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Review

Effects of Drought on Livestock Sector in Balochistan Province of Pakistan

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ABSTRACT

Drought is a period of abnormally dry weather sufficiently prolonged due to the lack of precipitation to cause a serious hydrological imbalance and carries connotations of a moisture deficiency for man's use. The chief characteristic of a drought is a decrease of water availability in a particular period and over a particular area. The drought prevalent in the country these days is not due to a single factor. Drought has affected negatively on river flows, resulting in dry-up or minimal flow of water in the canals. Although drought has affected whole of Pakistan; Balochistan province is the worst-hit. It caused huge loss to life, particularly to livestock, including sheep, goats, cattle, camels, horses, donkeys and poultry and in some area buffaloes, which is likely to stagger further agricultural economy of Balochistan. Recently severe drought has jolted many parts of the region. This review is an attempt to look into the drought's catastrophes and its effect on the economy of Balochistan specifically focusing on livestock.

Key Words: Drought; Economy; Ruminants; Livestock

INTRODUCTION

Drought is a condition wherein the amount of water for use in any of man's activities cannot be met for some reason (Wilhite, 1995). It is a normal and recurrent feature of climate, although many erroneously consider it a rare and random event. It occurs in virtually all-climatic zones, though the characteristics vary significantly from one region to another (Norman *et al.,* 1999). Drought originates from the deficiency of precipitation over an extended period of time, usually one or more a season (Dyson-Hudson, 1991; Adds, 1996), resulting in water shortage for some activity, group, or environmental sector (Rathore, 2005). It is also related to the timing and effectiveness of the rains. The single most important factor is the La Nina (Anyamba & Eastman, 1996), which resulted in abnormal weather conditions (Willeke *et al*., 1994; Salem, 1998; Atheru, 1999). Other climatic factors such as high temperature, wind and low humidity are associated with it in many regions of the world and can significantly aggravate its severity (Edwards *et al*., 1997).

Drought should not be viewed as merely a physical phenomenon or natural event. Drought effects on society result from the interaction between a natural event (less precipitation than expected resulting from natural climatic variability) and human demand for water supply. Human beings often exacerbate the affect of drought. Recent droughts im most parts of the world and the resulting economic and environmental effects have underscored the vulnerability of all societies to this "natural" hazard (Hazell *et al.,* 2001). In fact drought monitors the supply and demand of some economic goods with elements of meteorological, hydrological and agricultural standpoints. The supply of many economic goods, such as water, forage, food grains, fish and hydroelectric power, depends on weather. Because of the natural variability in climate, water supply is ample in some years but unable to meet human and environmental needs in other years. Socioeconomic drought occurs when the demand for an economic good exceeds supply as a result of a weather-related shortfall in water supply. For example, in Uruguay in 1988 - 89, drought resulted in significantly reduced hydroelectric power production, because power plants were dependent on stream flow rather than storage for power generation. Reducing hydroelectric power production forced to adopt expensive and stringent energy conservation measures to meet the nation's power needs (FAO, 2002).

In most instances, the demand for economic goods is increasing as a result of increasing population and per capita consumption. Supply may also increase, because of improved production efficiency, technology, or the construction of reservoirs that increase surface water storage capacity. If both supply and demand increase, the critical factor is the relative rate of change. If the demand increases more rapidly than supply, vulnerability and the incidence of drought may increase in the future as supply and demand trends converge. Drought has hit the countries like India, Tajikistan, Iran, Afghanistan and Pakistan (Watson *et al*., 1998). In Pakistan, hardest hits are Balochistan, parts of Sindh and Punjab provinces. Drought affected 3.49×10^5

people in Pakistan, which were waiting the urgent assistance to mitigate serious shortage, vaccines and feed to livestock (Federal Bureau of Statistics, 1998). That is the reason, which has badly disturbed the scale of demand and supply regarding the daily edible items. Pakistan suffered the lack of rains especially areas of Sindh and Balochistan; the sever spell began in 1996 to 2004. Even the Federal Capital, Islamabad, could not escape its ravages and encountered water shortages. Pakistan economy is based on agriculture, while agriculture survival is dependent on the supply of rampant water. With the shortage of water, there is little agriculture and resultantly very low economic activity. The seriousness of the drought can be gauged from the State Bank of Pakistan's report that drought cost the national exchequer by US$ 927 million in the third quarter in 2001 - 02 fiscal year.

Drought is well known to the inhabitant of Balochistan for long as drought has continual attribute of the province, but recent one was the worst in the last 75 years, which badly affected all spheres of lives. According to Relief Commissionerate, Balochistan during the recent drought spell an estimated 29.29% people were affected out of ~65 million. The livestock population was estimated to be ~22 million and 36.59% were affected. (Relief Commissionerate Quetta, 2000 - 02). In Balochistan 70% people depend upon livestock in rural areas. Livestock prices declined during the period up to tenfold, implying that people had even no money to buy food. Rains during droughts period were very scarce. Twenty six districts in the Southeast and South and 10 in the Northeast of Balochistan received nominal rainfall. Districts like, Pishin, Mastung, Killa Abdullah, Lasbilla, Chaghi, Kharan, Awaran, Panjgoor and Ketch etc. have no rain at all during the drought periods (Shafiq *et al.*, 2005).

Drought affects on economy of Pakistan. Due to drought and other factors, livestock of the country is on decline by about 2.6%, as against 2.8% growth in the preceding year. (Annual Report, State Bank of Pakistan, 2003 - 04). The drought that is yet to show its full face has already had a great affect on the country's economy. The State Bank has calculated the effect of the drought to the tune of $927 million in the third quarter of 2001 - 02 fiscal years. As a result of this blow to the economy, the anticipated GDP growth rate of 4.5% has not been achieved, rather, the GDP growth rate had declined to less than 3% resulting in stagnation of the per capita income (Annual Report, State Bank of Pakistan, 2001 - 02). As Pakistan is an agriculture based economy, the major industries owe their production to the agricultural output, which has significantly reduced due to the drought resulting in increasing the country's dependence on imports thus adversely hampering the "Balance of Trade". Another major debacle due to drought was reduction in the production of hydroelectricity. To remedy this, additional furnace oil had to be imported for the generation of thermal electricity and saving the foreign exchange reserves. With its worst effects on the livestock production, drought has lessened the meet production, badly hampered the carpet industry, wool products, and most importantly affected the leather industry.

Drought effects on livestock sector. Drought has affected badly the livestock of Balochistan during the spell of recent drought. It is difficult to estimate the impact of the losses but immediate affects are the worst. This livestock sector has become the single largest sub-sector of agriculture accounting for all most one half of agriculture value added and as much as 11.4% to GDP in fiscal year 2004. However, the pattern of output witnessed during the last four years appears at variance with the much higher growth of this sub-sector during the 1990s. Decline in livestock sector during 2004 may be partially explainable by the impact of the "Bird Flu virus" in the domestic poultry industry. Livestock is important in insuring the stable income stream for formers and alleviating rural poverty as it provides case income to supplement subsistence on crops.

The potential for higher growth; the downward trend is the source of serious concern. Policy makers have to review whether this trend is temporary or structural shift has occurred (Annual Report, State Bank of Pakistan, 2003 - 04). The province of Punjab was also greatly affected by drought as evident from the Government's relief program for the drought-hit areas. According to the Government of Punjab, the wheat crop in 2,632 villages was damaged and the livestock sector suffered a loss of nearly Rs. 5.5 billion. In Punjab, ten districts are arid, which were most affected by the drought. Among them are Dera Ghazi Khan, Rajanpur, Lodhran, Chakwal, Rawalpindi, Jehlum, Attock, Mianwali, and Gujrat in which sheep and goat are the most effected among other livestock. During the past years, Sindh had experienced a number of natural calamities such as drought, cyclone, earthquake etc. The total losses that the province had to face due to these natural calamities amount to Rs. 145.8 billion out of which about Rs. 33 billion were attributed to the drought and water shortage. The areas of Sindh worst affected by the drought were Tharparkar, Mirpurkhas, Thatta and Sanghar. Over 2.2 million acres of cultivable land in NWFP was affected by the last drought during the Kharif 2001 crop season. Especially affected were the rain-fed areas in the southern and northern parts of the province, and destroyed the livestock from the whole province. The Government of NWFP received financial assistance of about Rs. 1.4 billion from the Federal Government. The districts of NWFP affected by the drought included Mardan, Swabi, Kohat, Hangu, Karak, Mansehra, Abbottabad, Haripur, Battagram, Buner, Bannu and Taank.

Drought adverse affects on livestock of the county recorded unpleasantly (Table I). According to the official sources, the losses to this sector were worth Rs. 15 billion. Out of this amount, Punjab suffered a loss of Rs. 5.5 billion, NWFP Rs. 4.4 billion, Balochistan Rs. 3.5 billion and Sindh Rs. 1.63 billion (Oxfam, 2002).

Causes of drought in Balochistan. The economy of the province mainly depends upon rainfall. The main causes of

Table I. Shows province-wise situation of losses in the livestock sector

Province	(Rs. billion)	Affected livestock population (million)
Punjab	5,494	5.12
NWFP	4,426	6.00
Balochistan	3,522	9.31
Sindh	1,631	3.08
Total	15,073	23.51

Source: 2002 Report Oxfam, Quetta, Pakistan

Table II. Rain-fall data of Balochistan for the period 1998-2002

S. No	Session/ year	Normal/ aggregate	Actual/ aggregate	Difference (mm)	Percentage received	Difference deficient
1	Summer 1998	59.05	26.72	32.33	45.2	54.8
	Winter 1998-99	74.01	65.98	8.03	89.3	10.8
2	Summer 1999	59.05	29.11	29.94	49.3	50.7
	Winter 1999-2000	74.01	98.80	54.21	26.8	73.2
3	Summer 2000	59.05	30.54	28.51	51.7	48.3
	Winter 2000-2001	74.01	27.54	46.47	37.2	62.8
4	Summer 2001	59.05	35.51	23.51	60.1	39.9
	Winter 2001-2002	74.01	29.60	44.41	40.0	60.0
	Total	532.24	264.80	264.80	49.8	50.2

Source: Meteorological Department, Quetta (2005)

the drought are as under:

1. Lack of rainfall. There are two main rainy seasons in the province: The winter season, starts from December and lasts up to March each year and Monsoon season, which starts from the end of June to ends of September. The province receives 55% of rain during winter and about 45% during the Monsoon season each year (Table II). Average rainfall is highly variable and unreliable, but un-fortunately during the last four years below average rainfall was recorded and a vast area received no rainfall at all. A prolong drought resulted in very little grazing opportunities particularly for small ruminants. During Monsoon 2001, and March and April 2002 only five districts namely Loralai, Zhob, Kohlu, Khuzdar and area of Kharan received some rain. In the area Rakshan Basima, Shinger and Nag had partial rainfalls and floodwater in the Bolan area of Kachhi District (Wahab, 2002). The rainfall in these districts and floodwater in Kachhi District had already attacked livestock flock owners, who were to migrate to these districts owing to the presence of some rangeland for grazing their animals. The flocks migrated to Kachhi plains are now migrating back to upper ranges due to hot weather and especially non-availability of drinking water for their flocks (Relief Commissionerate, Quetta, 2000 - 02).

2. Karezes. Kareze is a tunnel, which taps subsurface aquifer following the slope. A mother well is dug to the aquifer at the head of Karez. The farmers own Karezes individually or collectively. Karezes are ancient and well-organized system of extracting water for agriculture in province of Balochistan. The Karezes are basically under ground water canals automatically flow from the upper water points through numerous wells connected with each other and make a water canal. In majority of areas, where there was no rain and snowfall, the Karezes were dried. Availability of water from the Karezes and well of Krezes almost in all 22 but now 20 districts have been reduced by 90%, and in some cases 100% (Baloch, 2001). Most of the recharge took place after the rainfall and snow falls in the Monsoon and winter seasons; mostly during winter season by snowfall. Little rainfall for the last four years in all 22 Districts has reduced the water for all purposes with no recharge of underground water. In addition, most of the Karezes in the province could not be properly cleaned and repaired to keep them functional (Relief Commissionerate Balochistan, Quetta, 2000 - 02).

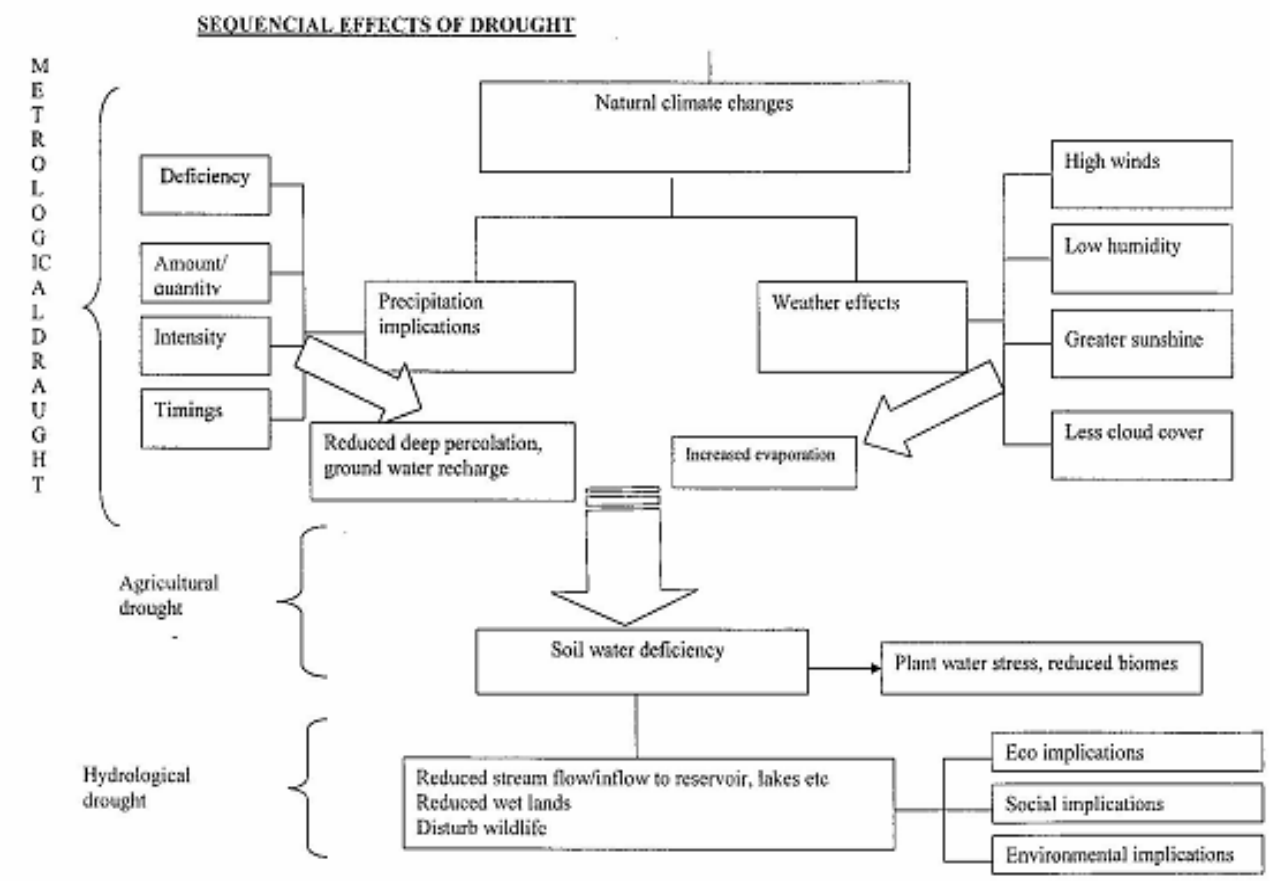
3. Tube wells. With the availability of electricity in different parts of the province, thousands of unplanned tube wells were installed. The extracted water is mainly used for irrigating cash crops and orchards, and also for drinking purposes of human being and livestock. Due to less rain and snowfall the level of underground water also dropped and consequently affected agriculture expansion and livestock raising, thereby affecting the economy of rural inhabitants.

4. Scattered population. The scattered population of the province and the non-established infrastructure is main hindrance in the execution of consolidated and well-organized operation plane. The human density in Balochistan is 19 km^{-2} (Federal Bureau of Statistics, 1998), which is a cause of continued drought in the province.

5. Livestock and agriculture dependency on rainfall. The provincial economy entirely depends on agriculture products especially livestock and its byproducts. Livestock mainly dependent on 93% of the rangelands present in the province as 90% of the feed requirements of livestock particularly of small ruminants are met from these rangelands (Wahab, 2002). As matter of fact, livestock is proportional to the development of agriculture to a considerable extend. Hence both depend on rainfall as result they both face continual drought.

6. Others. The experts of meteorology have a view that major changes have occurred in the global weather due to the EI –Nino and La –Nina phenomena (FAO, 1997). The phenomenal changes in the weather have taken place due to both the factors during the last three to four years. The effects of both the factors have changed the ecology patron and density of rain besides major changes in weather all over the world. Similarly, the experts are of the view that effect and changed patterns of climate are reversing to normal very soon (Wahab, 2002). A group of experts also pointed out that there is a hard bowled shaped structure (strata) geographically known as aquifer (Agriculture census Islamabad, 1996), which works at certain depth under the ground. It stops water to go down further and works as a

Fig. 1. Sequential effects of drought (effects are proportional to the time duration).



water reservoir and facilities extraction of water from a manageable and shallow depth. The experts are of the view that due to high density under ground tremors the aquifer might have been broken or cracks might have been erupted resulting to the seepage of water from the normal level to the deeper level. The underground tremors are the usual features of terrenes like the province of Balochistan. In these circumstances even the heavy rains might not be able to raise the underground water level to the affordable and manageable depth of 200 to 250 feet (Wahab, 2002).

Drought affects on Balochistan. Balochistan, the largest province, covers about 44% land of Pakistan. It is characterized as arid and semi-arid with a wide range of interrelated desert ecosystems that vary from one another, mainly as a function of precipitation, temperature and altitude. Affects are commonly referred to as direct or indirect. Reduced crop, rangeland and forest productivity, increased fire hazard, deep water levels, increased livestock and wildlife mortality rates, and damage to wildlife and fish are some examples of direct affects (Figs. 1 - 3). The consequences of these effects illustrate indirect affects. For example, a reduction in crop, rangeland and forest productivity may result in reduced income for farmers and agribusiness, increased prices for food and timber, unemployment, reduced tax revenues because of reduced expenditures, increased crime, relaxation on bank loans to farmers and businessmen, migration and disaster relief programs. Direct or primary affects are usually biophysical. Conceptually speaking, the more removed the affect from the cause, the more complex the link to the cause. In fact, the web of affects becomes so diffuse that it's very difficult to come up with financial estimates of damages.

Balochistan is the largest province in terms of area but smallest in population therefore the affects of drought are not exactly available on record to its full scale. Most of the parts of this province constitute the dry and arid areas. Agriculture is hard for the farmer due to little rainlaff. Hence, people depend on animal husbandry specially sheep and goat. Balochistan is the worst affected province from this drought. Spell of drought was on its full swing from 1996 but it was in worst shape in 2000 and low rains in 2001. The province received almost 50% of the normal rains in the summer, while winter rains turned out to be only 37% of the normal. According to provincial authorities, 1.911 million people and 9.31 million livestock were affected; out of which 1.76 million perished. A total of 1.973 million acres cultivable land was also affected (Relief Commissionerate Balochistan, Quetta, 2000 - 02).

Fig. 2. Showing the livestock mortality during the drought in Balochistan

Fig. 3. Showing the drought affected rangelands of Balochistan

Affects of drought on livestock of Balochistan. In fact, drought situation has inflicted heavy losses to the province's water resources, the agriculture, the livestock, the rural environment and the ecosystem as well as the socio-economic fabric of the rural society. For example, the abrupt decline in rainfall in most of the upland caused a complete drying off of the surface drinking water resources and decreased the water output from spring and tube wells (Mahmood & Rodriguez, 1993; Mahmood, 1995). This caused water to drop in most of the valleys. Consequently, the otherwise green valleys were converted into arid zones. This all had direct or indirect affect on the livestock of Balochistan, since, most of the livestock consist of sheep and goat therefore they are the most affected due to lack of area for grazing. According to the Special Report of the FAO, the World Food Program Crop and Food Supply Assessment Mission to Pakistan released on July 11, 2001, as a result of the prolonged drought, heavy livestock losses were reported in Balochistan. Livestock is the major livelihood and about 70% of the households own it. Out of the 55 million livestock heads of the country about 23 million or nearly 42% belong to Balochistan. The indirect affect was on the sheep and goat, which is the inhabitant of almost every house whether it is crop growing family or fruit producer (Quraishi *et al.,* 1993). In the uplands of Loralai, Killi Saifulla and Pishin around 60 – 100% of the fruit trees have dried up. This has also ultimately affected on the livestock's feed and aftermath was on their low production of livestock of Balochistan. During the recent drought spell, the authors visited Balochistan's countryside area in Moola sub-Tehsil of district Khuzdar, a vast rural hilly area with big mountain tracks. The area extends from Zahri to Kachhi Tehsil bordering with Sindh. Majority of population is dependent on the agriculture and livestock. Being under the Landlord system, this area is among the poorest and the most illiterate. Various small and big valleys are major source of agriculture and livestock grazing. The provincial government had declared almost all districts as 'calamity hit' with the exception of urban parts of some districts during the spells of drought.

During sever period of drought, Balochistan was not far from Ethiopia. If appropriate measures were not taken, the great human disaster would have taken place. This terrifying news was made public by a Britain based NGO, Oxfam, which on especial invitation visited the drought-hit areas of Balochistan. This was first ever-glaring acknowledgement of the world's community about the sufferers of the fate - the people of Balochistan. Their plight got exposed to the national and world media. It also brought the situation of drought in the focus. The distressed condition of the sufferers of Aranji (it is the small town of Khuzdar) disappeared from the screen when it was revealed that out of 26 districts of Balochistan 23 are going to be the future Aranji. Nearly 2 million people and 10 million livestock heads will be affected from the anticipated worst spell of drought, which has been lasting for the last three to four years and will reportedly continue for another year or more (Younas, 1997).

The severity of the drought can be judged by the government efforts that more than Rs. 1.5 billion grant packages and relief operations were continued to the drought affected people during spell. However, still a lot of apprehensions are there. The scattered population of Balochistan with no infrastructure is considered to be the main hindrance in the execution of consolidated and well-organized operation plans. There is a dire need to put all the eggs in the basket to save the sufferers of the drought. The rural economy of the people of Balochistan is mainly depends upon livestock mostly comprise the sheep and goat, which are the worst victim of the ongoing drought. Three million heads of livestock have been perished or about to perish. Once the wells to do families are now begging due to loss they suffered of huge scale of drought, which had engulf their entire flocks. Thus a wide spread poverty is grabbing the rural areas of Balochistan, which may emerge into a worst law and order situation in the coming years.

The government cannot be held responsible for the drought and its disasters. But, it is always expected from the

government that the process of healing will be more or less or equal to the disaster. It is thoughtfully accepted that those will feel the miseries of the people with both ears on the ground that can lessen the sufferings of the people. The situation emerging in different parts of Balochistan is at its beginning. But our routine activities and customary approach answer dullness to the required situation. The drought stress in Balochistan, Sindh and some areas of Punjab and NWFP has claimed many human lives, eroded sustenance and livelihood opportunities with multiple affects on human health and eco-biological diversity. The current disaster is being identified as a simultaneous incidence of agricultural, hydrological and meteorological drought. The causes of drought are many and so are the solutions. However, the commitment and wholehearted efforts by all cross sections of society will determine how far we succeed in alleviating the traumatic calamity of drought and bring back the fleeing life to its habitat on a sustainable basis. Actually, drought produces a complex web of affects that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. This complexity exists, because water is integral to our ability to produce goods and provide services.

Other effects of drought. Income loss is another indicator used in assessing the affects of drought, because so many sectors are affected. Reduced income for farmers has a ripple effect. Retailers and others who provide goods and services to farmers face reduced business (Buzdar, 1989). This leads to unemployment, increased credit risk for financial institutions, capital shortfalls and loss of tax revenue for local, state and federal government. Less discretionary income affects the recreation and tourism industries. Prices for food, energy and other products increase as supplies are reduced. In some cases, a local shortage of certain goods results in importing these goods from outside the stricken region. Reduced water supply impairs the navigability of rivers and results in increased transportation costs, because products must be transported by rail or truck. Hydropower production may also be significantly curtailed. Environmental losses are the result of damages to plant and animal species, wildlife habitat and air and water quality; forest and range fires; degradation of landscape quality; loss of bio-diversity; and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes and vegetation. However, many species will eventually recover from this temporary aberration. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity of the landscape. Although environmental losses are difficult to quantify, growing public awareness and concern for environmental quality has forced public officials to focus greater attention and resources on these effects. Social affects mainly involve public safety, health, conflicts between water users, reduced quality of life and inequities in the distribution of affects and disaster relief. Many of the affects specified as economic and environmental have social components as well.

Population out-migration is a significant problem in many countries, often stimulated by greater availability of food and water elsewhere. Migration is usually to urban areas within the stressed area or to regions outside the drought area. Migration may even be to adjacent countries, creating refugee problems. However, when the drought has abated, these persons seldom return home, depriving rural areas of valuable human resources necessary for economic development. For the urban area to which they have immigrated, they place ever-increasing pressure on the social infrastructure, possibly leading to greater poverty and social unrest. The drought-prone Northeast region of Brazil had a net loss of nearly 5.5 million people between 1950 and 1980. Although not this entire population shift was directly attributable to drought, it was a primary factor for many in the decision to relocate. This continued to be a significant problem in Brazil and many other drought-prone countries. Drought is the most important natural triggers for malnutrition and famine; a significant and widespread problem in many parts of Africa and in other countries as well (Kottak, 1991). Deaths resulting from famine are sometimes mistakenly attributed to drought rather than to underlying causes such as war or civil strife. Numerous early warning systems have been established in Africa to monitor a wide range of physical and social variables that signal a trend toward food insecurity. The Southern Africa Development Community (SADC) monitors crop and food situation and issues alerts during periods of crisis.

How herders traditionally manage drought in Balochistan. Agro-pastoral societies have developed their own strategies for coping with drought. These include:

- Mobile or transhumant grazing practices that reduce risks of having insufficient forage in any one location.
- Reciprocal grazing arrangements with more distant communities for access to their resources in drought years.
- Adjustment of flock sizes and stocking rates as the rainy reason un-folds, to match available grazing resources.
- Keeping extra animals that can be easily liquidated in a drought, either for food or cash.
- Investment in water availability — wells, cisterns, water harvesting.
- Diversification into crops and livestock (agropastoralism) especially in proximity to settlements and storage of surplus grain, straw and forage as a reserve in good rainfall years.
- Diversification among animal species (sheep, goats, cattle, camels, donkeys) and different breeds within species. Sheep and goats are abundant on the low rainfall rangelands. Cattle are more commonly maintained on farms, or on grazing in canal irrigated areas e.g., Nasirabad, Jhal Magsi and Jaffafarabad etc.
- Income diversification into non-agricultural

Table III. Showing the grant support from federal and provincial government in Balochistan for drought mitigation

Name	Grant received
Federal Government	Rs. 2.5 billion (equivalent to US $48.8 million) for Balochistan. Rs. 1 billion (equivalent to US $19.5 million) for Sindh.
Provincial Governments	Rs. 407 million (equivalent to US $9.48 million).
Private Organizations	Rs. 45.5 million (equivalent to US $ 888,000).
President of Pakistan	Rs. 5 million (equivalent to US $ 82,000).

Source: Livestock Department, Government of Balochistan, Quetta (2002)

Table IV. Showing the grant from different governments of the world

Country name	Amount of funds received
Japan	US$ 4.37 million (through Government of Pakistan for water supply, medical and livestock relief products as well as vehicles for relief activities and transportation & monitoring services).
Turkey	US $ 3 million (through Government of Pakistan).
China	US $ 5.0 million (through Government of Pakistan). US $ 50, 000 (through Pakistan Red Crescent Society).
South Korea	US $ 50, 000 (for both Sindh and Balochistan).
United State of America	US $ 70, 000 (through NGOs for both Sindh and Balochistan).
Norway	US $ 22,000 (through OCHA - for animal feed in Balochistan).
EU (European Union)	Euro 1.21 million (equivalent to US $ 1.15 million) (through Oxfam, Italian Red Cross and Pakistan Red Cross).
New Zealand	NZ $100,000 (equivalent to about US $43,900 through Red Crescent Society of Sindh and Balochistan - for urgent medical treatment and rehabilitation activities).

Source: - Livestock Department, Government of Balochistan, Quetta, (2002)

occupations, particularly seasonal migration for off-farm employment.

Traditional risk management strategies have proven effective in managing drought and have enabled pastoral societies to survive harsh environments for many centuries. But despite their advantages, traditional drought management strategies can have associated opportunity costs. It is useful to think in terms of two types of such costs: those arising from inefficient use of resources within existing agro-pastoral systems and opportunity costs arising from failure to exploit more productive agricultural development pathways. Without a shift to such intensification strategies, it is not clear how rural communities can or should continue to absorb increases in their populations (Pingali *et al.,* 1987). One alternative is that common property grazing areas be managed more effectively by local communities, with collective investment in land improvements, as is the case in Turkey and parts of Jordan, Morocco and Tunisia (Oram & De Haan, 1995). But the absence of many successful examples suggests that such local management is extremely difficult to organize, manage and sustain, particularly in the context of rapid population

Table V. showing the united nation assistance to Balochistan for drought mitigation

Name of agency	Grant received
UNOCHA	US $30,000 (for animal feed in Balochistan). With this assistance and NORAD's funds ($22,000) received through UNOCHA, Balochistan Area Development Program of UNDP arranged preparation and distribution of 200,000 Urea Molasses Blocks (UMB) to supplement the poor grazing and crop residue feeding of 30,000 breeding sheep and goats in the hard hit areas of the Balochistan province.
United Nation Development Program (UNDP)	US $100,000 (for assessment, donor coordination and logistics support).
Food and Agriculture Organization (FAO)	US $392,000 for animal feed, veterinary support and coverage with vaccine and medicine for about half a million animals.
UNFPA	Emergency obstetric care kits as well as safe delivery kits for pregnant women for use by obstetricians or trained midwives in drought affected areas of Aranji, Balochistan.
United Nation International Children Emergency Fund (UNICEF)	2,000 each of 5 essential drugs, 315,000 sachets of ORS, 450,000 water purifying tablets, 60 metric tons of UNIMIX food, 15 hand pumps, 2 water pumps, 40 water storage tanks, 11,000 Jerry cans and 200 Pit Latrines and Disposal of Solid Waste.
United Nation High Commissioner for Refugees (UNHCR)	600 packets of foodstuffs, 150 tents, 600 Jerry-cans (10 liter each) of water, 400 packets of utensils, two tankers for water supply (on loan for 2 months).

Source: - Livestock Department, Government of Balochistan, Quetta, (2002-2003)

Table VI. Showing the assistance from the govt. of Punjab and some NGOs

Name of agency	Grant received
Government of Punjab	500 metric ton fodder, 550,000 bags of wheat flour, 547 truckloads of miscellaneous relief goods (for both the provinces).
NGOs (Non-Government Organizations)	500 metric ton food items and fodder, 25,850 packets of items of daily use, 555,000 bags (20 kg each) of wheat flour and 80 bags (80 kg each) of wheat, 4 truck of miscellaneous relief items and ration for 1,000 families.

Source: - Livestock Department, Government of Balochistan, Quetta (2002-2003)

growth, un-certain property rights and the increasing commercialization of agriculture, which make cropping increasingly attractive in the less drought-prone areas.

Mitigation and control measures. During the past, the government of Balochistan along with a Drought Crisis Control Center constituted a Relief Commissionerate and the Provincial Disaster Management Committee to manage of relief efforts in drought affected areas. The Federal Government as well as other government sources have already contributed more than 1.1 billion rupees in cash, while nearly Rs. 400 million worth of in kind donations were received from various Pakistani (Table III) as well as foreign organizations (Table IV). The government had initiated efforts to remedy the situation created by the

Table VII. Showing the summary of relief support activities undertaken by the Government of Balochistan during recent drought phase

Item	Quantity/number
Feed Provided	21,242.436 metric tons (for 22,668 farmers owning 1.2 million animals)
Vaccine Provided	3,343,270 doses
Animals Treated	1,172,044
Water	
Revival of Small Water Schemes	138 Nos.
Water Tanks (500 Gallon Capacity)	112 Tanks
Water Carriers	7
Water Tank (2,500 liters) truck mounted	35 tanks
Water Bowzers Tractor Towed (4,800 liters)	40
Water Trains arranged	13 (1.10 million gallon water)
Water Cans	2,843
Hand Pumps	75
Wells Improved	37
Generators Provided	6
Artificial Rainfall	18 flights over 500 kilo meters in different areas in Quetta, Zhob and Khuzdar.

Source: - Livestock Department, Government of Balochistan, Quetta (2002- 2003)

drought through immediate relief as well as rehabilitation of the drought affectees for which the Federal Government allocated of Rs. 10 billion. As a long-term measure, the government also intended to allocate Rs. 120 billion for future investment in water resource development. The United Nations System in Pakistan had also initiated measures to gauge the impact of the drought in the affected areas. It had completed a Non-Food Assessment of the drought-affected areas in Sindh and Balochistan. A Crop and Food Assessment Mission also had been launched. Missions from the World Bank and Asian Development Bank visited the country to assess the effect of drought and to suggest remedial measures. The mission from the Asian Development Bank has been completed. The UN is in close coordination with these missions and a Memorandum of Understanding drafted for reaching an understanding between the United Nations and the Banks to avoid overlaps and facilitate further cooperation in the future. The World Bank is likely to provide $250 million to Pakistan to lessen the affects of the drought. The Asian Development Bank also intended to reallocate a sum of $125 million from existing programs for the same purpose. The socio-economic loss was tremendous on scale during the most recent and the sever drought of the history but some relief effort was also under taken by different level that has mitigated the affect of drought to some extent. Some of the detail has presented in (Tables V, VI & VII).

CONCLUSIONS AND RECOMMENDATIONS

1. At Federal level, a separate ministry must be established for policy decision and resource mobilization regarding the livestock development. In addition a holistic approach should be taken involving all the stakeholders.
2. In general drought forecasting and management body must be constituted on national and provincial levels, which must consider; pre-drought planning, during drought action plans and post drought management.
3. Joint venture of public and private sector must be formed at national level with strong footings at provincial and district level for the development and sustainability of livestock in any circumstances.
4. Livestock loan must be provided to the livestock holders on commercial basis likewise agriculture especially in Balochistan.
5. Balochistan must be declared country's mutton producing zone and special subsidies and facilities be provided for the establishment of small ruminants feed lot fattening and export.
6. In general, there is utmost need for planning for suitable dams, reservoir and rainwater storage in Balochistan.
7. Proper steps must be initiated for the management of water, which is still available on the surface or underground in Balochistan.
8. Digging and operation of tube wells in Balochistan urgently need suitable regulation policy for the safety and protection of reserves of water lying in the beneath of land.
9. Attention must be paid on the use of solar energy for desalination and lifting of underground water both in coastal areas and where saline underground water is available.
10. Care has to be taken not to create people's dependency on handouts. Apart from immediate relief to people in genuine hardship, attention should be diverted to creating sustainable solutions to public concerns on a fasting basis.
11. Installation and the rehabilitation of water facilities for the improvement of rangelands, extension of veterinary facilities, production of livestock feed, distribution of crop seed and soft loans to farmers are very imporant.
12. Similarly, as the lack of water has converted large tracks of land into wasteland, it needs fresh leveling of land, which is impossible for the animal grower to privately level the land in hilly areas.
13. In order to aware the world, internet technology may be used. Help can be provided through the setting a website, which should be updated regularly. Research workers, information resources, drought related web-links, addresses/reports of donors and other organizations should be involved in the relief work.

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