

# **RAINFALL STATISTICS AND SEASONAL CONDITIONS**

## **1. Importance:**

The Economy of the Telangana is basically an agro based one. The Agriculture sector is directly contributing around 25 percent to the State Gross Domestic Product and also provides livelihood to about 63 percent of the State's population. Historically, the economy of the State is heavily dependent on the vagaries of monsoon. As such, rainfall statistics play vital role in plan formation of irrigation projects, flood control measures and to study procedure of drought conditions.

The rainfall statistics is needed, **in the short-run**, to monitor the progress of Agricultural Operations in an area, to assess the recurrence of drought or floods and to prepare contingency plans, to advise farmers on the cultivation practices to be adopted for different levels of precipitation and soil moisture.

**In the long run**, these data are required for development of water resources and to plan for construction for irrigation projects. The Ground Water Department is using the rainfall statistics for assessing fluctuations and recharging of ground water levels.

The Director, Directorate of Economics and Statistics, is designated as Rainfall Registration Authority in the State. The network of raingauges in the State is wide spread and rain gauges are installed as per the specifications laid down by the India Meteorological Department. The state has one raingauge in every mandal covering an area of about 250 sq. kms. as against the IMD's specifications of 500 to 900 sq.kms per raingauge. The State has the best rainfall monitoring system in the country.

## **2. Definition of Rainfall :**

The total amount of rain deposited on a given area during a given time as measured by a raingauge is called rainfall.

### **3. Raingauge:**

The raingauge, which is now in vogue in the State, is 200 sq.c.m F.R.P. (Fibre-glass Reinforced Polyester) with a rim diameter 159.6 mm non-recording raingauge. The non-recording raingauge consists of three parts in general, **(a) Base, (b) Collector (funnel), (c) Bottle (Receiver)**. However 100 mm and 200 mm capacity raingauges are provided with an additional cylinder, to avoid risk of overflow from the bottle. The base and the collector are locked together by a set of two locking rings fixed firmly to the two parts. Besides, a hasp and staple is provided to permanently lock the raingauge with a padlock. The entire raingauge is made of fiberglass reinforced polyester material as per Indian Standard Specifications.

### **4. Erection of the Raingauge:**

The raingauge should be fixed on a masonry or concrete foundation **60 cms x 60 cms** sunk into the ground. Into this foundation, the base of the raingauge is cemented, so that the rim of the gauge is exactly 30 cm above the ground and perfectly in level. This height prevents most of the rain water from splashing into the gauge if exceeded, the amount of rain collected decreases owing to wind eddies set up by the gauge itself. Again it is necessary to keep the rim perfectly horizontal since anything, which decreases the effective area of the collecting funnel, reduces the amount of rain collected.

### **5. Protection of the Gauge:**

- (a) A fence should ordinarily be erected around raingauge to protect from being damaged by stray animals and miscreants.
- (b) The distance between the ground and first and second strands may be between 18-20 cm to prevent stray animals entering the enclosures.
- (c) The height of the fence above the rim of the gauge should not be more than one fourth the distance of the fence from the gauge and in any case not more than half of the distance.

## **6. Precautions for erection of Raingauge:**

The amount of precipitation collected by a raingauge depends on its exposure and hence great care must be exercised in selecting a suitable site.

- a) The raingauge should be placed on level ground, not upon a slope or uneven land.
- b) It should on no account be installed on the ground that falls away steeply on the side of the prevailing wind.
- c) Its distance from every object should be preferably four times the height of the object but never less than twice the height of the object, above the rim of the gauge.
- d) A site plan in duplicate satisfying the above conditions along with details may be sent to the respective rainfall registration authority of the state for obtaining necessary approval.

## **7. Measurement of the Rainfall:**

Rainfall is measured in terms of the depth of the water, which would be collected upon a level area of any size, assuming the rain to fall uniformly over the area at the rate at which it falls into the gauge.

Thus, one c.m. of rainfall means that if the rain were to fall on a level surface which does not absorb it and from which it cannot runoff or evaporate, it would form a sheet of water covering one c.m in depth.

To measure the rainfall, the water collected in the receiving bottle is poured into a specially graduated glass/plastic cylinder prescribed to measure the rainfall, which is placed on a level surface. Care should be taken to avoid spilling any of the collected water. Each of the graduations on this cylinder represents 0.2 mm and the observer must count the number of divisions covered by the water. If the lower surface of water rests between two divisions, the rainfall should be estimated to the nearest 0.1 mm.

The observer at each station must maintain a written record of the rainfall measured at 08:30 hrs. every day. For this purpose, Rainfall Registers were supplied to all the Assistant Statistical Officers for recording the date wise rainfall.

The rainwater in the gauge should be measured every day at 08.30 hrs. IST and the raingauge should be examined everyday even though there is **no rain**. During heavy rain it must be measured three or four times in a day and sum of total of all the measurements during the previous 24 hours should be entered as the rainfall of the day. If it is raining at the time of observation, it is necessary to complete all operations as quickly as possible to avoid considerable error.

If rainfall is heavy at the time of observation, it is desirable that a glass bottle or spare receiver is placed immediately after the receiver is taken out for measurement of rainfall, so that the rain is collected in the new bottle during the interval. The receiver should then be replaced quickly and the rainfall collected in the bottle should be poured into the original receiver.

Why rainfall should be measured at 8.30 am?

In order to ensure uniformity, across the country, the IMS had decided to measure the rainfall at 8.30 am, every day as the weather conditions are more or less uniform at that time everyday.

In order to avoid damage to the rim and funnel (Collector), the following procedure should be adopted.

1. The funnel should be removed gently and held in one hand.
2. The receiving bottle should be taken out with other hand.
3. The funnel should be replaced.
4. After measurement of the rainfall, the funnel must be again removed and held in one hand, and the receiver bottle should be restored to its position in the raingauge with the other hand.
5. The funnel should be replaced in its proper position and locked.

## **8. Normal Rainfall:**

Normal has been defined as the average of a rainfall data computed over a long period. Previously normals were calculated based on rainfall data for the years 1901-1970. But these normals are calculated for only 438 raingauge stations (i.e. Revenue / IMD / PWD Stations) and daily normals are calculated for only 217 stations.

In view of monitoring the drought situation in each mandal, the Directorate of Economics and Statistics, has calculated the normals for each rain gauge, (situated in every mandal) for the years 1985 to 1999. (i.e.15 years).

## **9. Actual Rainfall:**

The amount of rainfall received in a given area during a given time (i.e. 24 hrs periods to measuring rainfall every day at 8.30 hrs. IST) is defined as actual rainfall of a particular raingauge station for the day.

## **10. Average Rainfall of a day :**

Average rainfall of a day for a particular district is calculated as:

Sum of rainfall of all raingauge stations received in the district on a particular day

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Total No. of raingauge stations in the district

## **11. Rainy Day:**

- (a) Rainy day is defined as a day on which 2.5 mm or more of rain is recorded.
- (b) **For the purpose of drought analysis a Rainy Day is defined as follows:**
  - (i) for mandals with average annual rainfall of more than 750 mm, 5.0 mm or more rainfall per day will be treated as rainy day and
  - (ii) for mandals with average annual rainfall of less than 750 mm, 2.5 mm or more rainfall per day will be treated as rainy day.

- (iii) For those mandals where Red soil areas are predominant 5 mm or more rainfall per day will be treated as rainy day and
- (iv) Black for those mandals where soil areas 2.5 mm or more rainfall per day will be treated as rainy day.

## **12. Dry Spell:**

- (a) A wide gap of 21 days or more between two consecutive rainy days is called dry spell.
- (b) According to drought manual, a "**Dry spell**" can be termed, if the rainfall received is less than 50% of its normal value for a consecutive period of more than 20 days in a month during a season and the deficiency continues from 21 to 28 days it should be considered as **mild drought**, 29 to 42 days as **moderate drought** and more than 43 days as **severe drought**.

## **13. Drought assessment:**

- (a) India Meteorological Department (IMD) defines "**drought**" as a situation occurring in any area when the annual rainfall is less than 75% of the normal rainfall i.e. where the deficiency in rainfall is 25% or more means drought or scarcity conditions arising out of failure of rains.
- (b) For computation of **deficiency in rainfall** while considering declaration of drought, mandals be classified in to the following three categories:
  - (i) **Mandals receiving less than 750 mm (i.e. 749.9 mm) annual normal rainfall:** Mandals where less than 750 mm annual normal rainfall even with a deficiency of 15% may have pronounced bad effect on growth and yield of current agricultural crops.
  - (ii) **Mandals receiving from 750 mm to 999.9 mm annual normal rainfall:** The mandals where annual normal rainfall is from 750 mm to 999.9 mm, 20% deficiency can be made applicable.

**(iii) Mandals receiving 1000 mm and above annual normal rainfall:**

Mandals where annual normal rainfall is 1000 mm and above, 25% deficiency can be made applicable.

- (c) (i) Compression/reduction in the cropped area of 50% and above under all principal crops.
- (ii) Normal reduction in crop yield of 50% and above compared with average yields.
- (iii) Dry Spells and its impact on crop damages.

For declaration of drought norm 'b' is compulsory and any two norms from 'c' must be fulfilled.

**(d) Besides, existence of scarcity situation or drought conditions prevailing in a mandal can be assessed by satisfying the following criteria:**

- (i) Significant deficiency in rainfall, gross un even spread of rain and very much prolonged dry-spells.
- (ii) Steep reduction in area sown and also heavy damage to standing crops.
- (iii) Fall in the estimated yields of crops based on the estimated annavari valuation of crops in the area with the actual annavari valuations during the two preceeding years.
- (iv) Considerable fall in extent of grain and fodder supply with abnormal increase in prices.
- (v) A trend of falling current agriculture and non-agriculture wages as compared with normal times;
- (vi) Extent of unemployment position with reference to agricultural operations and on going works of Government; local bodies and big employers, and
- (vii) Unusual movement of labour in search of employment.

#### **14. Monsoon Periods:**

Telangana receives 93% of rainfall from the South-West Monsoon as well as North-East Monsoon. The coverage of monsoon periods is as follows:

- i) ***South – West Monsoon (June to September):*** The south-west monsoon enters the state in second week of June. It provides almost 79 percent of state's rainfall.
- ii) ***North-East Monsoon (October to December):*** The North-east monsoon generally enters the state in the month of October. It provides almost 14 percent of state's rainfall.
- iii) ***Winter Period (January & February) and Hot Weather Period (March to May):***  
Both winter and Hot Weather Periods put together contributes around 7 percent of state's rainfall. Most of the rains occurring due to depression and cyclone in the month of May in the state.

#### **15. Deficiency of Rainfall:**

Deficiency of Rainfall is categorised in to 4 categories Viz., 1. Scanty Rainfall  
2. Deficient Rainfall 3. Normal Rainfall and 4. Excess Rainfall

- 1. Scanty Rainfall:** (-)59% to -99% rainfall over normal is classified as scanty Rainfall.
- 2. Deficient Rainfall:** above -19% to -59% rainfall over normal is classified as deficient rainfall.
- 3. Normal Rainfall:** -19% to +19% Rainfall over normal is classified as normal rainfall.
- 4. Excess Rainfall:** Above +19% Rainfall over normal is classified as excess rainfall.
- 5. No rain:** There is no rain.



## **16. Periodical Report:**

**Daily rainfall:** During South-West monsoon (June to September) and North-East Monsoon (October to December) periods, rainfall data is monitored every day. The daily rainfall data is collected from all the raingauge stations through online / Fax and is being tabulated, computerized, and analyzed and reports sent to the departments concerned on the same day.

## **17. Inspection of Raingauges:**

All the Raingauge Stations located in each district shall, invariably, be inspected during January/February, every year by the officers drafted by the CPOs concerned and reports in the prescribed format shall be sent to the DES immediately for assessing the conditions of raingauge stations and to release necessary funds for attending repairs, if any, before on set of South-West Monsoon.

## **18. Analysis of Rainfall data:**

The Rainfall data is collected on daily, weekly and monthly basis from all the revenue rain gauge stations from the Chief Planning Officers and is tabulated, computerized and published regularly. The date-wise and year-wise database for all the stations is being maintained at DE&S for generating various reports.

To understand the pattern of Rainfall scenario, District-wise, week-wise, month-wise graphical representation like grids, charts and maps are also prepared regularly.

The Directorate of Economics and Statistics generates the daily, weekly, monthly, status and dry spell reports which are useful to various departments to take appropriate policy decisions like declaration of drought , to undertake relief measures during the cyclone, floods, drought periods and also for preparation of contingent plans by the concerned departments in the state.

The Directorate of Economics and Statistics analyses the rainfall data received from all the mandals and make use of statistical techniques to estimate the deviation from normal and graphical representations at district and mandal levels for the use of policy makers.