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Drought and its Extermination of the Diastrophic Plants in the TharDesert, Pakistan

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Abstract: The drought diastrophic instigated over the plant existences in the Thar Desert. While exploiting precisely of the SPI (Standardized Precipitation Index) and SPSS (Statistical Package for Social Science) for the climatic model, shows rainfall fluctuation and a gradual significant decrease led to Plant extinction.

The result of Meteorological data indicated rainfall decreased in the range of 100-200mm during late twentieth century. This research suggested a new intuition of determine the period of temporal correlation between drought and rainfall. From research perspective it's a significant finding which contributes to the aftermath as to how plant species eradicated from the region.

Keywords: Drought, Diastrophic, fluctuation, determine, temporal

1. <u>INTRODUCTION</u>

The decrease in the rainfall is an associated cause of drought condition in the TharDesert, it is owing to the variation in global scale climate pattern, desert morphology and monsoon demonstration. Which was originated some 18000 to 20000 year ago(Gupta *et al.* 1997). The south Asian regions are generally influenced by rudimentary atmospheric circulation from the ancient time to present (stamp, 1965).

The climate variation caused drought activity enhancement and it was originated from Pleistocene glaciation. Which caused degradation significantly the ecosystem and disruption in vegetation of Desert (James *et al*, 2007). All these climate and atmospheric deteriorations including Arabian Sea brought immense unhealthy shift in rainfall pattern of TharDesert, owing to the warmer temperature of Arabian Sea caused 10% drier of TharDesert (Rad *et al.* 1999 Roy *et al.* 2005). Whereas, rainfall fluctuation is the single most basic element in climate change in Thar Desert, Pakistan. (Chauhan, 1996). The rainfall significantly fluctuates during summer monsoon (July-September) that prompted drought to set in for a start (Simister *et al*, 2005).

Human being is significantly a responsible factor for creating drought for the very human creature employed iron instrument to change landscapes; such as deforestation, cultivation, building houses, unplanned urban constructions and roads. The land degradation flinched from 1000 BC, it caused very substantial blow to shift climate in this region (Homji, 1996).

Though rainfall is decreased all across but mainly between mid and late 20th century as evapotranspiration superlative increased. Which in turns caused the inevitable fluctuation year after year of rainfall from the range of 1650-2000mm in current Century (Rao, 1992). The decrease in rainfall induced drought and aridity, which is likely fluctuated and it is led to the disruption of the geomorphic features and the earth surface (El-Baz, 1984). Theseanti-eco circumstances suggested the scattered and some plants extinction forever.

The TharDesert of Pakistan is a subtropical arid Desert, which is geographically located 69^{0} , 53' and latitude 24^{0} , 43' (Time Atlas, 1959). This, over the global map is located over the Southeast of Pakistan (**Fig. 1**) The length of this area is about 800 km north south and 490 east west wide (Herani *et al.* 2007). The total population of Thar Desert is 955,812 (Census 1998) with the land area of 22000 km². The distribution of population (44/km²) represented dense populated Desert in the world (Alvi *et al.* 2008; SAZDA 1988).

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Fig. 1. Represented the surveyed (53) Villages where Survey Questionnaires were asked

2. <u>RESEARCH METHODOLOGY</u>

The collected rainfall data of 67 years of Badin and Chhor weather station was analysed with Standardised Precipitation Index (SPI); developed in Colorado, USA by Daniel *et al.*, 1993 and four years after subsequently elaborated in 1997. SPI based on probability of precipitation for any time scale. This index is employed to calculate the average monthly rain data. Whereas, SPI demonstrated the drought and aridity on the scale. The rainfall data was collected from Department of Meteorology, Karachi. To have an in-depth understanding, a real picture of drought, rainfall and geomorphology of the area.

A survey questionnaires were served to the local respondents (residents) and collected from the dwellers of the area. This method was used to determine, how people contemplate and review rainfall, climate and drought spell. The survey questionnaire was analysed using afore mentioned a software SPSS, 20.0. The survey questionnaire was made available in both notational and textual form, which elaborated the declining rainfall ratio and its impact, drought, aridity and climate variation of TharDesert. The questionnaire was prepared meticulously both in English as well as in local dialect and it was expounded to local dwellers ageing above 60 years, for the senior citizens had a clear idea about drought, climate, vegetation and morphology of TharDesert. A mixed of open close ended survey questionnaires were distributed among 103 males and 27 females participants as many as 53 different villages across the region covering the entire TharDistrict which is comprised of more than 2000 population per village. However, the large number of population were permanent residents of the hinterland.

3. <u>CLIMATE FLUCTUATION ASSOCIATED</u> BY ARABIAN SEA

The Arabian Sea is a warmer marine water with high temperature throughout the year. It triggered heating up the surface land area of adjacent peripheral area. The temperature of TharDesert was reported as 40° to 45° c during summer season (Roy, 2005). It is calculated the surface temperature extremely varied during late 20^{th} century in range of 3° to 10° (Roy, 2005). Arabian Sea owing to containing the inevitable elements forced through global atmospheric circulation caused significant variation in the rainfall at TharDesert (Swanson *et al.* 1999). This unsteady and unhealthy variation in rainfall originated arid semi-arid region through enhancement of drought which resulted in the scattered vegetation and extinctions of certain plants (Thomas *et al.* 1990)

Drought diastrophic

The decrease in rainfall caused substantial drought, its ratio fluctuated which is terribly affected on vegetation across the region. That was the most devastating prelude to scatter and extinct the Plants. As, the region had and continues encountering the worst drought periods, which caused damage to the landscape of vegetation (Rao, 2009).



Figure 2 Drought induces plants scattered

Therefore the mechanism of drought suggested the triangle of decreasing rainfall, strewn and extinction of plants (Fig.2). This morphological shifts taken place by drought pattern in TharDesert. There are different scales of drought with different values (Table 1)

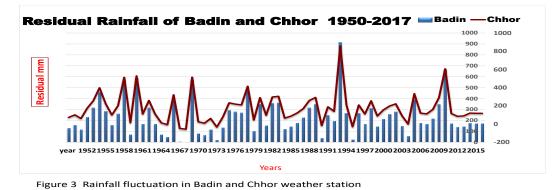
Table Drought scale

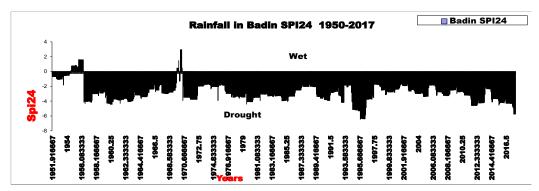
| SPI values | Drought category |
|----------------|------------------|
| 0 to -0.99 | Mild drought |
| -1.00 to -1.49 | Moderate drought |
| -1.50 to -1.99 | Severe drought |
| < -2.00 | Extreme drought |

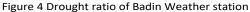
4.

RESULT

Predominately, decrease in rainfall at TharDesert led to a very high depression, which resulted in just as much high drought spell. This drought severely affected over the Plant. The unhealthy variation in rainfall and drought are communal in 20th Century (Rashid, 2004). The rainfall was heavily fluctuated between 1970s and 1990 and 1970s was known as the drought decade in the present history of this region. Hence this record was recapitulated in 2000 and 2008. Though the ordinary rainfall range variation difference occurs some 15mm (**Fig.3**). Whereas, this is the large duration of rainfall fluctuation period of 1960-1970, with difference at Badin 1 millimetres to 586 millimetres and Chhor indicated fluctuation of same period 1960-`970 was 8-645 mm. This duration not only left incredible chapter in the history of Geography but also left nearly inerasable marks on the landscape of the region owing to the heavy drought since 1900 and the rainfall fluctuation also triggered subsequently drought years such as 1951, 1965, 1966, 1968, 1972, 1974, 1979, 1982, 1985, 1986, 1987, 2002 (**Fig.4**).







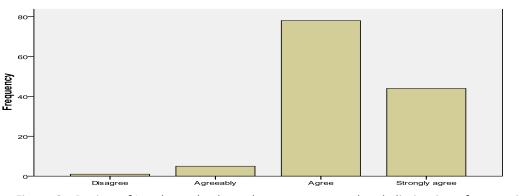


Figure 6. Review of Local people about decrease, scattered and elimination of vegetation

Fig. 5 Review of Local people about decrease, scattered and elimination of vegetation

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This Figure represented drought decades as 1911-20, 1932-1940, 1961-70,1981-90 and 2001-2009. That demonstrated severe back to back drought occurred 1-5 years rotation base and after every 2-3 years moderate drought used to take place in the region. The severe drought though intermittent period in this region yet problematic are: 1952, 1956, 1966, that caused massive damage to vegetation and plant pattern (**Fig.5**). The extinct plant name was calligonum polygonoides (Local name Phog) eliminated forever

The anthropogenic responses demonstrated collectively 94 percentages that vegetation and plant are scattered and certain number led to elimination (**Fig.5**).

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