

HEAVY RAINFALL IN BOMBAY
IN SEPTEMBER 1949 AND 1930

All records since the establishment of the Colaba Observatory in 1841 have been broken by the incessant rain which started at about midnight on 21 September 1949 and almost abated by midnight on the 23rd. For the 48 hours ending at 0830 IST on 23 September 1949, the Newman raingauge which is the standard raingauge in the Colaba Observatory since 1841, recorded 31.69 inches of rainfall. A further record has been created in that the total rainfall recorded during the month of September 1949 is the highest rainfall for the same month for the past 100 years. 49.01 inches of rain fell in September 1949 alone, thus contributing nearly 70 per cent of the normal rainfall of Bombay in a single month. The next highest total rainfall for the month of September was 43.77 inches in 1930. Of this total, 21.59 inches fell on a single day 10-11 September 1930. In spite of this very heavy downpour the total rainfall for the year 1949 is 108.51 inches, which is

the third highest on record from 1841 for a single year, the first and second being 114.9 inches in 1849 and 111.9 inches in 1878*. Life in Bombay City was paralysed due to the breakdown of communications. The deluge converted the streets and alleys into regular rivers in spate and miniature waterfalls were seen cascading over gradients. Table 1 gives a comparative statement of rainfall as recorded by the different raingauges in the Colaba Observatory.

The figures in brackets in the case of the Newman rain gauge represent the actual calculated amount of rainfall that must have fallen. The reading of 31.69 inches registered by the Newman rain gauge has been subjected to a correction of 65 cents to allow for the loss of rainwater lost during the twelve discharges given to the instrument during the wet spell. For this purpose the actual amount of rain water discharge and the intensity of rain at the different moments at which the discharges were made have been taken into account. In the case of the L.M.O. pattern and the I. Met. D. pattern raingauges which are similar in construction, the figures in brackets indicated the mean rainfall registered by these two instruments. The figures in brackets for the Syphon rain gauge represent the figures corrected for the rainwater lost during the syphoning action. A uniform correction of 1 cent per discharge has been applied assuming the mean intensity of rain to be between $1\frac{1}{2}$ to 2 inches an hour. Considering the facts that the rainfall was very heavy and the exposures of the different instruments are slightly different from one

another, the corrected figures can be said to be in good agreement with one another. The maximum hourly intensity of rainfall during the 48 hours ending at 0830 IST on 23 September 1949 was 8 inches which is perhaps a record in itself.

It will be interesting to compare the hyetograms of the Colaba and Alibag Observatories for the period 21 to 23 September 1949. They are reproduced in Fig. 1 (p.38).

The hourly tabulated values of both the stations have been given in Table 2. It will be seen that between 1500 and 1600 IST on the 22nd, Colaba has registered 6 inches of rainfall whereas for the corresponding period Alibag had no rainfall at all. The highest hourly rainfall as seen from hourly tabulations for Alibag was 3.50 inches between 0600 and 0700 IST on the 22nd.

Extracts from the *Indian Daily Weather Reports* regarding the general meteorological situation which caused this heavy downpour are given below—

18 September 1949

"It is believed that conditions are markedly unsettled in the north Andaman sea and the adjoining parts of the east central Bay of Bengal where a depression exists with its centre within 100 miles of Lat. 14° N, Long. 95° E."

19 September 1949

"Yesterday's shallow depression in the north Andaman sea has moved northwestwards, intensified and is apparently a deep depression centred at three hours GMT within half a degree of Lat. 17° N and Long. 90° E."

20 September 1949

"The deep depression in the Bay of Bengal has moved westnorthwestwards and is centred this morning at about 100 miles eastsoutheast of Vizagapatam."

TABLE 1

Date	Period	Newman rain gauge	L.M.O. pattern rain gauge	I. Met. D. pattern rain gauge	Syphon rain gauge
21-23 September 1949	0830—	31.69	32.20	32.05	31.52
	0830 IST	(32.34)	(32.13)	(32.13)	(32.31)

* From an old newspaper report it was seen that Bombay recorded 122 inches rain in 1828. The exact locality, the type and exposure of instrument are, however, not known.

"Under the influence of the depression, rainfall has been widespread in the Peninsula outside the Bombay Deccan."

21 September 1949

"The deep depression in the Bay of Bengal is crossing the coast to the north of Masulipatam at 0300 GMT today." "Under its influence, maritime air has penetrated further west in the Peninsula and the discontinuity between the continental and the maritime air runs at 5000 ft above sea level from west of Bombay to Nowgong through Baroda and thence eastwards."

22 September 1949

"The deep Bay depression has moved inland, slightly weakened and lies this morning with its centre near Khammameth in southeast Hyderabad." "The discontinuity between continental and maritime air runs at 5000 ft above sea level from Harnai to Bombay and thence to Bhopal and eastwards, the portion of discontinuity from Harnai to Malegaon being very active. Under the influence of the depression very heavy rain has fallen in the Konkan and the south Deccan"

23 September 1949

"The depression over north Hyderabad is centred this morning about sixty miles east of Bidar". "Under its influence, further very heavy rain has fallen in the north Konkan."

24 September 1949

"Observations are meagre. The depression over north Hyderabad has moved northeastwards and probably weakened. It presumably lies this morning as a diffuse low pressure area over the Central Provinces. It is likely to weaken further."

25 September 1949

"The diffuse low over the Central Provinces has filled up....."

In the instance above, the area of very heavy rainfall extended over Alibag, Colaba and Juhu and Santacruz of the order of about 50 square miles at least.

It will be interesting to recall facts of the previous heavy rainfall at Colaba, Bombay. This was on the 9-10 September 1930 when as much as 22 inches of rain were recorded for the 24 hours ending at 0800 local mean time, the maximum intensity of rain per hour during this wet spell was about $4\frac{1}{2}$ inches. The downpour of 1930 is different from that of 1949 in that the spell of heavy rain was of longer duration (about 10 hours) in the former case than in the latter. The hyetograms for the period 9-11 September 1930 are included in Fig. 1 (p. 38).

TABLE 2

Hourly totals of rainfall

Hrs (IST)	21 September 1949		22 September 1949		23 September 1949	
	Colaba	Alibag	Colaba	Alibag	Colaba	Alibag
0-1	0.00	0.00	0.58	0.46	0.03	0.24
1-2	0.00	0.00	0.30	1.76	0.00	2.40
2-3	0.16	0.00	0.12	0.72	0.00	2.32
3-4	0.10	0.00	0.20	1.34	0.00	1.00
4-5	0.34	0.02	1.53	0.69	0.00	0.10
5-6	0.01	0.21	2.16	1.31	0.00	0.00
6-7	0.00	0.70	1.18	3.50	0.00	0.25
7-8	0.14	0.87	2.28	2.04	0.01	0.00
8-9	0.00	1.02	2.40	1.64	0.03	0.01
9-10	0.10	0.00	1.88	0.08	0.01	0.03
10-11	0.30	0.07	0.82	0.09	0.00	0.00
11-12	0.03	0.18	0.14	0.13	0.02	0.03
12-13	0.02	0.23	0.36	0.11	0.00	0.03
13-14	0.14	0.06	0.56	0.45	0.01	0.07
14-15	0.01	0.87	3.04	0.04	0.02	0.11
15-16	0.01	0.04	6.00	0.00	0.04	0.03
16-17	0.00	0.83	1.62	0.30	0.03	0.10
17-18	0.01	0.00	0.72	0.28	0.03	0.17
18-19	0.10	0.00	1.00	1.00	0.02	0.20
19-20	0.46	0.05	0.32	3.59	0.04	0.19
20-21	0.28	0.13	0.10	2.37	0.09	0.38
21-22	0.13	0.25	0.16	0.27	0.08	0.23
22-23	0.87	0.08	0.11	0.17	0.00	0.01
23-24	1.88	0.14	0.09	0.27	0.00	0.00
Total	5.09	5.75	27.67	22.61	0.46	7.90

Jan 1952]

LETTERS TO

About 21 inches of rain was recorded between 2330 IST on the 9th to about 0930 IST on 10 September 1930. Alibag recorded a third of the rain as at Colaba. It can be seen from the provincial raingauge records that the extent of the area of heavy rainfall was much less than in 1949 and probably did not exceed 20 square miles. The meteorological factors which caused the heavy downpour of 1930 were similar to those attendant on the heavy downpour of 1949. Following briefly are the features as collected from the daily weather reports—

Conditions were markedly unsettled between the Andaman Sea and the head of the Bay of Bengal on the morning of 5 September 1930. The unsettled conditions developed further and formed into a depression centred on the morning of 7 September at Lat 19° N and Long. 89° E. The Bay depression crossed the Orissa-Ganjam coast on 8 September and lay on the morning of the 9th over the east Central Provinces. After causing heavy rain in the Konkan and the adjoining areas the depression weakened and merged into the seasonal low pressure area over the Gangetic valley by the 15th.

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