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SOME HYDROMETEOROLOGICAL FEATURES OF *TORSA* RIVER

1. *General features of river Torsa and its catchment*— The river *Torsa* originates from Chumbai valley in the south Tibet at an altitude of about 7060 metres. After flowing through Tibet and Bhutan, it enters Jalpaiguri district of West Bengal. It flows a distance of about 99 km in West Bengal before entering Bangladesh where it joins *Brahmaputra* near Nagaswari.

The slope of the river *Torsa* is about 95 m/km near its origin and of the order of 77 m/km in the downstream stretch up to Bhutan. Below Indo-Bhutan border and up to crossing of M.G. Railway line at Hasimara, the slope is about 4.5 m/km which subsequently falls to 0.38 m/km below NH-31 wooden bridge (district Jalpaiguri).

River *Torsa* on entering the State of West Bengal, flows through deep forest for a length of about 40 km before reaching the alluvial region of the plains. The M.G. Railway line crosses the river at Hasimara Railway bridge. The river bifurcates into two channels from about 1600 m below the bridge point. The western channel is named as *Char Torsa* and the eastern one as *Sil Torsa* which takes comparatively greater quantum of discharge. The two channels re-unite 40 km downstream near Patlakhowa forest in Cooch Behar district. This combined flow continues for about 13 km up to Hanskhowa where it bifurcates into two channels. The eastern channel carries the bulk discharge and river *Kaljani* joins it. The western one, also known as Dharala merges with *Jaldhaka* but is almost dead now. Another small river named *Gadadhar,* originating in the forest of Indo-Bhutan border and joins the combined flow of *Torsa-Kaljani* rivers in Bangladesh to join finally *Brahmaputra* river.

The river of *Kaljani* and *Gadadhar* are tributaries of the river *Torsa.* The rivers of *Jayanti* and *Jaugti* are tributaries of the river *Gadadhar.* The Torsa catchment area including its tributaries is about 7459 sq km as per records of North Bengal Flood Control Commission and Central Water Commission, Jalpaiguri. Out of this, about 2305 sq km is in Bhutan and 3419 sq km is in India. The rest catchment area is in Tibet. On the other hand, about 3419 sq km of the catchment lies in plains and rest of about 4040 sq km is in hilly area. In this study, the total catchment area in Bhutan and India only has been used. The river catchment is bounded by 26° 15′N and 28° 0′ N latitudes and 89°15′E and 89° 40′E longitudes.

2. *Rainfall features*—The study is based on 10-12 years (1974-85) rainfall data of 18 ordinary raingauges and 4 self recording raingauges in and around the basin, using isohyetal technique for analysis of data. Chief features of rainfall are as under :

(*i*) The average rainfall over the Torsa basin for the monsoon season (Jun-Sep) is about 303 cm, the monthly break up being June 79 cm, July 96 cm, August 75 cm and September 53 cm.

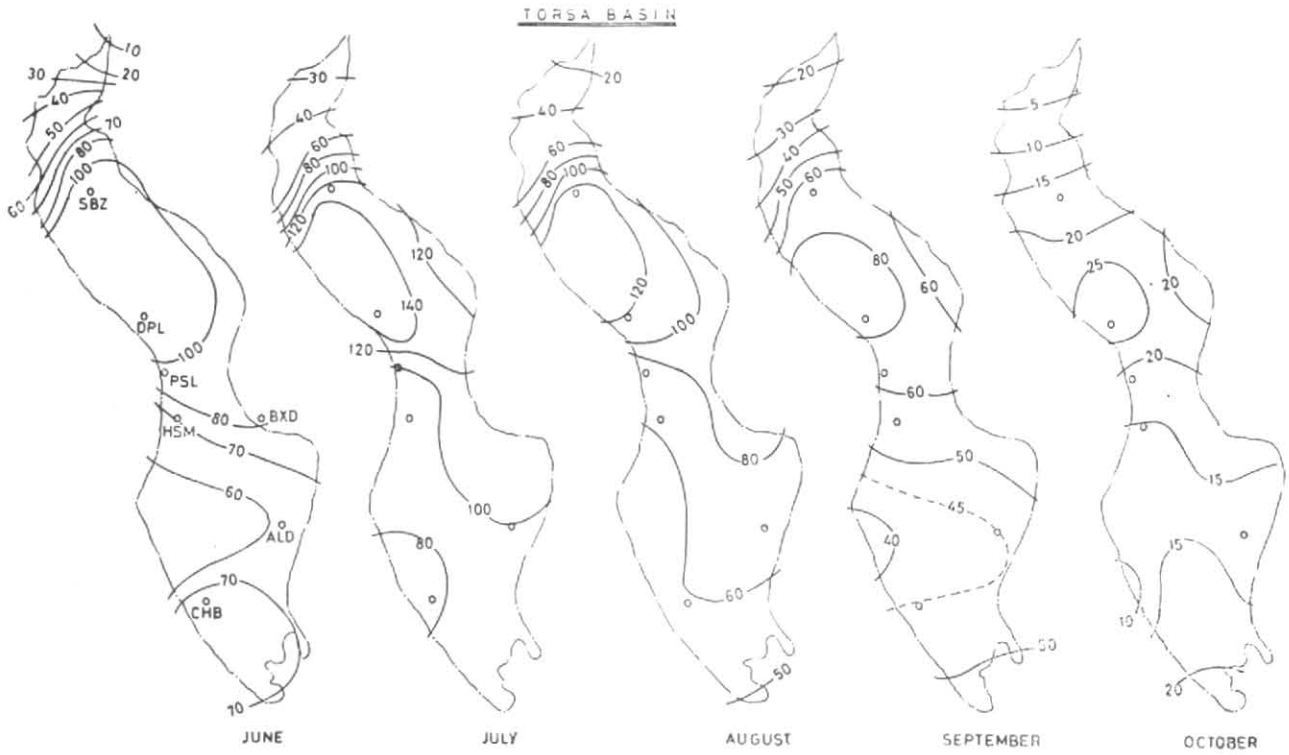

Fig. 1. Rainfall distribution in Torsa basin

(*ii*) In all the monsoon months, highest rainfall is recorded in the upper middle portion of basin under study, around and to the north of Daphulakha station (Fig. 1).

(*iii*) Gupta and Abbi (1972) analysed the rainfall of Torsa basin using long rainfall series from 1901 to 1968 of a small number of stations. However, the results obtained by the author on the basis of short period data (1974-85) of a comparatively much denser network of raingauges are at variance from the results of Gupta and Abbi. The monthly rainfall figures (cm) arrived in the former study and the present study respectively are, May 37 and 42, June 74 and 79, July 67 and 96, August 54 and 75, September 49 and 53 and October 16 and 16. The rainfall averages thus need updating when sufficient length of rainfall records of the present network of raingauges get accumulated.

(*iv*) Gupta and Abbi (1972) arrived at the conclusion that Torsa basin is affected by rainstorms of 1-3 day duration. However, a count of flood producing rainstorms for 6 years (1982-87) showed that rainstorms up to 5-day duration occasionally occur over the basin. During the 6-year period considered by the author, 72 per cent of the rainstorms were of 1-2 day duration and 12 per cent of 5-day duration. The highest 5-day point rainfall in the basin during the rainstorm of 15-19 September 1984 was 70 cm against the corresding basin average of 35 cm.

3. *Hydrological data*—A count of flood days (river level above danger mark at Ghugumari) from the *Weekly Flood Bulletins* issued by Central Water Commission, Jalpaiguri for 1982 to 1987 shows that number of floods in Torsa basin is highest in July (7 cases) followed by September (3 cases). The year 1984 recorded the highest number of flood days (22) whereas the year 1986 witnessed the least number of flood days (3). The highest flood level of 41.40 metres at Ghugumari was recorded on 17 September 1984 in association wih 5-day rainstorm of 15-19 September that year.

4. *Application*—The present work is in continuation of the hydrometeorological studies by Prasad *et al.* (1991) of the river basin of North Bengal, Sikkim and Bhutan. The monthly isohyetal maps during June to October will be useful to hydrological engineers for studying areas of heavy rainfall and discharge in connection with construction of reservoirs and mini-hydroelectric projects. It will be also useful to meteorological forecasters as a reference to study the variations in heavy rainfall belts associated with synoptic conditions over the basins of different rivers of North Bengal, Sikkim and Bhutan.

References

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