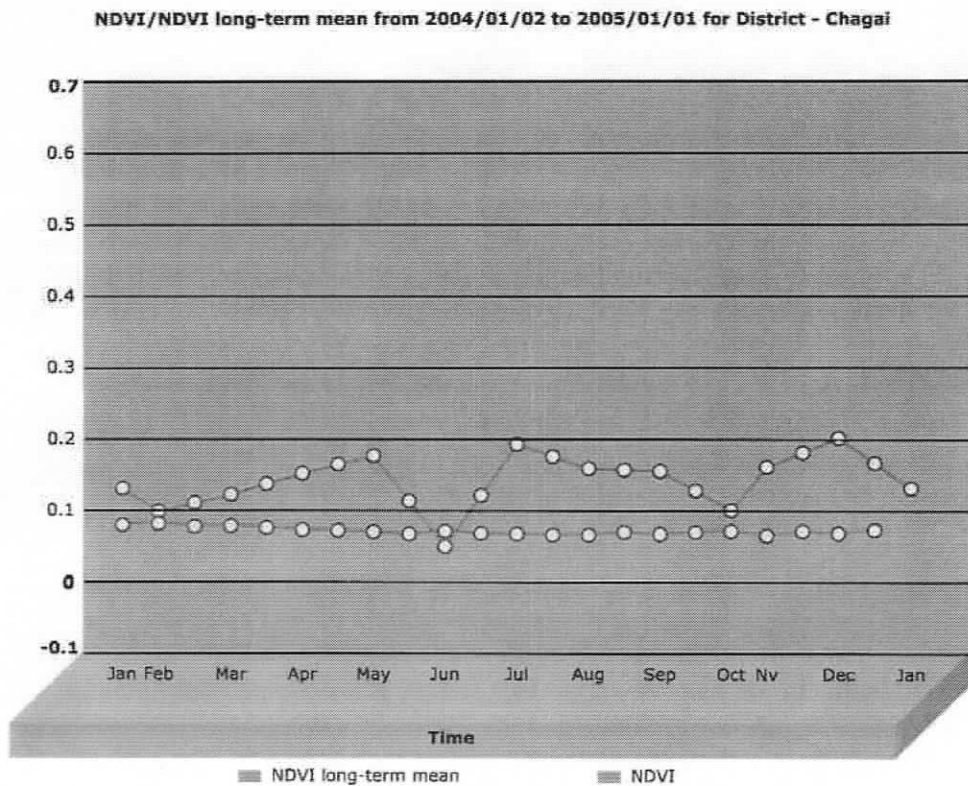


t: plotted from Jan 2000 to Dec 2000
lat: plotted from 29.55 to 29.55
lon: 65.6250
lev: 0



APPENDIX F

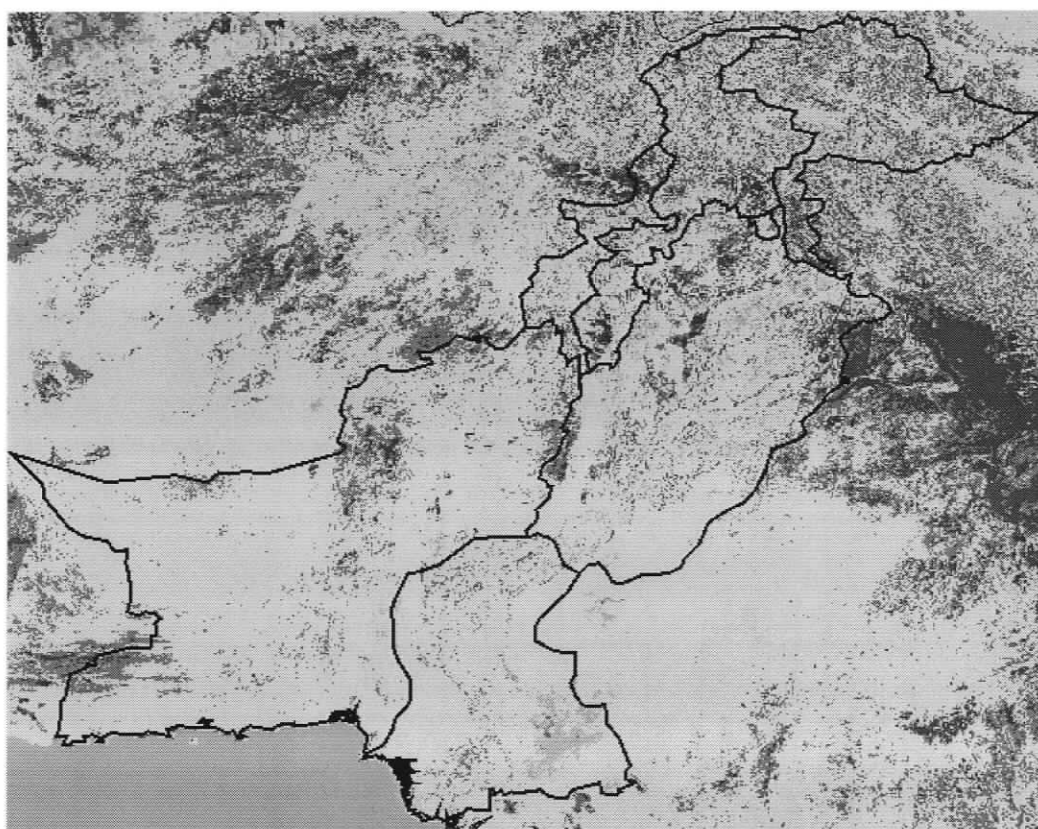
Deviations from Long-term mean for Vegetation (NDVI) in Chagai (Nushki) District



ANNEX G

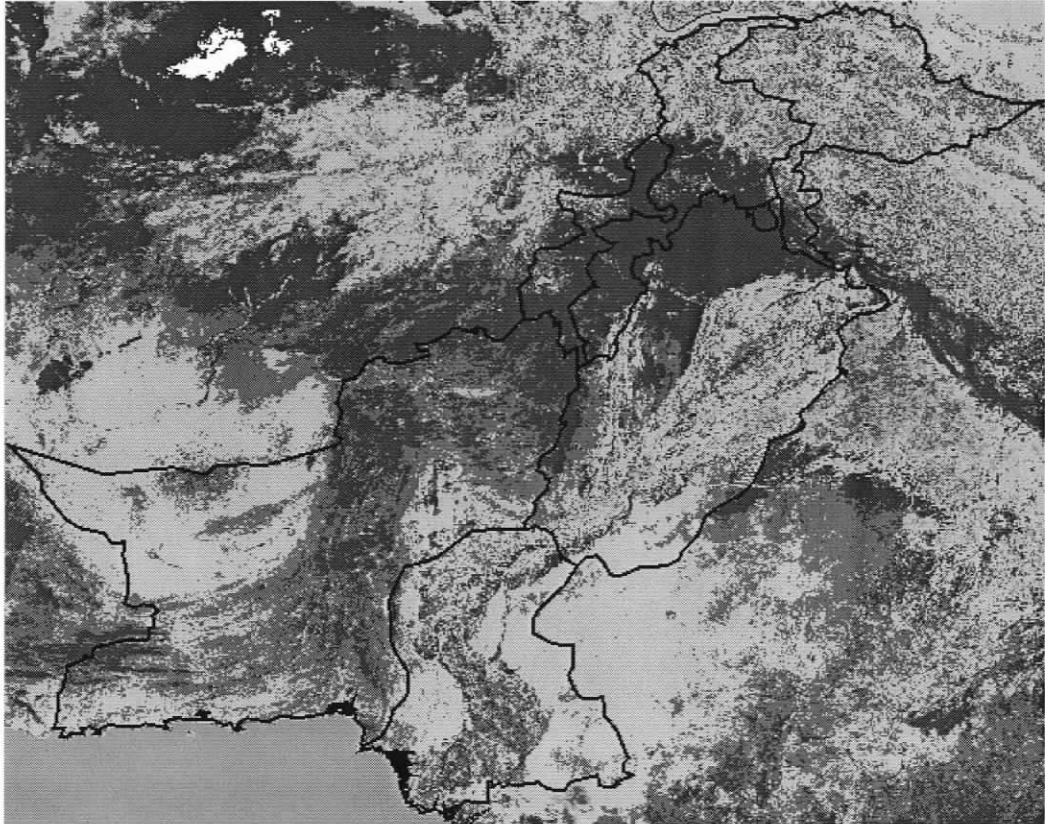
Differences in Vegetation Cover in Pakistan from 1999 to 2004³³ (Source: FAO 2005)

Note: Areas in red indicate below average vegetation and areas in green indicate above average vegetation. The depth of colour indicates the extent of difference. The month of April 1998 has been used as the baseline or average.

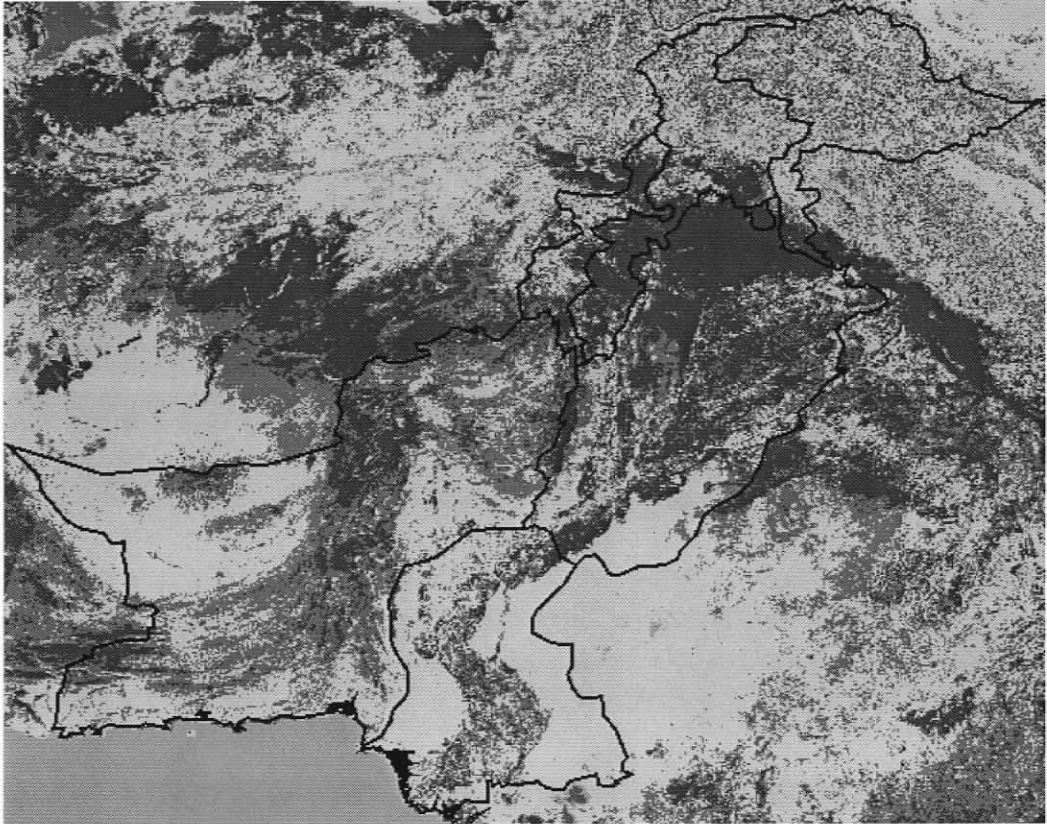


April 1999

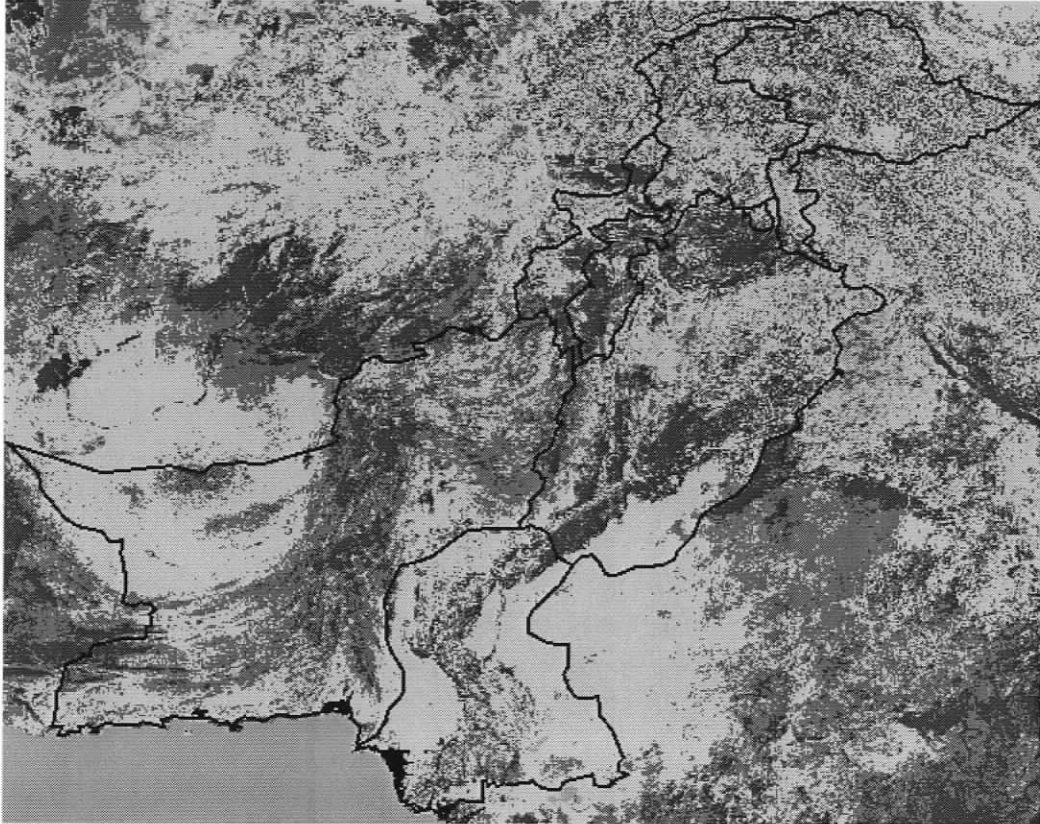
³³ The index uses 1998 as the base year. The areas in red indicate that vegetation cover was less compared to 1998 whereas areas in green show that vegetation was more compared to 1998. The darkness of the color indicates the higher magnitude of the difference. The grey areas show that there was no difference from the base year.



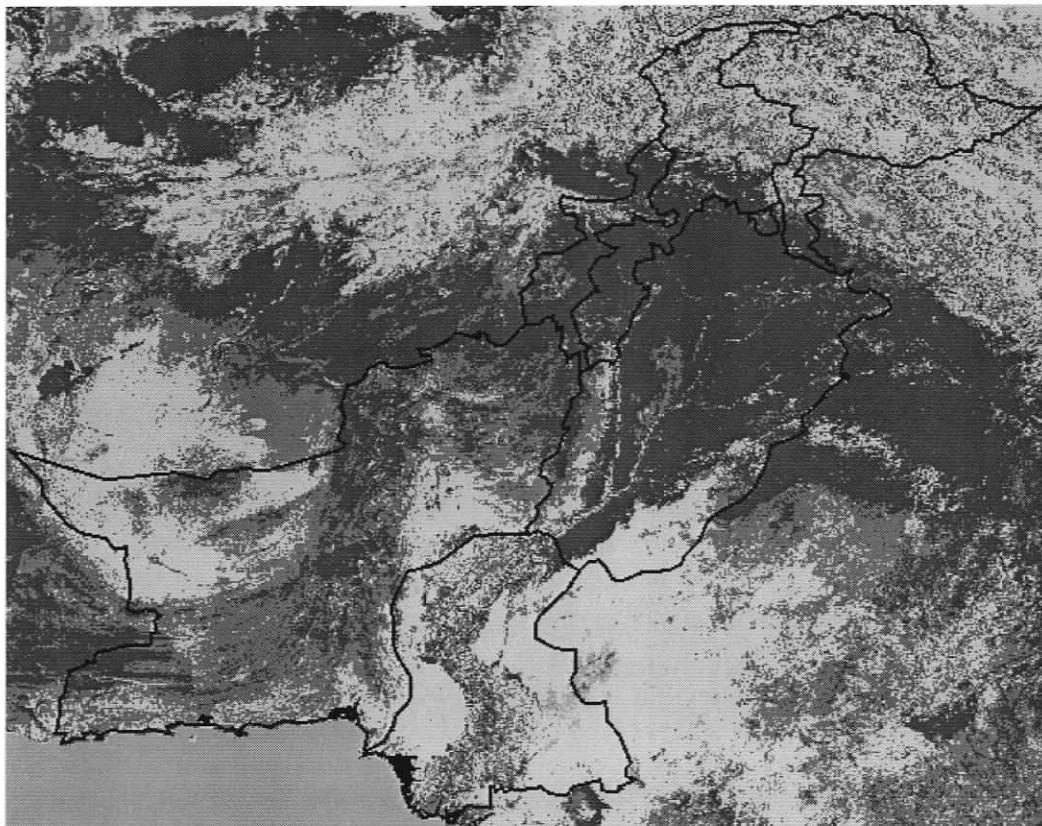
April 2001



April 2002



April 2003



April 2004

Source: FAO-SPOT Satellite Imagery

APPENDIX H

Brief Note on State Policy and the Decline of *Karez* Irrigation System in Balochistan Province

I) *Karez* Irrigation System:

Karez is an ancient socio-technical system of harvesting groundwater which comprises an underground water channel connecting a number of hand-dug wells. It is practiced in many parts of South and Central Asia, Middle East and North Africa including countries such as Pakistan, Iran, Afghanistan, China, Yemen and Morocco. It is also known by the alternate names of *Qanat* in Iran and Afghanistan, *Falaj* in the Middle East and *Foggara* in North Africa. Prominent ethnic and linguistic groups that practice *karez* irrigation include Arabs, Persians, Baloch, Pashtun and the Ughurs of China. The *karez* system has been in existence for over 2000 years in Iran and for many centuries elsewhere. Majority of the *karez*es in Balochistan Province are found in Quetta, Pishin, Zhob, Loralai and Kalat districts. While *karez*es are comparatively much smaller in geographical scale and water carrying capacity than the larger surface water systems in the irrigated plains of the Nile and the Indus river basins, it is an important source of livelihood and a focal point for human settlements in the arid highlands of Iran, Pakistan and Afghanistan where few reliable sources of surface water exist. For example, in 1973 there were an estimated 10,000 to 40,000 *karez*es in Iran alone (Beaumont 1973; Kahlown and Hamilton 1994; Qazi 2004).

A *karez* taps groundwater supplies that are available in the shallow slopes below seasonal streams which emerge from hilly areas. It is constructed by digging an approximately horizontal tunnel to intercept the sloping groundwater aquifer. After traditional water diviners or wise men of the village ascertain the availability of

groundwater for *karez* in a particular area, a mother well is dug in the underground aquifer at the head of the *karez* system. Further access wells are dug vertical to the main tunnel level at every 15 to 30 meters in order to provide for light, ventilation and the removal of material excavated from the main tunnel. The digging is carried out by specialist labourers who do not have any formal education but rely on skills and knowledge handed down from generation to generation. The water coming out from the underground aquifer flows along the tunnel by gravity to the surface and from there it is diverted through an open channel to the nearby fields. *Karezes* are normally 1 to 5 kilometres long but can be as long as 50 kilometres. (Beaumont 1973; Kahlow and Hamilton 1994).

II) Ownership, Water Rights, Land Tenure and Management:

Majority of *karezes* in Balochistan Province are owned collectively by residents of a village or several villages although some are owned by individual households³⁴. Collectively owned *karezes* are operated by families from the same lineage group³⁵ or from different lineage groups. They entrust the responsibility for its management to a single nominee who is variously called *Mir-e-Aab*, *Sarishta*, *Rais*, *Arbab* or *Kauda* (Farooqi and Rehman 1998; Van Steenberg 1996). His duties include overseeing water distribution, supervising maintenance and repair and collecting fees or contribution towards *karez* maintenance. Important decisions such as the magnitude

³⁴ A household or domestic group may be defined as a group of relatives (kin and affines) who eat from the same hearth, live in the same residential plot, or cultivate the same land or manage the same flock. It constitutes the focal point for production consumption and social life (Bonfiglioli 1995).

³⁵ A lineage (called *zai* in Pashtu and *phalli* or *paro* in Balochi) is a localized and unified group of families who can trace links of common ancestry. This is the innermost circle, after one's family or household, for an individual. The individual perceives himself or herself to be surrounded by concentric circles of kinship starting from the household and extending to the tribe (Bonfiglioli 1995; Buzdar et al 1989).

of repair work, the costs involved and the respective contribution of shareholders in a *karez* are collectively approved (Kahlowan and Hamilton 1994). Usually community members holding larger shares of water in a *karez* have more influence. This allows them to keep close contacts with government functionaries and obtain occasional funds from the government for the cleaning or maintenance of *karez*. They have a decisive say in resolving disputes over water shares and may veto some decisions against the wishes of numerous smaller shareholders (Farooqi and Rehman 1998; Messerschmidt 2002).

The water-shares of individual households are decided at the time of initial construction or major rehabilitation of a *karez* i.e. before the water starts to flow and are therefore fixed. These are defined in terms of the timing of water off-take from the *karez* in a particular season. These depend on the relative contribution of individual households or lineage members to the construction and maintenance of the *karez*. This contribution is called *gham* or *gham-kashi*. It is an abbreviated form of Persian expression *Gham-o-Khushi* which means to take part in the good or ill and joy and sorrow of the community or the tribe. However, the water-shares can be inherited and therefore are often fragmented. Beneficiaries' water off-take timings are fixed and cannot be rotated legally. In actual practice, however, farmers do make changes to accommodate emergencies. Moreover, all communities and households living along a *karez* are entitled to take water from it for drinking purposes or for washing clothes. In that sense it is also a common property resource owned by the entire community (Kahlowan and Hamilton 1994).

Different types of land tenure exist on lands irrigated by *karez*s. They can be managed directly by owner-cultivators or on a share-cropping basis or on rent (Messerschmidt 2002). However, despite the juridical separation of land ownership from water-share in a *karez*, households or lineages that own most of the land irrigated by a *karez* have a greater incentive to contribute towards its construction and maintenance and thus exert a greater influence in making decisions in disputes over water-share and relative contribution of the beneficiaries.

III) Kinship, Ethnicity and Commensality in the Management of *Karez*:

Until recently, *karez*s occupied an important place in the settlement of nomadic and semi-nomadic Baloch pastoralists in permanent villages (Messerschmidt 2002). Many of the larger villages and settlements in the valleys of Quetta, Mastung, Mangochar and Kanak take their names from the nearby *karez*s³⁶. *Karez*s appear to have started off as household owned or lineage-owned enterprises. This is evidenced from the existence of family-owned *karez*s and lineage-owned *karez*s alongside mixed-ownership *karez*s. However, over time people from outside the household or lineage seem to have acquired water-shares as a result of exogamous marriages and other ways of absorption of outsiders into the community (Farooqi and Rehman 1998). The pattern of mixed-ownership of *karez*s and heterogeneous communities is more common amongst the Baloch as compared to the Pashtun tribes. Van Steenberghe attributes this to the prevalence of open land and water tenure in Baloch settled communities. People from outside the tribe or the lineage may become members of

³⁶ These include, for example, *Karez Noth*, *Karez Kadi* and *Ashkena* villages in Mastung District, Balochistan Province (Author's observations in the field).

Baloch communities in several different ways: assimilation in communal property relations; tenancy; sharing in irrigation system maintenance; and, commercial land transactions (Van Steenberg 1996).

Assimilation in *karez* communities does not necessarily require becoming a member of the host tribe or accepting the formal authority of its tribal leader in the way that is pointed out by Barth (1981) regarding the assimilation of Zarkun Pashtuns in the Marri Baloch tribe³⁷. The decisive element of commensality in *karez* communities is sharing in the good or ill and joy and sorrow (*gham kashi*) (Van Steenberg 1996). They are able to do this by contributing towards the construction and maintenance of the *karez*, by sharing decision-making arrangements for the resolution of conflicts over water-share and by presenting a joint case to the government or political representatives for procurement of funds for repairs that are beyond the community's financial capacity (Author's observations in Manstung District as member of District Water Committee). Thus *karez* communities are extra-tribal and middle level social groups whose members are joined by bonds of commensality arising from earning their livelihood from the same source of water.

The communal nature of *karez* ownership and maintenance requires well established customs of cooperation with shared expectations, rights and responsibilities and mechanisms for resolving conflicts. Conflicts may arise over mismanagement of water, water theft and misappropriation of funds. It may also arise over the non-allocation of shares, especially to women. Women are entitled to their share in *Karez*

³⁷ Barth (1981) describes how uprooted Zarkoon Pashtuns seeking refuge (*hamsaya*) were accepted as fellow-tribesmen by the Marri Baloch in Kohlu District, Balochistan. They first worked as tenants but after accepting the supremacy of the tribal leader (*Nawab* of Marri tribe) and sharing in the joy and sorrow of the tribe (*gham kashi*), they were given full tribal status in a formal ceremony (Van Steenberg 1996).

according to Islamic Law but men usually resist actual transfer of land to their daughters and sisters. This sometimes leads to conflict between a woman's own family and her in-laws when she is married as the in-laws press her to claim her share of *karez* water. (Messerschmidt 2002).

Despite its susceptibility to domination by the richer and more powerful shareholders (elite capture) mentioned earlier, *karez* irrigation system has been vital to the socio-economic well being of small land-holders who could not afford to have their own *karez* or had no access to alternative sources of water. Moreover, in addition to its irrigation benefits, it is a common property resource for entire communities and villages for the purpose of obtaining water for drinking purposes and other household needs (Messerschmidt 2002). The social institutions revolving around *karez* system have ensured broader benefits for the community and have also promoted the traditional cultural values. These cultural values include shared responsibility for the resources of the community, taking part in the good or ill and joy and sorrow and providing free water to other members of community especially the poor who cannot afford to have their own source of water (Kahlowan and Hamilton 1994).

IV) Cultural Change as Imposed Development in *Karez* Communities in Balochistan:

Barth (1969) argued that culture emerges as "an implication or result, rather than a primary and definitional character of ethnic group organization" (Lewin 1996: viii). This emphasis on the interactive dimension of ethnicity encourages us to focus on the emergent and interactive qualities of cultural realities. Accordingly, ethnic

consciousness or the decline of it does not occur in a vacuum rather it occurs in the immediacy of social interaction. These social interactions take place within a context shaped by a number of external political and economic forces and an examination of these political and economic processes is a must in order to grasp the emergent realities of cultural change. Indeed Barth (1969) was the first to point out to us the explicit role of competition over natural resources in the dynamics of ethnicity in Balochistan, especially its role in ethnic and tribal boundary-maintenance among Baloch and Pashtun tribes (Lewin 1996).

We may argue then that the social organization of an ethnic group is both expressed in and is reinforced through the regulations governing land and water tenure (Van Steenberg 1996). Thus shared rights and responsibilities in collectively managed irrigation schemes such as flood-diversion structures (*gandhas*) and *karez*s are an important source of the establishment and the continuation of traditions, norms and social relations in Baloch communities. While these communal social relations are different from those on account of tribal affiliation and are mostly subordinate to them, they are nevertheless an important manifestation of Baloch culture, ethnicity and way of living.

The agricultural modernization policies pursued by the state in Balochistan Province have seriously damaged the viability of *karez* irrigation and the socio-cultural institutions surrounding it. Since the 1960s, Provincial and Federal Governments have engaged in an aggressive drive for mechanizing agriculture by introducing the installation of subsidized electric and diesel-powered tube-wells for extracting groundwater. These policies were based on the assumption that the supplies of

groundwater were inexhaustible and that water was wasted from *karezes* since they flowed throughout the year. In addition to installing subsidized machinery, tube-well development was also promoted through provision of cheap electricity to the farmers by charging a flat electricity rate regardless of the number of hours the tube-well was operated. Indeed, a study by Water and Power Development Authority (WAPDA) in 1977 seriously considered replacing well-functioning *karezes* in Mastung District by tube-wells on the grounds that they were not economically efficient because they 'wasted' water on low-value winter crops like wheat and water-melon (Van Steenberg 2000).

Alongside the improvements in transport network, tube-well development led to an upsurge in the cultivation of high-value fruit crops destined for sale in the urban markets and abroad and a relative decline in the cultivation of food crops. The tube-well rush became unstoppable in the 1980s and the 90s and more and more tube-wells were drilled despite alarming decreases in the water table (Van Steenberg 2000).

This led to a decline in the groundwater table in many areas and, as a result, the flow of *karezes* became less and many *karezes* and hand-dug wells dried up. The overall result was that the majority of *karezes* became economically unviable. The first people to abandon the *karezes* were the larger land-owners and water-share holders who were able to develop private tube-wells due to their economic health and political connections. The entire burden of maintaining the *karezes* increasingly fell on smaller farmers who were not well-placed financially or politically to face this situation. The final result was the total collapse of *karez* system. While the new economic situation

made some people better off, it left the majority of smaller water-share holders and land-owners destitute (Van Steenberg 2000).

The affected farmers tried to fight back by invoking the traditional *harim* rule in Islamic Law which required any new water source to be located at least at a distance of 250 meters away from an existing *karez* or well. However, this proved ineffective in halting the decline in water-table. Some affected farmers argued for enforcing a stricter distance and also lobbied for the same with the government. The Provincial Government promulgated the Balochistan Water Rights Administration Ordinance in 1978. Under this legislation, District Water Committees and a Provincial Water Board were established which were invested with the authority to issue permits to those individuals desirous of installing tube-wells. These bodies were required to establish safe yields for tube-wells and existing levels of withdrawals from groundwater harvesting sources. Based on this information, minimum distances would be established for each district or region that would serve as guidelines for the issue of new permits (Van Steenberg 2000). However, in practice, influential people were able to get away because of their political connections and there was not enough solidarity amongst or political-bureaucratic clout with the affected farmers to stop this. The legislation became a failure.

In sum, the government, in its efforts to expedite the modernization of agriculture in Balochistan Province, overlooked the social-cultural and ecological repercussions of its groundwater policies for the local communities. As a result the complex social structures governing the management of *karezes* collapsed and with it the traditional norms of cooperation and mutual self help have been eroded. While these policies led

to large increases in overall agricultural production, they have compromised the water security of the least well-off strata in the affected communities and made the livelihoods of these households more vulnerable.