

Evaporation over Bangladesh

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सार — बांगला देश में 5 वर्ष की अवधि के लिए 19 स्टेशनों पर क वर्ग के कड़ाहों से वाष्पन प्रेक्षण रिकार्ड किए गए थे और उनका उपयोग मासिक तथा वार्षिक वाष्पन मानचित्र बनाने में किया गया है। 93 से 220 मि०मी० के अधिकतम माध्य मासिक वाष्पन मान अप्रैल में उत्तर-पश्चिमी, दक्षिण-पूर्वी तथा पश्चिमी बांगला देश में रिकार्ड किए गए जबकि अधिकतम माध्य वार्षिक वाष्पन मान 1142 से 1636 मि०मी० तक बांगला देश के उत्तर-पश्चिमी तथा दक्षिण-पूर्वी भाग में रिकार्ड किए गए। निम्नतम माध्य मासिक वाष्पन 40 से 60 मि०मी० तक दिसम्बर माह में सिलहट, मादरीपुर तथा भोला में और न्यूनतम माध्य वार्षिक वाष्पन 700 मि०मी० सिलहट में रिकार्ड की गई।

ABSTRACT. Evaporation observations recorded with Class-A pans at 19 stations in Bangladesh for a period of five years have been used to present monthly and annual evaporation maps. Highest mean monthly evaporation values of 93-220 mm are recorded in the northwestern, southeastern and western sides of Bangladesh in April, and of 1142-1636 mm mean annual evaporation values are recorded in northwestern and southeastern parts of Bangladesh, while lowest mean monthly evaporation values of 40-60 mm are recorded in the month of December at the stations Sylhet, Madaripur & Bhola, and mean annual lowest evaporation value of 700 mm is recorded in Sylhet.

1. Introduction

Investigations in recent years have shown that measurements of the evaporative power of air recorded by pan evaporimeters are related to moisture losses from enclosed and free water bodies on the one hand and bare and vegetation covered soils on the other (Kohler *et al.* 1955, Stanhill *et al.* 1968). In this paper, an attempt has been made to present monthly and annual evaporation over Bangladesh from actual recorded pan evaporation data.

2. Data

Evaporation data for five years (April 1974 to March 1979) from a network of 19 stations equipped with standard Class-A open pan evaporimeters was collected from "Hydrological Year Book of Bangladesh" published by the Bangladesh Water Development Board. The pan evaporimeters of Bangladesh Water Development Board were opened and well protected by strong fence. Daily evaporation data has recently been compiled and published in "Hydrological Year Book of Bangladesh" by Bangladesh Water Development Board. As evaporation is nearly conservative, short period averages based on data of 5 years are helpful in giving a broad idea of the distribution of this parameter in space and time. Maps of mean monthly and mean annual evaporation are presented in Figs. 1-5. In mean monthly maps, isolines of monthly evaporation are drawn at intervals of 10 mm upto 20 mm. The annual chart gives the total evaporation of the year in mm. Isolines on this chart are drawn at intervals of 100 mm.

3. Results

The available data are analysed and the principal monthly and annual features are mentioned below :

3.1. Winter (December-February)

The pattern of the distribution of evaporation in December, January and February are nearly similar.

In December, evaporation is lowest (<50 mm) in Madaripur and Bhola, extending from Sylhet to Khulna and coastal area of Bangladesh. It decreases gradually southwards over the head of the funnel of the Bay of Bengal, *i.e.*, islands of Bhola, Sandwip etc. In southeast corner and northwest parts of Bangladesh, it increases gradually and attains a maximum value of 96 mm around Chittagong.

In January (Fig. 1) evaporation is lowest (50-60 mm) along Sylhet, Mymensingh, Rajshahi, Pubna axis and along Sylhet, Comilla, Maizdee Court, Bhola axis. It increases gradually towards southeast corner, *i.e.*, Chittagong (101 mm) and northwestern side, *i.e.*, Dinajpur area and attains its highest values over Dinajpur (108 mm). In February, evaporation is lowest (<69 mm) along Sylhet, Madaripur, Patuakhali, Bhola axis. It increases gradually towards southwest corner, *i.e.*, Chittagong area and northwest corner, *i.e.*, Dinajpur area (108 mm) of Bangladesh and attains its highest value over Chittagong (156 mm).

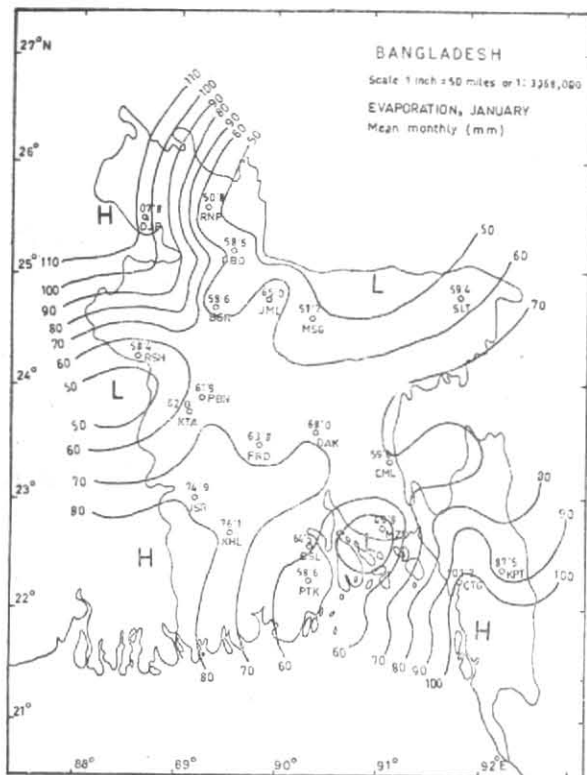


Fig. 1

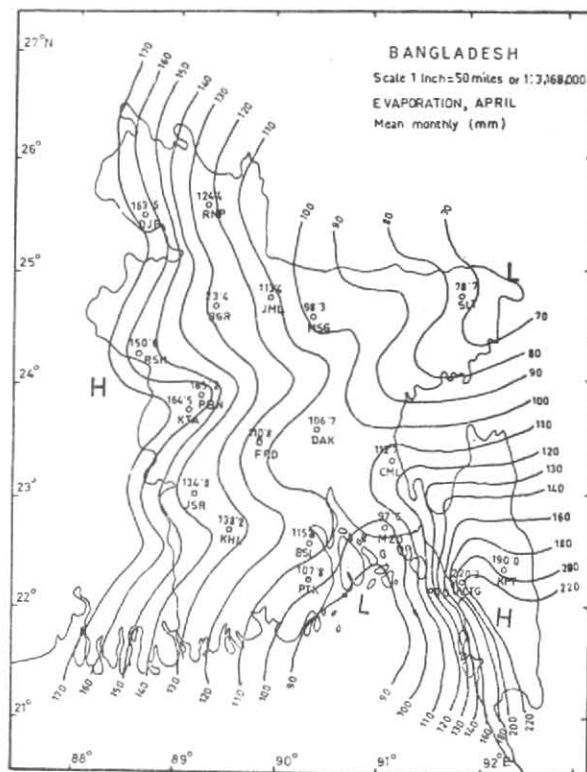


Fig. 2

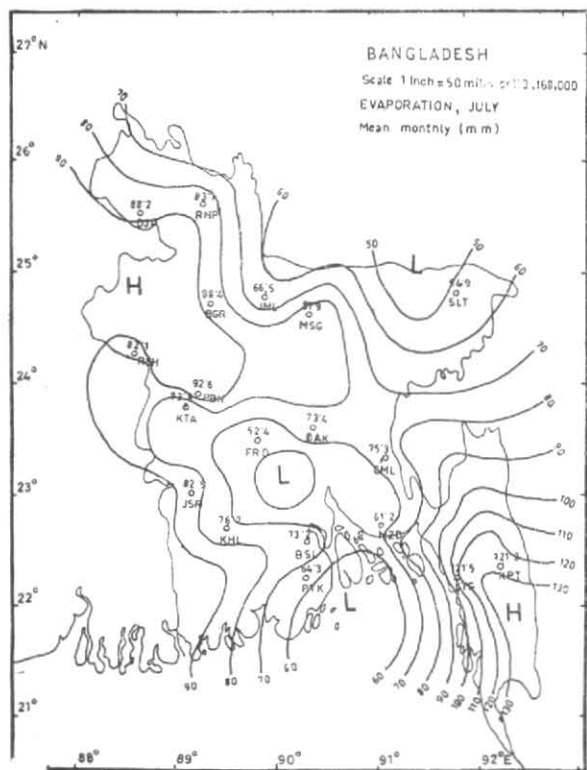


Fig. 3

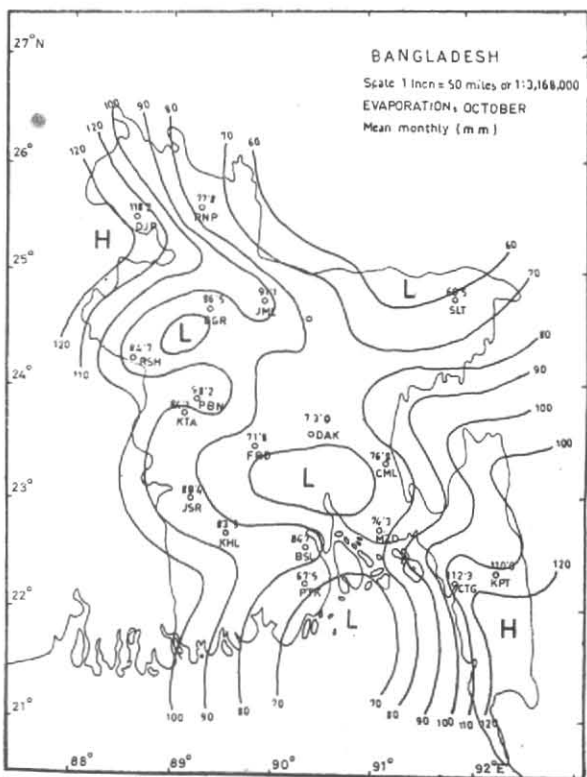


Fig. 4

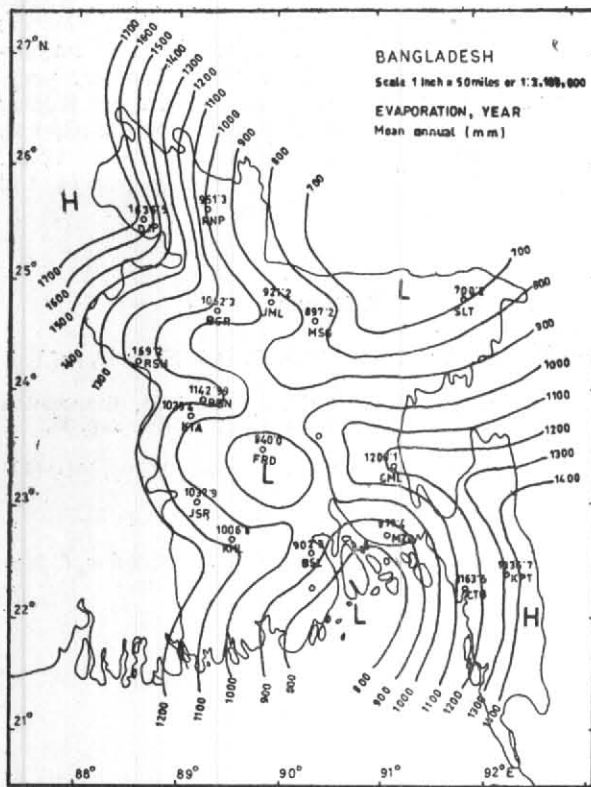


Fig. 5

3.2. Pre-monsoon (March-May)

The pattern of distribution of evaporation in March, April and May is nearly similar with some negligible dissimilarities.

By March, the regions of high evaporation, *i.e.*, northwestern and southeastern sides of the country extend slightly towards the central zone of the country. Also the region of less evaporation, *i.e.*, northeastern and southern side of the country extends slightly towards middle of the country. Highest value of evaporation is 172 mm at Dinajpur and 178 mm at Chittagong and lowest evaporation is 73 mm at Sylhet and 90 mm at Sandwip.

In April (Fig. 2), there is a marked increase in evaporation. The highest value of evaporation is 150-220 mm over northwest and southeastern side of the country. The area of lowest evaporation 70-90 mm are over northeast and central region of southern parts of Bangladesh.

In May, Kaptai recorded the highest average value of 181 mm per month and the lowest value recorded further decreases to less than 65 mm per month in Sylhet or northeast of Sylhet. During the hot season as a whole, evaporation over Bangladesh records a sharp increase. Evaporation at Chittagong registers a sharp rise from 178 mm per month in March to 220 mm per month in April. In March-May a well marked wedge of relative high evaporation (118-220 mm) is observed over

northwestern, western and southeastern side of Bangladesh, northeast zone, *i.e.*, Sylhet area and its neighbourhood, Dhaka and its neighbourhood and middle and west coastal area of Bangladesh register relatively low evaporation compared to the western, northwestern and southeastern parts of Bangladesh.

3.3. Southwest monsoon (June-September)

In June, when the southwest monsoon sets in over the country, evaporation registers a general decrease but high evaporation pattern remains the same as in May with a small difference over Rajshahi where evaporation is less. Chittagong and northwestern side of Bangladesh still records high evaporation values of 120-130 mm.

By July (Fig. 3), when the monsoon is fully established over the country, evaporation registers a further sharp fall, Chittagong records only 121 mm and Dinajpur only 88 mm. A region of low evaporation less than 60 mm extends from Sylhet towards Faridpur and coastal area of Bangladesh across Dhaka.

In August, the general pattern is similar to July with exception of Bogra and Dinajpur area where evaporation further decreases slightly. The areas of high values of evaporation (102-150 mm) are confined to northwest corner, *i.e.*, Dinajpur area and southeast corner, *i.e.*, Kaptai and Chittagong area. The areas of less than 80 mm evaporation cover practically the entire southwestern parts of Bangladesh and the Sylhet regions.

In September, the pattern is similar to that of August with an exception that evaporation over Bogra, Sirajgong and Pubna increases due to gradual withdrawal of monsoon from the northwestern sides of Bangladesh. Evaporation rate again increases slightly and registers an amount of (100-150 mm) over northwestern and southeastern parts of Bangladesh. Lowest evaporation, (60-70 mm) zones are Sylhet area and its neighbourhood-Faridpur and Dhaka area and mid-coastal area of Bangladesh.

3.4. Post monsoon (October and November)

In October (Fig. 4), with the withdrawal of southwest monsoon, evaporation pattern slightly changes. Evaporation is highest over Dinajpur (118 mm) and lowest over Sylhet (60 mm). The middle and western coast of the country have a monthly average evaporation of 70 mm or less.

In November, evaporation pattern is more or less similar to that of October. Evaporation is maximum over Dinajpur (129 mm) and second highest evaporation is over Chittagong (95 mm). Evaporation rate over middle and western coastal area of Bangladesh decreases further and its value is less than 60 mm. Minimum evaporation value records over Mymensingh (58 mm), Madaripur, Chandpur and Bhola (50 mm) each.

3.5. Annual

The main features observed in the monthly maps are well reflected in the annual distribution (Fig. 5). Evaporation is lowest over Sylhet and adjoining area (<700 mm). Evaporation over middle coastal area of the

country is less than or equal to 800 mm. Over central region of Bangladesh annual mean evaporation ranges from 800 to 1100 mm. There are two areas of maximum evaporation exceeding 1100 mm, one over Dinajpur, Rajshahi, Pubna and adjoining areas and another over Comilla, Chittagong, Kaptai and adjoining areas, *i.e.*, northwestern and western side and southeastern side of Bangladesh. The highest value of evaporation is 1636 mm at Dinajpur and neighbourhood. The southeast side of Bangladesh is another area of high total evaporation of 1150-1350 mm.

Between these zones of maxima, there are wedges of low evaporation over central, northeastern, western coast and mid-coastal areas of Bangladesh. The areas of lowest evaporation throughout the year are the middle coast, west coast, central Bangladesh and northeast corner, *i.e.*, Sylhet area of Bangladesh.

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