

## Characteristic Features of Rainfall and Meteorological Droughts in Jhunjhunu District of Arid Rajasthan

A.S. Rao<sup>1</sup> and Surendra Poonia\*

Central Arid Zone Research Institute, Jodhpur 342 003, India

Received: December 2012

**Abstract:** The rainfall characteristics and meteorological drought conditions in Jhunjhunu district of arid Rajasthan were studied using six tehsil-wise rainfall data (1901-2011). The district experiences 405 to 560 mm of annual rainfall in 26 to 34 rainy days with a coefficient of variation of 37 to 44%. The seasonal rainfall (June-September) varied from 343 to 477 mm in 18 to 24 rainy days. The highest annual rainfall recorded in the district was between 828 mm at Jhunjhunu and 1252 mm at Khetri. Similarly, the lowest rainfall record varied between 89 mm at Khetri and 187 mm at Udaipurwati. The extreme rainfall events recorded in the Jhunjhunu district showed that 1-day highest rainfall varied from 158 mm at Jhunjhunu to 281 mm at Khetri. The 1-day rainfall was lowest at Jhunjhunu (82.8 mm, 98.1 mm, 117.2 mm, 131.5 mm and 146.0 mm) and highest at Buhana (116.5 mm, 143.0 mm, 176.0 mm, 200.7 mm and 225.8 mm) for all return periods (5, 10, 25, 50 and 100 years). The long-term annual rainfall trends showed that there was a marginal increase at a rate 0.43 mm year<sup>-1</sup> at Jhunjhunu, 0.48 mm year<sup>-1</sup> at Khetri, 0.74 mm year<sup>-1</sup> at Chirawa. The meteorological droughts prevailed in 36 years out of 111 years (1901-2011) with lowest frequency of 32 years with drought at Jhunjhunu and Chirawa to a highest frequency of 35 years drought at Khetri. The decade 1981-90 experienced highest (6 out of 10 years) number of moderate to severe droughts, whereas the 1941-50 recorded least frequency (2 out of 10 years) of droughts.

**Key words:** Rainfall characteristics, meteorological drought, Jhunjhunu district.

Jhunjhunu district located in the arid western Rajasthan is highly vulnerable to extreme climatic conditions and drought compared to other arid regions of the country. It is characterized by very hot summers and very cold winters with poor rainfall during south-west monsoon. In May and June, the maximum temperature may sometimes goes up to 48°C. The potential evapotranspiration rates are quite high, especially during May and June. The average annual potential evapotranspiration of the area is 1819 mm compared to average rainfall of 480 mm received. During major cropping season of monsoon period (July to September) the normal daily PET at Jhunjhunu varied from 4.9 to 8.0 mm day<sup>-1</sup> and in winter (December to February) the normal daily PET varied from 2.1 to 3.7 mm day<sup>-1</sup> (Rao and Poonia, 2011). Out of 6463.2 sq. km of cropped area, only 2267.9 sq. km (35.1%) area has irrigation facility aggregating drought impact on crop production in the district (CGWB, 2008). Agriculture activity is spread over both

kharif and rabi cultivation. Kharif cultivation is rainfed and rabi cultivation is mostly based on ground water. The main kharif crops grown in the area are pearl millet, clusterbean, cowpea, mung bean and moth bean whereas, principal rabi crops are wheat, gram and mustard etc. (DES, 2008). An attempt is made in this paper, to analyze the rainfall characteristics for identifying the meteorological droughts.

### Materials and Methods

Jhunjhunu district is located in the extreme north eastern part (bordering Haryana state) of Rajasthan State (Fig. 1) which lies between 27°38' and 28°31' N latitudes and 75°02' and 76°06' E longitudes. For the present meteorological drought study, tehsil-wise rainfall data for six stations for the period 1901 to 2011 was collected.

The frequency of different categories of meteorological drought are made according to a classification given below (Table 1) by the India Meteorological Department (Koteswaram, 1976; Subrahmanyam, 1967; Rao *et al.*, 2007 and 2012).

\*E-mail: poonia.surendra@gmail.com

<sup>1</sup>Present address: Central Research Institute for Dryland Agriculture, Hyderabad 530 059, India