



## SURFACE WATER RESOURCES OF THE TAMILNADU STATE

**Dr. M.Parusuram Naik**

*ICSSR Post Doctoral Fellow, Department of Geography, S.K.University, Ananthapuramu, A.P., India.*

### **Abstract**

The Tamil Nadu State covering an area of about 5.30 lakhs Km<sup>2</sup> has been studied with a view to analyse the distribution of surface water resources. The data pertaining to monthly rainfall over a period of ninety years has been collected and analysed. From the study it is found that the rainfall is less than 50mm in coastal plains and uplands in January, February and March months, 50mm to 75mm in April, May, June and July months, 76 mm to 100mm in August, September and December months and more than 100mm in November month.

In the Western hilly terrain of the Tamil Nadu State the mean monthly rainfall is less than 100mm in January, February and March months, 10mm to 20mm in April, May, June, July, August, September, October, November and December months. The mean monthly rainfall exceeds 200mm in June, July, August and October in Udakamangalam, October and November months in Kodaikanal and Beneford's Estate and June, July and August in Hereford's estate.

### **Introduction**

Rainfall data is important for the hydrological studies to assess the surface water resources of any region or state. The amount of rainfall collected by a rain gauge depends on its exposure conditions. The rainfall process is essentially random in nature. It is difficult to predict what would be the rainfall for any given period in future. The rainfall magnitudes can be estimated only with some probability is attached to them. Therefore the analysis of the rainfall data obtained over a long period in the past would help the hydrologists to make probabilistic estimates of rainfall to be used in various designs. The method of analysis and which aspects of rainfall are to be analysed depend upon the purpose of analysis.

Studies on rainfall has been carried by Ram Mohan (1978) Subrahmanyam and Kamaraju (1983), Suresh Babu (1993), Sambasiva Rao (1984, 1996, 1997 & 2012). Subrahmanyam and Kamaraju (1983) has studied the rainfall and run-off Krishna river basin. Ram Mohan (1978) has studied the rainfall, water balance and drought climatology of the Tamil Nadu State. Suresh Babu (1993) has analysed the rainfall of Anantapuramu District, Andhra Pradesh, Sambasiva Rao (1984) has studied the rainfall patterns of the Madurai District, Tamil Nadu. The studies on rainfall of Tamil Nadu state is carried by Sambasiva Rao (1996).

The rainfall patterns of Nallamalai and Erramalai hills is studied by Sambasiva Rao (1997). The studies on rainfall are carried out by Sambasiva Rao (2012) to describe the water balance of the Kunderu basin.

### **Study Area**

The Tamilnadu state cover an area of about 1.3 lakh sq.km and lies 8.05' to 13.34 north latitude and 76.10 to 80.20' east longitude in south-eastern part of India. The total population of the State is 72,147,030 (2011 Census). The density of population is 555/km<sup>2</sup> persons. The state in the north is bordered by Andhra Pradesh, northwest by Karnataka, west and southwest by Kerala and east by Bay of Bengal. The State on an average receives rainfall of about 986 mm. per annum. There are 31 districts, 226 taluks and 385 blocks in the state. The total number of revenue villages are 16,564, hamlets 58,457 and 434 urban centres. The total length of coastline is about 1000 km.

### **Objectives**

The main objective of the study the rainfall pattern in monthly seasonal and annual basis and to describe the distribution pattern of the rainfall of the Tamil Nadu State.

### **Methodology**

The major input for water resources of Tamilnadu state is the rainfall. In the state there are about 200 rain-gauge stations to record the rainfall. The rainfall data for about 50 stations distributed in coastal plains, uplands and hilly terrain has been chosen to study the rainfall distribution in the state. The data has been collected over a period of 90 years and analysed statistically.



**Table-I,Rainfall in Different Months And Seasons of Tamilnadu (All values in mm)**

S.No	Station	Months and Seasons																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.	Ponneri	15	2	4	21	43	45	100	135	105	243	189	125	17	68	385	556	1026
2.	Chennai	45	12	13	17	28	45	87	113	119	306	650	139	57	58	364	795	1274
3.	Changalpattu	42	12	13	17	38	49	89	124	134	260	305	126	54	68	397	691	1210
4.	Thanjavur	66	19	20	39	55	34	47	97	110	203	305	168	85	144	228	680	1167
5.	Puddukottai	39	16	17	46	62	46	61	118	121	159	152	112	55	125	346	393	919
6.	Ramanad	55	20	25	49	39	13	25	45	53	179	212	107	75	109	136	498	818
7.	Tuticorin	28	30	34	45	18	14	4	7	16	135	189	95	58	97	31	419	605
8.	Radhapuram	30	18	13	50	33	61	36	18	22	151	197	96	48	99	13	444	728
9.	Kanyakumari	25	21	54	115	143	228	132	89	97	259	233	72	46	312	546	398	1302
10.	Udagamangalam	45	25	31	94	151	232	379	270	180	253	188	72	70	276	1061	513	1920
11.	Kodaikanal	72	35	52	156	134	104	117	150	175	256	250	139	107	342	546	645	1640
12.	Beneford's Estate	70	32	50	145	125	155	126	145	180	241	235	135	102	320	566	611	1599
13.	Hereford's Estate	25	26	60	124	195	352	344	212	115	154	155	55	51	379	102	346	1817
14.	Vellore	30	9	11	24	71	59	88	133	160	166	158	61	39	106	440	395	980
15.	Tiruttani	11	5	9	11	45	65	116	158	129	183	193	82	16	65	468	558	1007
16.	Villipuram	54	15	15	29	56	44	74	132	142	216	273	135	57	97	431	571	1156
17.	Dharmapuri	19	12	18	56	78	33	42	47	56	176	130	43	31	152	178	369	710
18.	Selam	16	9	12	45	102	49	68	116	122	162	108	33	25	159	355	303	842
19.	Coimbatore	19	12	18	56	78	33	62	47	56	176	130	43	31	152	178	349	710
20.	Bhavanisagar	8	14	18	51	103	18	28	37	73	117	137	64	22	172	153	378	728
21.	Avanashi	6	4	17	57	102	36	36	59	97	179	101	47	10	176	225	327	738
22.	Pollachi	3	7	13	53	87	97	164	86	55	139	131	44	10	153	402	314	879
23.	Tiruchi	28	12	14	43	77	30	37	92	114	183	150	62	40	134	373	395	842
24.	Erode	15	11	17	54	91	30	33	64	86	168	114	34	26	162	213	316	717
25.	Dindigal	33	11	16	61	77	32	31	67	91	191	164	63	44	154	221	418	837
26.	Palani	35	5	14	60	73	27	25	37	60	163	160	68	40	147	149	393	729
27.	Vedasandur	28	10	10	61	60	20	19	59	72	192	132	59	38	1361	170	383	722
28.	Uttampalayam	26	13	26	74	52	31	50	43	49	153	141	65	39	152	170	383	744
29.	Madurai	32	21	30	72	69	31	37	81	93	199	156	556	53	177	242	410	876
30.	Sivaganga	38	15	20	56	64	44	58	118	110	169	156	170	53	140	330	495	1018
31.	Virdhunagar	35	24	32	72	60	19	23	51	68	194	168	70	59	164	161	432	816
32.	Nilakkottai	26	18	23	79	80	34	32	72	100	170	129	50	44	182	208	349	783
33.	Tirunelveli	56	80	41	60	38	30	26	23	30	166	208	112	130	139	109	486	864
34.	Nanguneri	38	20	36	51	39	43	26	20	29	145	184	92	58	126	118	422	724
35.	Tenkasi	24	35	67	85	55	68	70	30	8	172	220	112	89	207	176	509	981
36.	Ambasamudram	79	35	45	64	48	38	32	19	28	159	225	155	114	157	117	539	927
37.	Tondi	32	20	30	57	43	801	100	116	104	149	180	77	52	133	394	401	985
38.	Vedranyam	701	59	40	55	37	50	60	70	65	242	450	336	129	132	245	1028	1534
39.	Nagapatnam	60	48	30	50	26	40	50	60	69	230	400	304	108	106	219	934	1367
40.	Cuddalore	50	39	30	32	30	60	90	100	90	200	380	249	89	92	340	829	1350
41.	Vulandarpet	40	20	30	50	28	45	75	130	133	142	130	120	60	108	383	492	1043
42.	Attur	20	18	40	70	47	50	80	130	133	140	120	100	38	157	393	387	975
43.	Aruppukkottai	32	21	35	79	48	14	18	31	39	189	184	80	53	162	102	453	770
44.	Kuilapatti	43	39	47	78	45	15	92	21	36	180	195	81	82	170	100	450	872
45.	Tiruannamalai	11	4	3	24	34	50	78	102	124	225	205	78	69	100	392	624	1185
46.	Pamban	45	21	26	58	49	22	31	62	70	182	186	88	66	133	185	456	840
47.	Karur	20	10	20	45	75	70	30	35	112	135	114	65	18	130	197	303	648
48.	Palladam	6	6	5	40	56	11	9	12	43	144	104	74	30	140	247	304	731

Note: 1(3)-January ; 2(4)-February ; 3(5)-March ; 4(6)-April ; 5(7)-May; 6(8)-June; 7(9)-July;  
8(10)-August; 9(11)-September; 10(12)-October;11(13)-November; 12(14)-December;13(15)-Winter;



14(16)-Summer; 15(17)-Southwest monsoon; 16(18)-Northeast monsoon ; 17(19)-Annual.

### Results

In the month of January the mean rainfall is about 34 mm. The maximum rainfall of 3 mm is found in the Pollachi. In February month the mean rainfall varies from a minimum of 2 mm in Ponneri station to a maximum of 80mm in Tirunelveli station. The mean rainfall of the state in the month of February is 20 mm. During March month minimum mean rainfall of 3 mm is found in Tiruannamalai and the maximum mean rainfall of 60 mm is noticed in Hereford's estate. The mean March rainfall of the state is 26 mm. In the month of April the minimum mean rainfall of 11 mm is found in Tiruttani and the maximum mean rainfall of 156 mm is noticed in Kodaikanal station. The mean rainfall of the state in April month is 59 mm.

During May month the mean minimum rainfall of 18 mm is found in Tuticorin station and the maximum mean rainfall of 195 mm is noticed in Hereford's estate. The state mean rainfall in May is 66 mm. In June the mean minimum rainfall of 4 mm is found in Tuticorin station and the mean maximum rainfall of 352 mm is found in Hereford's estate. The average rainfall of the state in the month of June is 57 mm. In July month the mean minimum rainfall of 4 mm is found in Tuticorin station and the mean maximum rainfall of 379 mm is noticed in Udagamangalam station. The state average rainfall is 72 mm. During August month the mean minimum rainfall of 7 mm is found in Tuticorin station and the mean maximum of 270 mm is noticed in Udagamangalam station. The average rainfall in the month of August is 83 mm. In September month the mean minimum rainfall of 8 mm is noticed in Tenkasi station and the mean maximum rainfall of 180 mm is found in Udagamangalam and Beneford's estate. The average of the state is 89 mm. During October the mean minimum rainfall of 135 mm is found in Karur and Tuticorin stations. The mean maximum rainfall of 306 mm is noticed in Chennai station. The state average rainfall in the month of October is 187 mm. In November month the mean minimum rainfall of 104 mm is noticed in Palladam and the mean maximum rainfall of 450 mm is found in Vedaranyam. The average rainfall of the state in November month is 193 mm. In the month of December the mean minimum rainfall of 33 mm is noticed in Salem station and the mean maximum rainfall of 336 mm is found in Vedaranyam station. The average rainfall of the state is 100 mm. The mean monthly analysis of rainfall indicates that the state receives rainfall less than 50 mm in plains and uplands in January, February and March, 50 mm to 75 mm in April, May, June and July months, 76 to 100 mm in August, September and December months and above 100 mm in October and November months. Climatologically the August, September, October, November and December months are favourable for crop cultivation. However over the hilly terrain the state receives rainfall less than 100 mm in January, February and March months, 100 mm to 200 mm in April, May, June, July, August, September and December months in Kodaikanal and Beneford's estate. In Udagamangalam station the mean rainfall varied from 100 mm to 200 mm in the months of May and November. In Hereford's estate in April, May, September, October and November months the mean rainfall varies from 100 mm to 200 mm. The mean rainfall exceeded 200 mm in June, July, August and October months in Udagamangalam, October and November months in Kodaikanal and Beneford's estate and June, July, and August in Hereford's estate. The western and southwestern hilly terrain receives high rainfall both during southwest and northeast monsoons.

In the winter period the mean minimum rainfall of 10 mm is found in Avanashi and Pollachi and the mean maximum rainfall of 130 mm is noticed in Tirunelveli. The state average during winter period is 54 mm. In summer season the mean minimum rainfall of 58 mm is found in Chennai and mean maximum rainfall of 379 mm is noticed in Hereford's estate. The state average rainfall is 151 mm. In southwest monsoon period the mean minimum rainfall of 31 mm is found in Tuticorin and the maximum of 1061mm in Udagamangalam station. The average rainfall of the state is 301 mm. During northeast monsoon period the mean minimum rainfall of 303 mm is found in Salem and Karur stations and the maximum rainfall of 1028 mm is noticed in Vedaranyam. The annual mean rainfall of 605 mm is noticed in Tuticorin station and the mean annual maximum rainfall of 1920 mm is found in Udagamangalam station. The average annual rainfall of the state is 986 mm. over all the annual average on hilly terrain varies from 1599 mm to 1920 mm and in the plains and uplands it varies from 605 mm to 1534 mm. The total surface water resources of Tamilnadu state is Average annual rainfall of the state X Geographical area

$$\begin{aligned} & 986 \text{ mm} \times 1,29,774 \text{ Km}^2 \\ & .986 \times 1,29,774 \times 1000 \times 1000 \\ & = 127,957,160,000 \text{ m}^3 \end{aligned}$$

### Conclusions

From the analysis of mean monthly rainfall of the Tamil Nadu State it is found that the mean rainfall is less than 50mm in January, February, and March months, 50mm to 100mm in April, May, June, July, August, September and December months. In the months of October and November the mean rainfall is above 100mm. The seasonal analysis of rainfall indicates that during winter period the mean rainfall is about 56mm. During northeast monsoon period the mean rainfall is about 480mm. The annual mean rainfall is 986mm. The total surface water resources of the state is about 127, 957 million



M3. The mean rainfall on the plains and uplands is low and it is less than 800mm. It is more than 1000mm on the western hilly terrain.

#### **References**

1. RAMMOHAN, H.S. (1978) A study of water balance and drought climatology of Tamilnadu. Unpublished Ph.D thesis submitted to Andhra University, Visakhapatnam.
2. SAMBASIVA RAO, M. (1984) Water balance and development of surface and sub-surface water resources and agriculture of Madurai district, Tamilnadu. *Indi. Journ. Agri. Meteorology*, Vol.2(1), pp.55-63.
3. SAMBASIVA RAO, M. (1996) Water balance and development of land, water and agricultural resources of the Tamilnadu State, India. Unpublished project report submitted to UGC, New Delhi.
4. SAMBASIVA RAO, M. (1997) Ecoclimatology, water balance, ecological depredation and eco-development of the Nallamalai and Erramalai hills of the Eastern Ghats, Andhra Pradesh, India. Unpublished project report submitted to MOEF, Govt. of India, New Delhi.
5. SAMBASIVA RAO, M. (2012) Geomophic evolution and development of land, water, agricultural resources of the kunderu river basin using remote sensing dara. Unpublished project report submitted to UGC, New Delhi.
6. SUBRAHMANYAM, V.P. AND KAMARAJU, M.V. (1983) Run-off studies of the Krishna river basin. *Proced. Seminar on Hydrology. Dept., of Geophysics, Andhra University, Visakhapatnam*, pp.127-132.
7. SURESH BABU, R. (1993) Water balance, drought climatology, cropping pattern and land water resources development of Anantapur district, A.P., India. Unpublished Ph.D thesis submitted to S.K. University, Anantapuram.