

Vulnerability Factors and Socio-economic Impacts of Drought in Balochistan (A Case Study of District Nushki)

Social work

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Abstract

Drought in Balochistan has remained a devastating natural disaster that impacted almost 90% area of the province. The 1998-2004 drought was probably the most severe in the history of province. The main focus of this paper is to analyze the specific vulnerability factors, and the socio-economic impacts of drought in Balochistan. The study is a combination of both qualitative and quantitative data analysis. The results reveal that more than 75% of the population belongs to agriculture and livestock sectors. The decrease in water resources severely affected local population directly and indirectly. Several vulnerability factors such as detrimental cultural practices, poor groundwater governance, lack of community's awareness of drought mitigation, environmental degradation, weather related religious beliefs, insufficient supply of electricity for agriculture and climate change intensifies the socio-economic impacts of drought. Consequently, a large number households suffer from decline in crop yields, food insecurity, unemployment, out-migration, increased conflicts, taking loans, and impacts on women and children. The article suggests policy and practice focused initiatives combined with further scientific research in order to mitigate the socio-economic impacts of drought.

Key word: Vulnerability; socioeconomic; impacts; drought; Balochistan; Nushki

Introduction

Mankind has been experiencing the turmoil and devastations of different climatic change events, for example, drought (Pomee, 2015). Drought is usual in many parts of the globe and the predictions of climate change forecast that it will increase in recurrence and/or severity to a substantial

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degree throughout the on-going century (Dai, 2010; Hennessy et al., 2008). Drought situation has determined adequate consideration globally because of rapid climate change and the need for water (Mishra and Singh, 2010). The recurrence of drought events and their intensity varies both spatially and fleetingly. Drought has been characterized as extreme scarcity of water for a particular and long time period in a territory. It has social, economic and environmental effects (Pérez et al., 2009). Droughts and heat waves are often related mis-conceptually; however the two are different phenomena. Heat waves may last for a week while a drought may endure from months to years (Chang and Wallace, 1987). The events of drought vary from each other taking into account their severity, length and the region engulfed (Wilhite et al., 2014).

In last couple of decades, the world has observed more extreme and intensive natural disasters such as droughts and floods (Mishra and Singh, 2010). All continents have encountered serious dry spells, influencing larger parts in Australia, Asia, North and South America, Africa, and Europe (Le Comte, 1995; Le Comte, 1994). Around 60 million human souls in Southwest and Central Asia were affected by durable drought season during 1999-2000. It was among the biggest dry seasons of the globe (IRI, 2001). The dry spell's extreme effects immersed Iran Tajikistan, Turkmenistan, Afghanistan, Uzbekistan, and Western Pakistan (Mishra and Singh, 2010).

As in other regions of southwest Asian, droughts in Pakistan are normal and they keep on causing various unfriendly impacts (Shahid et al., 2004). Recurrence of this inching disaster in our country is 2-3 years in every decade (Mazhar et al., 2015). All areas of Pakistan have encountered a number of drought seasons in the history. Among all, the last episode of dry season 1998-2005 was the most extreme one at national level that severely influenced the socio-economic and environmental conditions of people.

Balochistan remained severely inclined to the 1998-2006 drought. PDMA (2015) states that after the overwhelming period of dry spell of 1998-2006, the region is still experiencing another on-going spell of drought which is influencing agriculture, livestock, and in general the socio-economic status of the area. At least twenty three districts of Balochistan experienced mellow to moderate socio economic impacts of drought (Shafiq et al., 2007). Among all other districts of the province, Nushki remained severely affected by the devastating spell of 1998-2006 drought (UNDP, 2015). The social and economic sectors of the district are still suffering from drought impacts.

Literature Review

Concept of Drought

Drought is a natural disaster which is broadly spread event that can attack both low precipitation as well as high precipitation areas and in fields as well as in mountainous locales. Drought is a mind boggling term that has different definitions, contingent upon individual observations. Studies show that more than 150 definitions of drought are available in the literature (Boken et al., 2004). For example, a drought can be characterized as climatological, meteorological, water management, socioeconomic, absolute, partial, dry spell, serious, severe, multiyear, design, critical, point, or regional.

The glossary of Meteorology characterizes drought as a “period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrological imbalance in the affected area, on the degree of dryness and the duration of dry spell” (Huschke, 1959). Yevjevich (1967) states that because of the different perspectives upon the meanings of drought the study of drought has been a noteworthy hindrance. Wilhite and Glantz, (1987) recognizes the theoretical and operational meanings of drought. Theoretical means long and dry period is called drought, on other hand, operational means the beginning, harshness and end of drought time spell. Drought in climatic dialect implies when the real moisture supply is always not as much as would be expected at a specific area/region for a long time period. (Qureshi et al., 2004).

Generally, many people think that drought is seldom and random, although it is a regular and frequent characteristic of climate. It is a creeping onset natural disaster, and it is an ordinary event (Wilhite, 2000). It is a deceptive threat of nature that can eject in a matter of months, or it can step by step creep upon a clueless society over many seasons. It keeps on unnoticed by the people in general until impacts of drought have been occurred. (Khan et al., 2013)

Drought in Pakistan

Like other drought prone countries of the world, Pakistan, too, has been experiencing severe drought episodes. In every ten years, the recurrence of this slow disaster is at least 2 to 3 years every ten years. Nations that produce and consume poorly, are more vulnerable to the adverse impacts drought and extreme events of weather (Pereira et al., 2002). There is developing attention about the expanding recurrence and intensity of drought in Pakistan (Ahmed et al., 2015). It has been reported that there is a crucial growth in the

recurrence of heat waves that indicates the forth-coming intensification and expanding severity of drought (Zahid and Rasul, 2012). Significant areas of Pakistan's economy that are influenced because of droughts, that incorporates agriculture, livestock, transportation, unemployment, forestation, energy, fisheries, and increase in rates, etc.

Major Droughts of Pakistan

Studies reveal that Pakistan has regularly been in the grasp of serious drought spells. Punjab encountered the most exceedingly terrible droughts in 1899, 1920 and 1935. Sindh province experienced most awful droughts in 1871, 1881, 1899, 1931, 1947 and 1999 while the Khyber Pashtoonkhwa province faced worst droughts in 1902 and 1951. The most serious droughts at the national scale were perhaps the latest, which happened in 1999-2000 delaying up to 2002. The precipitation was inconsistent and the flow of water in rivers dropped. (Ahmed et al. 2004). As per the discouraging findings of World Disasters Report In 2003, 6,037 individuals lost their lives and 8,989,631 were directly or indirectly affected by the drought spell that kept going from 1998-2002 (Mazhar et al 2015)

Drought in Balochistan (1998-2006 and onward)

Balochistan is a southwestern province of Pakistan located between longitudes 610 and 710 E and latitudes 250 and 320 N. Balochistan is the largest province of the country covering almost half of the geography of the country. Geographically, Balochistan is around 347,190 square kilometers.

Balochistan is among the most drought-inclined provinces of the country where serious drought spells have been recorded in 1967-1969, 1971, 1973-1975, 1994, 1998-2002, and 2009-2015 (Ahmed et al., 2015). Among the different spells of drought the most serious one was drought of 1998-06 (Ahmed.2007) which extremely influenced the human/livestock populace, yields and water assets. This drought was termed as one of the most exceedingly terrible ever, judged from the way that it was the significant cause behind moderating the economic development rate down to just 2.6%. As per the Ministry of Finance, the drought brought about loss of 25 billion rupees to the national exchequer in the year 2000-2002 (PDMA, 2015).

The main reason behind long spell of drought was a continuous shortage of rainfall in the province. In most extremely influenced regions, even not a single drop of water was gotten in 1998-2002 season. In some areas the rainfall in winters decreased by 60-70% for several years. The condition of those regions was more alarming where underground water was either very

deep or salty and surface water resources were not accessible. Ahmed et al. (2003) states that there are obvious reasons of the adverse impacts of drought which includes violation of underground water sucking rules, poor management of water, deforestation, lack of management in grazing of animals and lack of systematic cropping systems.

The situation of drought in the province is quickly forming into one of the most exceedingly terrible disasters in Pakistan. Recently in 2013, very little rainfall ranging from 25 to 200 mm, associated with meteorological drought conditions prevailing in the province (NDMC, 2013). Upland Balochistan is the most vigorously influenced territory of the province. The abrupt reduction in rainfall in most of the northwest areas of the province has resulted a gloomy situation. This situation has resulted in paucity of the surface water assets for human use, diminished water resources from springs, *karezes* and tube-well. Additionally, the underground water table has been declining in majority of the areas and low-laying zones. As per PDMA (2012) and UNDP (2015), the accompanying areas were influenced by mellow to direct drought; Dera Bugti, Kohlu, Loralai, Zhob, Qilla Saifullah, Pishin, Qilla Abdullah, Nushki, Kharan, Awaran, Mastung, Kalat, Khuzdar, Lasbela, Chagai, Khuzdar and Kalat.

Impacts of Drought

The impacts of drought are typically complex which affects many segments of society. Unlike floods and earthquakes, which require generally short time-periods to get into a severe state of intensity, droughts grow all the more gradually, over times of month or years and inside certain local areas (Shah et al. 2011). The impacts of drought can be observed even in those areas that are not directly hit by drought (Mishra & Singh. 2010). Its impacts assessment is possible while taking into consideration some key qualities of that specific drought, for example, the length, economic intensity, total loss of economic assets, suddenness, socio-economic impacts, level of severity and occurrence of other additional hazards. Since drought is creeping disaster, that's why, its impacts may last for many years even if the drought period has finished.

Drought impacts are usually classified in in two classes, the direct and indirect impacts. The socioeconomic and environmental impacts of drought may be observed in different forms both the direct as well indirect (Hansen et al.2004; Hellmuth et al., 2007; Bhavnani et al., 2008). The direct impacts may include loss of productivity in agriculture, sand forestation on rangelands, decline in underground water table, loss of livestock, mortality

and damage to wildlife. These effects finally show adverse impacts in the form of decrease of income, raise in food prices, conflicts, migration and urbanization; displacement, food insecurity and malnutrition; unemployment, reduction in tax revenue, spread of diseases and famine.

The lack of sources of livelihood and food security caused by drought and climate stuns may compel families to sell household assets and land in exchange for food, take loans, take children out of schools and/or get involved in such practices that are exploitative for environment as a whole. Drought conditions can result in a variety of undesirable psychological problems among people (Bourque et al., 2006; Gerrity and Flynn, 1997).

Underlying Vulnerability Causes of Drought Impacts

Several studies (Ashraf & Routray, 2013) have discussed various causes of high vulnerability of drought impacts that are categorized into three major areas such as Environmental, Economic and Social Causes; in fact, drought itself is caused by some factors which show its impacts on people. These impacts further cause risks of higher vulnerability (impacts) as shown in following lines.

- Environmental degradation
- Poor groundwater governance
- Religious beliefs related to weather
- Climate change
- Poor water resource management
- Detrimental cultural practices (e.g. overgrazing)
- Community's lack of awareness of drought mitigation methods
- Insufficient supply of electricity for agriculture and irrigation

An Overview of District Nushki *

Total geographical area of the district is 5,797 square kilometers and is situated between 65°07'42"-66°18'45" East Longitudes and 29°01'51"-29°52'37" North Latitudes, administratively divided into one tehsil and 10 union councils. The district headquarter is Nushki town. It is in the north of Balochistan and shares its boundaries with Quetta in the east, Chaghi in the west, Kharan and Kalat in the south and Afghanistan in the north. Eastern and southern parts of the district consist of hilly areas while the rest of the district

* Information about Districts Nushki has been taken from District Profile (P&D Deptt. GOB) and UNDP 2015

area is plain land. The climate of District Nushki varies from extreme hot in summer to severe cold in winter. The rainfall is irregular and low.

According to the 1998 census, the total population of the district is 98,030 with 51,394 males and 46,636 females. The annual growth rate of the population in Nushki is 3.27%. There were 13,417 housing units in 1998 and on average 7.2 persons per household. The livelihoods of people in Nushki are highly dependent on agriculture and livestock. The main crops are wheat and barley in the *Rabi* season and sorghum, maize, mung bean, mash bean, onion, potato, melons, chilies, vegetables and fodders in the *Kharif* season. The major fruits are grapes and pomegranate.

The health condition in the district is very poor. There is one doctor for 6,868 persons. 59 infants in every 1,000 live births die within a year. The most common diseases are respiratory infections, gastro and diarrhea. Other diseases are malaria, meningitis, scabies and fever. About 80% of the children are breastfed. Some 19.3% families use suitable iodized salt. The primary net attendance ratio is about 38% for boys and 30% for girls. The net attendance ratio in secondary schools is just 21%. The literacy rate is 47-60% for males and 30% for females.

Objectives of study

- To analyze the overall situation of drought in Balochistan
- To study the socio-economic impacts of drought in District Nushki
- To assess the vulnerability factors associated with drought in District Nushki

Methodology

Since the nature of the study is descriptive, therefore, it requires a mix-method approach in order to reach into the depth of the issue. Both quantitative and qualitative data analysis was conducted for this study by collecting and analyzing secondary and primary data. Secondary information was retrieved from a large number of book, research journals, government reports, NGOs reports and internet websites. While primary data was mustered from household heads (192), key informants, potential stakeholders and government officials by applying structured questionnaire, focus group discussions (05) and individual interviews (15) respectively combined with observation as tools for data collection. The universe of the study was district Nushki. Primary data was collected from different UCs and villages of the district while applying multiple techniques of sampling in order to ensure the

validity and reliability of findings. Sampling techniques included cluster sampling and random sampling. The mustered primary data was analyzed through computer software SSPS in order to draw solid results and reach conclusion.

Results and Discussion

Both quantitative and qualitative results of structured questionnaires, FGDs and individual interviews are discussed in following lines.

Primary Occupation

The field data illustrates that a high majority of the household heads (69%) were linked to agriculture as owner of agricultural land or agriculture labor (tenants) as their primary occupation. The agriculture laborers work as tenants or on daily wages in the fields of rural areas. While 18% of survey participants belong to livestock. It was observed that most of the respondents who belong to agriculture possess livestock animals either for domestic or commercial purpose. Almost the same situation is observed in secondary data about the overall provincial figures where high majority of the people are dependent on agriculture and livestock for making their livings. In addition, very few respondents reported that they have government jobs. Thus is obvious from the given data that a high majority of the residents of Nushki belong to agriculture and livestock as primary source of income.

Type of agriculture (if primary occupation is agriculture)

People who are dependent on agriculture for their livelihoods further use various methods of irrigation depending on the availability of water resources of that particular village/region. The field survey shows that prior to drought conditions a high majority of the agricultural yield of people was dependent upon rain-fed (*Khushkaba/sailaba*) system of agriculture. However, the severe drought episode from 1997-2006 diminished this source of watering the crops and later on the untimely rains could not make it possible to cultivate the rain-fed lands and agriculture. The data reveals that most of the agriculture dependent households in the district rely upon irrigated annual crops for example wheat and barley in the *Rabi* season and sorghum, maize, mung bean, mash bean, onion, potato, melons, chilies and vegetables. However, since the underground water-table has been declining due to drought, therefore, the productivity of these crops has decreased. Both field data and secondary data witness that a lower percent of people in Nushki district rely on irrigated orchards (grapes and pomegranate). The drought spell has severely decreased the number of families depending on irrigated orchards.

Source of water for irrigated agriculture

Drought badly affected all sources of water for agriculture in the district. Before drought conditions, a good majority of respondents used springs and karez for irrigated agriculture. However, during and after drought, evident shift from springs and karez has been observed in this context. Majority of the agricultural families suck water from underground water through tube-wells while very few respondents (ranging from 2-4%) are dependent now on springs and karez for agriculture purpose. This abrupt shift from springs and karez to tube-wells has caused various short-term and long-term effects on local population of the district.

Drying up Karez/Springs/Tube-wells in drought (1997-onwards)

In response to this question, a high majority of respondents (92%) claimed that either their karez and springs dried up due to in last episode of drought or the amount of water that they received from these sources decreased to minimum level. Thus their livelihoods and other socio-economic conditions were harshly affected by drought conditions. Due to rapid decline in water-table, a reasonable number of tube-wells have either dried up or the supply water has become very low.

Intensity of impacts of drought on local population. (General)

According to the opinion of sampled household heads in the field survey, a high majority of the respondents (48%) believed that the last episode of drought (1997-onwards) had severe impacts on local population of the district particularly those families who are dependent on agriculture and livestock, while almost similar number of respondent (40%) claimed that the intensity level of drought was very severe. The remaining 12% of respondents showed their opinion in favor of moderate impacts of drought as a whole. Thus it is evident from field data that 88% (cumulative) household heads have noticed severe impacts of drought on local population of district Nushki.

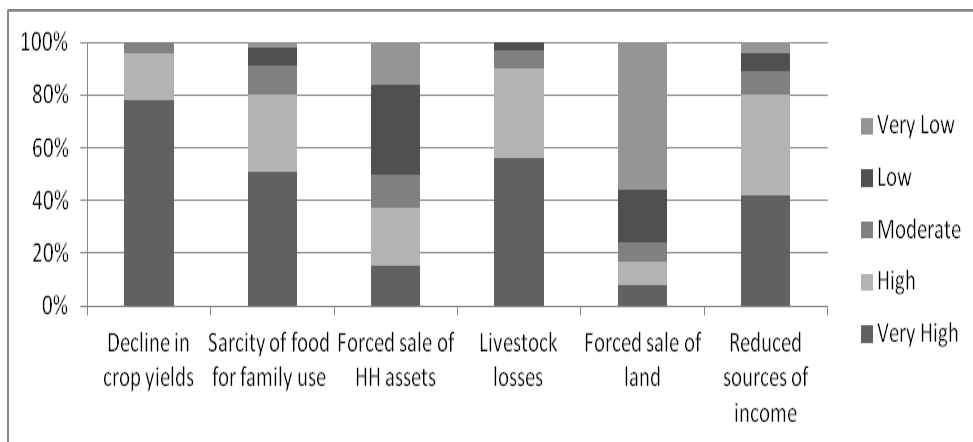
Specific indicators of drought impacts and their intensity level

There is close link between the impacts of drought and vulnerability factors of any particular area/region. The more vulnerable are the characteristics of an area, the more intensify will be the impacts of drought on any region. Vulnerability means “the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of drought” (PDMA, 2008)

In this study some key socio-economic indicators were set to gauge the intensity level of direct and indirect drought impacts and their vulnerability

factors. The responses of respondents were observed on value likert scale (*Very High, High, Moderate, Low and Very Low*) against each indicator.

Figure 1: Showing intensity level drought on each specific indicator (Direct Impacts).

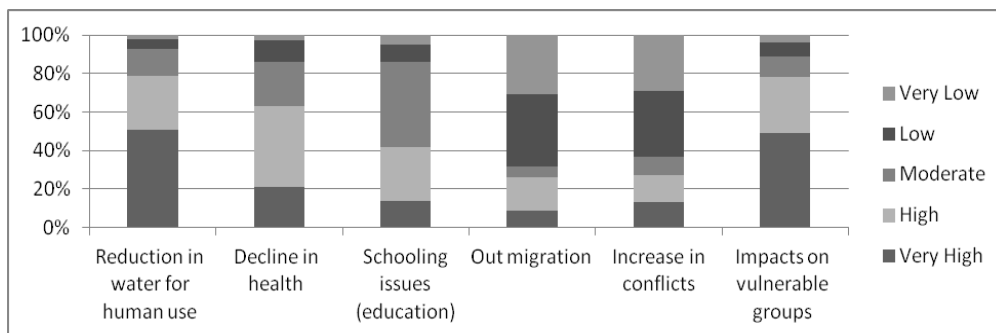


(Source: Field survey)

Both secondary and primary data proves that drought's direct and indirect impacts were observed on agriculture, livestock and related sectors. The field survey results show that decline in crop yields, loss of livestock, scarcity of food for family use and reduction in sources of income were most effects of last spell of drought. A high majority of respondents 78% and 18% believe that drought results on decline in crop yields were very high and high respectively, similarly 51% and 29% of the survey participants think that drought resulted in very high/ high level scarcity of food for family use.

Drought's results in Nushki were also very severe on employment of district residents as survey results in the figure explain that a cumulative of 80% of the respondents claimed that drought extremely affected the sources of income. Especially people who were attached to agriculture and agriculture labor were forced to search for new source of income or stay unemployed. Those who even find alternate sources of income in urban area are paid very low due to their unfamiliarity with the new jobs. An interesting finding of the survey results reveals that a lower proportion of participants were of opinion that drought forced people to sale their land during or after drought spell.

Figure 2: Showing intensity level drought on each specific indicator (Indirect Impacts).



(Source: Field survey)

Drought conditions not only reduced water for agriculture sector but also had severe negative impact on water for human use. Figure 2 shows that 51% of the respondents reported that drought's impacts in terms of reduction of water for human use was very high and another 28% respondent's response was in favor of High. This means that there has been paucity of water for human use such as drinking, cooking, cleaning etc. due to drought. Another severe impact of drought has been observed on vulnerable groups such as women and children. A total of 78% of survey participants feel that impacts of drought on vulnerable groups (women and children) are very high in the district. Similar findings can be sought out from other researches conduct on drought in other area of the province/country. Women and children are always vulnerable to various risks in general and to disaster conditions in particular. Their health, food, nutrition and education are major vulnerable sectors to drought.

The above figure also illustrates that health and education sectors have also been prone to drought in district Nushki. A high majority of respondents believe that drought resulted in decline of health conditions of general masses due to malnutrition, lack of safe and clean drinking water and spread of various diseases. Stomach problems, chest problems are more common due to drought in the district. On other hand, the impacts of drought on education are observable in district as shown in above figure. Drought did force people to migrate to other areas with water resources or to larger cities. The survey result shows that 26% of respondents claim that drought forced people to migrate to urban areas and larger cities in search of livelihoods especially those people whose life was very tough due to impacts of drought. These

cases were observed in remote UCs such as Keshangi, Ahmadwal, Anam bostan, and Dak.

Conclusion

As in other regions of the world, droughts are usual and frequent in Pakistan. Every region of the country has faced drought. Among all, Balochistan has been prone to drought more severely. The 1998-2005 spell of drought was perhaps the most devastating one which affected the social, economic and environmental sectors very harshly. Twenty five districts of the province had severe or moderate impacts of drought.

District Nushki is one of the most severely affected districts in the recent episode of drought. A large population of the district is dependent on agriculture and livestock as source of livelihood. The socio economic impacts of drought on district population have been both short-term and long-term. The ratio of drought vulnerability factors of district Nushki is very high due to the characteristics of its location and population living patterns. This study finds out that water resources were abundant prior to drought in district; however, drought not only reduced these resources but also had lasting socio-economic impacts on people.

The intensity of drought impacts are observed in terms of decline in crop productivity, loss of livestock, food insecurity and malnutrition; forced sale of household assets and land; reduction in water for human use such as for drinking, cooking, cleaning purpose; and some adverse effects that includes increase in crime rate, issues in schooling and education, reduction of sources and opportunities for income, migration of people to other areas for livelihood, and decline in health due to spread of diseases, lack of clean drinking water and malnutrition. In this whole situation women and children have been most vulnerable groups and were most severely affected by drought in the district.

This paper finds out that drought preparedness and mitigation has never been taken serious at any level. The only efforts taken for drought affected people are relief activities by government and non-governmental organizations. It is recommended that preparedness along with mitigation related activities along with relief operations need to be carried out through well-coordinated efforts. Besides, this study observed a serious gape in research related to drought hazards and it's imperative to conduct in-depth studies on this phenomenon to address the disastrous long-term socio-economic impacts of drought. Information provided in this paper is beneficial for planners, officials,

administrators, and non-governmental organizations to improve responses to future incidents of drought and held to reduce the adverse socio-economic impacts of droughts.

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