

FLOOD FORECASTING AND MANAGEMENT

Relevant for: Environment | Topic: Disaster and disaster management

Floods are natural calamity that India faces almost every year, in varying degrees of magnitude. The frequent occurrence of floods can be attributed to various factors, including wide variations in rainfall both in time and space with frequent departures from the normal pattern, inadequate carrying capacities of rivers, river bank erosion and silting of river beds, landslides, poor natural drainage in flood prone areas, glacial lake outbursts, etc.

The state-wise data on damages due to heavy rain and floods is compiled by Central Water Commission (CWC) after receipt of confirmation from respective States. The statement showing damage due to floods/heavy rain in the country during the last five years (2017-2021), State/UT-wise is at **Annexure – I**.

Flood management falls within the purview of the States. Flood management and erosion control projects are formulated and implemented by concerned State Governments from own resources as per their priority. The Union Government supplements the efforts of the States by providing technical guidance and also promotional financial assistance for management of floods in critical areas. Integrated flood approach aims at adopting judicious mix of structural and non-structural measures to provide a reasonable degree of protection against flood damages at economic cost.

To strengthen the structural measures of flood management, Union Government had implemented Flood Management Programme (FMP) during XI & XII Plans for providing central assistance to States for works related to flood control, anti-erosion, drainage development, anti-sea erosion, etc. which subsequently continued as a component of "Flood Management and Border Areas Programme" (FMBAP) for the period from 2017-18 to 2020-21 and was further extended up to September 2022 with limited outlay. 427 completed projects under FMP component of FMBAP have given protection to an area of around 4.994 million hectares (mha) and protected a population of about 53.57 million.

Central Water Commission (CWC) is the nodal Organisation entrusted with the task of flood forecasting & early flood warnings in the country. Presently, CWC issues flood forecasts for 338 forecasting stations (138 Inflow Forecast Stations & 200 Level Forecast Stations) which include 25 States and UTs. The network has been established in consultation with the State Governments and UTs. In order to provide more lead time to the local authorities to plan evacuation of people & take other remedial measures, CWC has developed basin wise flood forecasting model based on rainfall-runoff mathematical modelling for 5 days' advance advisory at its forecasting stations.

The primary responsibility of disaster management rests with the State Government concerned. The Central Government supplements the efforts of the State Government and provides requisite logistics and financial support. The State Government undertakes assessment of damages caused due to 12 notified natural calamities including rain and floods and provide relief assistance from State Disaster Response Fund (SDRF) already placed at their disposal as per Government of India's approved norms. Additional financial assistance is provided from National Disaster Response Fund (NDRF), as per laid down procedure in case of disaster of 'severe nature' which includes an assessment based on the visit of an Inter-Ministerial Central Team (IMCT). Total funds released to different States under SDRF and NDRF during last five years is at **Annexure-II**.

Delhi faced extreme flood situation in the river Yamuna during second week of July 2023 due to very heavy rainfall in the Himalayan region upstream of Hathnikund Barrage. Very high discharge passed downstream of Hathnikund Barrage, resulting in a highest ever recorded water level of 208.66 meters at Old Railway Bridge in Delhi at 18:00 hrs on 13th July, 2023, surpassing the earlier Highest Flood Level of 207.49 m recorded in September, 1978.

This information was given by the Minister of State for Jal Shakti, Shri Bishweswar Tudu in a written reply in Rajya Sabha today.

PK/AS

ANNEXURE-I

State-wise Total Damages due to Heavy Rains and Floods (2017-2021)

(in Rs. crore)

States/UT's

2017

2018

2019

2020

2021

ANDHRA PRADESH

-

3687.171

698.05

917.66

6320.46

ARUNACHAL PRADESH

1574.68

1913.82728

1390.08

567.9

ASSAM

4164.81

2480.98

3121.98

2439.73

1072.43

BIHAR

-

5.5598

-

810.19

6444.86

CHATTISGARH

-

41.689

-

31.34

1.24

GOA

-

-

-

-

218.62

GUJARAT

3555.87

118.048

2.79

2915.31

1259.98

HARYANA

18.007

89.026

0.6

-

614.63

HIMACHAL PRADESH

51.3667

65.9

229.11

60.55

1127.47

JHARKHAND

0.667

0.2

13.25

0.89

1.49

KARNATAKA

-

4620.78

-

9833

1975.81

KERALA

-

3320.76

-

-

NR

MADHYA PRAADESH

-

1.67

-

-

NR

MAHARASHTRA

-

-

-

-

NR

MANIPUR

-

-

-

-

NR

MEGHALAYA

0.14

0.0663

3.66

-

NR

MIZORAM

104.02

-

-

0.05

0.4

NAGALAND

551.59

-

-

-

NR

ODISHA

334.315

299.84

454.82

1509.33

379.51

PUNJAB

18.64

124.52

-

-
46.61
RAJASTHAN
1876.8578
31.7275
8820.91
191.17
5477.18
SIKKIM
245.44
-
-
349
92.43
TAMILNADU
-
-
1.21
-
7039.56
TELENGANA
-
-
-
-
NR
TRIPURA

132.824

946.1775

437.65

137.92

38.12

UTTAR PRADESH

308.053

547.4233

809.63

602.96

825.26

UTTARAKHAND

-

-

-

-

NR

WEST BENGAL

17727.94

54.006

1269.83

-

16079.45

A & N ISLAND

-

-

-

-
0.11

CHANDIGARH

-
-
-
-
Nil

D & N HAVELI

0.1

-
0.03

-
Nil

LADAKH

-
-
-
-
NR

DELHI

-
-
-
-
18.39

JAMMU & KASHMIR

NR

LAKSHADWEEP

5

5

NR

PUDUCHCHERRY

0.6

15.71

DAMAN & DIU

0.525

TOTAL

30665.8455

18349.97168

15868.52

21194.18

49617.62

NR- Not Reported

ANNEXURE-II

STATEMENT SHOWING STATE-WISE DETAILS OF ALLOCATION AND RELEASE OF FUNDS UNDER SDRF AND NDRF DURING THE YEAR 201&19 TO 2022-23 (AS ON 31-03-2023)

(Rs. in crore)

Sl. NO.

State

Allocation under SDRF including Centre and State share

Centre's Share of SDRF Released

Release from NDRF (For all calamities)

2018-19

2019-20

2020-21

2021-22

2022-23

2018-19

2019-20

2020-21

2021-22

2022-23

2018-19

2019-20

2020-21

2021-22

2022-23

1.

Andhra Pradesh

509.00

534.00

1192.80

1192.80

1252.80

458.10

324.15

895.20

895.20

940.00

1004.88

570.91

657.029

351.43

2.

Arunachal Pradesh

60.00

63.00

222.40

222.40

233.60

54.00

56.70

200.00

200.00

210.40

132.49

59.34

3.

Assam

532.00

559.00

686.40

686.40

720.80

478.80

503.10

617.60

617.60

648.80

44.37

250.00

4.

Bihar

543.00

570.00

1510.40

1510.40

1586.40

101.815

631.12

1132.80

1132.80

1189.60

--

953.17

1255.27

1038.96

5.

Chhattisgarh

278.00

292.00

460.80

460.80

484.00

349.575

177.30

345.60

345.60

181.60

6.

Goa

4.00

4.00

12.00

12.00

12.80

1.80

4.20

9.60

9.60

9.60

7.

Gujarat

816.00

856.00

1412.00

1412.00

1482.40

449.95

886.80

1059.20

1059.20

556.00

1000.00

8.

Haryana

356.00

374.00

524.00

524.00

550.40

320.40

227.10

392.80

392.80

412.80

9.

Himachal Pradesh

273.00

287.00

363.20

363.20

380.80

245.70

197.23

327.20

327.20

342.40

227.29

518.06

290

214.26

10.

Jammu & Kashmir *

295.00

310.00

252.90

405.00

11

Jharkhand

421.00

442 00

605.60

605.60

63520

315.75

331.50

454.40

454.40

200.00

12.

Karnataka

320.00

336.00

843.20

843.20

885.60

288.00

204.00

632.80

632.80

664.00

959.84

3208.28

689.27

1623 30

939.83

13.

Keraia

214.00

225.00

335.20

335.20

352.00

192.60

136.65

251.20

251.20

264.00

2904.85

14

Madhya Pradesh

1016.00

1066.00

1941.60

1941.60

2038.40

914.40

647.10

1456.00

1456.00

1528.80

334.00

1712.14

1891.79

600.50

15.

Maharashtra

1717.00

1803.00

3436.80

3436.80

3608.80

1287.75

1352.25

2577.60

2577.60

2706.40

2088.59

5189.40

420.12

1056.39

16.

Manipur

22.00

23.00

37.60

37.60

39.20

9.90

30.60

33.60

33.60

35.20

26.53

17.

Meghalaya

28.00

29.00

58.40

58.40

60.80

38.70

52.80

52.80

27.20

--

16.52

18.

Mizoram

20.00

20.00

41.60

41.60

43.20

18.00

18.00

37.60

37.60

39.20

19.

Nagaland

11.00

12.00

36.80

36.80

38.40

9.90

10.80

32.80

32.80

34.40

195.99

176.52

1.335

--

107.304

20.

Odisha

865.00

909.00

1711.20

1711.20

1796.80

778.50

552.00

1283.20

1283.20

1348.00

341.72

3294.10

500.00

500.00

21.

Punjab

451.00

474.00

528.00

528.00

554.40

321.99

412.37

474.43

396.00

416.00

-

22.

Rajasthan

1277.00

1340.00

1580.00

1580.00

1659.20

957.75

1005.00

1184.80

1184.80

1244.80

526.14

1949.59

68.65

--

13.46

23.

Sikkim

36.00

36.00

44.80

44.80

47.20

32.40

34.20

40.00

40.00

42.40

54.93

--

73.86

55.23

24.

Tamil Nadu

786.00

825.00

1088.00

1088.00

1142.40

707.40

500.85

816.00

816.00

856.80

900.31

286.91

566.36

25.

Telangana

317.00

333.00

479.20

478.20

503.20

226.50

487.50

359.20

359.20

188.80

--

26.

Tnpura

36.00

38.00

60.80

60.80

63.20

32.40

34.20

54.40

54.40

56.80

171.74

--

12.93

27.

Uttar Pradesh

781.00

2062.40

2062.40

2165.60

351.45

849.30

1546.40

1546.40

812.00

157.23

28.

Uttarakhand

243.00

255.00

832.80

832.80

874.40

218.70

229.50

749.60

749.60

787.20

29.

West Bengal

598.00

628.00

1078.40

1078.40

1132.80

269.10

650.40

808.80

808.80

849.60

--

958.33

2250.28

350.13

TOTAL

12825.00

13465.00

23186.40

23186.40

24344.80

9658.13

10937.62

17825.63

17747.20

16392.80

10000.00

18530.50

8257.11

7542.30

1524.854

* Now UT of Jammu and Kashmir and UT of Ladakh.

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(in Rs. crore)

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WEST BENGAL

17727.94

54.006

1269.83

-

16079.45

A & N ISLAND

-

-

-

-

0.11

CHANDIGARH

-

-

-

-

Nil

D & N HAVELI

0.1

-

0.03

-

Nil

LADAKH

-

-

-

-

NR

DELHI

-

-

-

-

18.39

JAMMU & KASHMIR

-

-

NR

LAKSHADWEEP

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5

NR

PUDUCHCHERRY

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DAMAN & DIU

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(Rs. in crore)

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State

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2021-22

2022-23

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1004.88

570.91

657.029

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222.40

233.60

54.00

56.70

200.00

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210.40

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59.34

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Assam

532.00

559.00

686.40

686.40

720.80

478.80

503.10

617.60

617.60

648.80

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250.00

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Chhattisgarh

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Goa

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12.00

12.00

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4.20

9.60

9.60

9.60

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856.00

1412.00

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1059.20

1059.20

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356.00

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524.00

524.00

550.40

320.40

227.10

392.80

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412.80

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Himachal Pradesh

273.00

287.00

363.20

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327.20

342.40

227.29

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214.26

10.

Jammu & Kashmir *

295.00

310.00

252.90

405.00

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Jharkhand

421.00

442.00

605.60

605.60

63520

315.75

331.50

454.40

454.40

200.00

12.

Karnataka

320.00

336.00

843.20

843.20

885.60

288.00

204.00

632.80

632.80

664.00

959.84

3208.28

689.27

1623.30

939.83

13.

Keraia

214.00

225.00

335.20

335.20

352.00

192.60

136.65

251.20

251.20

264.00

2904.85

14

Madhya Pradesh

1016.00

1066.00

1941.60

1941.60

2038.40

914.40

647.10

1456.00

1456.00

1528.80

334.00

1712.14

1891.79

600.50

15.

Maharashtra

1717.00

1803.00

3436.80

3436.80

3608.80

1287.75

1352.25

2577.60

2577.60

2706.40

2088.59

5189.40

420.12

1056.39

16.

Manipur

22.00

23.00

37.60

37.60

39.20

9.90

30.60

33.60

33.60

35.20

26.53

17.

Meghalaya

28.00

29.00

58.40

58.40

60.80

38.70

52.80

52.80

27.20

--

16.52

18.

Mizoram

20.00

20.00

41.60

41.60

43.20

18.00

18.00

37.60

37.60

39.20

19.

Nagaland

11.00

12.00

36.80

36.80

38.40

9.90

10.80

32.80

32.80

34.40

195.99

176.52

1.335

--

107.304

20.

Odisha

865.00

909.00

1711.20

1711.20

1796.80

778.50

552.00

1283.20

1283.20

1348.00

341.72

3294.10

500.00

500.00

21.

Punjab

451.00

474.00

528.00

528.00

554.40

321.99

412.37

474.43

396.00

416.00

-

22.

Rajasthan

1277.00

1340.00

1580.00

1580.00

1659.20

957.75

1005.00

1184.80

1184.80

1244.80

526.14

1949.59

68.65

--

13.46

23.

Sikkim

36.00

36.00

44.80

44.80

47.20

32.40

34.20

40.00

40.00

42.40

54.93

--

73.86

55.23

24.

Tamil Nadu

786.00

825.00

1088.00

1088.00

1142.40

707.40

500.85

816.00

816.00

856.80

900.31

286.91

566.36

25.

Telangana

317.00

333.00

479.20

478.20

503.20

226.50

487.50

359.20

359.20

188.80

--

26.

Tnpura

36.00

38.00

60.80

60.80

63.20

32.40

34.20

54.40

54.40

56.80

171.74

--

12.93

27.

Uttar Pradesh

781.00

2062.40

2062.40

2165.60

351.45

849.30

1546.40

1546.40

812.00

157.23

28.

Uttarakhand

243.00

255.00

832.80

832.80

874.40

218.70

229.50

749.60

749.60

787.20

29.

West Bengal

598.00

628.00

1078.40

1078.40

1132.80

269.10

650.40

808.80

808.80

849.60

--

958.33

2250.28

350.13

TOTAL

12825.00

13465.00

23186.40

23186.40

24344.80

9658.13

10937.62

17825.63

17747.20

16392.80

10000.00

18530.50

8257.11

7542.30

1524.854

* Now UT of Jammu and Kashmir and UT of Ladakh.

END

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