

CHAPTER NO. III  
CLIMATIC CHARACTERISTICS OF THE  
TARAPHINI RIVER BASIN

The Taraphini river basin is located in between the humid deltaic plain of West Bengal in the east and continental dry upland type of Bihar in the west. So, in general this area under investigation displays a transitional climatic pattern and behaviour, between these two types.

Seasons viz. cold, summer and rainy are well marked in this area. Summer is characterised by excessive heat, with occasional afternoon wind. The winter is of short duration, sometimes accompanied by scanty rainfall brought by retreating monsoon. The rainy or monsoon season lasts for 4 to 5 months; Evaporation is another significant phenomenon by which about 40 percent of total monsoon precipitation is dried off and precipitation/evaporation(P/E) ratio remains below 1.0 for about seven months (Table No.4).

Climatically, the Taraphini river basin can be regarded as having Savannah type climate or sub-humid tropical climate. (Chakraborty, S 1965).

The range of temperature varies from 6° C to 45° C for the coldest month(January/February) and the warmest month(April/May) respectively. The average rainfall is 1420 mm.

The river basin is provided with only two rainfall stations, Belpahari, in the southern part and Sutan in northern part which are quite insufficient for presenting any comprehensive information; therefore the data supplied by the other three neighbouring stations viz. Ranibundh, Raipur and Jhargram are also taken into account for the analysis of climate.

#### Temperature .

The temperature rises from  $6^{\circ}$  to  $8^{\circ}$  C in the months from the end of December to the beginning of February and March, and gradually towards the end of March it reaches upto  $22^{\circ}$  C. . The peak rise of temperature is attained in the month of April/ May, having an average of  $45^{\circ}$  C, The rise is somewhat ameliorated in the end of June when monsoon rain comes in. The day temperature drops down to about  $30^{\circ}$  C on an average, but night temperature does not show any appreciable variation. This type of condition persists for another four months throughout the monsoon season which makes the weather very uncomfortable.

The temperature again begins to rise after the termination of rain at the end of September or the beginning of October and a sultry oppressive weather prevails upto the middle of November, with an average temperature of  $30^{\circ}$  C. But from the end of November, cold spell associated with western disturbances, reduces the temperature down to  $14^{\circ}$  C and cold weather is experienced from <sup>the</sup> end

of November to the beginning of February.

The average temperature variation between the coldest month and the warmest month is  $17^{\circ}\text{C}$ , monthly difference between the mean maximum and mean minimum temperatures amounts to  $34^{\circ}\text{C}$  in the pre-monsoon and as well as in the post-monsoon period while the minimum difference of  $7^{\circ}$  is marked during rainy season. One of the factors contributing to this condition is that both the pre/and the post-monsoon periods are subject to winds or rain-associated with squalls in the afternoon, which makes the temperature somewhat abated whereas in the monsoon period, more or less continuous rainfall moderates the monthly temperature.

### Rainfall

The major portion of rainfall occurs in the period from the middle of June to the first half of October, and amounts to about 1173 mm (average of 5 stations) which accounts for about 83 per cent of the total amount of annual rainfall i.e. 1420 mm. This rainfall is due to the monsoonal current from the Bay of Bengal. In the month of June, the amount of rainfall is useful for wetting the dry, parched land surface and from the first week of August

When enough rain, continuing for almost 26 days in the month of July, has occurred, the ground water level rises from about 10 m. on an average in dry period to about 6 m. below the surface.

The remaining 17 percent of rainfall is distributed between the periods from the middle of March to May and from the middle of December to the 1st week of February. In the former period the local rise of temperature causes local depressions, attracting strong winds from the north western direction, associated with rain and thunder storm known as 'Kalbaisakhi' and again in the later period, shallow depressions originating from the north western part of the Bay of Bengal, creates storms causing light rain during their passage.

The amount of rainfall in this locality usually increases from the east to the west due to higher relief. But a comparison of five selected stations (Table No. 3), indicates that the increase in rainfall amount depends largely on local configuration, since the rainfall here is chiefly of cyclonic type. The existence of hillocks acts as a barrier to the route of vapour-laden winds. Raipur Station in the north eastern corner experiences highest amount of rainfall of about 1612 mm (Table No. 2 & 3).

TABLE NO. 2

Mean Temperature Data (°C) of the Five Stations in the Taraphini River Basin.

Stations	Jhargram		Raipur		Belpahari		Sutan		Ranibundh	
Average for the period	(1967-77)		(1967-77)		(1967-77)		(1970-77)		(1967 - 1977)	
Month:	Mean Maxi-mum temp.	Mean Mini-mum temp.	Mean Maxi-mum temp.	Mean Mini-mum temp.	Mean Maxi-mum temp.	Mean Mini-mum temp.	Mean Maxi-mum temp.	Mean Mini-mum temp.	Mean Maxi-mum temp.	Mean Mini-mum temp.
Jan.	30.0	6.0	26.9	18.1	28.0	11.0	26.0	6.0	27.0	6.0
Feb.	30.5	10.6	29.6	15.9	27.0	11.2	29.0	8.0	29.2	8.3
Mar.	27.2	14.4	22.0	20.8	22.0	19.3	35.0	11.0	35.2	12.0
Apr.	40.5	18.9	38.4	24.6	42.9	27.0	33.0	23.0	33.8	24.0
May.	45.2	20.0	38.2	26.3	45.2	30.3	38.0	30.0	38.0	31.9
Jun.	38.7	22.2	35.3	26.3	49.1	28.4	33.2	29.0	32.8	30.3
Jul.	35.0	23.3	31.9	25.8	36.4	26.4	32.0	29.0	32.9	30.3
Aug.	34.8	23.3	31.9	25.8	45.1	25.3	31.0	26.0	31.8	27.0
Sep.	35.0	22.8	32.1	25.6	35.0	24.9	30.0	23.0	31.8	24.3
Oct.	33.0	17.8	31.4	23.0	33.3	22.3	30.2	16.0	31.9	17.0
Nov.	31.6	10.0	29.0	17.0	34.3	17.9	31.2	15.0	31.2	14.3
Dec.	27.8	7.2	26.7	10.3	29.8	11.3	21.0	9.0	28.2	8.9

Source : Indian Meteorological Department, Forest Department of West Bengal and Kargari, Midnapur, Seva-Bharati Research Centre.

TABLE NO. 3

Average Rainfall(mm) of the Five Stations in the  
Taraphini River Basin.

Stations	Jhargram	Reipur	Belpahari	Sutan	Ranibundh
Average for the period.	(1967-77)	(1967-77)	(1967-77)	(1970 - 77)	(1967-77)
<u>Month:</u>					
Jan.	30.60	41.90	30.80	19.20	20.20
Feb.	13.00	24.00	14.90	14.70	14.00
March.	20.40	28.50	23.50	20.50	21.20
Apr.	78.30	99.00	79.00	73.40	75.00
May.	99.60	137.02	98.00	80.00	80.00
Jun.	227.04	260.56	229.60	175.47	220.30
Jul.	348.60	366.56	355.60	380.50	290.62
Aug.	320.60	356.92	259.80	245.80	259.80
Sep.	233.20	200.52	203.40	180.00	220.90
Oct.	145.00	76.16	89.50	60.84	90.40
Nov.	19.00	18.10	9.81	4.83	5.00
Dec.	2.23	4.00	2.20	1.20	1.83
<b>Total Rainfall</b>	<b>1537.57</b>	<b>1611.64</b>	<b>1396.11</b>	<b>1256.44</b>	<b>1299.25</b>

Source : Indian Meteorological Department, Forest Department of West Bengal and Kargari, Midnapur, Seva-Bharati Research Centre.

It can be explained by the fact that bulk of the surface in the Raipur Police Station of Bankura District is composed of several scattered deforested, rock-strewn hillocks, whose irregular arrangements obstruct the wind resulting in an appreciable amount of rainfall. Moreover, the barren rocky nature of the terrain around Raipur favours the development of vertical updraft of the air following intense heating during summer days resulting in local disturbances and producing the relatively higher amount of precipitation. As a result Sutan Station although located in higher part of this river basin, does not record a higher amount of rainfall than that of Raipur.

#### Evaporation:

Evaporation is another continuous and notable feature in this region. The data obtained from Sutan and Belpahari Stations ( Table No. 4 ) reveal the following trends :-

- i) Maximum rate of evaporation observed in 24 hours is 25 mm in the month of May which is due to the intense and continuous heat prevalent during the preceding 3 months (March-May) and occasional blow of hot westerly winds known as 'Loo' which accelerates the rate of evaporation.
- ii) Minimum evaporation is observed in September since the monsoon rain attains its <sup>peak</sup> in the former month (August) when high humidity in the atmosphere does not permit a high rate of evaporation.

iii) In November and December the rate of evaporation exceeds the rainfall amount, because after the termination of monsoon rain in October a short period of calm exists till the middle of November raising the temperature to some extent and making the weather dry. Although the northward movement of Bay of Bengal storms produces only a fraction ( 0.77 percent ) of the total annual rainfall, the weather dries it off.

iv ) The month of January experiences a lower amount of evaporation than December because the cold spells of northerly winds reduces the temperature which retards the rate of removal of the moisture from the surface.

v ) In February the maximum rate of diurnal evaporation increases slightly over that of the December because the amount of rainfall is mainly concentrated in two to three days of the month and the remaining days are having moderately high temperature.

The Graph No. 2 & Table No. 4 shows the mean distribution of different climatic parameters in this Taraphini River Basin.



TABLE NO. 4

Distribution of the Temperature, Rainfall and Evaporation  
in the Taraphini River Basin.

<u>Month:</u>	<u>Temperature in °C</u>		<u>Average Rainfall in mm</u>	<u>Average Evaporation in mm.</u>
	<u>Mean Max.</u>	<u>Mean Min.</u>		
Jan.	27.57	9.92	26.54	39.33
Feb.	29.06	10.79	14.12	39.20
Mar.	28.28	15.51	21.42	68.32
Apr.	37.72	23.49	76.94	95.20
May.	40.91	27.69	96.22	135.65
Jun.	37.97	27.24	219.89	55.35
Jul.	33.63	26.96	351.82	47.15
Aug.	34.92	25.68	287.88	46.05
Sep.	32.77	24.11	211.43	39.19
Oct.	32.02	20.26	101.83	40.23
Nov.	31.47	14.85	9.75	40.60
Dec.	26.67	9.34	2.29	39.68

Source: Indian Meteorological Department, Forest Department of West Bengal and Irrigation Department of West Bengal.

Drought:

The Government of India has scheduled the north eastern part of the Taraphini River Basin (Raipur Police Station) as "drought prone" or having inadequate precipitation. This is caused by the considerable periodic fluctuations in rainfall amount. A study by G.S.I. which has taken into account the rainfall data of 37 years for the period from 1919<sup>to</sup>1955, has revealed that the rainfall amount varies not only from

..... to year but also from station to station in the district of Bankura. Thus Sutan gets only 1256 mm of total rainfall while Raipur gets 1612 mm annually. Moreover, it has also been recorded that a period of lower rainfall follows, after an almost regular interval of 2-3 years. The whimsical monsoon often makes the rainfall distribution irregular; yet a sort of regularity can be marked in the occurrence of severe drought periods at regular intervals. The years recorded as having lower rainfall are; 1919, 1921, 1924, 1927, 1931, 1934, 1938, 1940, 1944-45, 1947, 1951-1955 (Indian Mineral, Vol. 19, 1972).

In this context, the statement of the distribution of the total annual rainfall in the Raipur meteorological station for the period of 1919-1955 is presented in the following table no. 5.

Table No. 5

Distribution of the Total Annual Rainfall in the Raipur Station for the period from 1919 to 1955. (in mm)

Year	- 1919	- 1920	- 1921	- 1922	- 1923	- 1924	- 1925
Total annual rainfall.	756	- 1080	- 803	- 1391	- 1449	- 823	- 1562
Year	1926	- 1927	- 1928	- 1929	- 1930	- 1931	- 1932
Total annual rainfall	1510	- 796	- 1210	- 1491	- 1654	- 8611	- 1612

contd.....47.

Year	-	1933	-	1934	-	1935	-	1936	-	1937	-	1938
Total annual rainfall		1093	-	856	-	1800	-	1539	-	1612	-	826

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Year	-	1939	-	1940	-	1941	-	1942	-	1943	-	1944
Total annual rainfall		1600	-	759	-	1842	-	1800	-	1643	-	899

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Year	-	1945	-	1946	-	1947	-	1948	-	1949	-	1950
Total annual rainfall		796	-	1600	-	909	-	1402	-	1609	-	1700

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Year	-	1951	-	1952	-	1953	-	1954	-	1955
Total annual rainfall		829	-	803	-	852	-	873	-	903

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Source: Indian Meteorological Department, P.

Floods:

Flood is not so common in this river basin as the high gradient and rock-confined stream courses rapidly drain out the excess water during rainy-season. But the year of 1978 records a period of abnormally high flood when the amount of rainfall during 48 hours for the period from 27.9.78 to 29.9.78 was as high as 361 mm (which normally does not exceed 10 mm on an average during the same length of time) i.e. the intensity of rainfall rose to about 180 mm per day (in place of the normal value of only 5 mm.

Forest Department of West Bengal has defined the flood year as the year when the monsoon rainfall exceeds by 1.50 times that of the average value for that period. Accordingly the following years are identified as flood year:

1893, 1913, 1924, 1927, 1928, 1929, 1933, 1941, 1948,  
1956, 1961, 1968, 1971, and 1978.

The area experiences the following three seasons, based mainly on the temperature and rainfall conditions:

- i) Hot season .. from March to the middle of June.
- ii) Wet season .. Middle of June to October.
- iii) Cold season .. November to February.

The season-wise distribution of temperature of rainfall, evaporation and precipitation/ evaporation ratio (P/E) are shown in the following table no. 6.

Table No. 6.

Seasonwise Distribution of Different Elements of Climate

	<u>Cold Season</u>	<u>Hot Season</u>	<u>Wet Season</u>
Mean Max. Temperature (°C)	28.69	35.63	34.26
Mean Min. Temperature (°C)	11.22	26.14	24.85
Total Average Rainfall(mm)	52.70	194.58	1172.58
Percent to Total Rainfall.	3.71	13.40	82.58
Average Total Evaporation(mm)	16.08	40.93	25.35
<u>Average P/E Ratio.</u>	<u>0.33</u>	<u>0.72</u>	<u>5.14</u>

Hot Season:

Hot season is marked by excessive heat, with occasional sweep of hot westerly wind locally known as 'Loo', in the afternoon during the month of May. The season starts from March with maximum temperature of 35°C at Ranibundh, which gradually increases to 45°C at Ranibundh and Jhargram. A special type of stormy weather prevails during this period which is locally known as 'Kalbaisakhi' (Norwester). The frequency and intensity of Kalbaisakhi are maximum in April/May.

Rainfall, brought by cyclonic weather, produces a rainfall amounting to 194.58 mm in this hot period. Frequency of rainy days in a month increases from 2 days on an average in March to 10 days in April and 12 to 14 days in May.

Wet Season:

Monsoon rains arriving

Monsoon rains arriving around 15/16th June and lasting up to October marks the period of wet season. The south western monsoon current dominates the weather. Consequently, the temperature is somewhat ameliorated by about 5°C. Maximum number of rainy days i.e. average 26 days in a month brings a rainfall amounting to 1172.58 mm which is mostly concentrated in July/August (Table No.5). Evaporation again begins to increase at the end of wet season because temperature rises by about 4°C. About 83 percent of the total annual rainfall occurs in this monsoon.

Cold Season:

Approximately from the month of November cold season begins; it lasts only for three months and actual cold felt from the end of December, during the passage of the western disturbances, when minimum temperature goes below  $10^{\circ}\text{C}$ . Only a slight amount of rainfall occurs due to the northward movement of cyclonic storms from the south of Bengal. The rate of Evaporation though minimum, yet sometimes exceeds the total amount of rainfall.

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