

**A Descriptive Analysis of Household Strategies of Nomad
Pastoralists under Ecological stress:
(A case Study of Cholistan Desert)**

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A Descriptive Analysis of Household Strategies of Nomad Pastoralists under Ecological stress: (A case Study of Cholistan Desert)

By

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Abstract

The purpose of this study is to review different types of household strategies adopted by nomad pastoralists under ecological stress in Cholistan Desert. Under this study three types of household strategies adopted by the nomadic pastoralists during migration from desert area to irrigated lands, and from irrigated lands to desert, are designed by using sample data which is taken from thirteen villages where people still adopted the practice of migration. i) Household strategies adopted in desert areas of Cholistan, ii) Household strategies adopted in desert during ecological stress and iii) Household strategies adopted in irrigated areas. The present study is performed to evaluate the economy of nomads of Cholistan desert along with their household strategies, influenced by the environmental stresses. It is plausible to conclude that economy of the desert is highly influenced by environmental stresses. During this study it was observed that females are playing a key role in managing their household during their migration from desert to irrigated land and vice versa.

Introduction

With a population of 135 million, Pakistan is the country with the most rapid growth in population in the world. It is a developing country, with arable land area accounting for 27% of the total and with agriculture dominating in the economy, well renowned as "Fruit Basket" of the East. The number of laborers engaged in agriculture accounts for 51% of the total nationwide. Pakistan is relatively good at product marketing Pakistan has been confronted with the difficulty in sustained development, and all its electric power, highways, communication system, housing and traffic are in sustained development, and all its electric power, highways, communication system, housing and traffic are in a state of insufficiency.

Total area of Pakistan is 79.6 million hectare, out of which about 11 million hectares are deserts including Thar, Thal, Chagi and Cholistan. Cholistan desert, an extension of Great Indian Desert, is located in southern Punjab, Pakistan, between latitude 27° 42' and 29° 45' north and 69° 52' and 73° 05' east. Large area of Cholistan desert is in Bahawalpur division. It is bound by Bahawalnagar on North East; on North West side by Rahimyar Khan and on South West side by Sukkhar. The length of this desert is about 480 km and breadth varies from 32 km to 192 km with an area of 2.6 million hectares (Akbar et al., 1996; Akbar and Arshad 2000).

Based on topography, parent material, soil and vegetation, the whole Cholistan desert can be divided into two geomorphic regions i.e. Lesser Cholistan and Greater Cholistan. The Lesser Cholistan borders canal irrigated areas to the bed of abandoned river "Hakra" in the desert and

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covers an area about 7770 km². Greater Cholistan which borders with India in south covers an area of about 18130 km² (Akhter and Arshad 2006).

The Climate of Cholistan desert is characterized by low and sporadic rainfall. The mean annual rainfall varies from less than 100 mm in the west to 200 mm in the east. Rain usually falls during monsoon (July through September) and in winter and spring (January through March). Monsoon rains occur mostly in heavy showers. Cholistan is one of the hottest regions in Pakistan. Temperatures are high in summer and mild in winter. The mean summer temperature (May, June) is 34°C with highs reaching more than 51°C. Aridity is the most striking feature of Cholistan desert with wet and dry years occurring in clusters. The annual rainfall may occur during as few as 11 days, although the spatial variation among the rainfall zones may be greater from year to year for entire area (Akhter and Arshad 2006).

Climate plays very important role in socio-economic structure of the nomadic people and their mobility pattern. Climate of Cholistan can be studied as following

- a) Temperature
- b) Rainfall
- c) Humidity

The Cholistan desert is one of the district and hottest areas in the country. Summer is very hot temperature rise rapidly during April onward and reaches its peak in the late May or June. The month of June is hottest month and daily maximum temperature exceeds 44°C. Sometimes it goes more than 49°C the temperature came down during July due to rain. (PCRWR)

An Average rainfall, which occurs from mid June to September, varies between 100-75 millimeters. Long Spell of drought extending over period of 2-3 years are uncommon, these droughts cause great damage upon plants and animal life. (PCRWR)

The relative humidity also falls below 32% due to the high temperature. At Dinger, the relative humidity during winter was 64.6% and during summer, it was 41.1% at morning and below 5% at noon (PCRWR).

Water is life for all but in Cholistan it is essential for the existence of settlement. All the activities of Cholistanies revolve around the Tobas. Presently no permanent stream or river flow in the area, in past there was flowing a river named Hakara River. The river supplied permanent water until 1200 B.C. About 600 B.C it becomes irregular in flow consequently dried. Water resources in Cholistan are: Surface water is received by rainfall and is collected in 'tobas' and 'kunds'. The underground water throughout is brackish and is obtained through wells. The underground water is present at a depth of 40-50 meters. The electrical conductivity level of water of wells ranges from 620 to 29800 mg/l. Two or three humans are needed to fetch water from well; camels are also used for this purpose. This is water brackish and not drinkable in medical point of view but people of Cholistan desert used this water without any fear.

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In Cholistan desert two systems, nomadic and transhumanie are observed. Pastoralists stay in the desert at rainwater harvesting sites during monsoon and migrate to semi-permanent settlements due to scarcity of water and harsh climate.

Transhumant system comprises the largest number of immigrating livestock and is characterized by mass movement, including people. Patterns of movement are location specific and dictated by a traditional system of land tenure. The timing of migration is determined by the onset of the monsoon and rainfall distribution: July/August (monsoon): Movement is from the irrigated and riverine areas to traditionally owned 'tobas' in Lesser or Greater Cholistan. The distances covered vary from 10 to more than 100 km. Several 'Tobas' belonging to the same clan may be located within a 1Km radius. At the start of the season, livestock generally graze within a few kilometers of the 'Toba'; but this distance increases to around 15 Km. by the end of the season. October/November: as water or forage is depleted at the Tobas, migration is to semi-permanent settlements having wells and kundis. March/April: Migration is back towards the fringe of the irrigated areas and after wheat harvest, to the Sutlej River for those with traditional, riverine rights. Irrigation canals are the water sources, but feed supplies are differentiated according to two sub-systems (Ahmad 2001).

Pastoral sub-system herds are partly fed on dried forage, on vegetation along canal banks, roadside, and partly on purchased fodder. Some stubble is available after the wheat harvest in May; Agro-pastoral systems herds are partly fed on dried forage but depend heavily on fodder crops and residues since their owners possess irrigated land. Transhumanie system, being heavily dependent on the timing and quantity of rainfall, can be severely disrupted by droughts. For example, during a prolonged droughts spread over 4 to 6 years, most of herders barely moved south, some staying only a few days or for a few months before being compelled to return. Average herd sizes in the pastoral system were small with a total of 106 animal units consisting mainly of sheep (46%), cattle (34%) and goats (20%). In the agro-pastoral system disparity in herd sizes was variable, but the average herd size was much larger at 779 sheep units, with cattle, sheep and camels predominant (Ahmad, 2002). Several constraints to productivity are identified by the socio-economic study in the transhumant system, all of these being linked to water supply and its balance with forage and fodder:

Nomadic system applies to the larger herds of camels and goats which remain throughout the year in the desert (Lesser or Greater Cholistan). The size of such camel herds varies from around 4 to 150 animals, and goat herds are of variable sizes. Depending on the size of the herds to be left in the desert, one or two members of each household will remain behind to tend the herds. In addition, a herdsman will be hired to assist if the herd is particularly large. The other members of the household will follow the normal transhumant system and will return to the irrigated land, taking along one or two camels for transport. Households with only

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a few surplus camels e.g. less than 5 for their transport needs will leave these behind to be cared for the arrangement with the owners of the larger herds. During winter and summer these nomadic animals drink from wells at the semi-permanent settlements (Jowkar et al., 1996). During the monsoon and post monsoon they drink from tobas like all the order animals. Natural grazing is the exclusive nutritional source for the nomadic animals living permanently in the desert (Ahmad, 2002).

Ecological stresses occur with the loss of adaptive capacity when the toughness of an environment involves in a way unfavorable to coping with perturbations that interfere with that ecosystem, landscape, or species survival. It may be that environment quality degrades compared to the species needs, after change in abiotic factors like increase in temperature and less rainfall.

Following are the major factors responsible for ecological stress in Cholistan desert.

1. Low, erratic and unpredictable rainfall
2. Very High Temperature
3. Low Relative Humidity
4. High rate of evaporation
5. Strong desiccating winds
6. Overgrazing
7. Deforestation

Climatic variability is characterized by Swift (1977) as a kind of 'great equaliser' in pastoral societies because it creates a situation in which the relatively rich and poor may change places with each other unpredictably'. Anil (1986) presented the ecological crisis in the agro-ecosystem is found to emerge from man's irresponsible interference with the soil and water systems than any disastrous natural situation. In an attempt to increase the economic returns from the land in the short run, biological productivity is threatened in the long run. Faruquee (1996) reviewed nature of Pakistan's major environmental problems both brown and green and assessed the extent to which economic policies are affecting incentives for the environment. Experiences of other countries have shown that nondistortionary economic policies that promote economic growth by improving the allocation of resources also create appropriate incentives for the protection of the environment. Khan et al., (1996) examined the factors behind low crop yield in Cholistan. Both the quantitative and qualitative analysis showed how the low levels of agricultural productivity in this area may be linked to material and climatic factors. The quantitative analysis was mainly focused on physical factors. The qualitative analysis, however, emphasises that relative inefficiency of agricultural activity in Cholistan reflected the influence of physical, economic, social and, most importantly, climatic factors. Bleek (1999) reported that paper throughput economy will yield to a customised economy, in which customtailored services are more important than mass products, and access to services more important than ownership of goods. Beyeler and Dale (2001) described that ecological indicators can be used to assess the condition of the environment, to provide an early warning signal of changes in the environment,

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or to diagnose the cause of an environmental problem. Ideally the suite of indicators should represent key information about structure, function, and composition of the ecological system. Ajmal et al., (2001) described the problems and sustainable development of Cholistan desert communities through various resources and sampled the available resources such as vegetation resources, livestock resources, soil resources and water resources. Israe and Elijah (2006) examined the impact of desertification and drylands on the environment and socio-economic conditions with particular emphasis on the Northern part of Nigeria for its empirical analysis. Caplovitz (1979, 1981) labeled the strategies of "increasing efficiency" as those that included the shopping strategies of coupons and sales (household management income). The "self-reliance" strategy was defined as doing for oneself what formerly was done by others (household labor income) such as repairing one's own car, making one's own clothes, painting one's house. Voydanoff and Donnelly (1988) reported some gender differences in uses of economic adjustment strategies.

Objectives

1. To determine the household strategies of nomadic pastoralists of Cholistan desert influenced by the environmental changes.
2. To record the problems arising from environmental changes of the nomads in Cholistan desert.

Materials and Methods

An overwhelmingly large part of study is based on the primary source of data. The present study is primarily based on the multi-topic household survey data as collected by the author during April-September 2012. The household survey was conducted and information recorded from two hundred household in a cluster sample of Cholistan consisting of ten villages (Chaks). Sampling techniques like, area sampling, cluster sampling, and simple random sampling were undertaken for the selection of a sample.

Primary data on household strategies under varying environmental conditions of nomad's pastorals of Cholistan desert was collected by interview technique by going door to door in Cholistan desert and the interview schedule was a set of Questions in a Questionnaire form which was filled by the interviewer.

Further, the published data from following sources utilized for the purpose of analytical analysis

- Pakistan Economic Survey (Annual)
- Pakistan Council for Research in Water Resources Reports

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In this study, major emphasis is on the analysis of economy of nomad pastorals in Cholistan desert by using two approaches. First approach is concerned with the preliminary data analysis on environmental changes in Cholistan desert. Second is an attempt to analyze different types of household strategies adopted by nomad pastorals at their semi-permanent settlements.

Results and Discussions

Rainfall in Cholistan desert is very low, erratic and unpredictable and heavy rains received during months of July, August, and September (monsoon season) as shown in table 9. The annual rainfall is 150 to 250 mm. About half of the total rainfall comes under the threshed category while others do not create runoff. However, average annual rainfall is insufficient for irrigation and for population of livestock. Second source of water in this desert is ground water which is brackish and not fit for drinking. The rain water stored in the low lying area called 'Tobas' could not prolong for the whole year (Arshad 1999).

Table1: Rainfall data recorded at Dingarh in the Cholistan desert.

Months	1997 Mm	1998 mm	1999 mm	2000 mm	2001 mm	2002 mm	2003 mm	2004 mm	2005 mm	2006 mm	2009 mm	2010 mm	2011 mm	2012 mm	2013 mm
January			5.4					4			6	10			
February		4	6.4	5.4			50		50.6				24		27
March	25						3		15	26	2				2
April	14	10			5.4				10					10	
May	12				26		1.4		6		42	2		1	
June	30	18	9		4	2	11	23.2	2	28	22	7		8	4
July	58	55	50	71	82.3		56	5.8	36	20	44	180	17	17	
August		20		50	28.5		108. 6	50		70	38	236	154	154	18
September	16	65.1							13.5		32				28
October	46							2							
November															
December								23.8		13		5			
Total	201	172.1	24.8	126.4	146	2	230	98.8	133.1	157	79	186	440	195	190

Source: Pakistan Council for Research in Water Resources

Table 1 shows that there was no rainfall during the months of November and December, during these months nomads stayed on semi-permanent settlements and earn their income by irrigation of their on lands or on the lands of others. During these months their source of income is totally depends on irrigation and partially on their livestock because during these months milk production from livestock is minimize. Then in January to April they stayed in irrigated areas

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with their livestock but due to low rainfall crops production was also. During these months they try to earn income from both sources of income as crop production and livestock production.

4.2.4b High Temperature

The Cholistan desert is one of the driest and hottest areas in Pakistan. The mean annual temperature of the area is about 27.5⁰C, the mean summer (average) temperature is 35.5⁰C, while winter (average) temperature is 18.0. The average maximum temperature goes up to 46⁰C and average minimum temperature falls up to 7⁰C. Some time maximum temperature during the year exceeds 50⁰C and minimum temperature falls up to 1⁰C. Summer is very hot. The temperature begins to rise rapidly from April onward and reaches its peak in late May or June. During this period hot dry winds blow throughout the day and occasionally this hot spell is interrupted by dust storms. The man relative humidity also falls below 32% due to high temperature. The month of June is the hottest and daily maximum temperature normally exceeds 45⁰C and some times crosses 50⁰C. The daily maximum temperature comes down in July due to monsoon rainy season in the country. There is always an abrupt temperature during nights. In summer days are hot but nights are cooler. Average temperature data for the last nine years at Dingarh in Cholistan desert is presented in table2

Table 2: Climatic data recorded at Dingarh in the Cholistan desert.

Month	Monthly Average Maximum Temperature (C ⁰)	Monthly Average Minimum Temperature (C ⁰)	Monthly Average Mean Temperature (C ⁰)	Monthly Average Wind Speed (KPH)	Monthly Average Rainfall (mm)
January	25	7	16	9.5	3.86
February	29	9	19	14	1.45
March	31	14	22.5	16.5	5.73
April	38	21	29.5	15	5.37
May	39	28	33.5	18	5.77
June	46	31	38.5	19	25.2
July	41	30	35.5	20	50.9
August	40	28	34	17	36.34
September	38	27	32.5	12	33.57
October	37	27	32	13.5	5.11
November	34	18	26	10	0.4
December	29	13	21	14.5	2.17

Source: Pakistan Council for Research in Water Resources

Winds

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There are two main wind movements in the Cholistan desert:

- a) Winds blow from the South, SW and SE during the summer months (May to October).
- b) Wind blow from the North, NE and ENE during the winter months (November to April). The summer winds are stronger than the winter.

The wind speed data recorded at Dingarh showed that the winds in Cholistan blow throughout the year. Winds blow with maximum speed and some times in the form of storms during the summer months i.e. May, June and August, otherwise winds blow in all months of the year with normal speed. The monthly average minimum wind speed during May, June, July and August is 10.25, 11.27, 10.85 and 7.78 km/hours respectively while average maximum wind speed is 26.30, 27.0, 28.67 and 26.33 km/hours.

Household

Household is group of people who normally live and eat together, make common provision for food and other essential for living and they regard one person as the head of the household.

A household includes all the persons who occupy a housing unit where housing unit is a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live and eat separately from any other persons in the building and which have direct access from the outside of the building or through a common hall. The occupants may be a single family, one person living alone, two or more families living together, or any other group of related or unrelated persons who share living arrangements (U.S Census Bureau).

Household Strategies

Households really do sit and plan their activities, an idea which he found unsustainable. Household strategy is that a strategy of some sort can be inferred from a given household outcome. Household strategy is that strategy which can enable a person to support his family in a better way (Warde 1990).

Household strategies' was a concept used first of all in studies of Latin America and Africa where the informal economy was at least as important as the formal economy in understanding every day economic behavior among the urban poor (Hart 1973, Castells and Portes 1989, Roberts 1991). It was later used as a concept in several empirical investigations of Britain in the 1980s, including the so-called Sheppey-project, as a way of looking at the impact of economic change, especially unemployment (Pahl 1984).

The concept of household strategies was used at first mainly to apply to specific social groups, ones that must draw on a range of resources in the struggle to survive in a risky

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environment. Hence, people in marginal positions, peasants, small business and farm families or immigrant entrepreneurs were said to have 'strategies' in this sense (Redclift 1986, Pile 1991, Portes 1994). These were often termed 'survival' or 'coping' strategies.

'By taking the language of strategy in an uncritical manner sociologists are contributing unintentionally to the spread and expansion of a multiplicity of these power discourses and practices. For there is little doubt that strategy operates as a power that normalises and individualises those who are subject to it; not only does it force them to act strategically and take responsibility for their own strategies, it actually transforms individuals into subjects who secure their own sense of meaning and reality through the discourse of strategy' (Knights and Morgan 1990: 481-2).

Household Strategies as a method of Analysis

A second theme to emerge is the idea of household strategies as a method of analysis, particularly for understanding the combinations of formal, informal and household work and the divisions of labour between them. Sometimes this includes only those activities that are not regulated by the state (or which avoid state regulation) and sometimes this can mean forms of reciprocal or unpaid exchange between households or household production otherwise known as self-provisioning (Pahl and Wallace 1985).

In this sense, household strategy has been used in different contexts all over the world including Latin America (Roberts 1991), Hungary (Sik 1993) and Italy (Mingione 1988, Vinay 1985). Despite the persuasive criticisms of the idea of 'informal economy' (Harding and Jenkins, 1989), the economic survival of households in some contexts such as certain postcommunist countries (Rose and Haerpfer 1992, Piirainen 1997) or Soviet-style systems (Sik 1993, Wedel 1986 and 1992), or developing countries where there is no state support (Roberts 1991) are difficult to explain without some recourse to this terminology. Since the informal sector is difficult to study using conventional methods of analysis, such as surveys, secondary sources and so on, it means that sociologists have had to look in more detail at the practices of households and at the way in which economic relationships are socially embedded (Granovetter 1985).

Household strategies of Nomadic Pastoralists in Cholistan Desert

Nomadic pastoralists of Cholistan desert are adopted different household strategies in irrigated and desert areas of Cholistan. Following are the household strategies developed during this study:

a Household Strategies in Desert Areas of Cholistan

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1. Men spend time for taking care of animals and women spends their time at home in cooking, embroidery, child caring, fuel wood collection and water collection.
2. Spending less money on food items.
3. Spending less money on clothing.
4. Spending no money on children education.
5. Women collect firewood for cooking.

b Household Strategies in Desert during Ecological Stress

1. Intensified sale of livestock.
2. Temporary migration towards irrigated areas.
3. Reduced frequency, quantity and quality of food.
4. Women involved in labor force.

c Household Strategies in Irrigated areas

1. Cultivation of more land.
2. Women play vital role in cultivation of land with men.
3. Sending children to schools of Non-government Organizations
4. Spending more money on food items.
5. Spending more money on clothing.
6. Using utilities services from informal uses.
7. Avoiding luxuries items
8. Move towards desert during rainy seasons.

The climate of Cholistan desert is an arid and subtropical type characterized by low and sporadic rainfall, high temperature, high rate of evaporation and strong summer winds. In this chapter we find out the factors responsible for ecological stress in Cholistan desert and explain the concept of household and household strategies. Different types of household strategies are described here. Nomadic pastoralists of Cholistan desert adopted different types of household strategies according to environmental changes in the region. When temperature is high and low rainfall during the months of June, July and August they stayed at irrigated areas of Cholistan desert and adopted household strategies similar to adaptive type strategies. When temperature is low and heavy rainfall they stayed on 'Tobas' and adopted household strategies described in this chapter. During ecological stress nomadic pastoralists move towards semi-permanent settlement on canal areas and adopted coping type household strategies.

Conclusion

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Ecological stress cause deaths, it can also more simply reduce the quality of life of the remaining individuals. Ecological stress cause epidemic diseases, famines, reduction quality of health, food crises .Due to the ecological stress in Cholistan Desert peoples are forced to adopt nomadic life style and they move to different areas for the sake of life and their living source of income. Due to this environmental changes and nomadic life style peoples are faced many type of health risk, like skin disease, sun stroke etc.

As climate of Cholistan desert is very intensive and low rainfall, high temperature and wind erosion are considered as ecological stress in Cholistan desert. When this environmental stress is converted into severe conditions then economic status of Cholistani peoples are affected badly and they adopt different types of household strategies to overcome these stresses. The most commonly household strategy adopted by sample population is to save their own life and life of their livestock is “Coping Household Strategy during these stresses. While the household strategy adapted by the sample population is “Adaptive Household Strategies”.

Policy Recommendations

As the nomads of Cholistan facing ecological stress in the form of high temperature, low rainfall, Shortage of water, high winds speed and soil erosion, It is recommended that different schemes should be initiated to improve the water supplies, to reduce water losses, to make more efficient use of available water and to develop new water resources. Especially availability of water should be ensured to those villages where water is not enough for the cultivation of crops. With the availability of water supply and improvement of available water resources the income of the desert dwellers could be enhanced which ultimately will help in better household strategies.

Construction of water reservoirs in those villages where drinking water is not available and people bring their drinking water from far flung areas. In 95DNB local people are forced to drink unhygienic water and their health is at risk. Special attention of Govt. should be given to recover the losses caused by soil erosion and high speed winds in the form of financial support of nomads of Cholistan.

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