GOVERNMENT OF INDIA
CENTRAL WATER COMMISSION
FLOOD FORECAST MONITORING DIRECTORATE

Submerged National Highway near Fatuha Patna district Bihar
August 2016

FLOOD FORECASTING AND WARNING NETWORK PERFORMANCE APPRAISAL REPORT 2016

NEW DELHI – 110066 **April 2018**

Member (RM)
Central Water Commission
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PREFACE

Central Water Commission had started Flood Forecasting & Warning service in India in November 1958 by setting one forecasting station at Old Delhi Bridge, for the national capital, on the river Yamuna. Today, its network of Flood Forecasting and Warning Stations gradually extended covering almost all the major inter-state flood prone river basins throughout the country.

Under the XII Plan Scheme "Flood Forecasting" the flood forecasting services of CWC were to be expanded to 100 new stations taking the total to 275 flood forecast stations. As the SFC memo for the scheme was approved in December 2015, during 2016, the flood forecasting services were expanded to 24 out of the 100 identified sites. With this expansion, the flood forecasting network of CWC comprised of 199 Flood Forecasting Stations including 48 inflow forecast in 19 major river basins. It covered 20 states besides NCT Delhi and UT of Dadra & Nagar Haveli. The flood forecasting activities of the Commission are being performed every year from May to December through its 24 field divisions which issue flood forecasts and warnings to the civil authorities of the states as well as to other organizations of the central & state governments, as and when the river water level touches or is expected to cross the warning level at the flood forecasting stations. Inflow Forecasts are issued for 48 reservoir/dam/barrages. The forecasts are formulated whenever the inflow into the dam exceeds the threshold value fixed by the respective project authorities for reservoir regulation as well as flood moderation.

The flood season 2016 witnessed unprecedented flood events at 4 stations on the river Ganga in the country. High Flood Situation was witnessed at 21 stations on Rivers Brahmaputra, Jia-Bharali, Kopili, Beki and Sankosh in Assam; River Ganga in Uttar Pradesh and Bihar and its tributaries Sone, Burhi Gandak, Kosi and Mahananda in Bihar and River Rapti in Uttar Pradesh. The year witnessed moderate to low intensity floods in many other parts of India. The highlight was the floods in Ganga and its south bank tributaries including Yamuna, Sone during August 2016. There was one High Flood event in river Desang during April 2016.

During the year 2016, 6239 forecasts were issued out of which 5948 forecasts (97.8%) were found to be within the limits of accuracy. The number of level forecasts issued during the year 2016 were 4969 out of which 4891 (98.43%) was within the limit of accuracy of ± 0.15 m. The number of inflow forecasts issued was 1270 out of which 1057 (83.23%) were within limits of accuracy of ±20%.

The expansion of flood forecasting activity was done using the rainfall runoff model by developing MIKE 11 model using the daily rainfall received through India Meteorological Department (IMD) and 3-day Quantitative Precipitation Forecasts received from various Flood Meteorological Offices (FMO) of IMD. CWC wishes to place its acknowledgements for the services provided by IMD through its various FMOs.

The level of performance achieved, has been possible as a result of the dedicated team work of the officers and staff manning the various activities of hydrometeorological observations & flood forecasting and monitoring the flood forecasting activities of the field offices.

Flood Forecast Monitoring (FFM) Directorate plays an important role in compiling the information received from various field offices at Headquarters and issues daily bulletins which are sent to various offices of the MOWR, MHA, Railway Board, Transport Ministry and Ministry of Agriculture. I wish to place on record my deep appreciations of the efforts put in by the officers and staff of FFM Directorate in carrying out the work with utmost devotion & dedication in bringing out this report. The staff of this Directorate, along with other supporting staff from other Directorates during flood duties in the flood season of 2016 also deserves all appreciation in keeping the control room fully functional on all the week days, including holidays, Saturdays & Sundays. The control room was kept operational round the clock throughout the flood season.

It is hoped that the momentum gained in expanding the flood forecasting network, improving performance modernization as well as computerization, year after year, will be further accelerated to achieve greater effectiveness of each and every forecast especially in high and unprecedented flood situations with the help of mathematical modelling supported by real-time data from telemetry.

Suggestions/comments of the Users of this report with a view to further enhance its usefulness are welcomed and will be incorporated in the next edition.

New Delhi **(Pradeep Kumar)**
April, 2018 **Member (RM)**

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EXECUTIVE SUMMARY

0.1 Meteorological Situation

During 2016, the south west monsoon performance was as given below:

- The rainfall during monsoon season (June-September) over the country as a whole was 97% of its long period average (LPA).
- Seasonal rainfalls over Northwest India, Central India, South Peninsula and Northeast India were 95%, 106%, 92% and 89% of respective LPA.
- Out of the total 36 meteorological subdivisions, 23 sub-divisions constituting 72% of the total area of the country received normal rainfall and 4 sub-divisions received excess rainfall (13% of the total area) during the season. However, 9 sub-divisions constituting 15% of the total area of the country received deficient seasonal rainfall.
- Monthly rainfall over the country as a whole was 89% of LPA in June, 107% of LPA in July, 91% of LPA in August and 97% of LPA in September.
- Southwest monsoon advanced into south Andaman Sea and Nicobar Islands on 18th May (2 days ahead of its normal date). However, further advance was sluggish. It set in over Kerala on 8th June (7 days behind the normal schedule of 1st June) and covered the entire country by 13th July (against the normal date of 15th July).
- Monsoon withdrawal commenced from West Rajasthan on 15th September with a delay of 2 weeks. It withdrew from the entire country on 26th October, 2016.
- Movement of Depression and Low Pressures over East and Central India during July and August gave rise to very heavy rainfall in Jharkhand, Madhya Pradesh, Uttar Pradesh and Rajasthan.
- During the North East Monsoon even though rainfall was deficient in South Peninsular India, Very Severe Cyclonic Storm "Vardah" crossed North Tamilnadu Coast near Chennai on 12th December

0.2 Flood Situation

During the year 2016, 4 Flood Forecast station namely Ballia in Ballia district of Uttar Pradesh, Patna Gandhighat and Hathidah in Patna district and Bhagalpur in Bhagalpur district all in Bihar flowed in Unprecedented flood situation during the period 20th to 29th August 2016. High Floods were witnessed in 17 Flood Forecasting Stations namely., River Brahmaputra at Dibrugarh, Neamatighat, Tezpur, Goalpara and Dhubri, river Jia-Bharali at N T Road Crossing, river Kopili at Kampur, river Beki at Road Bridge, river Sankosh at Golokganj in Assam. River

Ganga at Patna-Dighaghat and Kahalgaon, river Sone at Maner, river Mahananda at Jhawa, river Burhi Gandak at Khagaria and river Kosi at Kursela in Bihar also flowed in High Flood Situation. River Rapti at Balrampur and River Ganga at Ghazipur in Uttar Pradesh also flowed in High Flood Situation. River Desang at Nanglamoraghat in Assam flowed in High Flood Situation during April 2017 which is considered beyond the normal flood season which normally starts on 1st May every year in association with heavy to very heavy rainfall over its catchment areas. Moderate flood situation was witnessed in 55 Flood Forecasting Stations and 32 Flood forecast stations witnessed Low Flood Situation. No floods were witnessed in 42 flood forecasting stations. Out of the 48 reservoirs in the network, inflow forecasts were issued at 40 reservoirs and in 8 reservoirs the inflows did not exceed the criteria for issuing inflow forecasts. The highlight of this year flood was the Unprecedented Floods in Ganga in the reach from Ballia to Bhagalpur was in association with the movement of depression over Jharkhand, Madhya Pradesh and Uttar Pradesh during the period 18th to 27th August.

0.3 Flood Forecasting Performance

During the year 2016, 6239 forecasts were issued out of which 5948 forecasts (95.34%) were found to be within the limits of accuracy. The number of level forecasts issued during the year 2016 were 4969 out of which 4891 (98.43%) was within the limit of accuracy of ± 0.15 m. The number of inflow forecasts issued was 1270 out of which 1057 (83.23%) were within limits of accuracy of ±20%. During the unprecedented floods, CWC issued 3 to 5 advanced flood advisories for taking up relief and rescue operations in advance at flood affected areas which were well appreciated by the beneficiaries at Both National and State Levels.

Salient Features of Flood Forecasting System

The "Salient Features" of Flood Forecasting and Warning Network of the Central Water Commission are given in the table shown below.

1.	Establishment of 'First Scientific Flood Forecasting Unit" (F.F.U.) at Delhi in India	November, 1958
2.	Date of issue of first scientific flood forecast	25th July, 1959
3.	Name of first forecasting site and river	Delhi Railway Bridge (old) on the River Yamuna
4.	Year of commencement of flood forecasting system on the inter-state rivers i.e. first national level expansion	1969
5.	No. of Chief Engineer's offices including one CE (Flood Management) at CWC' headquarters, Monitoring – Central, Nagpur and Cauvery and Southern Rivers Organisation, Coimbatore being organisations supporting the Flood Forecasting Activities	12
6.	No. of Superintending Engineer's offices including one Flood Forecast Monitoring Directorate at CWC headquarter	15
7.	No. of present Flood Forecasting Divisions No. of Divisions supporting FF Activities	24 05
8.	No. of Control Room/Sub-Divisions engaged in flood forecasting work	78
9.	No. of states including union -territories covered under F.F. Programme	22
10.	No. of forecasting sites	199
11.	No. of gauge and gauge & discharge sites	1224
12.	No. of wireless stations (including Control Rooms)	544
13.	No. of Telemetry Stations installed/under installation during IX,X XI and XII Plans	510
14.	Maximum no. of forecasts issued in any one year Second Highest no. of forecasts issued	8566 (in 1990) 8223 (in 2007)
15.	No. of forecasts issued in flood season 2010	7519
16.	No. of forecasts issued in flood season 2011	5991
17.	No. of forecasts issued in flood season 2012	5031
18.	No. of forecasts issued in flood season 2013	7060
19.	No. of forecasts issued in flood season 2014	4772
20.	No. of forecasts issued in flood season 2015	4072
21	No. of forecasts issued in flood season 2016	6239

CHAPTER-1

NATIONAL FLOOD FORECASTING NETWORK

1.1 FLOOD FORECASTING SERVICES

Flood causes considerable damage to human lives and property almost every year. About one third of total flood prone area (40 mHa assessed by the Rashtriya Barh Ayog) of the country has been provided with reasonable protection against flood of a low magnitude due to technological and economical constraints but there is no protection from floods of higher magnitude. Since adoption of National Flood Policy by Government of India in 1954, it was realized that a total protection against flood by structural means alone is not possible and that optimum solution would consist of a mixture of structural and non-structural measures. Therefore, stress has been laid on non-structural measures like flood forecasting and warning, which is most important among such means to minimize the damage potential from floods. Accurate and timely flood forecasts and advance warning have, therefore, to be aimed for providing valuable time to the people and to civil authorities in taking preventive measures like evacuation, relief and rehabilitation measures, preparedness for flood fighting by engineering authorities etc. and thus mitigating such loses from floods.

1.2 FLOOD FORECASTING NETWORK IN THE COUNTRY

Flood Forecasting has been recognized as the most important, reliable and cost effective non-structural measures for flood mitigation. Recognizing the great importance of this measure, flood forecasting of river Yamuna at Delhi was suggested by Reddy Committee set up by Prime Minister, Govt. of India to manage flooding of Delhi. Accordingly in the year 1958, CWC commenced the flood forecasting service in a small way by establishing flood forecasting unit for issuing water level forecasts of the Yamuna for the National Capital, Delhi. On the recommendation of various committees/panels, a "Flood Forecast & Warning Organisation" was set up in CWC in 1969 to establish forecasting sites on inter-state rivers at various flood prone places in the country. 41 forecasting sites were added in 1969, making total number of forecasting sites to 43. Extension of the service followed from time to time. The year-wise positions of the number of flood forecasting sites till the flood season 2016 in the network of Central Water Commission are shown in the **Table 1.1**:

Table-1.1: Yearwise positions of number of forecasting sites in CWC

Year	Cumulative No. of Flood Forecasting Sites	Year	Cumulative No. of Flood Forecasting Sites
1958	01	2002	161
1965	02	2003	166
1969	43	2004	172
1977	77	2005	173
1980	84	2006	175
1985	145	2015	176
1987	147	2016	199
1990	157		
2001	159		

The "National Flood Forecasting and Warning Network" of Central Water Commission, which comprised of 199 flood forecasting sites including 48 inflow forecasting sites in flood season 2016 is shown in **Map-1.** The number of flood forecasting sites on each of the major inter-state river systems is in the **Table 1.2**.

Table 1.2: Number of flood forecasting sites in inter-state river systems

Sr. No	**Major Interstate River Systems**	**FF stations as on Date**		
		Level	**Inflow**	**Total**
1	Indus and its tributaries	1	0	**1**
2	Ganga & its tributaries	77	13	**90**
3	Brahmaputra & its tributaries	28	0	**28**
4	Barak System	6	0	**6**
5	Subarnarekha (i/c Burhabalang)	3	1	**4**
6	Brahmani & Baitarni	3	0	**3**
7	East Flowing(Mahanadi to Pennar)	3	2	**5**
8	Narmada	4	0	**4**
9	Tapi	1	2	**3**
10	Mahi	1	1	**2**
11	Sabarmati	1	1	**2**
12	Mahanadi	3	1	**4**
13	Godavari	14	7	**21**
14	Krishna	3	8	**11**
15	West Flowing Rivers(Kutch & Saurashtra)	0	1	**1**
16	West Flowing Rivers(Tapi to Tadri)	2	1	**3**
17	Cauvery and its tributaries	0	7	**7**
18	Pennar	1	1	**2**
19	East Flowing Rivers(Pennar to Kanyakumari)	0	2	**2**
	TOTAL	**151**	**48**	**199**

The above flood forecasting network covers the following 20 states, one Union Territory and NCT of Delhi as shown in the **Table 1.3**

Table 1.3 Statewise Flood Forecasting Network in CWC

Sr. No.	Name of State/UT	Number of flood forecasting Stations		
		Level	Inflow	Total
1	Andhra Pradesh	5	7	**12**
2	Arunachal Pradesh	1	0	**1**
3	Assam	25	0	**25**
4	Bihar	32	0	**32**
5	Chhattisgarh	1	0	**1**
6	Gujarat	6	5	**11**
7	Haryana	0	1	**1**
8	Jammu & Kashmir	1	0	**1**
9	Jharkhand	2	5	**7**
10	Karnataka	1	7	**8**
11	Madhya Pradesh	2	2	**4**
12	Maharashtra	7	3	**10**
13	Odisha	11	1	**12**
14	Rajasthan	0	1	**1**
15	Tamil Nadu	0	5	**5**
16	Telangana	4	6	**10**
17	Tripura	2	0	**2**
18	Uttar Pradesh	34	2	**36**
19	Uttarakhand	3	0	**3**
20	West Bengal	11	3	**14**
21	Dadra & Nagar Haveli	1	0	**1**
22	NCT of Delhi	2	0	**2**
	Total	**151**	**48**	**199**

Central Water Commission through its twenty four flood forecasting divisions issued forecasts to the various user agencies, which includes various civil / engineering agencies of the States/ Central Governments such as Irrigation/ Revenue/ Railways/ public undertakings and Dam/ Barrage Authorities/ District Magistrates/ Sub Divisional Officers besides the Defence Authorities involved in the flood loss mitigation work. During the flood season, the Hon'ble Minister of Water Resources, Government of India, the Chairman and the Member (River Management) of Central Water Commission were also being apprised of the latest flood situations in the above river basins in the country.

1.3 CLASSIFICATIONS OF VARIOUS FLOOD SITUATIONS

The Central Water Commission has categorized various flood situations, for monitoring the floods in the country though its flood forecasting network, into the

following four different categories, depending upon the severity of floods i.e. based on floods magnitudes.

1.3a Level Forecast

(i) LOW FLOOD

The river is said to be in **"LOW FLOOD"** situation at any flood forecasting sites when the water level of the river touches or crosses the warning level, but remains below the danger level of the forecasting site.

(ii) MODERATE FLOOD

If the water level of the river touches or crosses its danger level, but remains 0.50 m below the Highest Flood Level of the site (commonly known as "HFL") then the flood situation is called the **"MODERATE FLOOD"** situation.

(iii) HIGH FLOOD

If the water level of the river at the forecasting site is below the Highest Flood Level of the forecasting site but still within 0.50m of the HFL then the flood situation is called **"HIGH FLOOD"** situation. In **"High Flood Situations"** a special **"Orange Bulletin"** is being issued by the Central Water Commission to the users agencies which contains the "special flood message" related to the high flood.

(iv) UNPRECEDENTED FLOOD

The flood situation is said to be **"UNPRECEDENTED"** when the water level of the river touches or crosses the "**HIGHEST FLOOD LEVEL**" recorded at any forecasting site so far. In **"Unprecedented Flood Situations"** a special **"Red Bulletin"** is being issued by the Central Water Commission to the users agencies which contains the "special flood message" related to the unprecedented flood.

1.4 Standard Operating Procedure (SOP) for Flood Forecasting & Warning

The basic activity of data collection, its transmission and dissemination of flood forecasts to the local administration is carried out by the field divisions of CWC. The modelling centres and Divisional Flood Control Rooms (DFCR) are located in the premises of the field divisions. The field divisions perform these activities as per existing Manual on Flood Forecasting which contains the following critical activities as the general SOPs

1. Nomination of Nodal Officers of CWC for interaction with the Nodal Officers of concerned State Governments before monsoon every year.
2. Gearing up of flood forecasting network before monsoon every year.
3. Operation of Divisional Flood Control Room during monsoon every year
4. Operation of Central Flood Control Room (CFCR) during monsoon every year.

5. Issue of flood forecasts to designated officers of concerned State and transmission thereof through FAX/Telephone/E-mail/ through Special Messengers during monsoon every year.
6. Sending flood alerts through SMS on Mobile Phones to the concerned officers of State/ Central Government during high (12 hourly updates) and unprecedented (3 hourly updates) flood situations and uploading of Flood Forecasts and hourly water level data in CWC's Flood Forecasting Website as per Standard Operating procedure (SOP) for issuing alerts and electronic messaging in the event of disaster situations issued by National Disaster Management Division, Ministry of Home Affairs, vide letter No: 31-32/2003-NDM-III / II dated 10th April 2006, made effective from 24th April 2010.

For the purpose of dissemination of alerts to PMO/ Cabinet Secretariat, a uniform system has been devised by categorizing each type of alert in stages- Yellow, Orange and Red.

Categories of alerts for flood in respect of level forecasts is as indicated below.

Category	Description	Stage
IV	Low Flood (Water level between Warning level and Danger level)	Yellow
III	Moderate Flood (Water level below 0.50m less than HFL and above Danger Level)	Yellow
II	High Flood (Water Level less than Highest Flood Level but still within 0.50 m of the HFL)	Orange
I	Unprecedented Flood (Water Level equal and above Highest Flood Level-HFL)	Red

1.5 Inflow Forecasts

Inflow Forecasts are issued for 28 dams/reservoirs/barrages in various river basins in the country. The project authorities have identified the threshold inflow limits for issue of forecast considering various factors such as safety of the dam, status of reservoir, downstream channel/ canal requirements. The inflow in volume during the given duration indirectly indicates the possibility of accommodating the given volume or otherwise in the reservoir. The outflow pattern is decided keeping in view of the safety measures at the reservoir and the likely impact of the outflow from the reservoir to cause damages/ difficulties in the downstream areas giving due attention to the Emergency Action Plan (EAP) of the project. There is need for EAP for all reservoirs covering normal operational releases and high releases during floods.

1.6 EXPANSION OF THE NETWORK OF FLOOD FORECASTING SITES

The operation and maintenance of existing flood forecasting network is carried out as per budget allotment each year under 'Non-Plan' head and is thus

subject to such restrictions and cuts applied to items under `Non-Plan'. The allocation during the year 2016-17 was Rs. 100.20 Crore including Rs. 1.71 Crore for payment to Government of Bhutan for maintaining hydrometeorological stations in river common to India and Bhutan and strengthening & Modernization of FF and Hyd. Obs. Network in Brahmaputra and Barak Basin. The expansion of the network with a view to cover additional flood prone areas is proposed to be covered under 'Plan' head. Work on such Plan schemes is subject to approval of specific schemes by the Government and the budget allocation of funds. The activity was expanded to Tamilnadu and Rajasthan during 2016.

The salient features of all Flood Forecasting Sites, the details of all the sites basin-wise as well as Statewise during the flood season 2016, is shown at **Annex-I, Annex-II** and **Annex-III** respectively.

1.7 Data Communication System

Central Water Commission maintains 544 Wireless Stations for near real – time data communication. In addition, satellite based Telemetry System has been installed at 445 stations for sensor based automatic data collection and satellite based communication. As the wireless works on pre-fixed schedules and the Telemetry transmit the data at pre-fixed time intervals only, telephone/mobile phone, fax and internet in particular was also used for receiving the vital hydro-meteorological data immediately after its observation and dissemination of flood forecasts to user agencies.

1.7.a Wireless Communication

Wireless network in CWC consists of HF (3 to 30 MHz) and VHF (30 to 300MHz) sets. The HF sets are used for long distance communication between Site and Division (15 to 20Watts), Division to Division (20 to 100 Watts). VHF sets are used for short distance communication (i.e. from river to Site office).

1.7b Telemetry

Sensor based data collection and satellite based communication was installed at 445 sites upto end of XI Plan and another 56 stations have been installed during 2012-13 to 2013-14 under XII Plan for real time hourly water levels, hourly rainfall and other important meteorological parameters, established in Krishna, Godavari, Mahanadi, Chambal, Damodar, Ganga, Yamuna, Brahmaputra, Tapi, Mahi and Sutlej Basins. Three earth stations (DDRGS) located at Jaipur and Burla (in PRBS mode) and New Delhi (TDMA mode) are receiving through INSAT satellite. The data from remote stations received in DDRGS are further transmitted to the respective modelling centre through VSAT. The data received was used mainly by the divisions issuing forecast by MIKE-11.

1.8 DAMAGE DUE TO FLOODS/ HEAVY RAINS BETWEEN 1953 TO 2016

The damage due to floods for the entire country was estimated to be Rs.57393.761 Crore during the flood season 2016. The average annual damages to crops, houses and public utilities from the year 1953 to 2016 as reported by the States/UT's are of the order of Rs. 5428.707 Crore, the maximum annual damage being Rs.57393.761 Crore during 2015.

A comparative details showing the details of damages occurred during the flood season 2013 to 2016 on different accounts, based on the reports (tentative), received from the revenue authorities of the state governments is given in the **Table 1.4**.

Table 1.4: Damages occurred during flood season, 2014 to 2016

Sl. No.	Items	Flood damages during Year the Year				Flood Damages during 1953-2016	
		2014	2015	2016	Average 1953-2016	Maximum	
						Year	Damage
1	Area affected (in mha)	11.817	2.305	5.317	7.058	1978	17.5
2	Population affected (in millions)	26.505	33.203	26.555	31.879	1978	70.45
3	Damaged to Crops(area in mha)	8.007	3.374	6.658	3.923	2005	12.299
4	Damaged to crops(value in Rs. Crore)	7255.151	17043.948	4052.723	1598.026	2015	17043.948
5	Damaged to houses (in numbers)	311325	3959191	278240	1241642	2015	3959191
6	Damaged to houses (value in Rs. Crore)	581.978	8046.969	114.676	693.599	2009	10809.795
7	Cattle lost (in number)	60196	45597	22367	94104	1979	618248
8	Human lives lost (in numbers)	1968	1420	1420	1648	1977	11316
9	Damaged to public Utilities (in Rs. Crores)	7246.888	32131.172	1300.066	3108.656	2013	38902.613
10	Total damages to crops, houses & public utilities (in Rs. Crores)	15548.077	57393.761	5632.645	5431.894	2015	57393.761

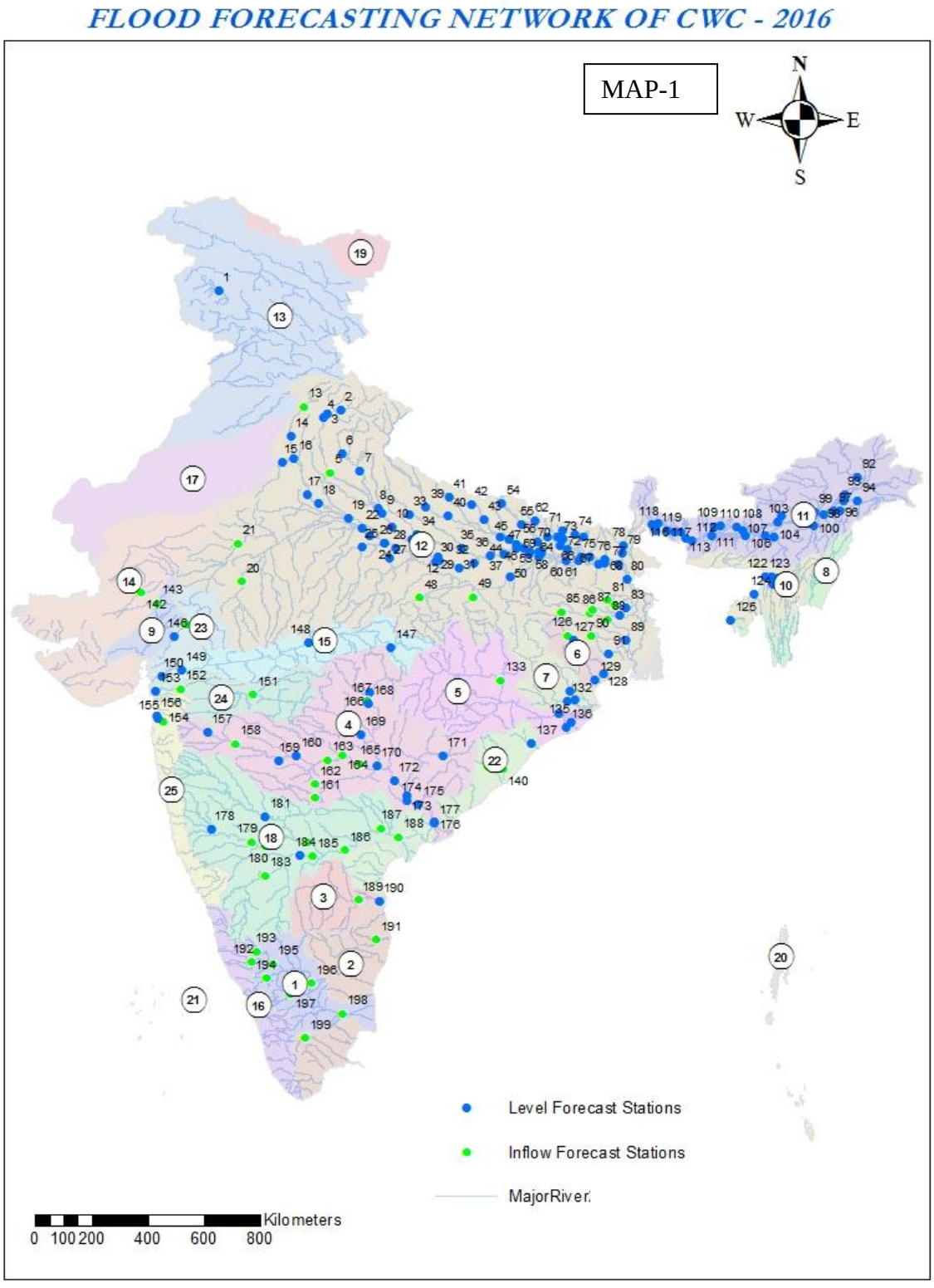
1.9 ANALYSIS OF PERFORMANCE OF FLOOD FORECASTING NETWORK

CWC carried out analysis and appraisal of the forecasting work, at the end of monsoon season. Based on this, measures for improvements, if necessary, are identified. A summary of the performance of the work carried out by the field divisions during the flood season 2016 presented in Chapter-3. While the performance of the flood forecasting system is satisfactory, yet there is constant endeavor for improving the performance especially for additional warning time as new technology and more data are becoming available.

1.10 ORGANISATIONAL SET-UP OF FLOOD FORECASTING NETWORK

The present organizational set up of Flood-forecasting & Warning Establishment of Central Water Commission under the Member (River-Management) is spread over regional offices of CWC each headed by a Chief Engineer. Fifteen Circle Offices and twenty six Divisions in its field formations carry out flood forecasting activities. Chief Engineer (Flood Management) and Flood Forecast Monitoring Directorate monitor the Flood Forecasting activities in the headquarters. It also issues flood bulletins at national level.

The organizational chart of Flood Forecasting and Warning set up of the Central Water Commission is given at **Figure-1.1**



Map -1: Flood Forecasting Network in India

List of River Basins

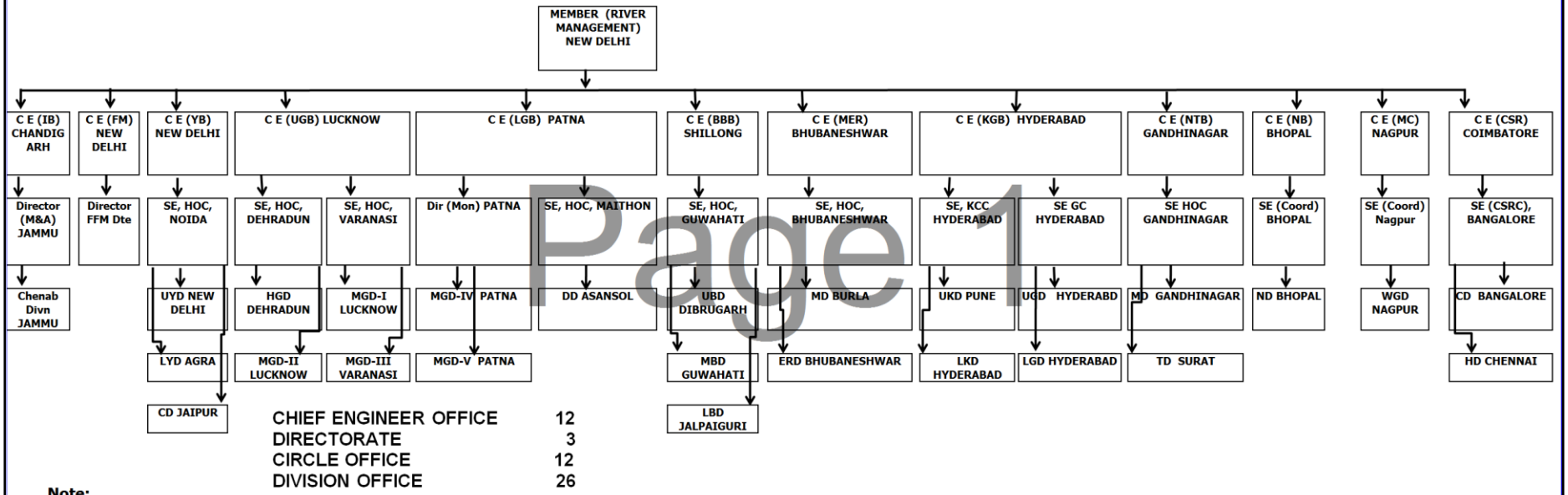
Basin Code	Basin Name
1	Cauvery
2	East flowing rivers between Pennar and Kanyakumari
3	Pennar
4	Godavari
5	Mahanadi
6	Subarnarekha
7	Brahmani and Baitarni
8	Minor rivers draining into Myanmar and Bangladesh
9	Sabarmati
10	Barak and Others
11	Brahmaputra
12	Ganga
13	Indus (Up to border)
14	West flowing rivers of Kutch and Saurashtra including Luni
15	Narmada
16	West flowing rivers from Tadri to Kanyakumari
17	Area of Inland drainage in Rajasthan
18	Krishna
19	Area North of Ladakh not draining into Indus
20	Drainage areas of Andaman & Nicobar Island
21	Drainage areas of Lakshadweep Island
22	East flowing rivers between Mahanadi and Pennar
23	Mahi
24	Tapi
25	West flowing rivers from Tapi to Tadri

List of Flood Forecast Stations									
1	Rammunshibagh	41	Balrampur	81	Massanjore Dam	121	Matizuri	161	Singur Dam
2	Srinagar	42	Bansi	82	Tilpara Barrage	122	Badarpurghat	162	Nizamsagar Dam
3	Rishikesh	43	Birdghat(Gorakhpur)	83	Narayanpur	123	Karimganj	163	Sriramsagar Dam
4	Haridwar	44	Turtipar	84	Gheropara	124	Kailashahar	164	Kaddam Project
5	Narora Barrage	45	Darauli	85	Tenughat Dam	125	Sonamura	165	Sripada Yellampally Project
6	Moradabad	46	Gangpur Siswan	86	Panchet Dam	126	Chandil Dam	166	Bhandara
7	Bareilly	47	Chhappra	87	Maithon Dam	127	Jamshedpur	167	Gosikhurd Dam
8	Kannauj	48	Bansagar Dam	88	Durgapur Barrage	128	Rajghat	168	Pauni
9	Ankinghat	49	Rihand Dam	89	Harinkhola	129	Govindpur(NH5 Road Bridge)	169	Balharsha
10	Kanpur	50	Inderpuri	90	Kangsabati Dam	130	Anandpur	170	Kaleswaram
11	Dalmau	51	Koelwar	91	Mohanpur	131	Akhuapada	171	Jagdalpur
12	Phaphamau	52	Maner	92	Passighat	132	Jenapur	172	Eturunagaram
13	Hathnikund Barrage	53	Patna(Dighaghat)	93	Dibrugarh	133	Hirakud Dam	173	Dummagudem
14	Mawi	54	Khadda	94	Naharkatia	134	Naraj	174	Bhadrachalam
15	Dhansa	55	Chatia	95	Chenimari(Khowang)	135	Alipingal	175	Kunavaram
16	Delhi Railway Bridge	56	Rewaghat	96	Nanglamoraghat	136	Nimapara	176	Rajahmundry(Rly Bridge)
17	Mathura	57	Hajipur	97	Sibsagar	137	Purushottampur	177	Dowlaiswaram Barrage
18	Agra	58	Patna Gandhighat	98	Neamatighat	138	Gunupur	178	Arjunwad
19	Etawah	59	Sripalpur	99	Badatighat	139	Kashinagar	179	Almatti Dam
20	Gandhisagar Dam	60	Hathidah	100	Golaghat	140	Gotta Barrage	180	Narayanpur Dam
21	Bisalpur Dam	61	Munger	101	Numaligarh	141	Thottapalli reservoir	181	Deongaon Bridge
22	Auraiya	62	Lalbeghiaghat	102	Jiabharali NT Road Crossing	142	Dantiwada Dam	182	PD Jurala Project
23	Kalpi	63	Sikandarpur(Muzzafarpur)	103	Tezpur	143	Dharoi Dam	183	Tungabhadra Dam
24	Hamirpur	64	Samastipur	104	Kampur	144	Shubhash Bridge(Ahmedabad)	184	Mantralayam
25	Mohana	65	Rosera	105	Dharamtul	145	Kadana Dam	185	Sunkesula Barrage
26	Shahjina	66	Khagaria	106	Guwahati	146	Wanakbori Weir	186	Srisailam Dam
27	Banda	67	Bhagalpur	107	Puthimari NH Crossing	147	Mandla	187	Dr KLRS Pulichintala Dam
28	Chillaghat	68	Kahalgaon	108	Pagladiya NT Road Crossing	148	Hoshangabad	188	Prakasam Barrage
29	Naini	69	Basua	109	Beki Road Bridge	149	Garudeswar	189	Somasila Dam
30	Chhatnag(Allahabad)	70	Benibad	110	Manas NH Crossing	150	Bharuch	190	Nellore
31	Mirzapur	71	Kamtaul	111	Goalpara	151	Hathnur Dam	191	Poondi Reservoir Chennai
32	Varanasi	72	Ekmighat	112	Dhubri	152	Ukai Dam	192	Harangi Dam

33	**Lucknow(Hanuman Setu)**	**73**	**Hayaghat**	**113**	**Golokganj**	**153**	**Surat**	**193**	**Hemavathy Dam**
34	**Rae Bareilly**	**74**	**Jhanjarpur**	**114**	**Tufanganj**	**154**	**Madhuban Dam**	**194**	**Kabini Dam**
35	**Jaunpur**	**75**	**Baltara**	**115**	**NH 31(Jaldhaka)**	**155**	**Vapi**	**195**	**K R Sagar Dam**
36	**Ghazipur**	**76**	**Kursela**	**116**	**Ghugumari**	**156**	**Daman**	**196**	**Mettur Dam**
37	**Buxar**	**77**	**Sahibganj**	**117**	**Mathabanga**	**157**	**Kopergaon**	**197**	**Bhavanisagar Dam**
38	**Ballia**	**78**	**Dhengraghat**	**118**	**Domohani Bridge**	**158**	**Jaikwadi Dam**	**198**	**Grand Anicut**
39	**Elginbridge**	**79**	**Jhawa**	**119**	**Mekhliganj**	**159**	**Gangakhed**	**199**	**Vaigai Dam**
40	**Ayodhya**	**80**	**Farakka**	**120**	**AP Ghat(Silchar)**	**160**	**Nanded**		

Fig-1.1

ORGANISATION CHART OF FLOOD FORECASTING AND WARNING SETUP OF CENTRAL WATER COMMISSION



CHIEF ENGINEER OFFICE	12
DIRECTORATE	3
CIRCLE OFFICE	12
DIVISION OFFICE	26

Note:

i) UGD, Hyderabad and WGD, Nagpur support LGD, Hyderabad by supplying data of sitesu nder their jurisdiction on real -time basis.

ii) UKD Pune, HD Chennai and CD, Bangalore support LKD, Hyderabad by supplying data of sites under their jurisdiction on real -time basis.

CHAPTER – 2

ROLE OF IMD IN FF ACTIVITIES AND SOUTHWEST MONSOON ACTIVITIES

2.1 Role of IMD & SOUTHWEST MONSOON

2.1a Role of IMD

India Meteorological Department (IMD) provides various Meteorological inputs for formulation of Flood Forecast in Divisional Flood Control Rooms (DFCR) of CWC. The inputs include rainfall in stations other than those operated by CWC on different sub-catchments of river basins, providing Quantitative Precipitation Forecast (QPF) for 24 hours, Weather Situation and Heavy Rainfall Warnings over various basins and outlook for further 48 hours. The QPFs are issued by 0930 hours daily and are modified if necessary around 1230 hours. For this purpose, IMD is operating Flood Meteorological Offices (FMO) in different river basins. These are located at Agra, Ahmedabad, Asansol, Bhubaneshwar, Delhi, Guwahati, Hyderabad, Jalpaiguri, Lucknow and Patna. These FMOs provide all the weather related inputs to the concerned DFCR by fastest available modes of communication. The FMOs are also provided the rainfall figures observed by the stations operated by CWC as well as the water level in the flood forecast stations in the basin by the concerned DFCR.

During the year 2016, the Hydromet division of IMD provided online QPF by using two Numerical Weather Prediction (NWP) models namely WRF ARW (9km x 9km) and Multi Model Ensemble (MME) for various sub-basins of different river basins.

The FMO at Hyderabad uploaded the daily weather summaries, QPF and rainfall figures issued in the web site of Meteorological Centre Hyderabad during the flood season from 1st June to 31st October. During the expansion of flood forecasting network under the XII Plan, it was also agreed that the concerned Regional/ Meteorological Centre falling within a basin will issue the QPF and provide Meteorological inputs for the additional basins where expansion is contemplated.

The INSAT-DRT secretariat of IMD looks after the works of allocation of Station Index number, Time slot allotment and frequency allocation for the various Automatic Weather Stations setup by different organisations. CWC is one of the members of INSAT-DRT User and officers of CWC attend the INSAT-DRT User meetings convened by the INSAT DRT Secretariat of IMD. CWC has so far installed 501 Satellite based Automatic Data Collection Units for collection of Hourly Water Level and Rainfalls from remote stations. IMD has allocated the Station Index Numbers and other parameters for all these stations. During the 12th Plan there is a proposal to install 458 additional automatic data collection units in various river basins and IMD has provided the Station Index numbers/ Time slot/ Frequency for these 458 stations. There is a provision in XII Plan to upgrade the telemetry equipments installed in IX Plan as well as to convert the mode of communication from Pseudo Random Burst System to Time Division Multiple Access System for the stations installed under X Plan. Accordingly,

IMD was approached for providing Satellite ID and Time slot allotment for these 223 stations which have been allotted by IMD AWS lab Pune.

2.1b Southwest Monsoon

India gets about 80% of its Annual rainfall during the south-west monsoon from June to September except some portions of south-eastern parts of peninsular India where the main rains occur during the period of north-east monsoon from October to December, which overlap with the receding stage of the south-west monsoon in October. Occasionally, cyclonic storm develop in the south-west bay and move into the Peninsula and produces heavy rain during north-east monsoon season.

Southwest monsoon advances from Kerala in the beginning of June. It produces spell of heavy rainfall along the western coast of the peninsula and on the southern slopes of Khasi and Jaintia hills in north- eastern region.

In association with the depression which occasionally form in the North Bay of Bengal and move north-westwards, heavy rains are produced in the central parts of the country, Orissa, Gangetic West Bengal, southern districts of Bihar, Gujarat region, and East Rajasthan and in the later monsoon months in and around North Deccan.

A very important characteristic of southwest monsoon is the occurrence of "break". The break situations arise when the monsoon trough shifts to the Himalayas and are very important as these cause floods in the rivers rising from the Eastern Himalayas. Sometimes, the phenomenon of break sets in immediately after a monsoon depression has occurred. These two causes occurring in succession serve to intensify the floods.

The whole India has been divided into 36 meteorological sub-divisions by India Meteorological Department (IMD) for the purpose of studies of rainfall/monsoon activities.

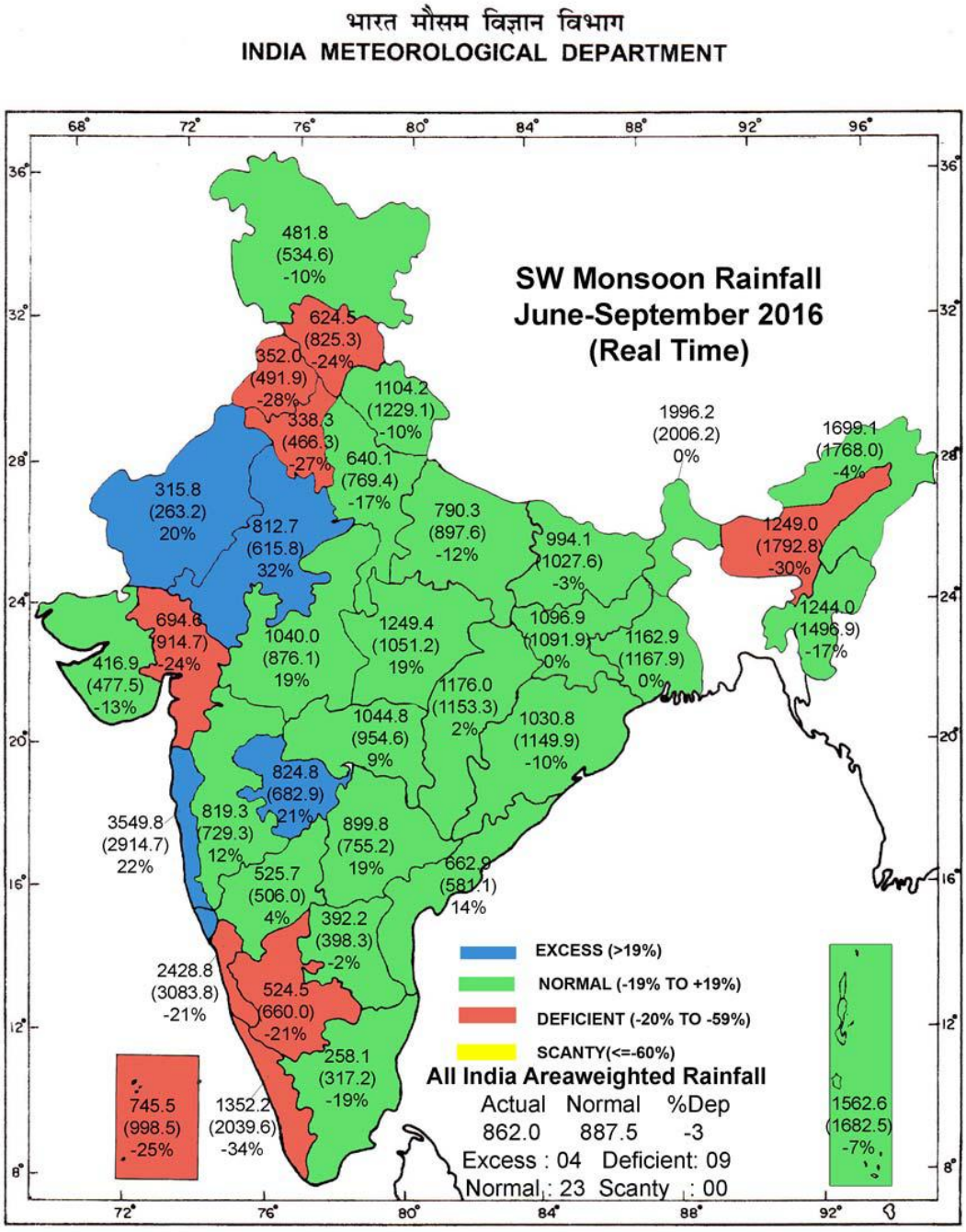
The progress of monsoon rainfall over the country is monitored by evaluating the departures of total rainfall from the normal rainfall in respect of meteorological sub-divisions and districts. The IMD has classified the rainfall as excess, normal, deficient and scanty, according to the following criteria.

Excess	:	+ 20% or more than normal
Normal	:	+ 19% to - 19% of the normal
Deficient	:	- 20% to - 59% of the normal
Scanty	:	- 60% to - 99% of the normal
No Rain (N.R.)	:	- 100% of the normal

Normal is defined as the Long Period Average say for 50 years for the period from 1st June to 30th September. Presently Long Period average for the years 1951 to 2000 is being used to define normal. For the country as a whole the normal rainfall during the period 1st June to 30th September is 89 cm.

2.2 HIGHLIGHTS OF SOUTH-WEST MONSOON

- The rainfall during monsoon season (June-September) over the country as a whole was 97% of its long period average (LPA).
- Seasonal rainfalls over Northwest India, Central India, South Peninsula and Northeast India were 95%, 106%, 92% and 89% of respective LPA.
- Out of the total 36 meteorological subdivisions, 23 sub-divisions constituting 72% of the total area of the country received normal rainfall and 4 sub-divisions received excess rainfall (13% of the total area) during the season. However, 9 sub-divisions constituting 15% of the total area of the country received deficient seasonal rainfall.
- Monthly rainfall over the country as a whole was 89% of LPA in June, 107% of LPA in July, 91% of LPA in August and 97% of LPA in September.
- Southwest monsoon advanced into south Andaman Sea and Nicobar Islands on 18th May (2 days ahead of its normal date). However, further advance was sluggish. It set in over Kerala on 8th June (7 days behind the normal schedule of 1st June) and covered the entire country by 13th July (against the normal date of 15th July).
- Monsoon withdrawal commenced from West Rajasthan on 15th September with a delay of 2 weeks. It withdrew from the entire country on 26th October, 2016.
- Movement of Depression and Low Pressures over East and Central India during July and August gave rise to very heavy rainfall in Jharkhand, Madhya Pradesh, Uttar Pradesh and Rajasthan.



Map-2 Sub-divisionwise South West Monsoon rainfall during 2016

2.3 ONSET OF SOUTH-WEST MONSOON SEASON

Southwest monsoon advanced over parts of south Bay of Bengal, Nicobar Islands and adjoining Andaman Sea on 18th May (2 days ahead of its normal date). It further advanced into some more parts of southeast Bay of Bengal, remaining parts of Andaman Sea and Andaman Islands on 20th May. However, further progress of monsoon was sluggish. As a result, monsoon set in over Kerala only on 8th June (7 days after its normal date of 1st June). On the same day, it advanced into south Arabian Sea, Maldives-Comorin area, most parts of Kerala & Tamil Nadu, some parts

of south interior Karnataka, remaining parts of south Bay of Bengal and some more parts of central Bay of Bengal.

In the subsequent two days, it advanced rapidly up to Lat. 15°N. Thereafter, a hiatus occurred on western part due to weakening of the Arabian Sea branch of the monsoon. A comparatively stronger Bay of Bengal branch led to advance of monsoon into Northeast India by 14th June. In the third week of June, as the active phase of the Madden Julian Oscillation (MJO) moved eastwards over the Indian Seas, the Bay of Bengal became more convectively active. Triggered by this, the further advance of monsoon was rapid and it covered most parts of peninsular India & western Himalayan region, entire central & east India and some parts of north Arabian Sea and northwest India by 22nd June. After a brief hiatus during the last week of June, monsoon advanced further very rapidly to cover most parts of the country, outside some areas of Kutch and west Rajasthan by 5th July. The monsoon covered the entire country on 13th July in association with the formation of an east-west shear zone at mid tropospheric levels and its northward shifting to the north of Lat. 20° N. Isochrones of advance of monsoon 2016 is shown in Fig. 2.1.

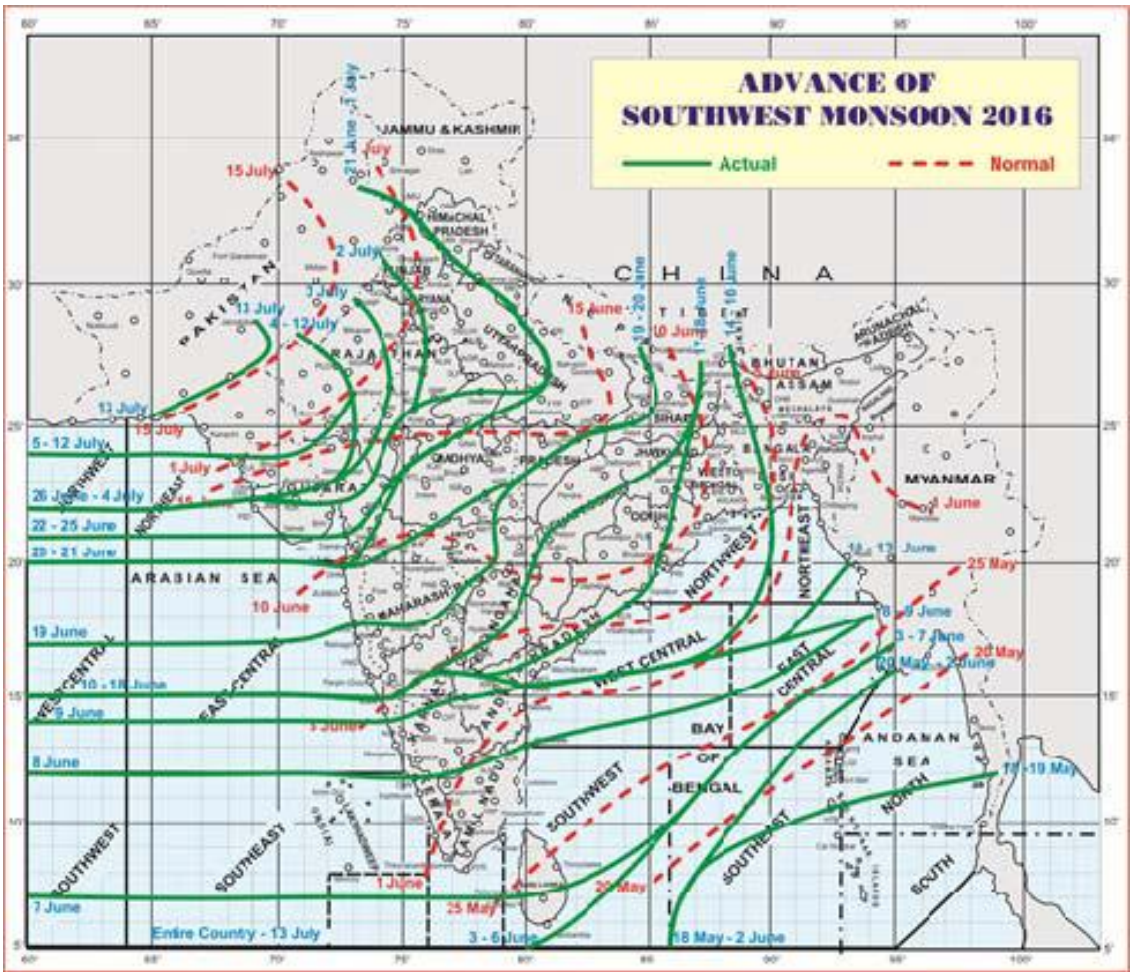


Fig. 2.1 Advance of southwest Monsoon–2016**.**

2.4 CHIEF SYNOPTIC FEATURES

During the season, 14 monsoon low pressure systems (LPSs) (2 Deep Depressions, 2 Depressions, 3 well marked low pressure areas & 7 low pressure areas) formed against an average of 6 Depressions & 8 low pressure areas. The frequencies of monsoon depressions were subdued over Bay of Bengal. Out of four depressions/deep depressions, one depression formed over the Bay of Bengal & one over Arabian Sea and remaining two over the land region.

The first Depression formed over northeast Arabian Sea in June (27^{th} –29^{th}) and the second as a Land Depression over northeast Madhya Pradesh & neighborhood in July (6^{th} –7^{th}). Thereafter, two Deep Depressions formed in August (9^{th} –12^{th} & 16^{th} –20^{th}); 1st over coastal areas of West Bengal & neighborhood and the 2nd over northwest Bay of Bengal. In addition, 5 low pressure areas also formed in August. In the month of September, 3 low pressure areas formed. **Tracks of Depressions & Deep Depressions are given in Fig.2.**

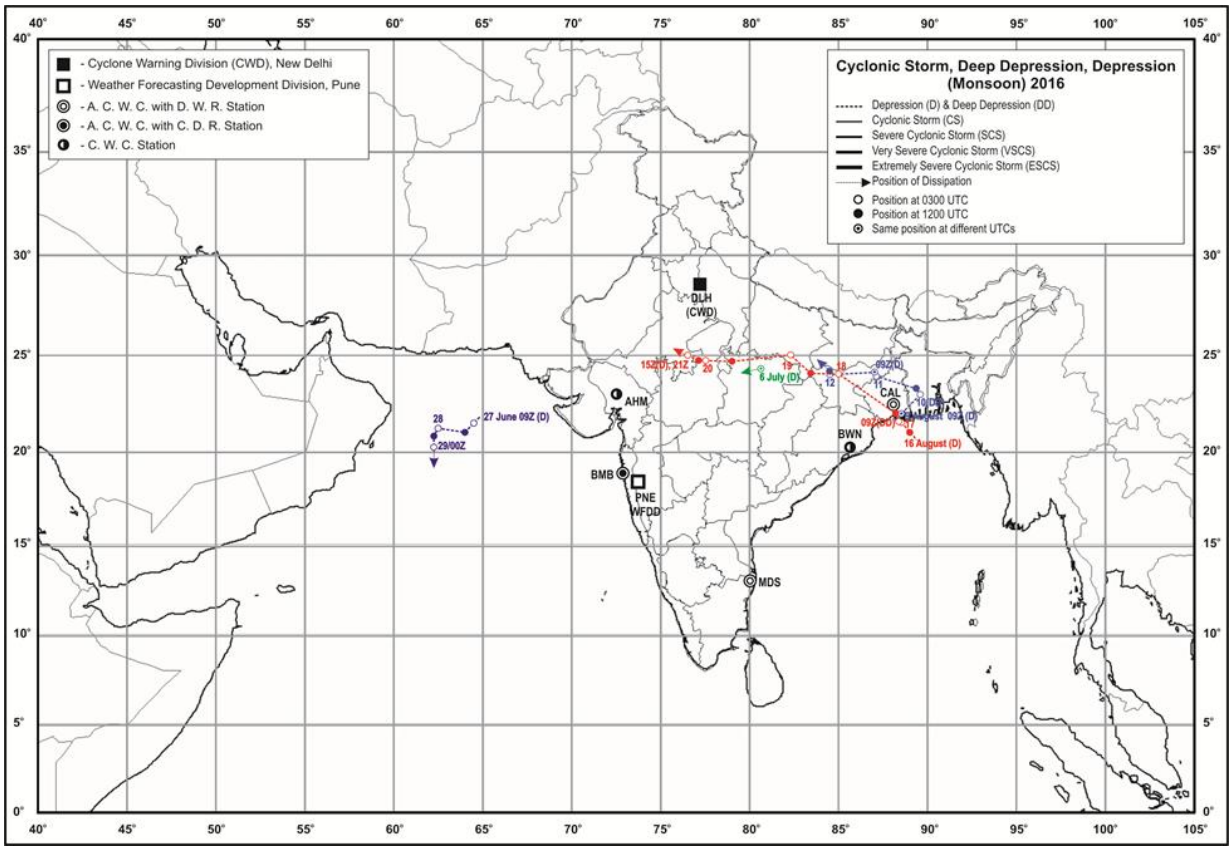


Fig-2.2 Track of the monsoon depressions and Cyclonic Storms

In general, the southwest monsoon circulation was weak in June. However with the, weakening of the Southern Hemispheric Equatorial Trough in the south Indian Ocean towards the end of June helped in the strengthening of cross equatorial flow and hence strengthening of monsoon circulation. With the deepening of southwesterlies towards the Indian landmass, a feeble off-shore trough developed off

Karnataka-Kerala coasts in the last week of June. The Heat Low gradually strengthened and got established over Pakistan along with a shallow 'heat trough' extending along the Indo-Gangetic plains during the week.

Also, the MJO moved eastwards over the Indian Seas, the Bay of Bengal became more convectively active. The formation and movement of cyclonic vortices at upper levels off both the coasts and one over central India during the third week of June triggered the monsoon activity over most parts of the country. The first Depression (27^{th} – 29^{th} June) and first Low pressure area (26^{th} – 28^{th} June) of the season formed over northeast Arabian Sea and over westcentral & adjoining northwest Bay of Bengal off north Andhra Pradesh-south Odisha coasts respectively. However, the Depression over Arabian Sea weakened *in-situ* over the Sea area due to a large vertical wind shear. An east-west shear zone was also observed along Lat. 15°N. All these systems enhanced the rainfall activity over northern plains, Peninsular India and central India towards the end of the June.

A cyclonic circulation extending between lower & mid tropospheric levels lay over Kutch & neighborhood during 1^{st} - 5^{th} July, which increased the rainfall activity over the Gujarat Region and West Rajasthan. A Land Depression (6^{th} – 7^{th} July) formed over northeast Madhya Pradesh & neighbourhood, which caused active to vigorous monsoon conditions over Madhya Pradesh and East Rajasthan. Two low pressure areas (on 30^{th} June- 5^{th} July & 7^{th} July -8^{th} July) along the east-west trough caused fairly widespread to widespread rainfall activity with heavy to very heavy rain at few places and extremely heavy at isolated places mainly over east & central India. The presence of an off-shore trough along the west coast caused active to vigorous monsoon conditions over western parts of central India during the 2^{nd} week of July. The deep convection over central & western parts of peninsular India due to northward shifting of an east-west shear zone during 10^{th} – 13^{th} July increased the rainfall activity over the extreme western parts during same period.

In third week of July, the monsoon trough shifted northwards closes to the foothills of the Himalayas and led to weak monsoon conditions over major parts of India. Thus, a lull in the monsoon activity was noticed over major parts of the country and break like situation prevailed. The monsoon trough remained close to the foothills of the Himalayas up to 21^{st} July and shifted back to its normal position from 22^{nd} July. However, the instability in the basic flow generated several cyclonic circulations which helped in maintaining near normal rainfall for the country as a whole. Towards the end of July and beginning of August, due to active monsoon trough and the enhanced convection over major parts of the country, triggered with the Somali Low Level Jet, there was formation of a couple of low pressure areas over north Bay of Bengal. These systems moved nearly west-northwestwards along the monsoon trough and caused active to vigorous monsoon conditions over parts of north & central India as well as northern parts of peninsular India with extremely heavy rainfall activity at isolated places over northern parts of Peninsular & Central India.

Thereafter, with the formation of a Depression over the coastal areas of West Bengal & neighborhood on 9^{th} of August and its immediate intensification into a Deep Depression on next day, the rainfall activity shifted northwards. Due to movement of

Deep Depression and formation of two more low pressure areas during 2nd week of August led to active to vigorous monsoon activity over Gangetic West Bengal, Odisha, Jharkhand, Madhya Pradesh, Rajasthan and Gujarat State.

In mid-August, the western end of the monsoon trough gradually shifted northwards and lay close to the foothills of the Himalayas on 17th August. However, the eastern end of the trough continued to remain active with the formation of a Deep Depression on 16th August over northwest Bay of Bengal & neighbourhood. The system followed the west-northwestward track after crossing the coast and traversed up to East Rajasthan. While moving west-northwestwards, it caused fairly widespread to widespread rainfall with isolated extremely heavy falls and caused flood situations all along its track. However, the subdued rainfall activity continued to prevail over south peninsular India since second week of August. Thereafter, the weakening of cross equatorial flow led to weak monsoon flow pattern over the Indian regime during the last week of August. The troughs in mid- latitude westerlies which intruded more southwards affected the monsoon flow. However, it maintained the rainfall activity mainly over the northwestern parts. The remnant cyclonic circulation of the low pressure area formed over westcentral Bay of Bengal off Andhra Pradesh coast caused fairly widespread to widespread rainfall activity with isolated extremely heavy falls over the eastern parts of south Peninsular India towards the end of August. During the first half of September, the monsoon trough shifted to the foothills of the Himalayas, which led to weak monsoon activity over the country. However, due to formation of three low pressure areas over the Bay of Bengal active to vigorous monsoon activity prevailed over many parts of east, central and Peninsular India. In the third week, in association with the strong MJO activity over the Maritime continent, strengthening of the monsoon circulation and increased convective activity, active to vigorous monsoon activity prevailed mainly over north peninsular India.

2.4.1 High Impact Weather Events

Fig. 2.3 depicts the met. Sub-divisions or parts thereof, which experienced high impact weather events like, floods, landslides during the southwest monsoon season (June- September) along with the dates. **Fig. 2.3** also indicates areas that experienced isolated extremely heavy rainfall (Rainfall amount ≥20 cm reported during the 24 hours ending at 0830 hrs IST) events during the season without any reference to the dates of these occurrences. Incessant rainfall associated with the formation and movement of the monsoon low pressure systems in the presence of strong cross equatorial flow often caused flood situations over various areas during different parts of the season.

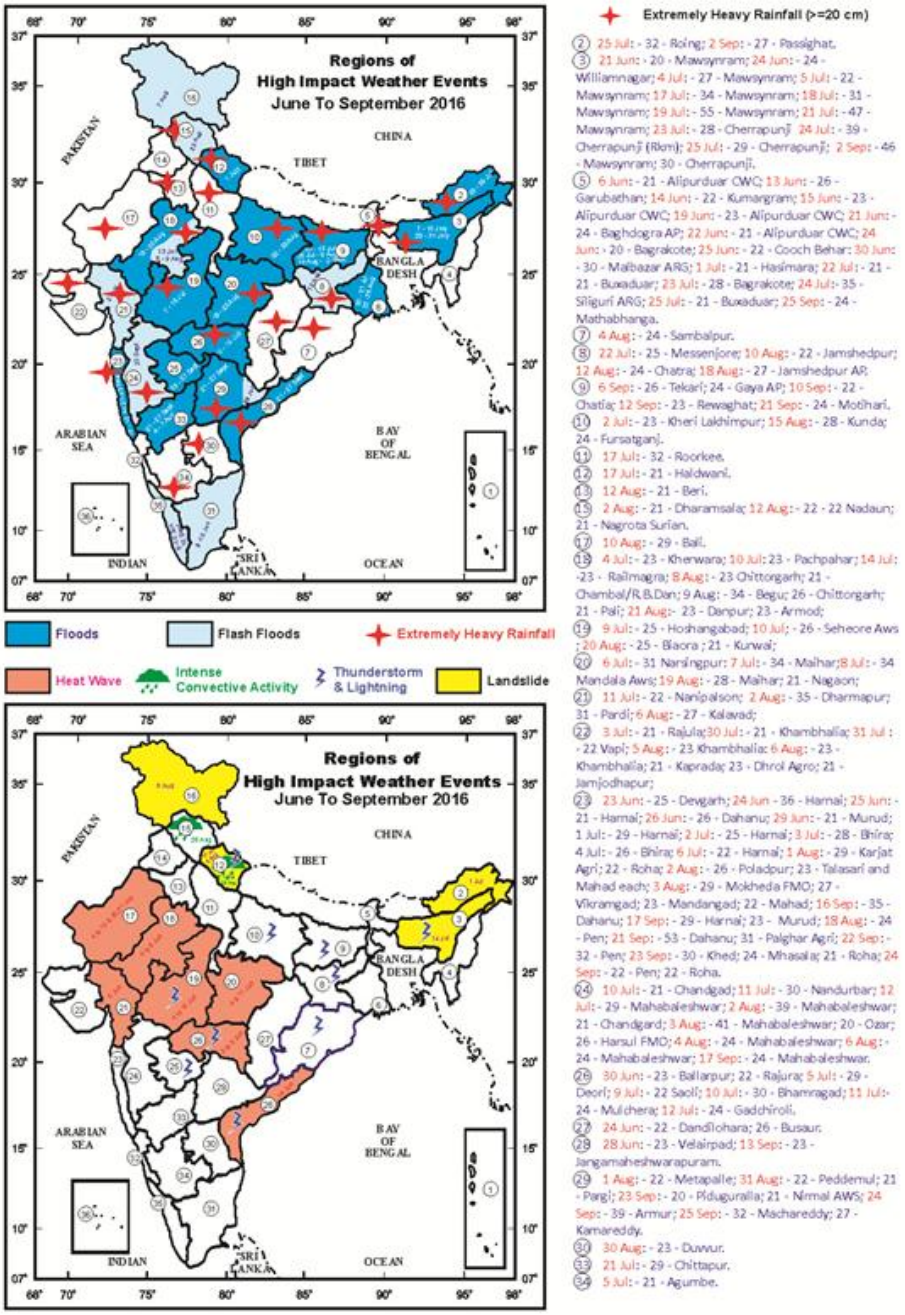


Fig 2.3 Areas and dates of high impact weather events during the 2016 southwest Monsoon.

2.5 WITHDRAWAL OF SOUTHWEST MONSOON

The rainfall activity over the northwestern parts of Rajasthan remained subdued since 5th September. Due to change in the lower tropospheric circulation pattern over the region from cyclonic to anti-cyclonic on 15th September, the southwest monsoon withdrawal commenced from west Rajasthan. Subsequent to this, moisture incursion due to the low level southeasterlies caused isolated rainfall over most parts of northwest India. The monsoon further withdrew from some more parts of the northwest India on 28th. Thereafter, with the southward shift of the Sub-

tropical westerly Jet stream over to the northern most Indian Latitudes from 5th October. The southwest monsoon further withdrew from remaining parts of Jammu & Kashmir and Punjab, most parts of Himachal Pradesh and some more parts of Haryana & Chandigarh and West Rajasthan on 5th October. Thereafter, it has further withdrawn from remaining parts of Himachal Pradesh, Haryana, Chandigarh & Delhi, most parts of Uttarakhand, some parts of West Uttar Pradesh & East Rajasthan and some more parts of West Rajasthan on 8th October. The withdrawal line passes through Dharchula, Aligarh, Jaipur and Barmer as on 10th October. Monsoon withdrew from the entire country on 26th October Isochrones of withdrawal of monsoon 2016 are shown in **Fig. 2.4**.

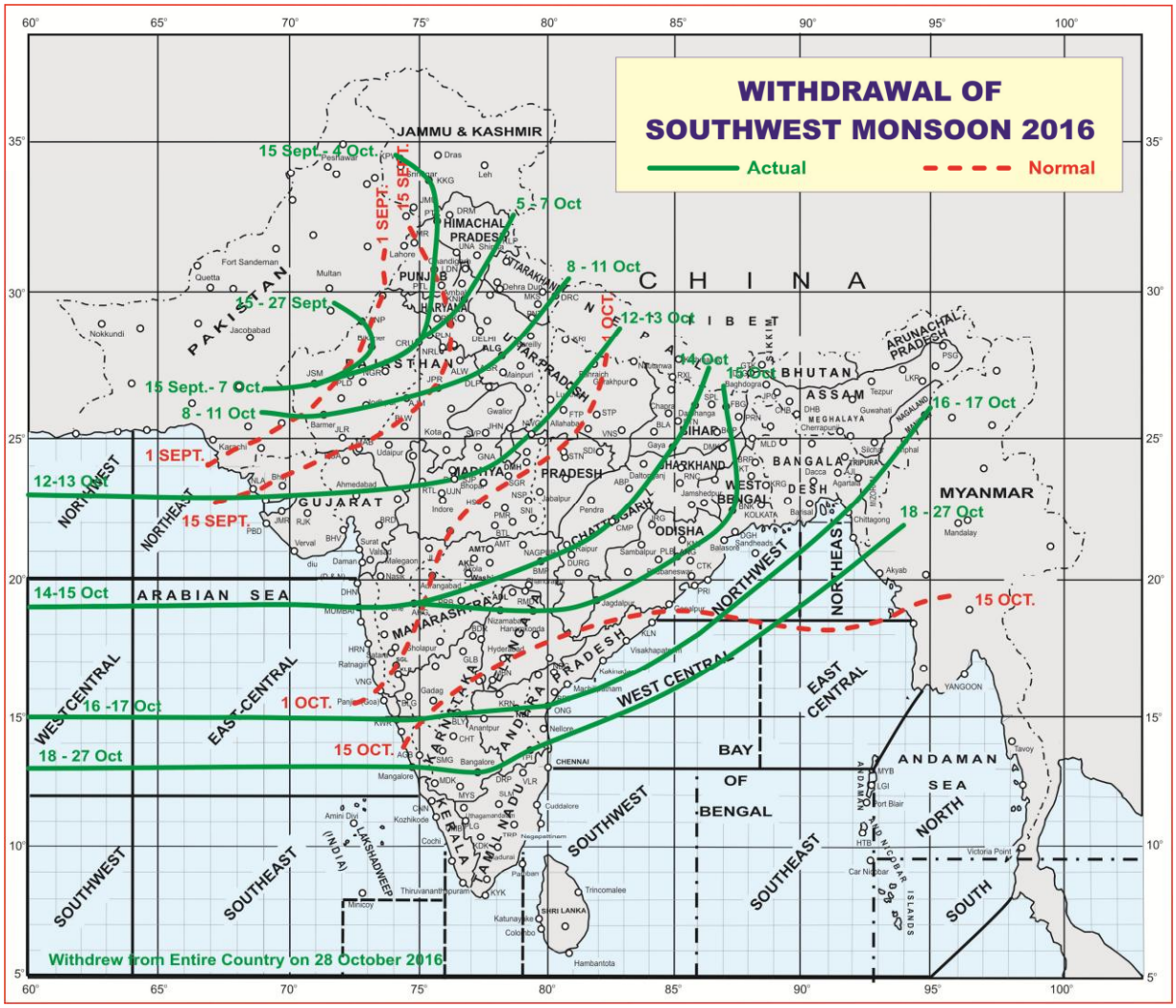


Fig. 2.4 Isochrones of withdrawal of southwest monsoon – 2016

2.6 North East Monsoon

The North East Monsoon commenced over South Peninsular India on 30th October 2016. During the North East Monsoon season of 2016, the rainfall was deficient in most parts of South Andhra Pradesh, Karnataka, Kerala and Tamilnadu.

Very Severe Cyclonic Storm "Vardah" which affected South Andhra Pradesh and North Tamilnadu crossed near Chennai on 12th December 2016. However, it did not cause any flood along its track even though extremely heavy rainfall occurred in parts of North Tamilnadu and South Andhra Pradesh as the North East monsoon was deficient and most of the reservoirs in these states were not filled. The track of the storm is given in **Fig 2.5** and IMD-NCMRWF GPM merged gauge rainfall during 7th – 13th and 7 days average rainfall (cm/day) is given in **Fig 2.6.**

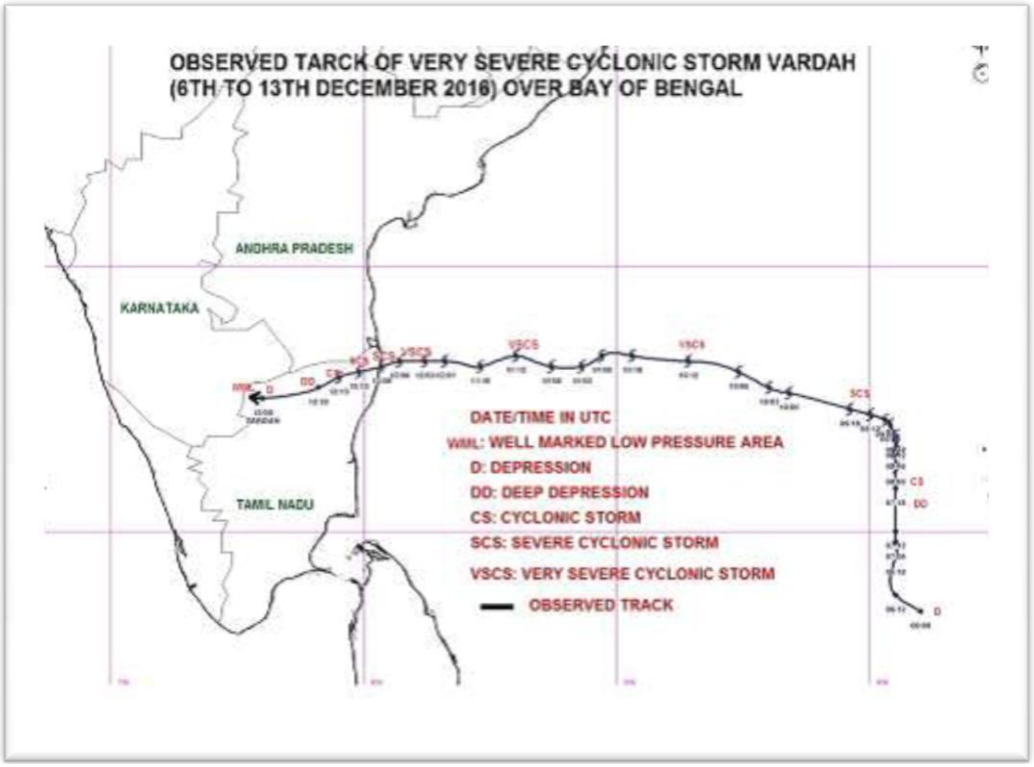


Fig 2.5 Observed track of VSCS, 'Vardah' over BoB during December 2016

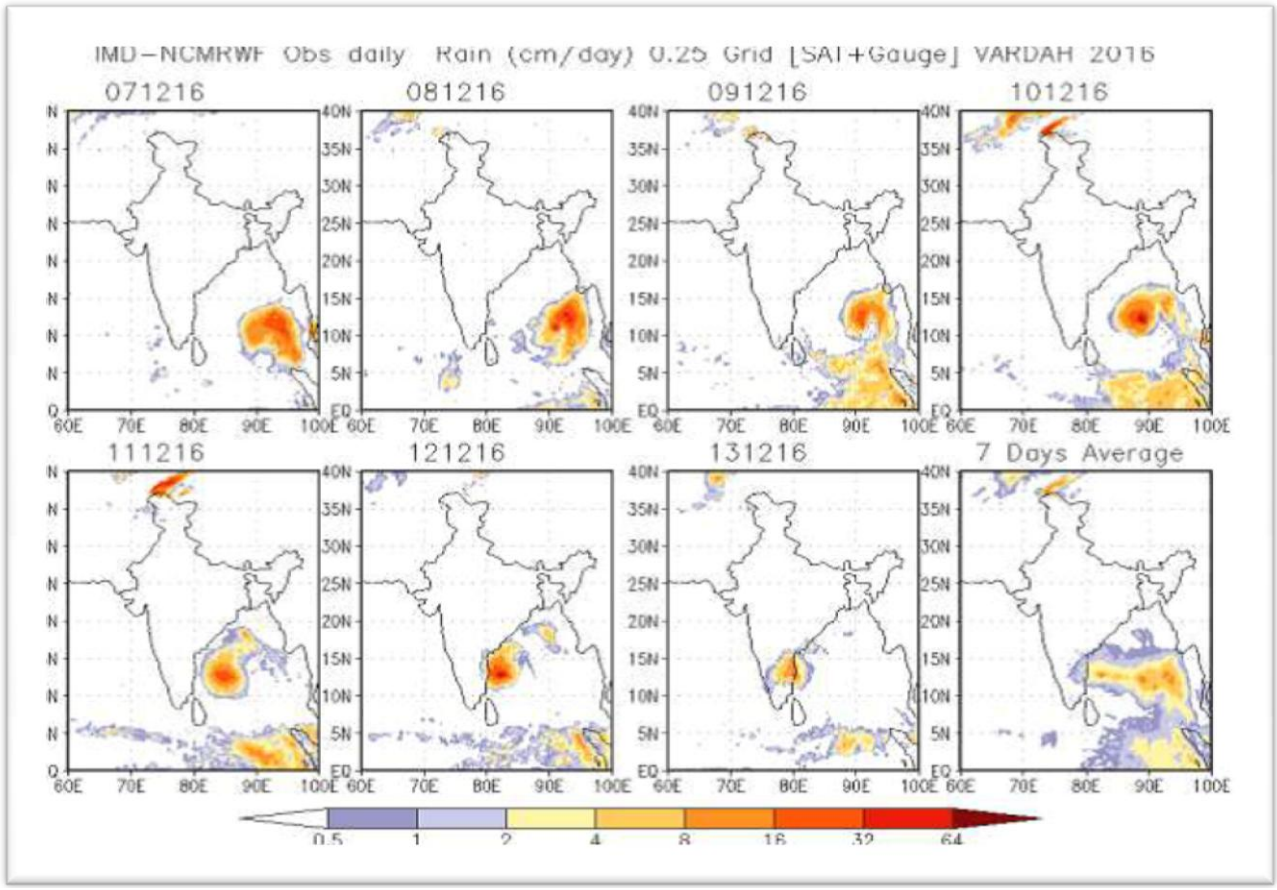


Fig.2.6: IMD-NCMRWF GPM merged gauge rainfall during 7th – 13th and 7 days average rainfall (cm/day)

(Source: The extracts for Chapter 2.2b to Chapter 2.6 have been taken from the end of season report published by IMD, NE monsoon report of IMD Chennai 2016 and the daily weather situation summaries given by IMD).

CHAPTER 3

FLOOD FORECAST PERFORMANCE

3.1 FLOOD FORECASTING EVALUATION - PRESENT CRITERIA AND PROCEDURE

A number of techniques are being utilised for formulation of river stage and inflow forecasts by Central Water Commission. While inflow forecast is being provided for assisting project authorities in reservoir regulation, the stage forecast is done for warning the civil and engineering authorities about the predicted water level well ahead of its occurrence. An accurate forecast is one where the forecast level and corresponding actual observed level exactly synchronize or have such a small difference that it can be taken as reasonably accurate. In an ideal situation, not only the forecast and the corresponding observed value of river stage/ inflow should be the same but also the time of such occurrence should be the same as that predicted.

3.2 EVALUATION CRITERIA FOR STAGE/ INFLOW FORECASTING

As per present practice, all the level and inflow forecasts are being judged by the single criteria of accuracy i.e. the actual level attained is within ± 15cm of forecasted value for stage forecasts and the actual inflow/ volume received in the dam/ barrage is within ± 20% of the forecasted value for inflow forecast.

The forecast of incoming flood gives the water level or inflow and "time" of occurrences. It is also observed that in many cases the levels attained were found within permissible limit of accuracy but the time of occurrence was not the same.

3.3 FLOOD FORECASTING ACTIVITIES

The flood forecasting activities like data collection, forecast formulation and its dissemination during 2016 covered various river basins and States. There was an expansion of Flood Forecasting activity to the States of Tamilnadu and Rajasthan under the Plan Scheme "Flood Forecasting" besides expansion of activity in existing States covered in the network. Cauvery and East Flowing rivers between Pennar and Kanyakumari were also brought into the flood forecasting activity beside additional forecasting sites in existing basins. A total of 6239 forecast were issued during 2016. The performance of flood forecasting Divisionwise, Major Basinwise, Statewise and for the period 2000 to 2016 are given from **Annex-IV to VII.**

3.4 RIVERWISE DETAILS OF FLOOD FORECASTING ACTIVITES & ACCURACY OF FORECAST

3.4.1 Indus Basin

During the flood season 2016, no forecasts were issued in Jhelum basin for Rammunshibagh site in Jammu and Kashmir.

3.4.2 Brahmaputra Basin

One new Flood Forecast Site namely Passighat on river Siang in Arunachal Pradesh was added during 2016 flood season. During the flood season 2016, analysis of the flood forecasts issued reveals that 2328 forecasts (37.31% of 6239 forecast) were issued for 28 sites (28 Level Forecast Sites) located on the main Brahmaputra and tributaries. Out of these, 2309 forecasts (99.18%) were found within permissible limit of accuracy.

3.4.3 Barak and other Basin

One new Flood Forecasting Site namely Badarpurghat on river Barak was added during 2016 flood season. During the flood season 2016, 199 forecasts (3.19% of 6239) were issued for four sites out of 6 (6 Level) Sites. Out of these, 198 forecasts (99.5%) were found within permissible limit of accuracy. No forecast was issued for two sites.

3.4.4 Ganga Basin

Three new inflow forecast stations namely, Bisalpur Dam, Bansagar Project and Rihand Dam were added during 2016 flood season. During the flood season 2016, 2712 forecasts (43.47% of 6239) were issued for 75 sites (63 Level and 12 Inflow), out of total 90 sites (77 Level and 13 Inflow Forecast) located on the main Ganga and its tributaries. No forecast was issued for the remaining 15 sites. Out of these, 2644 forecasts (97.49%) were found within permissible limit of accuracy.

3.4.5 Godavari

Three new Inflow Forecast Sites namely, Gosikhurd Dam, Kaddam Dam and Sripada Yellampally Project were added during flood season 2016. During the flood season 2016, 132 forecasts (2.12% of 6239) were issued for 13(7 Level and 6 Inflow) of the 21 sites (14 Level and 7 Inflow) on Godavari Basin and 120 (90.91%) forecasts were found within permissible limit of accuracy. No forecasts were issued for remaining 8 sites.

3.4.6 Krishna Basin

Two new inflow forecast sites namely, Sunkesula Barrage and Dr K L Rao Sagar Pulichintala Project were added during flood season 2016. During the flood season 2016, 246 forecasts (3.94% of 6239) were issued for 8 forecasting sites out of 11 sites. All the sites where forecasts were issued are inflow forecasting sites. Out of 246 forecasts issued, 216 forecasts were found to be within limit with an accuracy of 87.80%. No level forecasts were issued for the remaining 3 sites.

3.4.7 Cauvery Basin

Seven new inflow forecast sites were added for the first time to the Flood Forecasting network of Central Water Commission in the Cauvery Basin. A rainfall

runoff based mathematical model was developed for the basin which was run on daily basis for formulation of inflow forecasts. During the flood season 2016, 308 forecasts (4.94% of 6239) were issued for six forecasting sites out of seven sites and 167 forecasts (54.22 %) were found within permissible limit of accuracy. No forecast was issued for one site in Cauvery basin.

3.4.8 Subarnarekha Basin including Burhabalang

One Level Forecasting and One Inflow Forecasting sites were added during the flood season 2016. During the flood season 2016, 22 forecasts (0.35% of 6239) were issued for 3 forecasting sites (2 level and 1 inflow) out of 4 (3 level and 1 inflow) sites. Out of 22 (13 are level and 9 are inflow forecasts) forecasts issued, 16 (11 Level and 5 Inflow) forecasts were found to be within limit with an accuracy of 72.73%. No level forecasts were issued for the remaining site.

3.4.9 Brahmani and Baitarni Basin

During the flood season 2016, 1 forecast (0.02% of 6239) was issued for 1 forecasting sites (1 Level) out of 3 (3 level) sites. Out of 1 (1 Level forecast Site) forecast issued, 1 forecast was found to be within limit with an accuracy of 100%. No level forecasts were issued for the remaining sites.

3.4.10 Mahanadi Basin

During the flood season 2016, 67 forecasts (1.07% of 6239) were issued for 1 forecasting sites (1 Inflow) out of 4 (3 level and 1 inflow) sites. Out of 67 (1 Inflow forecast Site) forecast issued, 66 forecasts was found to be within limit with an accuracy of 98.51%. No forecasts were issued for the remaining sites.

3.4.11 East Flowing between Mahanadi and Pennar Basin

One new inflow forecast site was added during flood season 2016. During the flood season 2016, 4 forecasts (0.06% of 6239) were issued for 1 forecasting site (1 Level) out of 5 (3 level and 2 inflow) sites. Out of 4 (4 Level) forecast issued, 4 forecasts was found to be within limit with an accuracy of 100%. No forecasts were issued for the remaining sites (2 Level and 2 Inflow).

3.4.12 Pennar Basin

One new inflow forecast site was added during flood season 2016. During the flood season 2016, 4 forecasts (0.06% of 6239) were issued for 1 forecasting sites (1 Inflow) out of 2 (1 level and 1 inflow) sites. Out of 4 (4 Inflow) forecast issued, 3 forecasts was found to be within limit with an accuracy of 75%. No forecasts were issued for the remaining sites.

3.4.13 East Flowing between Pennar and Kanyakumari Basin

Two new inflow forecast site was added during flood season 2016. During the flood season 2016, 10 forecasts (0.16% of 6239) were issued for 1 forecasting sites (1 Inflow) out of 2 (2 inflow) sites. Out of 10 Inflow forecasts issued, 6 forecasts were found to be within limit with an accuracy of 60%. No forecasts were issued for the remaining site.

3.4.14 Mahi Basin

During the flood season 2016, 19 forecasts (0.3% of 6239) were issued for 2 forecasting sites (1 Level and 1 Inflow) out of 2 (1 level and 1 inflow) sites. Out of 19 (3 Level and 16 Inflow) forecast issued, 17 (1 Level and 16 Inflow) forecasts were found to be within limit with an accuracy of 89.47%.

3.4.15 Sabarmati Basin

During the flood season 2016, 19 forecasts (0.3% of 6239) were issued for 1 forecasting sites (1 Inflow) out of 2 (1 level and 1 inflow) sites. Out of 19 (19 Inflow) forecast issued, 18 (18 Inflow) forecasts were found to be within limit with an accuracy of 94.74%. No forecast was issued for one level forecast station in the basin.

3.4.16 Narmada Basin

During the flood season 2016, 14 forecasts (0.22% of 6239) were issued for 2 forecasting sites (2 Level) out of 4 (4 level) sites. Out of 14 forecast issued, 14 forecasts were found to be within limit with an accuracy of 100%. No forecast was issued for remaining two level forecast station in the basin.

3.4.17 Tapi Basin

During the flood season 2016, 137 forecasts (2.19% of 6239) were issued for 2 forecasting sites (2 Inflow) out of 3 (1 level and 2 Inflow) sites. Out of 137 forecast issued, 133 forecasts were found to be within limit with an accuracy of 97.08%. No forecast was issued for remaining one level forecast station in the basin.

3.4.18 West Flowing from Tapi to Tadri Basin

During the flood season 2016, 17 forecasts (0.27% of 6239) were issued for 2 forecasting sites (1 Level and 1 Inflow) out of 3 (2 level and 1 Inflow) sites. Out of 17 forecasts 4 Level and 13 Inflow) issued, 16 forecasts (3 Level and 13 Inflow) were found to be within limit with an accuracy of 94.12%. No forecast was issued for remaining one level forecast station in the basin.

3.4.19 West flowing rivers of Kutch and Saurashtra including Luni

During the flood season 2016, no inflow forecast was issued for 1 forecasting sites (1 Inflow).

The Basinwise – Riverwise flood forecasting information in India during flood season 2016 is given in **Annex-II.**

3.5 STATEWISE FLOOD FORECASTING PERFORMANCE

There are 20 states, one Union Territory of the Dadra & Nagar Haveli, and National Capital Territory of Delhi so far covered under the Flood Forecast and Warning Network of the Central Water Commission. The Statewise flood forecasting information in India during the flood season 2016, is given in **Annex –III.** Their salient features are as under:

3.5.1 Andhra Pradesh

In state of Andhra Pradesh, there were 12 (5 Level and 7 Inflow) forecasting sites. Forecasts were issued for 6 (2 Level and 4 Inflow) forecasting sites.

It is revealed that 92 forecasts (13 level and 79 inflow) were issued out of which 78 forecasts (13 level and 65 inflow) were within limits (84.78%). No forecasts were issued for 6 stations.

3.5.2 Arunachal Pradesh

Flood Forecasting activity was expanded to Arunachal Pradesh during 2016 flood season. One Level Forecast Station was operationalised at Passighat on river Siang during 2016. 94 Level Forecasts were issued for Passighat out of which 92 were within limit of accuracy (97.87%).

3.5.3 Assam

Flood Forecasting activity was expanded by one additional station at Badarpurghat in Barak Basin during 2016. In the state of Assam, there were 25 forecasting sites and all of them were level forecasting sites during 2016. Forecasts were issued for 26 sites. It is seen that during 2016 season, 2257 forecasts were issued out of which 2248 forecasts (99.60%) were found within limit of accuracy.

River Desang at Desangpani a flood monitoring station flowed in Unprecedented Flood Situation and at Flood Forecasting Station Nanglamoraghat flowed in High Flood Situation between 23rd and 26th April 2016 due to passage of severe weather system in the last week of April 2016 which was considered as pre-monsoon flood events.

Following Flood Forecast Stations River Brahmaputra at Dibrugarh, Neamatighat, Tezpur, Goalpara and Dhubri, River Jia-Bharali at N T Road Crossing, River Kopili at Kampur, River Beki at Road Bridge and River Sankosh at Golokganj flowed in High Flood Situation during the designated monsoon period.

Flood Monitoring Station on river Aie at N H Crossing also flowed in High Flood Situation during designated flood season 2016.

3.5.4 Bihar

In the state of Bihar, there were 32 level forecasting sites. Forecasts were issued for 28 sites during the year 2016. Out of 1451 forecasts issued during the flood season 2016, 1437 forecasts (99.04%) were found within limit of accuracy. No forecasts were issued for 4 sites.

River Ganga at Patna Gandhighat, Hathidah and Bhagalpur flowed in Unprecedented Flood Situation during 3rd week of August 2016.

Following Flood Forecasting Stations on Rivers Ganga at Patna Dighaghat, Kahalgaon, Sone at Maner, Burhigandak at Khagaria, River Kosi at Kursela, River Mahananda at Jhawa also flowed in High Flood Situation during 2016.

Following Flood Monitoring stations on River Gandak at Dumariaghat, River Bagmati at Runisaidpur, River Mahananda at Taibpur also flowed in High Flood Situation during 2016.

3.5.5 Chhattisgarh

In the state of Chhattisgarh there was one level flood forecasting site (i.e. Jagdalpur) on the Indravathi River (a tributary of the Godavari River). 4 flood forecast were issued for this station during the flood season 2016 out of which 4 (100%) were within the limits of accuracy.

One Flood Monitoring Site namely Kharra on river Rihand flowed in High Flood Situation during August 2016.

3.5.6 Gujarat

There were 11 (6 Level and 5 Inflow) forecasting sites in the state of Gujarat including five inflow forecasting sites. However, forecasts were issued for only 6 (2 Level and 4 Inflow) sites. Out of 86 forecasts issued (7 level and 79 inflow), 80 forecasts (4 level and 76 inflow) (93.20 %) were found within limits of accuracy during the flood season 2016. No forecasts were issued for 5 (4 Level and 1 Inflow) sites.

River Wakal at Jotasan a flood monitoring station flowed in High Flood Situation during August 2016.

3.5.7 Haryana

Data from Hathnikund Barrage were collected. However, no inflow forecasts were issued due to very little travel time available from base station.

3.5.8 Jammu and Kashmir

In the State of Jammu and Kashmir, one FF Site namely Rammunshibagh remained operationalised during 2016. However, as the water level did not cross warning level, no forecast was issued for the one FF site.

3.5.9 Jharkhand

Flood Forecasting Activity was expanded to two additional stations in Subarnarekha Basin of Jharkhand during 2016. In the state of Jharkhand, there were five inflow and two level flood forecasting sites due to the expansion of the activity. Flood forecasts were issued for all of them. During the flood season 2016, Out of 249 (63 level and 186 inflow) forecasts issued, 244 (62 level and 182 inflow) forecasts (97.99 %) were found within limit of accuracy.

One Flood Monitoring Site namely Japla on river Sone flowed in High Flood Situation during August 2016.

3.5.10 Karnataka

Flood Forecasting Activity was expanded to four additional stations in Cauvery Basin during 2016 by using rainfall runoff based mathematical model. There were 8 (1 Level and 7 Inflow) forecasting sites in the state of Karnataka. During the flood season 2016, forecasts were issued for 7 inflow forecast sites. Out of 351 forecasts (0 level and 351 inflow) issued, 221 (0 level and 221 inflow) forecasts (62.96%) were found within limit of accuracy.

3.5.11 Madhya Pradesh

Flood Forecasting Activity was expanded to one additional inflow forecast site in Sone basin during 2016. In the state of Madhya Pradesh, there were two level forecasting sites on the river Narmada and two inflow forecast sites at Gandhisagar on river Chambal and Bansagar Dam on river Sone during 2016. During the flood season 2016, forecasts were issued for all sites. Out of 36 forecasts issued (14 level and 22 inflow), 24 (14 level and 10 inflow) (66.67%) forecasts were found within the limit of accuracy.

3.5.12 Maharashtra

Flood Forecasting Activity was expanded to one inflow forecast site on river Wainganga with this there were 10 (& Level and 3 Inflow) forecasting sites, in the state of Maharashtra. During the flood season 2016, forecasts were issued for 3 (1 Level and 2 Inflow forecast) sites. Total 123 forecasts were issued (12 Level 111

inflow) during 2016 out of which 119 (11 Level and 108 inflow) were within limit (96.75%). No forecasts were issued for 7 stations.

One Flood Monitoring Site namely Nasik on river Godavari flowed in Unprecedented Flood Situation during first week of August 2016.

3.5.13 Odisha

In the state of Odisha, there were 12 (11 Level 1 Inflow) forecasting site. During the flood season 2016, 82 (15 level and 67 inflow) forecasts were issued for 4 forecast sites (3 Level and 1 Inflow) out of which 80 (14 level and 66 inflow) (97.56 %) were found within limit of accuracy. No forecasts were issued for remaining 8 flood forecasting sites.

3.5.14 Rajasthan

Flood Forecasting activity was expanded to Rajasthan during 2016 flood season. One Inflow Forecast Station was operationalised at Bisalpur Dam on river Banas (tributary of Chambal in Ganga Basin) during 2016. 7 Inflow Forecasts were issued out of which 7 were within limit of accuracy (100%).

Flood Monitoring Site on River Jakham at Dhariawad flowed in Unprecedented Flood Situation during August 2016.

3.5.15 Tamilnadu

Flood Forecasting activity was expanded to Tamilnadu during 2016 flood season. 5 Inflow Forecast sites were operationalised by using rainfall runoff based mathematical model. during 2016. 82 Inflow Forecasts were issued out of which 60 were within limit of accuracy (73.17%).

3.5.16 Telangana

Flood Forecasting activities were expanded to additional two sites with this there are 10 forecast stations (4 level and 6 inflow forecast stations) in the state of Telangana. Forecasts were issued for 9 (4 Level and 5 Inflow) Sites. 154 forecasts (28 Level and 126 Inflow) were issued in the State of Telangana during 2016. Out of which 134 (28 Level and 106 Inflow) were within limit of accuracy (87.01%). No forecasts were issued for the remaining site.

3.5.17 Tripura

There were two level forecasting sites in the state of Tripura namely, Kailashahar on river Manu and Sonamura on river Gumti. Forecast was not issued to both these stations as they did not cross warning level during the year 2016.

3.5.18 Uttarakhand

There were three level forecasting sites in the state of Uttarakhand, namely, Srinagar on the Alaknanda, Rishikesh and Haridwar on the main river Ganga. Forecasts were issued for all three stations in 2016. 25 forecasts were issued out of which 25 (100%) were within limit of accuracy.

3.5.19 Uttar Pradesh

Flood Forecasting Activity was expanded to one inflow forecast site in Rihand Sub-basin of Ganga Basin during 2016. With this expansion there were 36 (34 Level and 2 Inflow) flood forecasting sites in the state of Uttar Pradesh. During the flood season 2016, forecasts were issued for 30 stations (28 level and 2 inflow). Out of 676 forecasts (613 level and 63 inflow), 636 forecasts (577 level and 59 inflow) (94.08%) were found within limit of accuracy. No forecasts were issued for 6 sites.

Flood Forecasting Site Ballia on river Ganga flowed in Unprecedented Flood Situation during August 2016. Flood Monitoring Sites at Duddhi on river Kanhur and Kaimaha on river Urmil flowed in Unprecedented Flood Situation during August 2016.

Flood Forecasting Site Ghazipur on river Ganga and Balrampur on Rapti flowed in High Flood Situation during August 2016. Flood Monitoring Station at Kachhla Bridge and Sitamarhi on river Ganga, Paliakalan on river Sharda, Bhinga on river Ghaghra also flowed in High Flood Situation during August 2016.

Flood Monitoring Site Naugaon on river Yamuna flowed in High Flood Situation during July 2016.

3.5.20 West Bengal

In the state of West Bengal, there were 14 (11 Level and 3 Inflow) flood forecasting sites. During the flood season 2016, forecasts were issued for 11 sites (8 level and 3 inflow stations). Out of 449 forecasts (352 level and 97 inflow), 439 forecasts (342 level and 97 inflow) (97.77%) were found within limit of accuracy. No forecasts were issued for three level forecast sites.

3.5.21 Daman & Diu

In the Union Territory of Daman & Diu, there was one flood forecasting site at Daman on river Damanganga. No flood forecast was issued for the site during the flood season 2016.

3.5.22 NCT of Delhi

There are two flood forecasting sites in the National Capital Territory of Delhi (NCT of Delhi), namely, Delhi Railway Bridge on the Yamuna River and Dhansa Regulator at Delhi and Haryana border on the Sahibi river, a tributary of Yamuna River which is commonly known by name of Najafgarh drain within Delhi town. Both the sites are level forecasting sites. Forecast was issued for Delhi Railway Bridge only. During the flood season 2016, Out of 21 forecasts, 20 forecasts (95.24%) were within limits of accuracy.

The performance of flood forecasting Stations (Divisionwise) in India during flood season 2016 is given in **Annex-IV.**

The Major Basin/Statewise performance of flood forecasting stations in India during flood season is given in **Annex-V to VI**.

Details of unprecedented and high flood events in the various river systems covered under the Flood Forecasting & Warning Network are given in **Annex- VIII** and **Annex-IX** respectively for the year 2016**.** Moderate and low flood events were observed as listed at **Annex-X to XII,** for the year 2016.

3.6 AN OVERVIEW OF FLOOD FORECASTING PERFORMANCE

During the flood season 2016, an average number of flood forecasts issued per forecasting site were 31.35. The number of forecasting sites where the performance accuracy of the issued forecasts was found to be above 95.35 % (National average for flood season 2016) was 107 sites (53.76 %) which include 82 sites (41.21 %) where flood forecasting stations having 100% accurate forecasts. The number of forecasting sites where the performance accuracy was found greater than 97% as fixed in the Results Framework Document (RFD) of Ministry of Water Resources is 102 (51.26%).

The flood forecasting performance of the level forecasting as well as inflow forecasting sites from 2000 to 2016 is given in **Annex-VII** and from 2000 to 2016 as **Fig.3.1.**

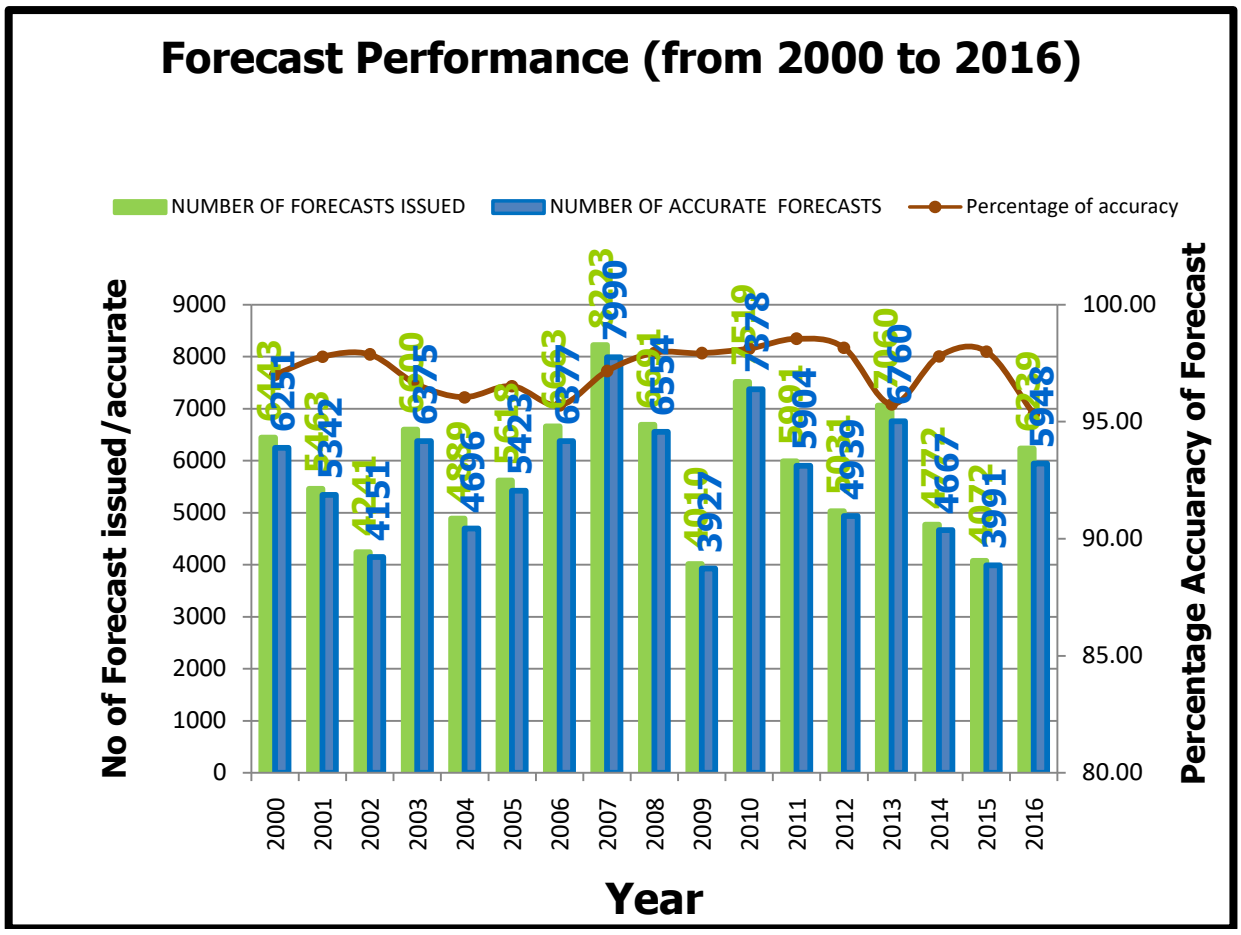


Fig.3.1 Flood Forecast Performance from 2000 to 2016

3.6.1 Overall Performance

Thus, in the nine major river systems in the country where "Flood Forecasting & Warning Network" of the Central Water Commission exists, and floods are being monitored, the accuracy of the forecasting performance during 2016 season varies from a maximum of 100% for Brahmani and Baitarni, Narmada and East Flowing rivers between Mahanadi and Pennar to a minimum of 54.22% for the Cauvery Basin. The overall accuracy performance was of the order of 95.34% for the country as a whole.

Sitewise "Forecast Performance" out of 176 operational sites in flood season 2016 is shown in **Table 3.1**.

Table 3.1 Site wise "Forecast Performance" of flood forecasting sites of CWC in Flood Season, 2016

Sl. No.	Details of sites within different range of permissible limit of accuracy (±15cm,±20%cumec)	Flood Season 2016	
		No. of Sites	% age
1	Sites with performance accuracy between 0.0 % to 25.0%	2	1.33%
2	Sites with performance accuracy between 25.1 % to 50.0%	5	3.33%
3	Sites with performance accuracy between 50.1 % to 75.0%	16	10.67%
4	Sites with performance accuracy between 75.1 % to 99.99%	45	30.00%
5	Sites with 100% performance accuracy i.e. where all forecasts issued were within permissible limit of accuracy	82	54.67%
6	Total sites where forecasts were issued	150	100

CHAPTER – 4
SIGNIFICANT FLOOD EVENTS

4.1 GENERAL

The Flood Forecasting Activity was expanded to 199 locations as explained in previous Chapter. All the 199 flood forecasting sites including 48 inflow forecasting sites were operational i.e. where desired hydro-meteorological data was observed/ collected, during the flood season 2016. Unprecedented floods, exceeding previous highest flood levels (HFL), were observed in four sites namely Ballia in Ballia district of Uttar Pradesh, Patna Gandhighat and Hathidah in Patna district and Bhagalpur in Bhagalpur district of Bihar during the year 2016. The levels were recorded within 0.5 m of their respective H.F.L at 18 Flood Forecasting sites.

4.2 AN OVERVIEW OF FORECAST EVENTS

The highlight of this year is as follows:

4.2.1 Unprecedented Flood Situation

4.2.1.1 Middle Reaches of main Ganga

Very heavy to exceptionally very heavy rainfall recorded during the period 18th to 22nd August in southern catchment areas of Ganga and its southern tributaries in association with movement of severe weather system River Ganga flowed in Unprecedented Flood Situation at 4 FF stations namely **Ballia** in Ballia district of Uttar Pradesh, **Patna Gandhighat, Hathidah** in Patna district and **Bhagalpur** in Bhagalpur district of Bihar during 20th to 30th August 2016.

4.2.2 High Flood events

High Flood Situation was witnessed in 17 flood forecasting stations in the rivers Brahmaputra at **Dibrugarh, Neamatighat, Tezpur, Goalpara and Dhubri**, Kopili at **Kampur**, River Jia-Bharali at **N T Road Crossing**, River Beki at **Road Bridge** and River Sankosh at **Golokganj** in Assam, River Sone at **Maner**, River Ganga at **Patna Dighaghat, Kahalgaon**, River Burhi Gandak at **Khagaria**, River Kosi at **Kursela**, River Mahananda at **Jhawa** in Bihar, River Ganga at **Ghazipur**, River Rapti at **Balrampur** during designated Flood Season 2016.

River Desang at **Nanglamoraghat** flowed in High Flood Situation during April 2016 which was pre-flood season in association with very heavy rainfall during last week of April 2016.

4.2.3 Moderate to Low flood events and inflow forecasts

Moderate to low flood events were witnessed in 89 stations and inflow forecasts were issued in 40 Stations.

4.2.4 No Forecasts

No flood forecasts were issued at 49 flood forecast stations (41 level and 8inflow) as they did not cross warning level or flows above criteria in case of inflow forecasts.

Statement showing number of stations where level/inflow crossed Warning Level

State	Level					Inflow	
	No of Stations where River Warning Level exceeded	No. of Station where Danger Level exceeded	No of Stations where within 0.5 m of Highest Flood Level exceeded	No of Stations where Highest Flood exceeded	No of station where river level remained below Warning Level	No. of Dams/ Barrages where inflows exceeded threshold limit	No. of Dams/ Barrages where inflows not exceeded threshold limit
Andhra Pradesh	2	0	0	0	3	4	3
Arunachal Pradesh	0	1	0	0	0	0	0
Assam	2	14	9	0	0	0	0
Bihar	6	13	6	3	4	0	0
Chhattisgarh	1	0	0	0	0	0	0
Gujarat	2	0	0	0	4	4	1
Haryana	0	0	0	0	0	0	1
Jammu and Kashmir	0	0	0	0	1	0	0
Jharkhand	0	2	0	0	0	5	0
Karnataka	0	0	0	0	1	7	0
Madhya Pradesh	1	1	0	0	0	2	0
Maharashtra	0	1	0	0	6	2	1
Odisha	1	2	0	0	8	1	0
Rajasthan	0	0	0	0	0	1	0
Tripura	0	0	0	0	2	0	0
Tamilnadu	0	0	0	0	0	3	2
Telangana	3	0	0	0	1	6	0
Uttarakhand	3	0	0	0	0	0	0
Uttar Pradesh	7	18	2	1	6	2	0
West Bengal	4	4	0	0	3	3	0
Daman & Diu	0	0	0	0	1	0	0
Delhi	0	1	0	0	1	0	0
Total	32	57	17	4	41	40	8

4.2.5 Flood in Ganga Basin

In year 2016, there was unprecedented flood in Ganga basin during the period 19th to 30th August 2016. River Ganga was flowing above the danger level at Ballia in UP, Gandhighat (Patna), Hathidah and Bhagalpur in Bihar. According to IMD two low pressure systems were active during the period 1st to 10th August which affected the areas of Gangetic West Bengal, Jharkhand, Madhya Pradesh and East Rajasthan. Consequent to these two low pressure systems heavy to very heavy rainfall occurred in the sub-catchments of Koel, Rihand, Sone, Tauns, Ken, Betwa, Urmil, Lower Chambal, Kalisindh, Gambhir, Yamuna and Ganga downstream of Dalmau sub-catchments.

Meanwhile a slow moving deep depression also formed in Gangetic West Bengal and adjoining Bangladesh on 16th August 2016 and moved very slowly west wards after intensifying from 16th to 21st August 2016. It finally weakened in East Rajasthan. Rainfall of heavy to very heavy intensity at a few places with extremely heavy rainfall at isolated places were witnessed in the basins of Koel, Rihand, Sone, Tons, Ken, Betwa, Urmil, Lower Chambal, Kalisindh, Gambhir, Yamuna and Ganga downstream of Dalmau sub-catchments. The rainfall above 50 mm in Ganga Basin from 1st August 2016 to 5th September 2016 is given in Table-4.1.

Table-4.1: Recorded rainfall (mm) at different locations of Ganga basin during 1st August 2016 to 3rd September 2016

1st Aug:	Chittorgarh: 54.4, Banda: 54.0
2nd Aug:	Manderial: 72.8, Chittorgarh: 58.0
3rd Aug:	Bigod: 54.0.
5th Aug:	Tonk: 66.0, Bigod: 50.8
8th Aug:	Chittorgarh: 177.0, Bigod: 100.2, Mirzapur: 53.0.
9th Aug:	Chittorgarh: 445.0, Bigod: 68.0,
12th Aug:	Rihand Dam: 183.0, Daltonganj: 142.8, Chopan: 135.0, Chittorgarh: 73.8
13th Aug:	Rihand Dam: 248.0, Satna: 58.4
14th Aug:	Banda: 87.2, Pratappur: 50.4
15th Aug:	Garrauli: 57.0, Pratappur: 54.8
16th Aug:	Daltonganj: 66.2
17th Aug:	Satna: 172.2, Kaimaha: 124.4, Pratappur: 116.2, Ballia: 50.4
18th Aug:	Rihand Dam: 123.0
19th Aug:	Rihand Dam: 344.0, Bansagar Dam: 177.8, Banda: 144.2, Satna: 120 Kaimaha: 113.0, Mirzapur: 70.4, Chopan: 70.4
20th Aug:	Bigod: 83.2
21st Aug:	Chittorgarh: 55.6, Bigod: 51.0

23rd Aug:	Rihand Dam: 110.0, Mirzapur: 75.4, Chopan: 59.6
28th Aug:	Bigod: 51.0.
1st Sept:	Garrauli: 108.0
2nd Sept:	Ballia: 74.6
3rd Sept:	Ballia: 88.4.

Due to spells of rainfall occurred during the period 1st to 10th August, the river levels were rising in most of the sub-basins of Ganga basin. On 11th August 2016 Ganga was flowing above the danger level at Ballia, Patna, Hathidah and Bhagalpur. On 16th August 2016 when the depression formed river levels at Ballia, Patna, Hathidah and Bhagalpur were almost nearly 0.5 m to 1 m above Danger Level.

The weather system formed on 16th August 2016 was a slow moving and it gave rise to continuous heavy to very heavy rainfall with a highest rainfall of around 350 mm at Rihand dam on 18th August 2016. The entire Sone catchment including its tributaries Rihand, North Koel etc were affected by very heavy continuous rainfall as the system stagnated near Daltonganj for almost 18 to 24 hours on 18th. This was followed by heavy spells of rain in Upper Sone Catchment on 19th and consequently the Bansagar Dam released a peak of 15,600 cumec for about 21 hours from 2100 hrs of 18th to 18 hrs on 19th August 2016 before reducing the outflow. During the same time Rihand Dam had also released around 5000-6000 cumec which also added to the flow into Sone.

The water level at Patna Gandhighat was already above the Danger Level and at the same time water level at Ballia crossed the previous HFL. The combined effect of Ganga and Sone was felt at Patna Gandhighat which crossed the HFL of 50.27 m and attained a peak level of 50.52 m on 20th August 2016 by 1800 hrs. Further downstream, river Crossed HFLs at Hathidah and Bhagalpur also and flowed above HFL for a number of days.

In order to estimate the possible reasons of year 2016 flood in Bihar the daily discharge of different contributing rivers has been plotted and the same is presented in Fig.4.1. The flood volume above 55000 cumec was about 12 BCM.

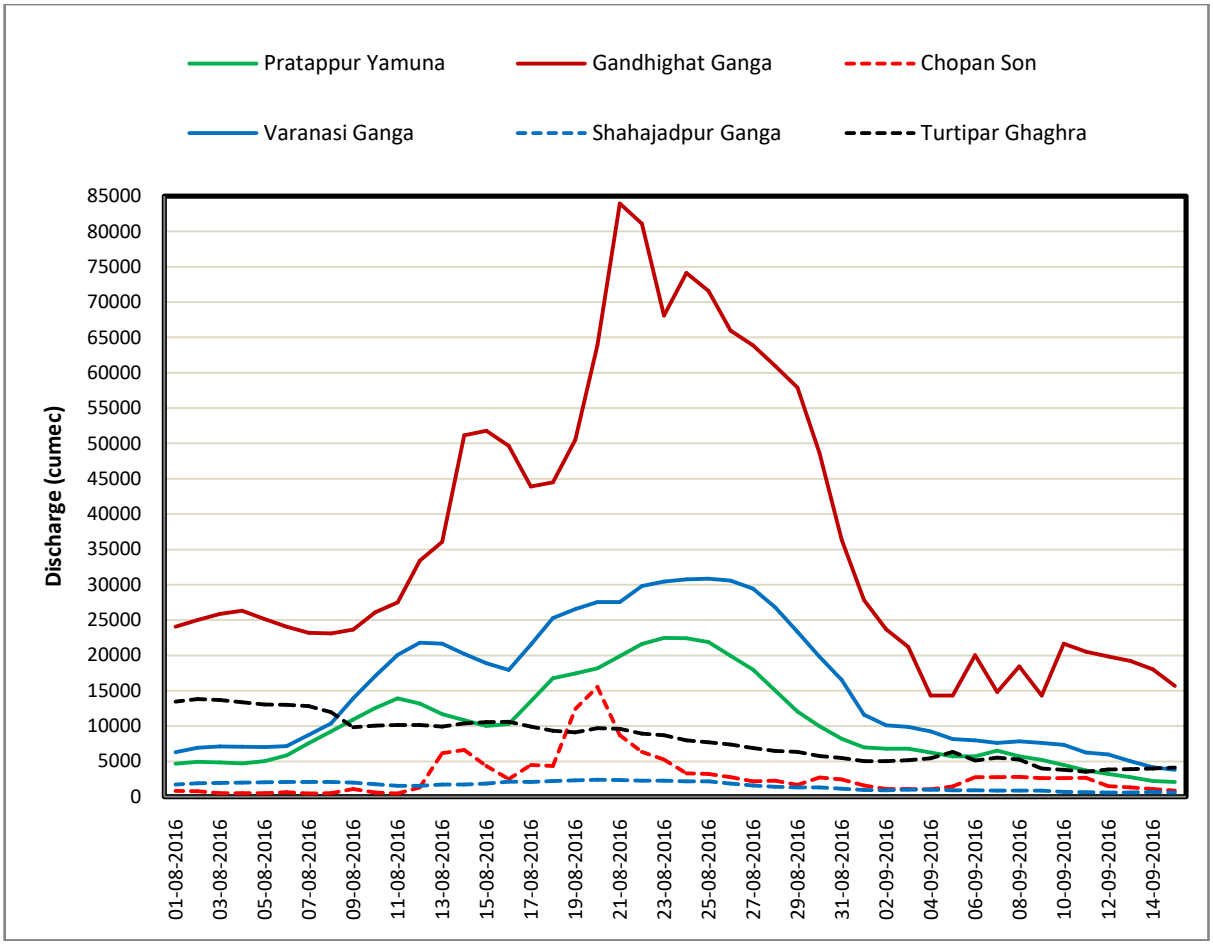


Fig.4.1: Flood hydrograph at Gandhighat, Chopan, Pratappur, Shahjadpur and Turtipar

From the above plots it can be stated that during August 2016 the flood at Patna was due to very significant contributions from Yamuna, Sone and Ghaghra rivers. River Tauns joins river Ganga downstream of Allahabad and discharge at Varanasi was about 7000 cumec to 9000 cumec more than the combined discharge of Yamuna at Pratappur and Ganga at Shahjadpur. This difference in discharge is the contribution from Tauns river.

A comparison plot of combined discharge of Ganga at Varanasi (lagged by 3 days), Sone at Chopan (lagged by 2 days) and Ghaghra at Turtipar (lagged by 1 day) is presented with the river Ganga discharge at Gandhighat (Patna) in Figure-4.2. The lag has been considered corresponding to travel time of flood discharge from respective locations to Patna.

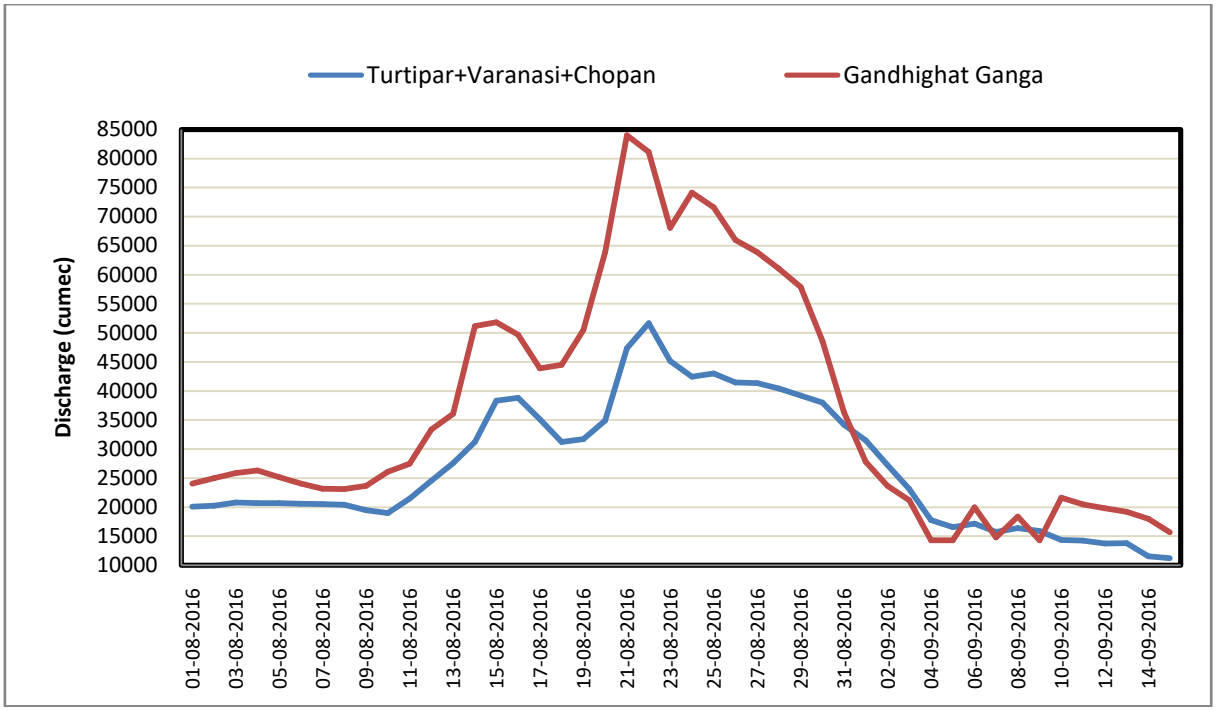


Fig.4.2: Flood hydrograph of total discharge of Varanasi, Turtipar and Chopan in comparison to observed discharge at Gandhighat Patna

From the above plot it can be conclude that the contribution of intervening catchment between Patna and above mentioned G&D sites was about 30,000 to 35,000 cumec in the peak segment of the flood hydrograph (discharge more than 60,000 cumec) at Gandhighat, Patna. The continuous contribution of substantial inflow from Sone, Upstream part of Ganga and Ghaghra resulted in slow fall of river stage at Patna and further downstream.

4.2.6 Very Severe Cyclonic Storm 'Vardah'

A low pressure area developed over south Andaman Sea & adjoining Sumatra in the morning of 4th December. It lay as a well marked low pressure area in the night of 5th over south Andaman Sea and adjoining southeast Bay of Bengal (BoB). Moving westwards, it concentrated into a depression (D) over southeast BOB in the afternoon of 6th December. Moving northwestwards initially and northwards thereafter, it intensified into a deep depression (DD) in the midnight of 7th December, into a cyclonic storm (CS) "**VARDAH**" in the morning of 8th and into a severe cyclonic storm (SCS) in the midnight of 9th. It then moved west-northwestwards and intensified further into a very severe cyclonic storm (VSCS) over westcentral and adjoining south BOB in the evening of 10th December. It then moved nearly westwards and reached its peak intensity of about 130 kmph on 11th December evening and maintained the same intensity till noon of 12th December. It weakened into an SCS at the time of landfall and crossed north Tamil Nadu coast near Chennai during 1500-1700 hrs IST of 12th December 2016 with a wind speed of 110 kmph gusting to 125 kmph. After the landfall, the SCS moved westsouthwestwards and weakened into a CS in the evening, into a DD in the midnight of 12th and into D in the early morning of 13th.

Continuing its west-southwestwards movement, it weakened into a well marked low pressure area in the forenoon of 13th December.

The salient features of the system are as follows.

(i) It was the first severe cyclonic storm of the year 2016.

(ii) Vardah was the fourth consecutive cyclone with recurving track after cyclones Roanu, Kyant and Nada during the year, as it changed its track from initial northwards movement to west-northwestwards and then west-southwestwards after landfall.

(iii) Unlike the previous two cyclones in the post-monsoon season, it crossed the coast with the cyclone intensity.

(iv) The peak maximum sustained wind speed of the cyclone was 130 kmph gusting to 145 kmph over westcentral BOB. However, the maximum sustained wind speed of the cyclone was 110 kmph gusting to 125 kmph at the time of landfall.

(v) The life period of cyclone was 159 hours (6.6 days) against the normal of 4.7 days over north Indian Ocean during post-monsoon season for VSCS category.

(vi) The track length of the cyclone was 1795 km.

(vii) The 12 hour average translational speed of the cyclone was 5.2 kmph against normal of 13 kmph over BOB for post-monsoon season. However, prior to landfall, the cyclone moved with a speed of about 15-20 kmph.

(viii) Lowest estimated central pressure (ECP) was 975.0 hPa with a pressure drop of 26 hPa.

(ix) The Accumulated Cyclone Energy (ACE) which is a measure of damage potential was about 5.99 X 10^4 $knot^2$.

(x) The Power Dissipation Index which is a measure of loss due to a CS was 3.61 X 10^6 $knot^3$.

(xi) There was rapid weakening of the system from 0600 to 1800 UTC of 12th Dec as the maximum sustained wind speed decreased from 70 knots to 30 knots during this period.

(xii) During genesis stage cyclone Vardah caused heavy to very heavy rainfall over Andaman & Nicobar Islands and squally wind speed reaching 50-60 kmph prevailed along and off Andaman & Nicobar Islands.

(xiii) It caused heavy to very heavy rainfall at many places with isolated extremely heavy rainfall over Chennai, Thiruvallur, Kanchipuram districts of Tamil Nadu and heavy to very heavy rainfall at a few places over Nellore district of Andhra Pradesh

The maximum gale wind of about 100-110 kmph gusting to 125 kmph has been reported in these districts.

Chief Amounts of Rainfall on 13th December 2016 in Tamilnadu and Andhra Pradesh (in cm) is given as Under:

Tamilnadu
Satyabama University (Kanchipuram)-38, Kattukuppam (Kanchipuram)-34, Kanchipuram (Kanchipuram)-28, Kalavai (Vellore)-23, Poonamallee (Thiruvallur)-22, Chembarabakkam (Thiruvallur)-21, Meenambakkam-20, Sriperumbudur (Kanchipuram)- 17, Chembarabakkam (Thiruvallur)-16, Yercaud (Salem)-15, Alangayam (Vellore)-15, Tambaram (Kanchipuram)-14, Nungambakkam-12, Vellore-11, Melalathur (Vellore)-9, Tirppattur-8, Poondi (Thiruvallur)-9, Mahabalipuram (Kanchipuram), Uthiramerur (Kanchipuram), Tirupattur (Vellore), Maduranthagam (Kanchipuram), Krishnagiri (Krishnagiri), Shoolagiri (Krishnagiri), Hosur (Krishnagiri), Vandavasi (Tiruvannamalai), Marakkanam (Villupraum), Vaniyambadi (Vellore), Gudiyatham (Vellore) and Cheyyur (Kanchipuram) -7 each

Andhra Pradesh:
Atmakur (Nellore) 13, Vinjamur (Nellore) 12, Udayagiri (Nellore) 11, Sullurpeta (Nellore) 9, Kandukur (Prakasam) 9, Kavali (Nellore) 8, Nellore (Nellore) 8, Veligandla (Prakasam) 8, Rapur (Nellore) 7, Gudur (Nellore) 7, Venkatagiri (Nellore) 7, Shar (Nellore) 7, Tirumalla (Chittoor) 15, Puttur (Chittoor) 14, Nagari (Chittoor) 12, Chittoor 10, Kodur (Cuddapah) 10, Satyavedu (Chittoor) 10, Venkatagiri Kota (Chittoor) 9, Palasamudram (Chittoor) 9, Nambulipulikunta (Anantapur) 7, Thottambedu (Chittoor) 7, Tirupati Aero (Chittoor) 7, Atlur (Cuddapah) 7, Rajamet (Cuddapah) 7, Mandapalle (Chittoor) 7, Kuppam (Chittoor) 7, Pakala (Chittoor) 7, Sambepalle (Cuddapah) 7, Royachoti (Cuddapah) 7.

(xiv) The maximum storm surge of about 1 meter inundated low lying areas of Chennai, Thiruvallur districts of Tamil Nadu and Nellore district of Andhra Pradesh at the time of landfall.

4.2.6.1 Hydrological Situation in association with Vardah

In spite of the heavy to very heavy rainfall with isolated extremely heavy rainfall in the catchment areas of Chembarampakkam Lake as the reservoir level was very low, no major flooding occurred during the passage of Vardah in Chennai city. An advisory forecast indicating the unlikelihood of flood was issued to all concerned beneficiaries during the above period. Advisory inflow forecasts for Poondi Satyamurthy Reservoir and Chembarampakkam Lake in Thiruvallur district of Tamilnadu was also issued during the above period. River Palar at Chengalpattu an Hydrological Observation Station maintained by Central Water Commission in Kanchipuram district also flowed very near to High Flood Situation.

4.12.7 Statistical Analysis of Flood Situations during the last 10 years

A Statistical analysis of flood situations during the last 10 years (2007-2016) have been carried out using the data on number of times the flood forecasting stations observed in Moderate, High and Unprecedented Flood Situation. For the purpose, data have been segregated for Moderate Flood and for High & Unprecedented Floods together during the last 10 years period. The details for all the 147 level forecast stations which existed for the past 10 years were used in the study. The number of years where a Flood Forecasting station observed Moderate Flood Situation and High and Unprecedented Flood Situation is given as Fig. 4.3 and Fig. 4.4.

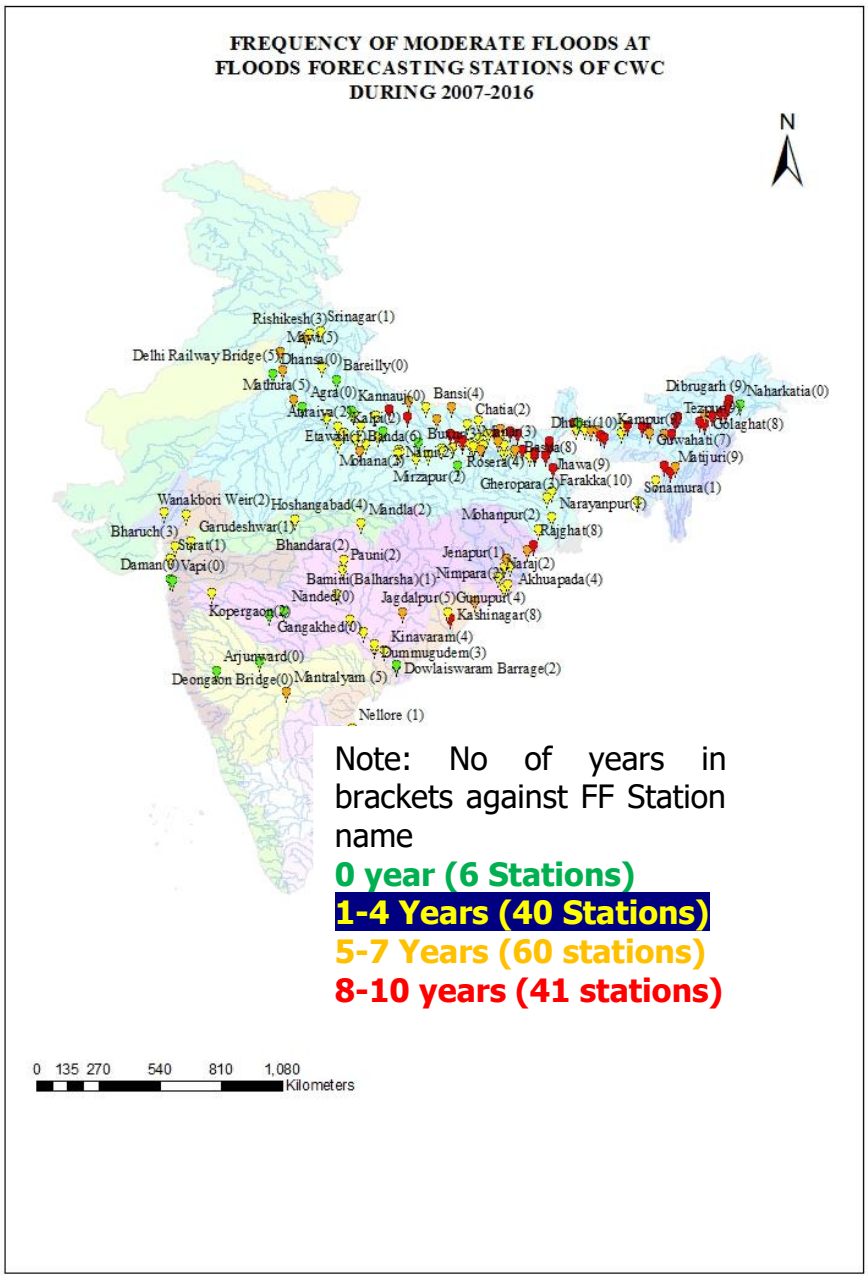


Fig.4.3: Frequency of Moderate Floods at Flood Forecasting Station during the period 2007-2016

From the Fig. 4.3 it can be seen that most of the stations in Brahmaputra and Barak basins, Ganga and its north bank tributaries have observed Moderate Flood Situation quite frequently.

However, the trend of rivers flowing in Moderate flood is also being witnessed in Wainganga, Wardha, Indravathi and Lower Godavari sub-basins of Godavari basin, Tungabhadra sub-basin of Krishna basin, Pennar, Narmada, Subarnarekha, Brahmani and Baitarni, Mahanadi and East Flowing rivers between Mahanadi and Pennar.

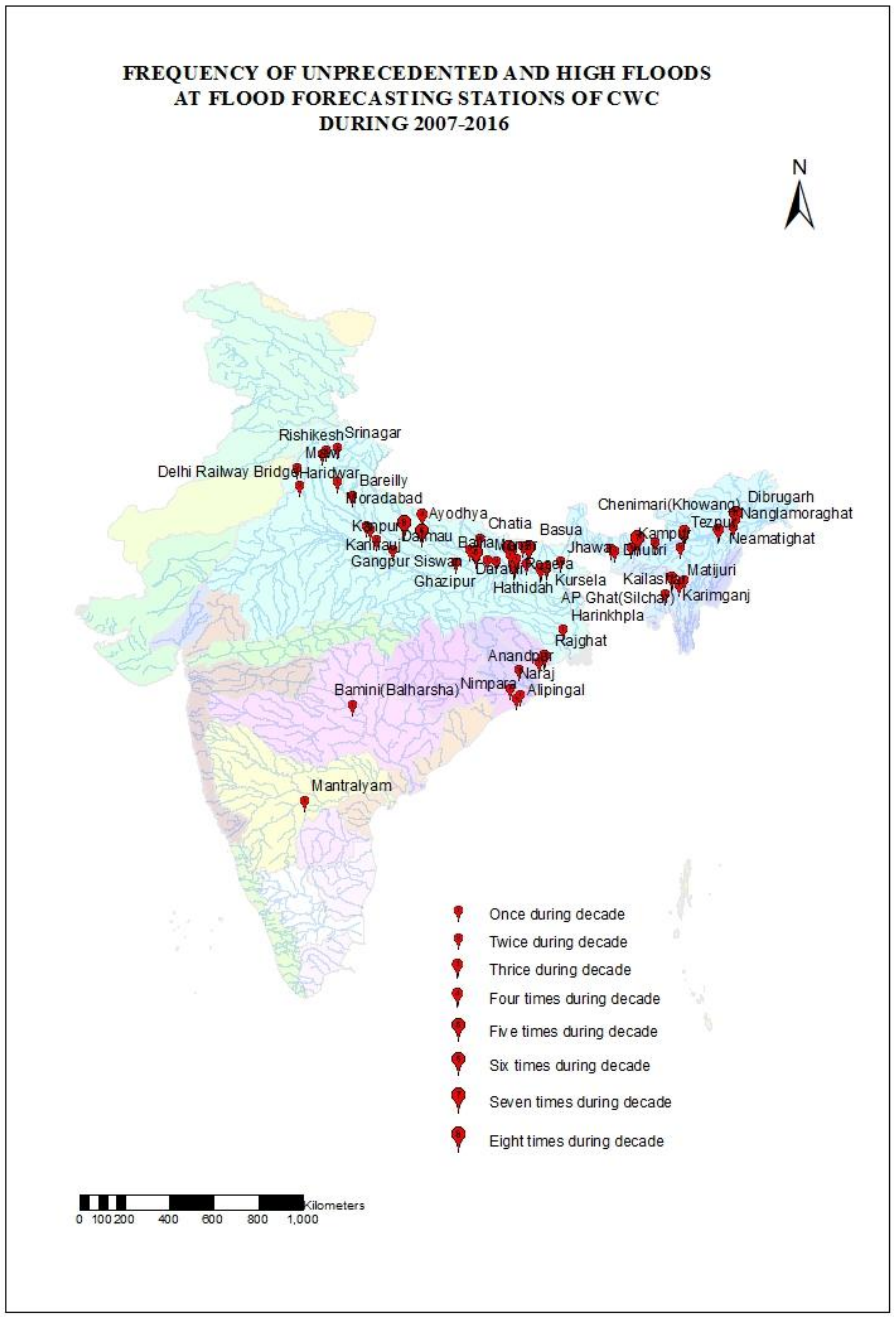


Fig.4.4: Frequency of High and Unprecedented Floods at Flood Forecasting Station during the period 2007-2016

From the Fig. 4.4 it can be seen that most of the stations in Brahmaputra and Barak basins, Ganga and their north bank tributaries have flowed in High & Unprecedented Flood Situations quite frequently. However, the trend of rivers flowing in High and Unprecedented flood is also being witnessed in Wardha sub-basin of Godavari, Tungabhadra sub-basin of Krishna, Subarnarekha, Brahmani, Baitarni and Mahanadi basins.

CHAPTER 5

RESPONSE FROM USER AGENCIES

5.1 General

Central Water Commission performs the Flood Forecasting and Warning job on flood prone interstate river basins in the country. It issues the forecast to the users such as various civil and engineering departments of the state and central governments including, railway, defense, revenues authorities, public sector undertakings besides National Disaster Management Cell in the Ministry of Home Affairs, who are responsible for taking timely flood fighting measures, rescue operations including shifting of flood affected people to safer places etc.

Though the various state government agencies in-charge of the flood management and relief operations generally do not give their views in writing on usefulness of the flood forecasting activities of CWC, yet some of them do write to the Central Water Commission conveying their views on the usefulness of the flood forecasts received by them.

5.2 Appreciation letters received during flood season 2016

Abstract of some of the messages received by our field unit during the flood season 2016 are given below:

5.2.1 Additional Commissioner Relief, Ex-Officio Additional Secretary to Government, Revenue & Disaster Management Department (Special Relief), Government of Odisha, Bhubaneswar-751001. Lr. no: 5475/R&DM (SR) dated 01.12.2016

"Inviting reference to the above, I am directed to say that monsoon 2016, CWC has constantly monitored the water level in different major rivers and shared the information with State Emergency Operation Centre every 3 hours. Water Level Forecasts were also received from CWC in High Flood Situations. These helped the Govt. authorities remain updated and prepared to face the flood situation. Suggestion: The flood warning with water levels at the time of floods at different gauge stations of major rivers, no. of sluice gates opened/to be opened and areas to be inundated may be transmitted every hours by WAYSMS to SRC and DRC."

5.2.2 Office of Engineer-in-Chief, Water Resources, Odisha, Bhubaneshwar, Odisha Lr. No: FC-II-CWC-28/10/41489 dated 26/11/2016.

"I am directed to furnish herewith the utility of flood forecasts as per your letter under reference that the the flood wing of Department of Water Resources dealing with flood problems of State has always sought inputs like flood information and flood warnings to combat the gigantic task of flood control and flood management in all river basins of the state. For the flood 2016, we have received the forecast for different rivers of the State. The same

has been distributed to all concerned authorities in time. I feel great to mention here that the availability of such facilities in form of supply of hydro-meteorological information and situation forecast etc (round the clock) from pioneer organisations like CWC & IMD have made it possible time and again to overcome successfully the flood exigencies in time and with better preparedness. As an active user of online data and forecast of CWC, I do express my deep thanks and gratitude to CWC organisation. It is to further request that to make the system little more efficient, consideration to the following points may be given:

1. Some additional forecasting stations in flood prone areas of Odisha are needed.
2. The flood data i.e. river gauges, discharge, flood forecasts and rainfall data etc may please be provided to this office through e-mail service. Our e-mail address is celmbbbsr@yahoo.co.in

5.2.3 Executive Engineer, R W Division, Supaul, Government of Bihar. Lr. no: 462/ Supaul dated 21.03.2017 (*Translated from Hindi Version*)

On the above subject, it is stated that timely availability of flood forecasting related information and Daily Flood Water Level Report for year 2016 was very useful for flood preparedness related activities. The work done by your office is extremely appreciable.

5.2.4 Executive Engineer, Flood Control Sub Division, Rosera (Samastipur) Letter No. 159, dated 17/03/2017 (translated from Hindi).

On the above subject, it is stated that information provided by your office in respect of water level and flood forecast is very satisfactory and appreciable. Hope that, same cooperation shall continue in future too.

ANNEXURES-I to XIII

Salient Features of Flood Forecasting Stations maintained by Central Water Commission

S.No	Name of FF Station/Type	River/Basin	Nearest Town/Vill/District/State	Lat (N)	Long (E)	Base Station (TT in hrs)	Div/Circle/ Orgn	Met Sub Division as per IMD	Mode of Data Collection	Methodology/ Model used for FF Formulation
1	Rammunshibagh (Srinagar)	Jhelum/ Indus	Srinagar/Jammu and Kashmir	34.06	74.86	1.1 Sangam 1.2 Khanabal 1.3 Nunwan	CD, Jammu / Dir (M), Jammu/ IBO		Telephone/ Mobile/ Telemtry	Rainfall Runoff Model
2	Srinagar	Alaknanda/Ganga	Srinagar/Garhwal/ Uttarakhand	30.22	78.78	2.1 Rudraprayag (06)	HGD/HOCD/UGBO	Uttarakhand	Wireless/ Telemetry	Conventional
3	Rishikesh	Ganga/Ganga	Rishikesh/Dehradun/Uttarakhand	30.11	78.31	3.1 Deoprayag (08) 3.2 Marora (05)	HGD/HOCD/ UGBO	Uttarakhand	Wireless/ Telemetry	Conventional
4	Hardwar	Ganga/Ganga	Hardwar/Hardwar/ Uttarakhand	29.98	78.19	4.1 Deoprayag (09) 4.2 Marora (06)	HGD/HOCD/ UGBO	Uttarakhand	Wireless/ Telemetry	Conventional
5	Moradabad	Ramganga/Ganga	Moradabad/Moradabad/Uttar Pradesh	28.83	78.80	5.1 Kalagarh (36)	MGD2/HOCD/ UGBO	West Uttar Prasdesh	Wireless/ Telemetry	Conventional
6	Bareilly	Ramganga/Ganga	Bareilly/Bareilly/ Uttar pradesh	28.30	79.37	6.1 Moradabad (28)	MGD2/HOCD/ UGBO	West Uttar Prasdesh	Wireless/ Telemetry	Conventional
7	Kannauj	Ganga/Ganga	Kannauj/Kannauj/ Uttar Pradesh	27.02	79.97	7.1 Narora (D/s) (48)	MGD2/HOCD/ UGBO	West Uttar Prasdesh	Wireless	Conventional
8	Ankinghat	Ganga/Ganga	Ankinghat/Kanpur/ Uttar Pradesh	26.93	80.03	8.1 Narora (D/s) (48) 8.2 Bareilly (48) 8.3 Fathegarh (12) 8.4 Dabri (12)	MGD2/HOCD/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
9	Kanpur	Ganga/Ganga	Kanpur/Kanpur/ Uttar Pradesh	26.47	80.38	9.1 Fathegarh (24) 9.2 Dabri (24) 9.3 Ankinghat (12)	MGD2/HOCD/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
10	Dalmau	Ganga/Ganga	Rae-barerilly/ Rae-barerilly/ Uttar Pradesh	26.06	81.03	10.1 Ankninghat (28) 10.2 Kanpur (16)	MGD2/HOCD/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
11	Phaphamau	Ganga/Ganga	Allahabad/ Allahabad/ Uttar Pradesh	25.47	83.11	11.1 Kanpur (30) 11.2 Chillaghat (24)	MGD3/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
12	Mawi	Yamuna/Ganga	Panipat/ Muzzafarpur/ Uttar Pradesh	29.38	77.07	12.1 Kalanur (18-30)	UYD/HOCN/ YBO	West Uttar Pradesh	Wireless/ Telemetry	Conventional
13	Delhi Railway Bridge	Yamuna/Ganga	Delhi/Delhi/ NCT Delhi	28.66	77.25	13.1 Mawi (18-32)	UYD/HOCN/ YBO	Haryana Chandigarh& Delhi	Wireless/ Telemetry	Conventional

S.No	Name of FF Station/Type	River/Basin	Nearest Town/Vill/District/State	Lat (N)	Long (E)	Base Station (TT in hrs)	Div/Circle/ Orgn	Met Sub Division as per IMD	Mode of Data Collection	Methodology/ Model used for FF Formulation
14	Dhansa Regulator	Sahibi/Yamuna/ Ganga	Delhi/Delhi/ NCT Delhi	28.53	76.87	14.1 Dadri (48) 14.2 Masani (48)	UYD/HOCN/ YBO	Haryana Chandigarh& Delhi	Wireless	Conventional
15	Mathura	Yamuna/Ganga	Mathura/Mathura/ Uttar Pradesh	27.51	77.69	15.1 Mohana (20-33)	UYD/HOCN/ YBO	West Uttar Pradesh	Wireless/ Telemetry	Conventional
16	Agra	Yamuna/Ganga	Agra/Agra/ Uttar Pradesh	27.19	78.03	16.1 Mathura (216-4)	LYD/HOCN/ YBO	West Uttar Pradesh	Wireless/ Telemetry	Conventional
17	Etawah	Yamuna/Ganga	Etawah/Etawah/ Uttar Pradesh	26.75	78.99	17.1 Agra (20-45)	LYD/HOCN/ YBO	West Uttar Pradesh	Wireless/ Telemetry	Conventional
18	Auraiya	Yamuna/Ganga	Auraiya/Auraiya/ Uttar Pradesh	26.42	79.48	18.1 Etawah (21-24) 18.2 Dhaulpur (15-36)	LYD/HOCN/ YBO	West Uttar Pradesh	Wireless/ Telemetry	Conventional
19	Kalpi	Yamuna/Ganga	Kalpi/Jalaun/ Uttar Pradesh	26.13	79.76	19.1 Etawah (21-27) 19.2 Dhaulpur (15-42)	LYD/HOCN/ YBO	West Uttar Pradesh	Wireless/ Telemetry	Conventional
20	Hamirpur	Yamuna/Ganga	Hamirpur/Hamirpur/ Uttar Pradesh	25.96	80.16	20.1 Auraiya (15)	LYD/HOCN/ YBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
21	Chillaghat	Yamuna/Ganga	Banda/Banda/ Uttar Pradesh	25.77	80.53	21.1 Hamirpur (12)	LYD/HOCN/ YBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
22	Mohana	Betwa/Yamuna/ Ganga	Jhansi/Jhansi/ Uttar Pradesh	25.65	78.99	21.1 Garrouli (16-21) 21.2 Nautghat (12-21)	LYD/HOCN/ YBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
23	Sahjiana	Betwa/Yamuna/ Ganga	Hamirpur/Hamirpur/ Uttar Pradesh	25.95	80.15	22.1 Mohana (18-24)	LYD/HOCN/ YBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
24	Banda	Ken/Yamuna/ Ganga	Banda/Banda/ Uttar Pradesh	25.48	80.31	23.1 Madla (12-18) 23.2 Kaimaha (9-15)	LYD/HOCN/ YBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
25	Naini	Yamuna/Ganga	Allahabad/ Allahabad/ Uttar Pradesh	25.42	81.84	24.1 Chillaghat (18-24)	LYD/HOCN/ YBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
26	Allahabad (Chatnag)	Ganga/Ganga	Allahabad/ Allahabad/ Uttar Pradesh	25.41	81.91	25.1 Kanpur (30) 25.2 Chillaghat (24)	MGD3/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
27	Mirzapur	Ganga/Ganga	Mirzapur/Mirzapur/ Uttar Pradesh	25.15	82.53	26.1 Dalmau (28) 26.2 Chillaghat (34)	MGD3/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
28	Varanasi	Ganga/Ganga	Varanasi/Varanasi/ Uttar Pradesh	25.33	83.04	27.1 Kanpur (48) 27.2 Hamirpur(48)	MGD3/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional

S.No	Name of FF Station/Type	River/Basin	Nearest Town/Vill/District/State	Lat (N)	Long (E)	Base Station (TT in hrs)	Div/Circle/ Orgn	Met Sub Division as per IMD	Mode of Data Collection	Methodology/ Model used for FF Formulation
29	Rae-Bareilly	Sai/Gomti/Ganga	Rae-bareilly/Rae-bareilly/Uttar Pradesh	26.20	81.25	28.1 Bani (48)	MGD2/HOCD/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
30	Hanuman Setu	Gomti/Ganga	Lucknow/Lucknow/ Uttar Pradesh	26.86	80.95	29.1 Bhatpurwaghat (48)	MGD2/HOCD/ UGBO	East Uttar Prasdesh	Wireless	Conventional
31	Jaunpur	Gomti/Ganga	Jaunpur/Jaunpur/ Uttar Pradesh	25.75	82.69	30.1 Sultanpur (24)	MGD3/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
32	Ghazipur	Ganga/Ganga	Ghazipur/ Ghazipur/ Uttar Pradesh	25.58	83.60	31.1 Allahabad (28) 31.2 Sultanpur (30)	MGD3/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
33	Buxar	Ganga/Ganga	Buxar/Buxar/Bihar	25.58	83.97	32.1 Allahabad (30)	MGD5/HOCP/ LGBO	Bihar	Wireless/ Telemetry	Conventional
34	Elgin Bridge	Ghaghra/Ganga	Barabanki/Barabanki/ Uttar Pradesh	27.09	81.49	33.1 Katernighat (30-36) 33.2 Shardanagar (30-36)	MGD1/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
35	Ayodhya	Ghaghra/Ganga	Ayodhya/Faizbad/ Uttara Pradesh	26.81	82.21	34.1 Elgin Bridge (18-24)	MGD1/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
36	Balrampur	Rapti/Ghaghra/ Ganga	Balrampur/ Balrampur/ Uttar Pradesh	27.44	82.23	35.1 Kakardhari (18-24)	MGD1/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
37	Bansi	Rapti/Ghaghra/ Ganga	Bansi/ Siddarthnagar/ Uttar Pradesh	27.18	82.93	36.1 Balrampur (18-24)	MGD1/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
38	Gorakhpur (Birdghat)	Rapti/Ghaghra/ Ganga	Gorahpur/ Gorakhpur/ Uttar Pradesh	26.73	83.35	37.1 Bansi (18-24)	MGD1/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
39	Turtipar	Ghaghra/Ganga	Balthra/Ballia/ Uttar Pradesh	26.14	83.88	38.1 Ayodhya (30-36) 38.2 Gorakhpur (Birdghat) (30-36)	MGD1/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
40	Darauli	Ghaghra/Ganga	Darauli/Siwan/Bihar	26.07	84.13	39.1 Elgin Bridge (54) 39.2 Gorakhpur (Birdghat) (28)	MGD5/HOCP/ LGBO	Bihar	Wireless	Conventional
41	Gangpur Siswan	Ghaghra/Ganga	Siwan/Siwan/Bihar	25.91	84.39	40.1 Turtipar (20)	MGD5/HOCP/ LGBO	Bihar	Wireless	Conventional
42	Chhapra	Ghaghra/Ganga	Chhapra/Saran/Bihar	25.76	84.79	41.1 Gangpur Siswan (16)	MGD5/HOCP/ LGBO	Bihar	Wireless	Conventional

S.No	Name of FF Station/Type	River/Basin	Nearest Town/Vill/District/State	Lat (N)	Long (E)	Base Station (TT in hrs)	Div/Circle/ Orgn	Met Sub Division as per IMD	Mode of Data Collection	Methodology/ Model used for FF Formulation
43	Ballia	Ganga/Ganga	Ballia/ Ballia/ Uttar Pradesh	25.77	84.37	42.1 Varanasi (28) 42.2 Jaunpur (28)	MGD3/HOCV/ UGBO	East Uttar Prasdesh	Wireless/ Telemetry	Conventional
44	Inderpuri	Sone/Ganga	Inderpuri/Rohtas/ Bihar	24.84	84.13	43.1 Chopan (12) 43.2 Daltonganj (12)	MGD5/HOCP/ LGBO	Bihar	Wireless	Conventional
45	Koelwar	Sone/Ganga	Koelwar/Bhojpur/ Bihar	25.57	84.79	44.1 Inderpuri (10-15)	MGD5/HOCP/ LGBO	Bihar	Wireless	Conventional
46	Maner	Sone/Ganga	Maner/Patna/Bihar	25.70	84.86	45.1 Gandhighat (8)	MGD5/HOCP/ LGBO	Bihar	Wireless	Conventional
47	Sripalpur	Punpun/Ganga	Sripalpur/Patna/Bihar	25.50	85.11	46.1 Kinjer (24)	MGD5/HOCP/ LGBO	Bihar	Wireless	Conventional
48	Patna (Dighaghat)	Ganga/Ganga	Patna/ Patna/ Bihar	25.64	85.10	47.1 Allahabad (30) 47.2 Patna (Gandhighat) (04)	MGD5/HOCP/ LGBO	Bihar	Wireless	Conventional
49	Patna (Gandhighat)	Ganga/Ganga	Patna/ Patna/ Bihar	25.62	85.17	48.1 Buxar (24) 48.2 Darauli (24) 48.3 Japla (24) . 48.4 Rewaghat (24)	MGD5/HOCP/ LGBO	Bihar	Wireless/ Telemetry	Conventional
50	Hathidah	Ganga/Ganga	Hathidah/Patna/Bihar	25.37	85.99	49.1 Gandhighat (16)	MGD5/HOCP/ LGBO	Bihar	Wireless/ Telemetry	Conventional
51	Munger	Ganga/Ganga	Munger/Munger/ Bihar	25.38	86.46	50.1 Gandhighat (24)	MGD5/HOCP/ LGBO	Bihar	Wireless/ Telemetry	Conventional
52	Khadda	Gandak/Ganga	Deoria/Kushinagar/ Uttar Pradesh	27.19	83.95	51.1 Triveni (07)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
53	Chatia	Gandak/Ganga	Ariraj West Champaran/ Motihari/ Bihar	26.50	84.54	52.1 Triveni (24)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
54	Rewaghat	Gandak/Ganga	Muzzafarpur/Muzzafarpur/Bihar	25.99	85.05	53.1 Chatia (20)	MGD5/HOCP/ LGBO	Bihar	Wireless	Conventional
55	Hazipur	Gandak/Ganga	Hazipur/Vaishali/ Bihar	25.69	85.20	54.1 Rewaghat (16)	MGD5/HOCP/ LGBO	Bihar	Wireless	Conventional
56	Lalbeghiaghat	Burhi Gandak/ Ganga	Dhaka/Motihari/Bihar	26.65	85.03	55.1 Chainpatia (24)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional

S.No	Name of FF Station/Type	River/Basin	Nearest Town/Vill/District/State	Lat (N)	Long (E)	Base Station (TT in hrs)	Div/Circle/ Orgn	Met Sub Division as per IMD	Mode of Data Collection	Methodology/ Model used for FF Formulation
57	Muzzafarpur (Sikandarpur)	Burhi Gandak/ Ganga	Sikandarpur/Muzzafarpur/Bihar	26.14	85.39	56.1 Ahirwala(S) (22)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
58	Samastipur	Burhi Gandak/ Ganga	Samastipur/Samastipur/Bihar	25.86	85.79	57.1 Sikandarpur (20)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
59	Rosera	Burhi Gandak/ Ganga	Rosera/Samastipur/ Bihar	25.74	86.02	58.1 Sikandarpur (28)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
60	Khagaria	Burhi Gandak/ Ganga	Khagaria/Khagaria/ Bihar	25.50	86.48	59.1 Sikandarpur (24) 59.2 Gandhighat (24)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
61	Benibad	Bagmati/Ganga	Benibad/Muzzafarpur/ Bihar	26.20	85.67	60.1 Runisaidpur (24)	MGD4/HOCP/ LGBO	Bihar	Wireless/ Telemetry	Conventional
62	Hayaghat	Bagmati/Ganga	Hayaghat Papermill/Darbhanga/ Bihar	26.08	85.89	61.1 Benibad (24) 61.2 Ekmighat (24)	MGD4/HOCP/ LGBO	Bihar	Wireless/ Telemetry	Conventional
63	Kamtaul	Adhwara Group/Ganga	Kamtaul Market/Darbhanga/ Bihar	26.33	85.85	62.1 Sonebarsa (24)	MGD4/HOCP/ LGBO	Bihar	Wireless/ Telemetry	Conventional
64	Ekmighat	Adhwara Group/Ganga	Laheria Seria/Darbhanga/ Bihar	26.12	85.88	63.1 Saulighat (24)	MGD4/HOCP/ LGBO	Bihar	Wireless/ Telemetry	Conventional
65	Jhanjharpur	Kamlabalan/ Ganga	Jhanjharpur/Madhubani/ Bihar	26.27	86.27	64.1 Jainagar (8)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
66	Bhagalpur	Ganga/Ganga	Bhagalpur/Bhagalpur/Bihar	25.27	87.02	65.1 Gandhighat (32)	MGD5/HOCP/ LGBO	Bihar	Wireless/ Telemetry	Conventional
67	Colgong/Kahalgaon	Ganga/Ganga	Colgong/Bhagalpur/ Bihar	25.27	87.23	66.1 Gandhighat (38)	MGD5/HOCP/ LGBO	Bihar	Wireless/ Telemetry	Conventional
68	Basua	Kosi/Ganga	Supaul/Supaul/Bihar	26.13	86.58	67.1 Birpur (16)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
69	Balthara	Kosi/Ganga	Choutham/Khagaria/ Bihar	25.54	86.72	68.1 Basua (24) 68.2 Hayaghat (24)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
70	Kursela	Kosi/Ganga	Kusela/Katihar/Bihar	25.42	87.23	69.1 Basua (24) 69.2 Hathidah (24)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
71	Sahibganj	Ganga/Ganga	Sahibganj/Sahibganj/Jharkhand	25.25	87.64	70.1 Bhagalpur (22)	MGD5/HOCP/ LGBO	Jharkhand	Wireless	Conventional

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72	Dengraghat	Mahananda/ Ganga	Bayasi/Purnes/Bihar	25.85	87.81	71.1 Taibpur (24) 71.2 Chargharia (24)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
73	Jhawa	Mahananda/ Ganga	Jhawa/Katihar/Bihar	25.43	87.76	72.1 Dhengraghat (16) 72.2 Araria (16)	MGD4/HOCP/ LGBO	Bihar	Wireless	Conventional
74	Farakka Barrage	Ganga/Ganga	Farakka/Murshidabad/ West Bengal	24.80	87.92	73.1 Bhagalpur (36)	MGD4/HOCP/ LGBO	Gangetic West Bengal	Wireless	Conventional
75	Passighat	Siang/ Brahmaputra	Passighat/ East Siang/ Arunachal Pradesh	28.06	95.33	74. 1 Tuting (9)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
76	Dibrugarh	Brahmaputra/ Brahmaputra	Dibrugarh/Dibrugarh/Assa m	27.49	94.91	74.1 Passighat (12) 74.2 Tezu (12)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless/ Telemetry	Conventional
77	Naharkatia	Buridehing/ Brahmaputra	Naharkatia/ Dibrugarh/ Assam	27.29	95.33	75.1 Margherita (10)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
78	Chenimari (Khowang)	Buridehing/ Brahmaputra	Khowang/ Dibrugarh/ Assam	27.31	94.88	76.1 Naharkatia (21)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
79	Nanglamoraghat	Desang/ Brahmaputra	Sibsagar/Sibsagar/ Assam	26.99	94.78	77.1 Dillighat (18)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
80	Sibsagar	Dikhow/ Brahmaputra	Sibsagar/Sibsagar/ Assam	26.98	94.58	78.1 Bihubar (09)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
81	Badatighat	Subansiri/ Brahmaputra	Bihuparia/ Lakhimpur/ Assam	26.95	93.96	79.1 Chouldhowaghat (18)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
82	Neamatighat	Brahmaputra/ Brahmaputra	Neamatighat/ Jorhat/ Assam	26.86	94.25	80.1 Dibrugarh (24) 80.2 Chenimari (24)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless/ Telemetry	Conventional
83	Tezpur	Brahmaputra/ Brahmaputra	Tezpur/ Sonitpur/ Assam	26.62	92.80	81.1 Neamatighat (24)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless/ Telemetry	Conventional
84	Golaghat	Dhansisri (S)/ Brahmaputra	Golaghat/ Golaghat Assam	26.50	93.95	82.1 Bokajan (14) 82.2 Gelabil (14)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
85	Numaligarh	Dhansisri (S)/ Brahmaputra	Numaligarh/ Golaghat/ Assam	26.63	93.73	83.1 Golaghat (10)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
86	N T Road Crossing	Jia- Bharali/ Brahmaputra	Balipara/Sonitpur/ Assam	26.81	92.88	84.1 Seppa (9)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional

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87	Kampur	Kopili/ Brahmaputra	Kampur/ Nagaon/ Assam	26.15	92.65	85.1 Kheronighat (24)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
88	Dharamtul	Kopili/ Brahmaputra	Dharamtul/Morigaon/Assam	26.17	92.36	86.1 Kampur (15)	UBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
89	Guwahati D C Court	Brahmaputra/ Brahmaputra	Guwahati/Kamrup/ Assam	26.19	91.74	87.1 Tezpur (24)	MBD/HOCG/ BBBO	Assam and Meghalaya	Wireless/ Telemetry	Conventional
90	N H Crossing	Puthimari/ Brahmaputra	Rangia/ kamrup/ Assam	26.44	91.56	88.1 DRF (13)	MBD/HOCG/ BBBO	Assam and Meghalaya	Wireless/ Telemetry	Conventional
91	N T Road Crossing	Pagladiya/ Brahmaputra	Nalbari/Nalbari/ Assam	26.45	91.46	89.1 Melabazar (12)	MBD/HOCG/ BBBO	Assam and Meghalaya	Wireless/ Telemetry	Conventional
92	Road Bridge	Beki/ Brahmaputra	Sorbhog/ Barpeta/ Assam	26.49	90.91	90.1 Kurijampa (12) (Bhutan)	LBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
93	N H Crossing	Manas/ Brahmaputra	Bijni/ Bongaigaon/ Assam	26.46	90.75	91.1 Panbari (6)	LBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
94	Goalpara	Brahmaputra/ Brahmaputra	Goalpara/ Goalpara/ Assam	26.20	90.58	92.1 Guwahati (24)	MBD/HOCG/ BBBO	Assam and Meghalaya	Wireless/ Telemetry	Conventional
95	Golokganj	Sankosh/ Brahmaputra	Golokganj/Dhubri/ Assam	26.11	89.82	93.1 Sankosh LRP (12) 93.2 Barabisa (12)	LBD/HOCG/ BBBO	Assam and Meghalaya	Wireless/ Telemetry	Conventional
96	N H 31	Jaldhaka/ Brahmaputra	Dhupguri/ Jalpaiguri/ West Bengal	26.57	88.94	94.1 Nagarakata (6) 94.2 Diana (6) 94.3 Murti (6)	LBD/HOCG/ BBBO	Sub Himalayan West Bengal & Sikkim	Wireless	Conventional
97	Mathabhanga	Jaldhaka/ Brahmaputra	Mathabhanga/ Coochbehar/ West Bengal	26.32	89.23	95.1 N H 31 (6)	LBD/HOCG/ BBBO	Sub Himalayan West Bengal & Sikkim	Wireless	Conventional
98	Ghughumari	Torsa	Coochbehar/Coochbehar/ West Bengal	26.29	89.46	96.1 Hasimara (8)	LBD/HOCG/ BBBO	Sub Himalayan West Bengal & Sikkim	Wireless	Conventional
99	Tufangunj	Raidak -I	Tufangunj/ Coochbehar/ west Bengal	26.31	89.68	97.1 Chepan (12)	LBD/HOCG/ BBBO	Sub Himalayan West Bengal & Sikkim	Wireless	Conventional
100	Domohani Road Bridge	Tista	Jalpaiguri/ Jalpaiguri/ West Bengal	26.56	88.77	98.1 Tista Bazaar (8) 98.2 Ghista (4-6) 98.3 Chel (4-6) 98.4 Nebra (6)	LBD/HOCG/ BBBO	Sub Himalayan West Bengal & Sikkim	Wireless	Conventional
101	Mekhligunj	Tista	Mekhligunj/ Coochbehar/ West Bengal	26.33	88.85	99.1 Domohani Rd Brdige (6)	LBD/HOCG/ BBBO	Sub Himalayan West Bengal & Sikkim	Wireless	Conventional

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102	Dhubri	Brahmaputra/ Brahmaputra	Dhubri/Dhubri/ Assam	26.01	89.99	100.1 Goalpara (15)	LBD/HOCG/ BBBO	Assam and Meghalaya	Wireless/ Telemetry	Conventional
103	Annapurnaghat (Silchar)	Barak/ Barak	Silchar/Silchar/ Assam	24.83	92.80	101.1 Chottabekra (18)	MBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
104	Badarpurghat	Barak/Barak	Silchar/Cachar/ Assam	24.86	92.52	102. 1 Annapurnaghat (9)	MBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
105	Matizuri	Katakhal/Barak	Hailakhandi/ Hailakhandi/ Assam	24.85	92.61	102.1 Gharmura (12)	MBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
106	Karimgunj	Kushiyara/Barak	Karimgunj/Karimgunj/Assam	24.87	92.36	103.1 Annapurnaghat (12)	MBD/HOCG/ BBBO	Assam and Meghalaya	Wireless	Conventional
107	Kailashshar	Manu	Kailashshar/ North Tripura Tripura	24.32	91.99	104.1 Manughat (18-24)	MBD/HOCG/ BBBO	NMMT	Wirless	Conventional
108	Sonamura	Gumti	Sonamura/ West Tripura/ Tripura	23.47	91.27	105.1 Amarpur (15-21)	MBD/HOCG/ BBBO	NMMT	Wireless	Conventional
109	Narayanpur	Mayurakshi/ Ganga	Kandi/Murshidabad/ West Bengal	23.88	87.99	106.1 Tilpara Barrage (12-18)	DD/HOCM/ LGBO	Gangetic West Bengal	Wireless	Conventional
110	Gheropara	Ajoy/Ganga	Khairasol/ Bhirbum/ West Bengal	23.62	87.71	107.1 Jamtara (8-24) 107.2 Sikata Barrage (8-24)	DD/HOCM/ LGBO	Gangetic West Bengal	Wireless	Conventional
111	Harinkhola	Mundeshwari/ West Benagl	Arambagh/Hooghly/ West Bengal	22.88	87.78	108.1 Durgapur Barrage (20-26)	DD/HOCM/ LGBO	Gangetic West Bengal	Wireless/ Telemetry	Conventional
112	Mohanpur	Kangsabati/ Ganga	Medhinipur/ Medhinipur/ West Bengal	22.40	87.34	109.1 Kangsabati Dam (24) 109.2 D P Ghat (24)	DD/HOCM/ LGBO	Gangetic West Bengal	Wireless	Conventional
113	Rajghat	Subarnarekha/ East Flowing Rivers	Jaleswar/Balasore/ Odisha	21.77	87.16	110.1 Jamsaloghat (18-20) 110.2 Fekoghat (6-9)	ERD/HOCB/ MERO	Odisha	Wireless/ Telemetry	Conventional
114	N H 5 Road Bridge	Burhabalang/ East Flowing Rivers	Govindpur/ Balasore/ Odisha	21.55	86.92	111.1 Baripada (18-20) 111.2 Jayapur (16-18)	ERD/HOCB/ MERO	Odisha	Wireless	Conventional
115	Anandpur	Baitrani/East Flowing Rivers	Anandpur/ Keonjargarh/ Odisha	21.22	86.11	112.1 Swampatna (6-7)	ERD/HOCB/ MERO	Odisha	Wireless/ Telemetry	Conventional/ Mathematical
116	Akhuapada	Baitrani/East Flowing Rivers	Akhuapada/ Bhadrak/ Odisha	20.92	86.28	113.1 Anandpur (18-20)	ERD/HOCB/ MERO	Odisha	Wireless/ Telemetry	Conventional

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117	Jenapur Expressway	Brahmani/East Flowing Rivers	Jenapur/Jajpur/ odisha	20.88	86.01	114.1 Talcher (18-20)	ERD/HOCB/ MERO	Odisha	Wireless/ Telemetry	Conventional
118	Jamshedpur	Subarnarekha/ East Flowing Rivers	Chakulia/Purba singbhum/ Jharkhand	22.82	86.21	115. 1 Adtiyapur (6-8)	ERD/HOCB/ MERO	Jharkhand	Wireless/ Telemetry	Conventional
119	Naraj	Mahanadi/ Mahanadi	Cuttack/ Cuttack/Odisha	20.47	85.77	115.1 Tikarapara (18-20)	ERD/HOCB/ MERO	Odisha	Wireless	Conventional/ Mathematical
120	Alipingal	Devi/Mahanadi	Alipingal/Jagitsinghpur/ Odisha	20.07	86.17	116.1 Naraj (12)	ERD/HOCB/ MERO	Odisha	Wireless/ Telemetry	Conventional
121	Nimapara	Kushbhadra/ Mahanadi	Nimapara/Puri/ Odisha	20.06	86.01	117.1 Naraj (12)	ERD/HOCB/ MERO	Odisha	Wireless/ Telemetry	Conventional
122	Purushottampur	Rishikulya/ East Flowing Rivers	Purushottampur/ Ganjam/ Odisha	19.50	84.87	118.1 Sorada (18-20)	ERD/HOCB/ MERO	Odisha	Wireless/ Telemetry	Conventional
123	Gunupur	Vamshadara/East Flowing Rivers	Gunupur/Koraput/ Odisha	19.08	83.81	119.1 Kutragada (03-06)	ERD/HOCB/ MERO	Odisha	Wireless/ Telemetry	Conventional
124	Kashinagar	Vamshadara/East Flowing Rivers	Kashinagar/Ganjam/ Odisha	18.85	83.87	120.1 Kutragada (06-09)	ERD/HOCB/ MERO	Odisha	Wireless/ Telemetry	Conventional/ Mathematical
125	Mandla	Narmada/ Narmada	Mandla/Mandla/ Madhya Pradesh	23.77	85.56	121.1 Dindori (11) 121.2 Mohgaon (04) 121.3 Mukki (12)	ND/SECB/ NBO	East Madhya Pradesh	Wireless	Conventional
126	Hoshangabad	Narmada/ Narmada	Hoshangabad/ Hoshangabad/ Madhya Pradesh	22.76	77.69	122.1 Barman(22) 122.2 Tawanagar (08)	ND/SECB/ NBO	West Madhya Pradesh	Wireless	Conventional
127	Garudeshwar	Narmada/ Narmada	Garudeshwar/ Bharuch/Gujarat	21.89	73.65	123.1 Sardar sarovar dam (12)	TD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional
128	Bharuch	Narmada/ Narmada	Bharuch/Bharuch/ Gujarat	21.70	73.00	124.1 Garudeshwar (12)	TD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional
129	Subash Bridge (Ahmedabad)	Sabarmati/ West Flowing Rivers	Ahmedabad/Ahmedabad/ Gujarat	23.06	72.59	125.1 Derol Bridge (04-06) 125.2 Hatmati Weir (04-06)	MD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional
130	Wanakbori Weir	Mahi/ West Flowing River	Wanakbori/Kheda	22.74	72.69	126.1 Kadana Dam (06) 126.2 Panam Dam (06)	MD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional
131	Surat	Tapi/ Tapi	Surat/Surat/Gujarat	21.20	72.82	127.1 Hatnur Dam (24)	TD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional

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132	Vapi Town	Damanganga/ West Flowing Rivers	Vapi Town/ Valsad/Gujarat	20.37	72.88	128.1 Madhuban Dam (03-06)	TD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional
133	Daman	Damanganga/ West Flowing Rivers	Daman/Daman/Diu	20.41	72.84	129.1 Madhuban Dam (05-09)	TD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional
134	Kopergaon	Godavari/ Godavari	Kopergaon/Ahmednagar/Maharashtra	19.89	74.49	130.1 N M Weir (05-06)	LGD/GC/ KGBO	Marathwada	Wireless/ Telemetry	Conventional
135	Gangakhed	Godavari/ Godavari	Gangakhed/Parbhani/Maharashtra	18.98	76.75	131.1 Dhalegaon (15-18)	LGD/GC/ KGBO	Marathwada	Wireless/ Telemetry	Conventional
136	Nanded	Godavari/ Godavari	Nanded/Nanded/ Maharastra	19.15	77.31	132.1 Dhalegaon (24-27) 132.2 Purna (03-06)	LGD/GC/ KGBO	Marathwada	Wireless/ Telemetry	Conventional
137	Bhandara	Wainganga/ Godavari	Bhandara/Bhandara/Maharashtra	21.15	79.66	133.1 Balaghat (15-18) 133.2 Rajegaon (15-18) 133.3 Sitakesa (15-18)	LGD/GC/ KGBO	Vidharbha	Wireless/ Telemetry	Conventional
138	Pauni	Wainganga/ Godavari	Pauni/Bhandara/ Maharashtra	20.79	79.65	134.1 Bhandara (06-09) 134.2 K R Bridge (06)	LGD/GC/ KGBO	Vidharbha	Wireless/ Telemetry	Conventional
139	Balharsha	Wardha/Godavari	Balharsha/Chandrapur/ Maharashtra	19.82	79.37	135.1 Hivra (24-30) 135.2 Nandgaon (24) 135.3 Ghugus (12) 135.4 P G Bridge (12-15)	LGD/GC/ KGBO	Vidharbha	Wireless/ Telemetry	Conventional
140	Kaleswaram	Godavari/ Godavari	Kaleswaram/Karimnagar/ Andhra Pradesh	18.82	79.91	136.1 Ashti (12) 136.2 Balharsha (12-15) 136.3 Mancherial (12)	LGD/GC/ KGBO	Telangana	Wireless/ Telemetry	Conventional
141	Jagdalpur	Indravathi/ Godavari	Jagdalpur/ Bastar/ Chhatisgarh	19.09	82.03	137.1 Nowrangpur (06-24) 137.2 Kosagumda (06-24)	LGD/GC/ KGBO	Chhatisgarh	Wireless/ Telemetry	Conventional
142	Eturunagaram	Godavari/ Godavari	Eturunagaram/ Warangal/ Andhra Pradesh	18.32	80.46	138.1 Kaleswaram (12) 138.2 Pathagudem (09) 138.3 Perur (03)	LGD/GC/ KGBO	Telangana	Wireless/ Telemetry	Conventional
143	Dummagudem	Godavari/ Godavari	Dummagudem/ Khammam/ Andhra Pradesh	17.85	80.88	139.1 Perur (12-15) 139.2 Taliperu dam (06)	LGD/GC/ KGBO	Telangana	Wireless/ Telemetry	Conventional
144	Bhadrachalam	Godavari/ Godavari	Bhadrachalam/ Khammam/ Andhra Pradesh	17.67	80.88	140.1 Perur (15-18) 140.2 Taliperu dam (09)	LGD/GC/ KGBO	Telangana	Wireless/ Telemetry	Conventional

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145	Kunavaram	Godavari/ Godavari	Kunavaram/ Khammam/ Andhra Pradesh	17.57	81.25	141.1 Perur (24-27) 141.2 Taliperu (15-18) 141.3 Konta (06)	LGD/GC/ KGBO	Telangana	Wireless	Conventional
146	Rajahmundry GNV Railway Bridge	Godavari/ Godavari	Rajahmundry/ East Godavari/ Andhra Pradesh	17.01	81.77	142.1 Koida (12)	LGD/GC/ KGBO	Coastal Andhra Pradesh	Wireless/ Telemetry	Conventional
147	Dowlaiswaram Barrage	Godavari/ Godavari	Dowlaiswaram/ East Godavari/ Andhra Pradesh	16.94	81.78	143.1 Koida (15)	LGD/GC/ KGBO	Coastal Andhra Pradesh	Wireless/ Telemetry	Conventional
148	Arjunwad	Krishna/Krishna	Arjunwad/ Kolhapur/ Maharashtra	16.78	74.63	144.1 Karad (24) 144.2 Samdoli (21)	LKD/KCC/ KGBO	Madhya Maharashtra		
149	Deongaon Bridge	Bhima/ Krishna	Afzalpur/ Gulbarga/ Karnataka	17.17	76.33	145.1 Takli (18) 145.2 Wadakbal (18)	LKD/KCC/ KGBO	North Interior Karnataka	Wireless/ Telemetry	Conventional
150	Mantralayam	Tungabhadra	Mantralayam/ Kurnool/ Andhra Pradesh	15.94	77.42	146.1 Ollenur (18) 146.2 T Ramapuram (18)	LKD/KCC/ KGBO	Rayalaseema	Wireless/ Telemetry	Conventional
151	Nellore Anicut	North Pennar	Nellore/ Nellore/ Andhra Pradesh	14.47	79.99	147.1 Chennur (18) 147.2 Nandipally (18) 147.3 Somasila Project (09)	HD/SR	Coastal Andhra Pradesh	Wireless	Conventional
152	Narora Barrage	Ganga/Ganga	Narora/ Bulanshahar/ Uttar Pradesh	28.19	78.40	148.1 Haridwar (48)	MGD2/HOCD/ UGBO	West Uttar Pradesh	Wireless	Conventional
153	Tajewala Barrage (Hathnikund Barrage)	Yamuna/Ganga	Yamunanagar/ Yamunanagar/ Haryana	30.31	77.58	149.1 Paonta (06)	UYD/HOCN/ YBO	Haryana Chandigarh& Delhi	Wireless	
154	Gandhisagar Dam	Chambal/Ganga	Gandhisagar Dam/Mandasur/ Madhya Pradesh	24.65	75.61	150.1 Tal (12-21) 150.2 Mahidpur (12-20)	CD/HOCN/ YBO	West Madhya Pradesh	Telemetry	Mathematical
155	Massanjore Dam	Mayurakshi/Ganga	Massanjore Dam/ Santhal Parganas/ Jharkhand	24.11	87.31	151.1 Maharo (24) 151.2 Kusiyari (24) 151.3 Haripur (24)	DD/HOCM/ LGBO	Jharkhand	Wireless/ Telemetry	Conventional
156	Tilpara Barrage	Mayurakshi/Ganga	Tilpara Dam/Suri/ Birbhum/ West Bengal	23.95	87.53	152.1 Massanjore Dam (24) 152.2 Tantoloi (24)	DD/HOCM/ LGBO	Gangetic West Bengal	Wireless/ Telemetry	Conventional
157	Tenughat Dam	Damodar/Ganga	Tenughat Dam	23.72	85.84	153.1 Hendgir (24) 153.2 Ramgarh (24)	DD/HOCM/ LGBO	Jharkhand	Wireless/ Telemetry	Conventional
158	Panchet Dam	Damodar/Ganga	Panchet Dam/ Dhanbad/ Jharkhand	23.68	86.75	154.1 Pupunki (24) 154.2 Tenughat Dam (24) 154.3 Konar Dam (24)	DD/HOCM/ LGBO	Jharkhand	Wireless/ Telemetry	Conventional

S.No	Name of FF Station/Type	River/Basin	Nearest Town/Vill/District/State	Lat (N)	Long (E)	Base Station (TT in hrs)	Div/Circle/ Orgn	Met Sub Division as per IMD	Mode of Data Collection	Methodology/ Model used for FF Formulation
159	Durgapur Barrage	Damodar/Ganga	Durgapur/ Burdwan/ West Bengal	23.48	87.31	155.1 Panchet Dam (24) 155.2 Maithon Dam (24)	DD/HOCM/ LGBO	Gangetic West Bengal	Wireless/ Telemetry	Conventional
160	Maithon Dam	Barakar/ Damodar	Maithon Dam/ Dhanbad/ Jharkhand	23.78	86.81	156.1 Nandadih (24) 156.2 Tilaiya Dam (24) 156.3 Barkisaraia (24)	DD/HOCM/ LGBO	Jharkhand	Wireless/ Telemetry	Conventional
161	Kangsabati Dam	Kangsabati	Kangsabati Dam/Bankura West Bengal	22.96	86.75	157.1 Simulia (24) 157.2 Purihalsa (24) 157.3 Tusuma (24) 157.4 Kharidwar (24) 157.5 Phulbaria (24)	DD/HOCM/ LGBO	Gangetic West Bengal	Wireless	Conventional
162	Hirakud	Mahanadi/ Mahanadi	Burla/ Sambalpur/ Odisha	21.52	83.85	158.1 Basantpur (24) 158.2 Kurubata (24) 158.3 Sundergarh (24) 158.4 Kelo (6-18) 158.5 Paramapur (4-18)	MahanadiDiv/ HOCB/MERO	Odisha	Wireless/ Telemetry	Conventional/ Mathematical
163	Gotta Barrage	Vamsadhara/ East Flowing Rivers	Gotta Barrage/ Srikakulam/ Andhra Pradesh	18.69	83.96	159.1 Kutragada (12)	ERD/HOCB/ MERO	Coastal Andhra Pradesh	Wireless/ Telemetry	Conventional
164	Dantiwada Dam	Banas/ West Flowing Rivers	Dantiwada dam/Palanpur/ Banaskanta/ Gujarat	24.34	72.34	160.1 Sarotry (2-5) 160.2 Chitrasani (2-5)	MD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional
165	Dharoi Dam	Sabarmati/ West Flowing Rivers	Dharoi Dam/ Mehsana/ Gujarat	24.00	72.86	161.1 Kheroj (2-5) 161.2 Harnav Weir (2-5)	MD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional
166	Kadana Dam	Mahi/ West Flowing Rivers	Kadana Dam/ Panchmahal/ Gujarat	23.31	73.83	162.1 Paderdibadi (2-7) 162.2 Anas PH -II (2-7)	MD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional
167	Hathnur Dam	Tapi/ Tapi	Hathnur Dam/ Jalgaon/ Maharashtra	21.07	75.95	163.1 Burhanpur (12) 163.2 Yerli (12)	TD/HOCG/ NTBO	Marathwada	Wireless/ Telemetry	Conventional
168	Ukai Dam	Tapi/ Tapi	Ukai Dam/ Surat/ Gujarat	21.25	73.59	164.1 Gidadhe (6) 164.2 Sarangkheda (6)	TD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional
169	Madhuban Dam	Damanganga/ West Flowing River	Madhuban Dam/ Valsad/ Gujarat	20.19	73.06	165.1 Ozarkheda (6) 165.2 Nanipalsan (6)	TD/HOCG/ NTBO	Gujarat	Wireless/ Telemetry	Conventional
170	Jailwadi Dam	Godavari/Godavari	Paithan/ Aurangabad/ Maharashtra	19.48	75.37	166.1 N M Weir (12)	LGD/GC/ KGBO	Marathwada	Wireless	Conventional
171	Singur Dam	Manjira/ Godavari	Singur Dam/ Medak/ Andhra Pradesh	17.75	77.93	167.1 Saigaon (24)	LGD/GC/ KGBO	Telangana	Wireless	Conventional
172	Nizamsagar Dam	Manjira/ Godavari	Nizamsagar dam/ Nizamabad/ Andhra Pradesh	18.22	77.96	168.1 Singur Dam (24)	LGD/GC/ KGBO	Telangana	Wireless	Conventional

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173	Sriramsagar	Godavari/Godavari	Pochampad/ Nizamabad/ Andhra Pradesh	18.97	78.34	169.1 Nanded (24) 169.2 Nizamsagar (24) 169.3 Degloor (24)	LGD/GC/ KGBO	Telangana	Wireless	Conventional
174	Almatti Dam	Krishna/ krishna	Almatti Dam/Bijapur/ Karnataka	16.33	75.88	170.1 Kurundwad (48) 170.2 Sadalga (48) 170.3 Gokak (27)	LKD/KCC/ KGBO	North Interior Karnataka	Wireless	Conventional
175	Narayanpur Dam	Krishna/ krishna	Narayanpur Dam/ Gulbarga/ Karnataka	16.20	76.36	171.1 Kurundwad (54) 171.2 Sadalga (54) 171.3 Gokak (35) 171.4 Almatti Dam (09)	LKD/KCC/ KGBO	North Interior Karnataka	Wireless	Conventional
176	Priyadharshini Jurala Project	Krishna/ krishna	Gadwal/ Mahbubnagar/ Andhra Pradesh	16.33	77.70	172.1 Huvinhedgi (18) 172.2 Yadgir (18) 172.3 Deosugur (06)	LKD/KCC/ KGBO	Telangana	Wireless	Conventional
177	Tungabhadra Dam	Tungabhadra/ Krishna	Hospet/ Bellary/ Karnataka	15.26	76.34	173.1 Harlahalli (12) 173.2 Marol (12)	LKD/KCC/ KGBO	South Interior Karnataka	Wireless	Conventional
178	Srisailam Dam	Krishna/ krishna	Srisailam/ Kurnool/ Andhra Pradesh	16.08	78.90	174.1 Mantralayam (18) 174.2 Krishna Agraharam (18)	LKD/KCC/ KGBO	Rayalaseema	Wireless	Conventional
179	Prakasam Barrage	Krishna/ krishna	Vijayawada/ Krishna/ Andhra Pradesh	16.50	80.60	175.1 Wadenapalli (16) 175.2 Madhira (12) 175.3 Polampally (12) 175.4 Paleru Bridge (12) 175.5 Keesara (12)	LKD/KCC/ KGBO	Coastal Andhra Pradesh	Wireless	Conventional
180	Somasila Dam	Pennar/Pennar	Ozili//Nellore/ Andhra Pradesh	14.48	79.3		HD/ C&SRC Bangalore/ C & SRO Coimbtore.	Coastal Andhra Pradesh		Rainfall Runoff Model
181	Dr KLRS Pulichintala Dam	Krishna/Krishna	Bellamkonda/Guntur/Andhra Pradesh	16.75	80.05		LKD/KCC/ KGBO	Coastal Andhra Pradesh		Rainfall Runoff Model
182	Thotapalli Reservoir system	Nagavali/ East Flowing River Basin	Parvathipuram/Vizianagaram/ Andhra Pradesh	18.78	83.49		ERD/HOCB/ MERO			Rainfall Runoff Model
183	Sunkesula Barrage	Krishna/Krishna	C.Belagal/Kurnool/ Andhra Pradesh	15.88	77.82		LKD/KCC/ KGBO	Rayalaseema		Rainfall Runoff Model
184	Kaddam Dam	Godavari/Godavari	Kaddam/Adilabad/Telengana	19.1	78.79		UGD/GC/KGBO			Rainfall Runoff Model
185	Sripada Yellampalli project.	Godavari/Godavari	Karimnagar/ Telengana	18.84	79.36		UGD/GC/KGBO			Rainfall Runoff Model
186	Chandil Dam	Subarnarekha/ Subarnarekha	Musabani/Purba singbhum/ Jharkhand	22.97	86.05		ERD/HOCB/ MERO	Jharkhand		Rainfall Runoff Model
187	Hemavathy Dam	Cauvery/Cauvery	Channaryapatra/Hassan/Karnataka	12.82	76.05		CD Banglore / C&SRC Bangalore/ C & SRO Coimbtore.	Coastal Andhra Pradesh		Rainfall Runoff Model
188	Harangi Dam	Cauvery/Cauvery	Somwarpet/ Kodagu/ Karnataka	12.49	75.9		CD Banglore / C&SRC Bangalore/ C & SRO Coimbtore.	Coastal Andhra Pradesh		Rainfall Runoff Model
189	Kabini Dam	Cauvery/Cauvery	Heggadevanakote/Mysore/ Karnataka	11.84	76.33		CD Banglore / C&SRC Bangalore/ C & SRO Coimbtore.	South Interior Karnataka		Rainfall Runoff Model

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190	Krishnarajasagar	Cauvery/Cauvery	Srirangapatna/Mandya/Karnataka	12.45	76.57		CD Banglore / C&SRC Bangalore/ C & SRO Coimbtore.	South Interior Karnataka		Rainfall Runoff Model
191	Bansagar Dam	Ganga/Ganga	Beohari/Shahdol/Madhya Pradesh	24.19	81.8		MGDIII/HOC Varanashi/UGBO	East Madhya Pradesh		Rainfall Runoff Model
192	Gosikhurd Dam	Godavari/Godavari	Pauni/Bhandara/ Maharashtra	20.87	79.6		WD Nagpur/CC Nagpur/ MCO Nagpur	Vidharbha		Rainfall Runoff Model
193	Rihand Dam	Rihand/ Ganga	Robertsganj/Sonbhadra/ Uttar Pradesh	24.21	83.02		MGDIII/HOC Varanashi/UGBO	East Uttar Pradesh		Rainfall Runoff Model
194	Mettur Dam	Cauvery/Cauvery	Mettur/Salem/Tamilnadu	11.8	77.8		SRD/C & SRC / C & SRO	Tamilnadu & Puducherry		Rainfall Runoff Model
195	Grand Annicut	Cauvery/Cauvery	Thanjavur/ Tamilnadu	10.83	78.81		SRD/C & SRC / C & SRO	Tamilnadu & Puducherry		Rainfall Runoff Model
196	Bhavanisagar Dam	Bhavani/Cauvery	Sathyamangalam/Erode/Tamilnadu	11.47	77.1		SRD/C & SRC / C & SRO	Tamilnadu & Puducherry		Rainfall Runoff Model
197	Vaigai Dam	Vaigai/EFR South of Cauvery	Andipatti/ Theni/ Tamilnadu	10.5	77.33		SRD/C & SRC / C & SRO	Tamilnadu & Puducherry		Rainfall Runoff Model
198	Poondi Satyamurthy Dam	Kosasthalaiyar/ EFRB Pennar-Cauvery	Thiruvallur/ Tamilnadu	13.18	79.86		HD / C & SRC / C & SRO	Tamilnadu & Puducherry		Rainfall Runoff Model
199	Bisalpur Dam	Banas/Ganga	Deoli/Tonk/Rajasthan	25.92	75.45		CD Jaipur/HOC Noida/YBOND	East Rajasthan		Rainfall Runoff Model

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						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	4	5	6	7	8	9	10	11	12	13.00
	1. Indus Basin											
1	Jhelum	Rammunshibagh	Jammu & Kashmir	1585.53	1586.5	1589.7	08-09-2014	1584.73	28-Jul-16 16	0	0	-
	2 a. Ganga Basin											
2	Alaknanda	Srinagar	Uttarakhand	535.00	536.00	537.90	17-06-2013	535.15	15-Jul-16 13	5	5	100.00
3	Ganga	Rishikesh	Uttarakhand	339.50	340.50	341.72	05/09/1995	339.61	10-Aug-16 15	8	8	100.00
4	Ganga	Haridwar	Uttarakhand	293.00	294.00	296.30	19/09/2010	293.60	02-Aug-16 10	12	12	100.00
5	Ganga	Narora Barrage	Uttar Pradesh			180.61	23/09/2010	179.070	22-Aug-16 00	50	49	98.00
6	Ganga	Kannauj	Uttar Pradesh	124.97	125.97	126.78	27/09/2010	125.300	05-Aug-16 20	20	20	100.00
7	Ganga	Ankinghat	Uttar Pradesh	123.00	124.00	124.49	28/09/2010	123.450	05-Aug-16 07	29	29	100.00
8	Ganga	Kanpur	Uttar Pradesh	113.00	114.00	114.08	29/09/2010	112.640	07-Aug-16 04	33	33	100.00
9	Ganga	Dalmau	Uttar Pradesh	98.36	99.36	99.84	03/08/1973	98.290	20-Aug-16 14	0	0	-
10	Ganga	Phphamau	Uttar Pradesh	83.73	84.73	87.98	08/09/1978	86.300	24-Aug-16 18	11	11	100.00
11	Ganga	Allahabad Chhatnag	Uttar Pradesh	83.73	84.73	88.03	08/09/1978	85.600	24-Aug-16 04	10	10	100.00
12	Ganga	Mirzapur	Uttar Pradesh	76.72	77.72	80.34	09/09/1978	78.550	25-Aug-16 19	10	10	100.00
13	Ganga	Varanasi	Uttar Pradesh	70.26	71.26	73.90	09/09/1978	72.560	25-Aug-16 12	12	12	100.00
14	Ganga	Ghazipur	Uttar Pradesh	62.11	63.11	65.22	09/09/1978	65.040	26-Aug-16 08	21	21	100.00
15	Ganga	Buxar	Bihar	59.32	60.32	62.09	1948	61.26	24-Aug-16 11	21	21	100.00
16	Ganga	Ballia	Uttar Pradesh	56.62	57.62	60.25	14/09/2003	60.390	25-Aug-16 01	39	39	100.00
17	Ganga	Patna Dighaghat	Bihar	49.45	50.45	52.52	23/08/1975	52.120	21-Aug-16 06	26	25	96.15
18	Ganga	Patna Gandhighat	Bihar	47.60	48.60	50.27	14/08/1994	50.520	21-Aug-16 05	63	62	98.41
19	Ganga	Hathidah	Bihar	40.76	41.76	43.15	07/08/1971	43.170	22-Aug-16 00	62	62	100.00
20	Ganga	Munger	Bihar	38.33	39.33	40.99	19/09/1976	40.070	25-Aug-16 09	21	21	100.00
21	Ganga	Bhagalpur	Bihar	32.68	33.68	34.20	17/09/2003	34.720	26-Aug-16 07	48	48	100.00
22	Ganga	Kahalgaon	Bihar	30.09	31.09	32.87	17/09/2003	32.840	27-Aug-16 17	80	79	98.75
23	Ganga	Sahibgunj	Jharkhand	26.25	27.25	30.91	1998	29.120	26-Aug-16 22	60	60	100.00
24	Ganga	Farakka	West Bengal	21.25	22.25	25.14	07/09/1998	24.200	28-Aug-16 22	174	173	99.43
25	Ramganga	Moradabad	Uttar Pradesh	189.60	190.60	192.88	21/09/2010	190.100	26-Jul-16 00	5	5	100.00
26	Ramganga	Bareilly	Uttar Pradesh	162.70	163.70	162.88	06/8/1978	160.580	02-Aug-16 16	0	0	-
27	Banas	Bisalpur Dam	Rajasthan		FRL 315.5			315.50	14-Sep-16 08	7	7	100.00
28	Yamuna	Tajewala Weir	Haryana			338.90	17/06/1013			0	0	-
29	Yamuna	Mawi	Uttar Pradesh	230.00	230.85	232.45	26/09/1988	230.60	13-Aug-16 12	14	13	92.86
30	Yamuna	Delhi Rly Bridge	NCT Delhi	204.00	204.83	207.49	06/09/1978	204.90	14-Aug-16 04	21	20	95.24
31	Yamuna	Mathura	Uttar Pradesh	164.20	165.20	169.73	08/09/1978	165.30	15-Aug-16 08	37	37	100.00
32	Yamuna	Agra	Uttar Pradesh	151.40	152.40	154.76	09/09/1978	150.00	16-Aug-16 14	0	0	-
33	Yamuna	Etawa	Uttar Pradesh	120.92	121.92	126.13	11/09/1978	119.38	17-Aug-16 19	0	0	-
34	Yamuna	Auraiya	Uttar Pradesh	112.00	113.00	118.19	25/08/1996	113.27	23-Aug-16 20	4	2	50.00
35	Yamuna	Kalpi	Uttar Pradesh	107.00	108.00	112.98	25/08/1996	108.98	24-Aug-16 10	5	3	60.00

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						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12	13.00
36	Yamuna	Hamirpur	Uttar Pradesh	102.63	103.63	108.59	12/09/1983	104.94	23-Aug-16 08	5	4	80.00
37	Yamuna	Chilaghat	Uttar Pradesh	99.00	100.00	105.16	06-09-1978	102.10	23-Aug-16 00	10	6	60.00
38	Yamuna	Naini	Uttar Pradesh	83.74	84.74	87.99	08-09-1978	86.07	24-Aug-16 05	12	7	58.33
39	Sahibi	Dhansa	NCT Delhi	211.44	212.44	213.58	06-08-1977	210.08	03-Sep-16 03	0	0	-
40	Chambal	Gandhisagar Dam	Madhya Pradesh	FRL 399.99						8	1	12.50
41	Betwa	Mohana	Uttar Pradesh	121.66	122.66	133.69	11/09/1983	124.41	21-Aug-16 13	3	0	0.00
42	Betwa	Sahjina	Uttar Pradesh	103.54	104.54	108.67	12/09/1983	105.02	23-Aug-16 03	6	4	66.67
43	Ken	Banda	Uttar Pradesh	103.00	104.00	113.29	07/07/2009	109.97	21-Aug-16 11	19	7	36.84
44	Gomati	Lucknow	Uttar Pradesh	108.50	109.50	110.85	10/09/1971	104.92	17-Aug-16 05	0	0	-
45	Gomati	Jaunpur	Uttar Pradesh	73.07	74.07	77.74	22/09/1971	71.110	22-Aug-16 14	0	0	-
46	SAI	Raibareli	Uttar Pradesh	100.00	101.00	104.81	17/09/1982	110.57	16-Aug-16 10	3	3	100.00
47	Ghaghra	Elgin Bridge	Uttar Pradesh	105.07	106.07	107.56	10-10-2009	106.886	20-Jul-16 08	71	69	97.18
48	Ghaghra	Ayodhya	Uttar Pradesh	91.73	92.73	94.01	11-10-2009	93.100	01-Aug-16 12	58	57	98.28
49	Ghaghra	Turtipar	Uttar Pradesh	63.01	64.01	66.00	28/08/1998	64.410	02-Aug-16 23	47	47	100.00
50	Ghaghra	Darauli	Bihar	59.82	60.82	61.74	29/08/1998	60.95	02-Aug-16 20	39	39	100.00
51	Ghaghra	Gangpur Siswan	Bihar	56.04	57.04	58.01	18/09/1983	57.47	21-Aug-16 07	47	47	100.00
52	Ghaghra	Chhapra	Bihar	52.68	53.68	54.59	03/09/1982	53.850	21-Aug-16 08	10	10	100.00
53	Rapti	Balrampur	Uttar Pradesh	103.62	104.62	105.25	11/09/2000	105.200	29-Jul-16 15	26	25	96.15
54	Rapti	Bansi	Uttar Pradesh	83.90	84.90	85.82	21/08/1998	84.980	02-Aug-16 09	14	14	100.00
55	Rapti	Gorakpur_Birdghat	Uttar Pradesh	73.98	74.98	77.54	23/08/1998	75.290	31-Jul-16 14	13	13	100.00
56	Sone	Inderpuri	Bihar	107.20	108.20	108.85	23/08/1975	108.10	20-Aug-16 04	2	2	100.00
57	Sone	Koelwar	Bihar	54.52	55.52	58.88	20/07/1971	57.08	20-Aug-16 15	8	6	75.00
58	Sone	Maner	Bihar	51.00	52.00	53.79	10/09/1976	53.70	21-Aug-16 05	22	21	95.45
59	Sone	Bansagar Dam	Madhya Pradesh	FRL 341.65				341.64	25-Sep-16 12	14	9	64.29
60	PunPun	Sripalpur	Bihar	49.60	50.60	53.91	18/09/1976	53.34	13-Sep-16 13	64	61	95.31
61	Gandak	Khadda	Uttar Pradesh	95.00	96.00	97.50	23/07/2002	95.88	23-Jul-16 15	76	76	100.00
62	Gandak	Chatia	Bihar	68.15	69.15	70.04	26/07/2002	68.56	31-Jul-16 06	4	4	100.00
63	Gandak	Rewaghat	Bihar	53.41	54.41	55.41	17/09/1986	54.36	31-Aug-16 23	12	12	100.00
64	Gandak	Hazipur	Bihar	49.32	50.32	50.93	1948	50.39	21-Aug-16 04	17	17	100.00
65	Rihand	Rihand Dam	Uttar Pradesh	FRL=268.22				265.97	06-Sep-16 08	13	10	76.92
66	Burhi Gandak	Lalbeghiaghat	Bihar	62.20	63.20	67.09	30/07/1975	61.77	24-Jul-16 10	0	0	-
67	Burhi Gandak	Muzaffarpur	Bihar	51.53	52.53	54.29	15/08/1987	50.29	04-Aug-16 09	0	0	-
68	Burhi Gandak	Samastipur	Bihar	45.02	46.02	49.38	15/08/1987	43.63	04-Aug-16 05	0	0	-
69	Burhi Gandak	Rosera	Bihar	41.63	42.63	46.35	16/08/1987	41.19	18-Sep-16 05	0	0	-
70	Burhi Gandak	Khagaria	Bihar	35.58	36.58	39.22	1976	38.30	31-Aug-16 01	62	62	100.00

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						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12	13.00
71	Bagmati	Benibad	Bihar	47.68	48.68	50.01	12/07/2004	49.37	24-Jul-16 06	74	72	97.30
72	Bagmati	Hayaghat	Bihar	44.72	45.72	48.96	14/08/1987	45.06	26-Sep-16 19	7	7	100.00
73	Adhwara Group	Kamtaul	Bihar	49.00	50.00	52.99	12/08/1987	50.80	28-Sep-16 21	52	52	100.00
74	Adhwara Group	Ekmighat	Bihar	45.94	46.94	49.52	12/07/2004	46.68	27-Sep-16 01	32	32	100.00
75	Kamla Balan	Jhanjharpur	Bihar	49.00	50.00	53.01	10/07/2004	52.18	22-Sep-16 14	256	255	99.61
76	Kosi	Basua	Bihar	46.75	47.75	49.17	25/08/2010	47.36	27-Jul-16 05	73	73	100.00
77	Kosi	Baltara	Bihar	32.85	33.85	36.40	15/08/1987	35.31	28-Jul-16 01	121	120	99.17
78	Kosi	Kursela	Bihar	29.00	30.00	32.04	06/09/1998	31.59	27-Aug-16 07	66	66	100.00
79	Mahananda	Dhengraghat	Bihar	34.65	35.65	38.09	1968	37.23	27-Jul-16 17	67	66	98.51
80	Mahananda	Jhawa	Bihar	30.40	31.40	33.51	14/08/1987	33.30	28-Jul-16 06	95	95	100.00
81	Mayurakshi	Massanjore Dam	Jharkhand	121.31		122.87	25/09/1999	119.741	11-Oct-16 05	7	7	100.00
82	Mayurakshi	Tilpara Barrage	West Bengal	62.79		67.05	27/09/1978	62.789	05-Sep-16 23	8	8	100.00
83	Mayurakshi	Narayanpur	West Bengal	26.99	27.99	29.69	27/09/1995	26.52	12-Aug-16 06	0	0	-
84	Ajoy	Gheropara	West Bengal	38.42	39.42	43.94	27/09/1978	140.20	11-Aug-16 16	0	0	-
85	Damodar	Tenughat Dam	Jharkhand	268.83		265.56	17/09/1985	261.24	11-Sep-16 21	49	49	100.00
86	Damodar	Panchet Dam	Jharkhand	132.59		132.89	02/10/1959	129.46	24-Aug-16 15	72	72	100.00
87	Damodar	Durgapur Barrage	West Bengal	64.47		64.47	31/10/2002	64.47	Several Times	62	62	100.00
88	Barakar	Maithon Dam	Jharkhand	150.88		151.79	02/10/1959	149.86	25-Sep-16 22	49	49	100.00
89	Mundeshwari	Harinkhola	West Bengal	11.80	12.80	14.58	29/09/1978	12.75	24-Aug-16 00	2	2	100.00
90	Kangsabati	Kangsabati Dam	West Bengal	134.11		134.71	02/09/1978	133.09	09-Sep-16 00	27	27	100.00
91	Kangsabati	Mohanpur	West Bengal	24.73	25.73	29.87	02/09/1978	23.66	01-Aug-16 18	0	0	-
	2 b Brahmaputra Basin											
92	Siang	Passighat	Arunachal Pradesh	152.96	153.96	157.54	11-06-2000	154.80	23-Jul-16 06	94	92	97.87
93	Brahmaputra	Dibrugrah	Assam	103.24	104.24	106.48	03/09/1998	106.08	25-Jul-16 15	141	141	100.00
94	Brahmaputra	Neamatighat	Assam	84.04	85.04	87.37	11/07/1991	86.87	25-Jul-16 22	147	147	100.00
95	Brahmaputra	Tezpur	Assam	64.23	65.23	66.59	27/08/1988	66.22	26-Jul-16 20	65	65	100.00
96	Brahmaputra	Guwahati	Assam	48.68	49.68	51.46	21/07/2004	50.57	27-Jul-16 19	47	47	100.00
97	Brahmaputra	Goalpara	Assam	35.27	36.27	37.43	31/07/1954	37.00	28-Jul-16 14	45	45	100.00
98	Brahmaputra	Dhubri	Assam	27.62	28.62	30.36	28/08/1988	30.00	28-Jul-16 15	83	83	100.00
99	Burhidihing	Naharkatia	Assam	119.40	120.40	122.69	17/06/1973	119.49	24-Jul-16 14	2	2	100.00
100	Burhidihing	Khwong	Assam	101.11	102.11	104.16	02-09-2015	103.64	27-Jul-16 04	26	26	100.00
101	Desang	Nanglamoraghat	Assam	93.46	94.46	96.49	06/09/1998	95.30	11-Sep-16 20	72	70	97.22
102	Dikhow	Shivsagar	Assam	91.40	92.40	95.62	08/07/1974	93.30	17-Jul-16 18	92	92	100.00
103	Subansiri	Badatighat	Assam	81.53	82.53	86.84	28/06/1972	82.91	25-Jul-16 15	65	65	100.00
104	Dhansiri (S)	Golaghat	Assam	88.50	89.50	91.30	11/10/1986	89.95	07-Jul-16 08	70	70	100.00
105	Dhansiri (S)	Numaligarh	Assam	76.42	77.42	79.87	24/09/1985	79.12	08-Jul-16 07	251	251	100.00

Basinwise -Riverwise- Flood Forecasting Information in India during Flood Season 2016												
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						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12	13.00
106	Jiabharali	Jiabharali_NTX	Assam	76.00	77.00	78.50	26/07/2007	78.00	26-Jul-16 06	404	402	99.50
107	Kopilli	Kampur	Assam	59.50	60.50	61.86	16/06/1973	61.66	19-May-16 06	7	7	100.00
108	Kopilli	Dharmatul	Assam	55.00	56.00	58.09	21/07/2004	55.40	28-Jul-16 19	16	16	100.00
109	Puthimari	Puthimari _NHX	Assam	50.81	51.81	55.08	31/08/2008	53.97	27-Jul-16 08	216	214	99.07
110	Pagladiya	Pagladia_NTX	Assam	51.75	52.75	55.45	08/07/2004	52.81	26-Jul-16 19	26	26	100.00
111	Beki	Beki NHX	Assam	44.10	45.10	46.20	04/08/2000	45.99	25-Jul-16 23	209	209	100.00
112	Manas	Manas NHX	Assam	47.81	48.42	50.08	15/09/1984	48.63	24-Jun-16 22	6	6	100.00
113	Sankosh	Golakganj	Assam	28.94	29.94	30.95	08/09/2007	30.78	26-Jul-16 16	68	66	97.06
114	Raidak-I	Tufanganj	West Bengal	34.22	35.30	36.36	21/07/1993	35.30	24-Jul-16 00	21	19	90.48
115	Torsa	Ghughumari	West Bengal	39.80	40.41	41.46	03/08/2000	40.71	23-Jul-16 00	53	52	98.11
116	Jaldhaka	NH-31	West Bengal	80.00	80.90	82.33	28-07-1972	80.50	24-Jul-16 13	35	34	97.14
117	Jaldhaka	Mathabhanga	West Bengal	47.70	48.20	49.85	07/09/2007	49.03	24-Jul-16 21	18	15	83.33
118	Tista	Domohani	West Bengal	85.65	85.95	89.30	14/10/1968	86.23	24-Jul-16 12	46	44	95.65
119	Tista	Mekhliganj	West Bengal	65.45	65.95	66.45	13/07/1996	65.60	24-Jul-16 21	3	3	100.00
	2 c Barak & Others											
120	Barak	APGhat	Assam	18.83	19.83	21.84	01/08/1989	20.63	20-May-16 08	38	37	97.37
121	Katakhal	Matizuri	Assam	19.27	20.27	22.73	10/09/2007	21.69	19-May-16 17	26	26	100.00
122	Kushiyara	Karimganj	Assam	13.94	14.94	16.57	10/06/2010	15.81	23-May-16 22	75	75	100.00
123	Barak	Badarpurghat	Assam	15.85	16.85	18.48	11-09-2007	17.67	20-May-16 00	60	60	100.00
124	Manu	Kailashar	Tripura	24.34	25.34	25.79	07/06/1993	24.21	15-Sep-16 10	0	0	-
125	Gumti	Sonamura	Tripura	11.50	12.50	14.42	23/07/1993	10.67	01-Sep-16 22	0	0	-
	3. Godavari Basin											
126	Godavari	Kopergaon	Maharashtra	490.90	493.68	499.17	1969	495.95	08-Aug-16 14	12	11	91.67
127	Godavari	Jaikwadi Dam	Maharashtra	463.91		464.69	12/10/1990	462.88	13-Oct-16 05	5	4	80.00
128	Godavari	Gangakhed	Maharashtra	374.00	375.00	377.57	1947	365.27	17-Sep-16 10	0	0	-
129	Godavari	Nanded	Maharashtra	353.00	354.00	357.10	06/08/2006	347.35	17-Sep-16 03	0	0	-
130	Manjira	Singur Dam	Telangana	523.60		523.60	15/10/1999	523.60	01-Oct-16 08	14	12	85.71
131	Manjira	Nizamsagar Dam	Telangana	428.24		428.24	15/10/1999	428.24	29-Sep-16 18	13	12	92.31
132	Godavari	Sriram Sagar	Telangana	332.54		332.72	13/10/1990	332.54	28-Sep-16 14	22	20	90.91
133	Wainganga	Bhandara	Maharashtra	244.00	244.50	250.90	16/09/2005	243.08	07-Aug-16 16	0	0	-
134	Wainganga	Pauni	Maharashtra	226.73	227.73	232.35	07/09/1994	226.05	10-Jul-16 06	0	0	-
135	Wainganga	Goshikhurd Dam	Maharashtra		FRL=245.5			241.50	14-Oct-16 00	0	0	-
136	Wardha	Balharsha	Maharashtra	171.50	174.00	176.00	15/08/1986	171.07	12-Jul-16 23	0	0	-
137	Godavari	Kaleswaram	Telangana	103.50	104.75	107.05	15/08/1986	101.65	13-Jul-16 08	0	0	-
138	Indravati	Jagdalpur	Chhatisgarh	539.50	540.80	544.68	09/07/1973	540.32	11-Jul-16 08	4	4	100.00
139	Godavari	Eturunagaram	Telangana	73.32	75.82	77.66	24/08/1990	74.72	13-Jul-16 00	11	11	100.00
140	Godavari	Dummagudam	Telangana	53.00	55.00	60.25	16/08/1986	54.30	12-Jul-16 13	6	6	100.00

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						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12	13.00
141	Godavari	Bhadrachalam	Telangana	45.72	48.77	55.66	16/08/1986	48.58	12-Jul-16 18	11	11	100.00
142	Godavari	Kunavaram	Andhra Pradesh	37.74	39.24	51.30	16/08/1986	38.88	13-Jul-16 06	5	5	100.00
143	Godavari	Rajamundry	Andhra Pradesh	17.68	19.51	20.48	16/08/1986	17.34	13-Jul-16 14	0	0	-
144	Godavari	Sripada Yellampally Dam	Telangana	FRL 148				147.84	19-Sep-16 06	18	13	72.22
145	Godavari	Dowalaiswaram	Andhra Pradesh	14.25	16.08	18.36	16/08/1986	15.18	13-Jul-16 18	8	8	100.00
146	Kaddamvagu	Kaddam Dam	Telangana	FRL 213.21				213.36	13-Oct-16 06	3	3	100.00
	4. Krishna Basin											
147	Krishna	Dr K L R S Pulichintala Dam	Andhra Pradesh	FRL 53.34				49.90	26-Sep-16 08	5	5	100.00
148	Krishna	Arjunwad	Maharashtra	542.07	543.29	543.69	05-08-2005			0	0	
149	Krishna	Alamati Dam	Karnataka	519.60		519.60	18-09-2002	515.60	17-Aug-16 06	28	27	96.43
150	Krishna	Narayanpur Dam	Karnataka	492.25		492.22	26-09-2008	492.25	29-Sep-16 08	44	41	93.18
151	Krishna	Priyadarshini	Telangana	318.52		318.50	09-10-2012	318.50	22-Jul-16 20	56	46	82.14
152	Krishna	Srisailam Dam	Andhra Pradesh	269.75		273.25	03-10-2009	269.20	07-Oct-16 05	54	45	83.33
153	Krishna	Prakasham Barrage	Andhra Pradesh	18.30		21.50	07-10-1903	17.39	31-Aug-16 03	16	12	75.00
154	Bhima	Deongaon	Karnataka	402.00	404.50	407.34	13-08-2006	399.80	06-Oct-16 12	0	0	-
155	Tungabhadra	Tungabhadra Dam	Karnataka	497.74		497.74	08-10-1994	493.14	22-Aug-16 18	43	40	93.02
156	Tungabhadra	Sunkesula Barrage	Andhra Pradesh	FRL 292				292.00	24-Sep-16 10	0	0	-
157	Tungabhadra	Mantralayam	Andhra Pradesh	310.00	312.00	318.77	02-10-2009	308.59	07-Sep-16 00	0	0	-
	5. Cauvery Basin											
158	Cauvery	Krishnarajasagar	Karnataka	FRL 752.49				744.82	28-Jul-16 08	62	40	64.52
159	Cauvery	Mettur Dam	Tamilnadu	FRL=240.79				230.94	28-Sep-16 08	63	46	73.02
160	Bhavani	Bhavanisagar Dam	Tamilnadu	FRL=280.42				267.13	11-Aug-16 08	0	0	-
161	Cauvery	Grand Anicut	Tamilnadu					64.31	01-Oct-16 08	9	8	88.89
162	Harangi	Harangi Dam	Karnataka	FRL 871.42				871.20	05-Aug-16 08	53	20	37.74
163	Hemavathy	Hemavathy Dam	Karnataka	FRL 890.63				884.77	22-Aug-16 08	60	21	35.00
164	Kabini	Kabini Dam	Karnataka	FRL 696.16				694.21	20-Aug-16 08	61	32	52.46
	6. Subarnarekha											
165	Subernarekna	Jamshedpur	Jharkhand	122.5	123.5	129.82	12-10-1973	123.58	19-Aug-16 05	3	2	66.67
166	Subernarekna	Chandil Dam	Jharkhand	FRL 192				182.30	19-Aug-16 08	9	5	55.56
167	Subernarekna	Rajghat	Odisha	9.45	10.36	12.69	19/06/2008	11.76	20-Aug-16 00	10	9	90.00
168	Burhabalang	NH_5 _Road Bridge	Odisha	7.21	8.13	9.50	12/10/1973	5.48	19-Aug-16 05	0	0	-
	7. Brahmani and Baitarani											
169	Baitarni	Anandpur	Odisha	37.44	38.36	41.35	23-09-2011	36.80	18-Aug-16 22	0	0	-
170	Baitarni	Akhuapada	Odisha		17.83	21.95	16/08/1960	17.86	19-Aug-16 09	1	1	100.00
171	Brahmani	Jenapur	Odisha	22.00	23.00	24.78	20/08/1975	21.28	05-Aug-16 15	0	0	-
	8. Mahanadi Basin											
172	Mahanadi	Hirakud Dam	Odisha	192.02		192.30	30/01/1998	192.11	13-Oct-16 21	67	66	98.51
173	Mahanadi	Naraj	Odisha	25.41	26.41	27.61	31/08/1982	25.44	08-Jul-16 15	0	0	-
174	Mahanadi	Alipingal Devi	Odisha	10.85	11.76	13.11	11-09-2011	6.99	08-Dec-16 15	0	0	-
175	Mahanadi	Nimapara	Odisha	9.85	10.76	11.60	31/08/1982	4.26	08-May-16 03	0	0	-

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						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	4	5	6	7	8	9	10	11	12	13.00
	9. Pennar Basin											
176	North Pennar	Somasila Dam	Andhra Pradesh	FRL 100.58				93.70	31-Oct-16 08	4	3	75.00
177	Pennar	Nellore	Andhra Pradesh	15.91	17.28	18.70	30-11-1882	12.84	15-Dec-16 08	0	0	-
	10. Mahi Basin											
178	Mahi	Kadana Dam	Gujarat	126.19	127.71	127.74	09/09/1989	127.71	26-Sep-16 17	16	16	100.00
179	Mahi	Wanakbori	Gujarat	71.93	74.98	76.10	12/08/2006	73.70	22-Aug-16 02	3	1	33.33
	11. Sabarmati Basin											
180	Sabarmati	Dharoi Dam	Gujarat	187.45	192.25	189.63	03/09/1990	189.41	21-Oct-16 09	19	18	94.74
181	Sabarmati	Ahmedabad Shubhash	Gujarat	44.09	45.34	47.45	19/08/2006	41.77	20-Jun-16 12	0	0	-
	12. Narmada Basin											
182	Naramada	Mandla	Madhya Pradesh	437.20	437.80	439.41	18/08/1974	437.76	07-Aug-16 22	9	9	100.00
183	Naramada	Hoshangabad	Madhya Pradesh	292.83	293.83	300.90	30/08/1973	294.40	12-Jul-16 18	5	5	100.00
184	Naramada	Garudeswar	Gujarat	30.48	31.09	41.65	06/09/1970	21.99	10-Aug-16 12	0	0	-
185	Naramada	Bharuch	Gujarat	6.71	7.31	12.65	07/09/1970	6.15	11-Aug-16 14	0	0	-
	13. Tapi Basin											
186	Tapi	Hatnur Dam	Maharashtra	212.00	214.00	214.00	12/10/1989	214.00	14-Oct-16 17	106	104	98.11
187	Tapi	Ukai Dam	Gujarat	102.41	105.16	105.51	08/10/1990	104.46	12-Oct-16 13	31	29	93.55
188	Tapi	Surat	Gujarat	8.50	9.50	12.50	09/08/2006	4.90	05-Jun-16 15	0	0	-
	14. West Flowing rivers from Tapi to Tadri											
189	Damanganga	Madhuban Dam	Gujarat	79.86	82.40	80.60	27/09/1993	80.05	31-Oct-16 01	13	13	100.00
190	Damanganga	Vapi Town	Gujarat	18.20	19.20	23.76	03/08/2004	18.70	02-Aug-16 20	4	3	75.00
191	Damanganga	Daman	Daman& Diu	2.60	3.40	4.00	03/08/2004	2.20	02-Aug-16 19	0	0	-
	16. East flowing rivers between Mahanadi and Pennar											
192	Rushikuluya	Purushottampur	Odisha	15.83	16.83	19.65	04/11/1990	15.03	07-Oct-16 18	0	0	-
193	Vamsadhara	Gunupur	Odisha	83.00	84.00	88.75	17/09/1980	82.29	06-Aug-16 12	0	0	-
194	Vamsadhara	Kashinagar	Odisha	53.60	54.60	58.93	18/09/1980	54.02	06-Aug-16 15	4	4	100.00
195	Vamsadhara	Gotta Barrage	Andhra Pradesh	34.84	34.84	39.92	07/10/1999	38.13	09-Sep-16 19	0	0	-
196	Nagavali	Thottapalli Reservoir Schen	Andhra Pradesh	FRL 105.00				104.26	07-Oct-16 09	0	0	
	17 East flowing rivers between Pennar and Kanyakumari											
197	Vaigai	Vaigai Dam	Tamilnadu	FRL=279.2				266.45	11-Aug-16 08	0	0	-
198	Kosasthaliyar	Poondi Satyamurthy reserv	Tamilnadu	FRL=42.67				39.21	20-Dec-16 08	10	6	60.00
	18. West flowing rivers of Kutch and Saurashtra including Luni											
199	Banas	Dantiwada Dam	Gujarat	182.88	185.06	186.04	01/09/1973	175.47	12-Oct-16 15	0	0	-
								Total Forecasts		*6239*	*5948*	95.34
								Level Forecasts		4969	4891	98.43
								Inflow Forecast		1270	1057	83.23

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					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	4	5	6	7	8	9	10	11	12
	Andhra Pradesh										
1	North Pennar	Somasila Dam	FRL = 100.58				93.70	31-Oct-16 08	4	3	75.00
2	Krishna	DrKLRS Pulichintala Dam	FRL = 53.34				49.90	26-Sep-16 08	5	5	100.00
3	Tungabhadra	Sunkesula Barrage	FRL = 292				292.00	24-Sep-16 10	0	0	-
4	Nagavali	Thottapalli Rsvr Sch	FRL = 105.00				104.26	07-Oct-16 09	0	0	-
5	Vamsadhara	Gotta Barrage	34.48	34.84	39.92	07/10/1999	38.13	09-Sep-16 19	0	0	-
6	Godavari	Kunavaram	37.74	39.24	51.30	16/08/1986	38.88	13-Jul-16 06	5	5	100.00
7	Godavari	Rajamundry	17.68	19.51	20.48	16/08/1986	17.34	13-Jul-16 14	0	0	0.00
8	Godavari	Dowalaiswaram	14.25	16.08	18.36	16/08/1986	15.18	13-Jul-16 18	8	8	100.00
9	Krishna	Srisailam Dam	269.75		273.25	03/10/2009	269.20	07-Oct-16 05	54	45	83.33
10	Krishna	Prakasam Barrage	18.30		21.50	07/10/1903	17.39	31-Aug-16 03	16	12	75.00
11	Tungbhadra	Mantralayam	310.00	312.00	318.77	02/10/2009	308.59	07-Sep-16 00	0	0	-
12	Pennar	Nellore Anicut	15.91	17.28	18.70	30/11/1882	12.84	15-Dec-16 08	0	0	-
	Assam										
13	Brahmaputra	Dibrugrah	103.24	104.24	106.48	03/09/1998	106.08	25-Jul-16 15	141	141	100.00
14	Brahmaputra	Neamatighat	84.04	85.04	87.37	11/07/1991	86.87	25-Jul-16 22	147	147	100.00
15	Brahmaputra	Tezpur	64.23	65.23	66.59	27/08/1988	66.22	26-Jul-16 20	65	65	100.00
16	Brahmaputra	Guwahati	48.68	49.68	51.46	21/07/2004	50.57	27-Jul-16 19	47	47	100.00
17	Brahmaputra	Goalpara	35.27	36.27	37.43	31/07/1954	37.00	28-Jul-16 14	45	45	100.00
18	Brahmaputra	Dhubri	27.62	28.62	30.36	28/08/1988	30.00	28-Jul-16 15	83	83	100.00
19	Burhidihing	Naharkatia	119.40	120.40	122.69	17/06/1973	119.49	24-Jul-16 14	2	2	100.00
20	Burhidihing	Khowang	101.11	102.11	103.92	25/08/1988	103.64	27-Jul-16 04	26	26	100.00
21	Desang	Nanglamoraghat	93.46	94.46	96.49	06/09/1998	95.30	11-Sep-16 20	72	70	97.22
22	Dikhow	Shivsagar	91.40	92.40	95.62	08/07/1974	93.30	17-Jul-16 18	92	92	100.00
23	Subansiri	Badatighat	81.53	82.53	86.84	28/06/1972	82.91	25-Jul-16 15	65	65	100.00
24	Dhansiri (S)	Golaghat	88.50	89.50	91.30	11/10/1986	89.95	07-Jul-16 08	70	70	100.00
25	Dhansiri (S)	Numaligarh	76.42	77.42	79.87	24/09/1985	79.12	08-Jul-16 07	251	251	100.00
26	Jiabharali	Jiabharali_NTX	76.00	77.00	78.50	26/07/2007	78.00	26-Jul-16 06	404	402	99.50
27	Kopilli	Kampur	59.50	60.50	61.86	16/06/1973	61.66	19-May-16 06	7	7	100.00
28	Kopilli	Dharmatul	55.00	56.00	58.09	21/07/2004	55.40	28-Jul-16 19	16	16	100.00
29	Puthimari	Puthimari _NHX	50.81	51.81	55.08	31/08/2008	53.97	27-Jul-16 08	216	214	99.07
30	Pagladiya	Pagladia_NTX	51.75	52.75	55.45	08/07/2004	52.81	26-Jul-16 19	26	26	100.00
31	Beki	Beki NHX	44.10	45.10	46.20	04/08/2000	45.99	25-Jul-16 23	209	209	100.00
32	Manas	Manas NHX	47.81	48.42	50.08	15/09/1984	48.63	24-06-2016 22:00	6	6	100.00
33	Sankosh	Golakganj	28.94	29.94	30.95	08/09/2007	30.78	26-Jul-16 16	68	66	97.06
34	Barak	APGhat	18.83	19.83	21.84	01/08/1989	20.63	20-May-16 08	38	37	97.37
35	Katakhal	Matizuri	19.27	20.27	22.73	10/09/2007	21.69	19-May-16 17	26	26	100.00

Statewise Flood Forecasting Information In India during Flood Season 2016

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2016				
					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12
36	Kushiyara	Karimganj	13.94	14.94	16.57	10/06/2010	15.81	23-May-16 22	75	75	100.00
37	Barak	Badarpurghat	15.85	16.85	18.48	11-09-2007	17.67	20-May-16 00	60	60	100.00
	Arunachal Pradesh										
38	Siang	Passighat	152.96	153.96	157.54	11-06-2000	154.80	23-Jul-16 06	94	92	97.87
	Bihar										
39	Ganga	Buxar	59.32	60.32	62.09	1948	61.26	24-Aug-16 11	21	21	100.00
40	Ganga	Patna Dighaghat	49.45	50.45	52.52	23/08/1975	52.120	21-Aug-16 06	26	25	96.15
41	Ganga	Patna Gandhighat	47.60	48.60	50.27	14/08/1994	50.520	21-Aug-16 05	63	62	98.41
42	Ganga	Hathidah	40.76	41.76	43.15	07/08/1971	43.170	22-Aug-16 00	62	62	100.00
43	Ganga	Munger	38.33	39.33	40.99	19/09/1976	40.070	25-Aug-16 09	21	21	100.00
44	Ganga	Bhagalpur	32.68	33.68	34.20	17/09/2003	34.720	26-Aug-16 07	48	48	100.00
45	Ganga	Kahalgaon	30.09	31.09	32.87	17/09/2003	32.840	27-Aug-16 17	80	79	98.75
46	Ghaghra	Darauli	59.82	60.82	61.74	29/08/1998	60.95	02-Aug-16 20	39	39	100.00
47	Ghaghra	Gangpur Siswan	56.04	57.04	58.01	18/09/1983	57.47	21-Aug-16 07	47	47	100.00
48	Ghaghra	Chhapra	52.68	53.68	54.59	03/09/1982	53.850	21-Aug-16 08	10	10	100.00
49	Sone	Inderpuri	107.20	108.20	108.85	23/08/1975	108.10	20-Aug-16 04	2	2	100.00
50	Sone	Koelwar	54.52	55.52	58.88	20/07/1971	57.08	20-Aug-16 15	8	6	75.00
51	Sone	Maner	51.00	52.00	53.79	10/09/1976	53.70	21-Aug-16 05	22	21	95.45
52	PunPun	Sripalpur	49.60	50.60	53.91	18/09/1976	53.34	13-Sep-16 13	64	61	95.31
53	Gandak	Chatia	68.15	69.15	70.04	26/07/2002	68.56	31-Jul-16 06	4	4	100.00
54	Gandak	Rewaghat	53.41	54.41	55.41	17/09/1986	54.36	31-Aug-16 23	12	12	100.00
55	Gandak	Hazipur	49.32	50.32	50.93	1948	50.39	21-Aug-16 04	17	17	100.00
56	Burhi Gandak	Lalbeghiaghat	62.20	63.20	67.09	30/07/1975	61.77	24-Jul-16 10	0	0	-
57	Burhi Gandak	Muzaffarpur Sikandarpur	51.53	52.53	54.29	15/08/1987	50.29	04-Aug-16 09	0	0	-
58	Burhi Gandak	Samastipur	45.02	46.02	49.38	15/08/1987	43.63	04-Aug-16 05	0	0	-
59	Burhi Gandak	Rosera	41.63	42.63	46.35	16/08/1987	41.19	18-Sep-16 05	0	0	-
60	Burhi Gandak	Khagaria	35.58	36.58	39.22	1976	38.30	31-Aug-16 01	62	62	100.00
61	Bagmati	Benibad	47.68	48.68	50.01	12/07/2004	49.37	24-Jul-16 06	74	72	97.30
62	Bagmati	Hayaghat	44.72	45.72	48.96	14/08/1987	45.06	26-Sep-16 19	7	7	100.00
63	Adhwara Grou	Kamtaul	49.00	50.00	52.99	12/08/1987	50.80	28-Sep-16 21	52	52	100.00
64	Adhwara Grou	Ekmighat	45.94	46.94	49.52	12/07/2004	46.68	27-Sep-16 01	32	32	100.00
65	Kamla Balan	Jhanjharpur	49.00	50.00	53.01	10/07/2004	52.18	22-Sep-16 14	256	255	99.61
66	Kosi	Basua	46.75	47.75	49.17	25/08/2010	47.36	27-Jul-16 05	73	73	100.00
67	Kosi	Baltara	32.85	33.85	36.40	15/08/1987	35.31	28-Jul-16 01	121	120	99.17
68	Kosi	Kursela	29.00	30.00	32.04	06/09/1998	31.59	27-Aug-16 07	66	66	100.00
69	Mahananda	Dhengraghat	34.65	35.65	38.09	1968	37.23	27-Jul-16 17	67	66	98.51
70	Mahananda	Jhawa	30.40	31.40	33.51	14/08/1987	33.30	28-Jul-16 06	95	95	100.00

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Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2016		No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	4	5	6	7	8	9	10	11	12
	Chhatisgarh										
71	Indravati	Jagdalpur	539.50	540.80	544.68	09/07/1973	540.32	11/07/2016 08	4	4	100.00
	Dadra & Nagar Haveli										
72	Damanganga	Daman	2.60	3.40	4.00	03/08/2004	2.20	02-Aug-16 19	0	0	-
	Gujarat										
73	Banas	Dantiwada Dam	182.88	185.06	186.04	01/09/1973	175.47	12-Oct-16 15	0	0	-
74	Sabarmati	Dharoi Dam	187.45	192.25	189.63	03/09/1990	189.41	21-Oct-16 09	19	18	94.74
75	Sabarmati	Ahmedabad Shubhash Bridge	44.09	45.34	47.45	19/08/2006	41.77	20-Jun-16 12	0	0	-
76	Mahi	Kadana Dam	126.19	127.71	127.74	09/09/1989	127.71	26-Sep-16 17	16	16	100.00
77	Mahi	Wanakbori	71.00	72.54	76.10	12/08/2006	73.70	22-Aug-16 02	3	1	33.33
78	Naramada	Garudeswar	30.48	31.09	41.65	06/09/1970	21.99	10-Aug-16 12	0	0	-
79	Naramada	Bharuch	6.71	7.31	12.65	07/09/1970	6.15	11-Aug-16 14	0	0	-
80	Tapi	Ukai Dam	102.41	105.16	105.51	08/10/1990	104.46	12-Oct-16 13	31	29	93.55
81	Tapi	Surat	8.50	9.50	12.50	09/08/2006	4.90	05-Jun-16 15	0	0	-
82	Damanganga	Madhuban Dam	79.86	82.40	80.60	27/09/1993	80.05	31-Oct-16 01	13	13	100.00
83	Damanganga	Vapi Town	18.20	19.20	23.76	03/08/2004	18.70	02-Aug-16 20	4	3	75.00
	Haryana										
84	Yamuna	Hathnikund Barrage		PL=334	338.90	17/06/1013			0	0	
	Jharkhand										
85	Ganga	Sahibgunj	26.25	27.25	30.91	1998	29.120	26-Aug-16 22	60	60	100.00
86	Mayurakshi	Massanjore Dam		FRL = 121.31	122.87	25/09/1999	119.741	11-Oct-16 05	7	7	100.00
87	Damodar	Tenughat Dam		FRL = 268.83	265.56	17/09/1985	261.24	11-Sep-16 21	49	49	100.00
88	Damodar	Panchet Dam		FRL = 132.59	132.89	02/10/1959	129.46	24-Aug-16 15	72	72	100.00
89	Barakar	Maithon Dam		FRL= 150.88	151.79	02/10/1959	149.86	25-Sep-16 22	49	49	100.00
90	Subarnarekha	Chandil Dam		FRL= 192.00			182.30	19-Aug-16 08	9	5	55.56
91	Subarnarekha	Jamshedpur	122.5	123.5	129.82	12-10-1973	123.58	19-Aug-16 05	3	2	66.67
	Jammu and Kashmir										
92	Jhelum	Rammunshibagh	1585.53	1586.45	1589.7	08-09-2014	1584.73	28-Jul-16 16	0	0	-
	Karnataka										
93	Krishna	Alamati Dam		FRL=519.60	519.60	18-09-2002	515.60	17-Aug-16 06	28	27	96.43
94	Krishna	Narayanpur Dam		FRL=492.25	492.22	26-09-2008	492.25	29-Sep-16 08	44	41	93.18
95	Bhima	Deongaon	402.00	404.50	407.34	13-08-2006	399.80	06-Oct-16 12	0	0	-
96	Harangi	Harangi Dam		FRL=871.42			871.20	05-Aug-16 08	53	20	37.74
97	Hemavathy	Hemavathy Dam		FRL=890.63			884.77	22-Aug-16 08	60	21	35.00
98	Cauvery	Krishnarajasagar		FRL=752.49			744.82	28-Jul-16 08	62	40	64.52
99	Kabini	Kabini Dam		FRL=696.16			694.21	20-Aug-16 08	61	32	52.46
100	Tungbhadra	Tungabhadra Dam		FRL=497.74	497.74	08-10-1994	493.14	22-Aug-16 18	43	40	93.02
	Madhya Pradesh										-
101	Chambal	Gandhisagar Dam		FRL 399.99					8	1	12.50
102	Naramada	Mandla	437.20	437.80	439.41	18/08/1974	437.76	07-Aug-16 22	9	9	100.00
103	Naramada	Hoshangabad	292.83	293.83	300.90	30/08/1973	294.40	12-Jul-16 18	5	5	100.00
104	Sone	Bansagar Dam		FRL=341.65			341.64	25-Sep-16 12	14	9	64.29

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					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	4	5	6	7	8	9	10	11	12
	Maharashtra										-
105	Godavari	Kopergaon	490.90	493.68	499.17	1969	495.95	08-Aug-16 14	12	11	91.67
106	Godavari	Jaikwadi Dam		FRL=463.91	464.69	12/10/1990	462.88	13-Oct-16 05	5	4	80.00
107	Godavari	Gangakhed	374.00	375.00	377.57	1947	365.27	17-Sep-16 10	0	0	-
108	Godavari	Nanded	353.00	354.00	357.10	06/08/2006	347.35	17-Sep-16 03	0	0	-
109	Wardha	Balharsha	171.50	174.00	176.00	15/08/1986	171.07	12-Jul-16 23	0	0	-
110	Wainganga	Bhandara	244.00	244.50	250.90	16/09/2005	243.08	07-Aug-16 16	0	0	-
111	Wainganga	Pauni	226.73	227.73	232.35	07/09/1994	226.05	10-Jul-16 06	0	0	-
112	Krishna	Arjunwad	542.07	543.29	543.69	05/08/2005			0	0	-
113	Tapi	Hatnur Dam	212.02	214.00	214.00	12/10/1989	214.00	14-Oct-16 17	106	104	98.11
114	Wainganga	Goshikhurd Dam		FRL=245.5			241.50	14-Oct-16 00	0	0	-
	NCT Delhi										-
115	Yamuna	Delhi Rly Bridge	204.00	204.83	207.49	06/09/1978	204.90	14-Aug-16 04	21	20	95.24
116	Sahibi	Dhansa	211.44	212.44	213.58	06/08/1977	210.08	03-Sep-16 03	0	0	-
	Odisha										
117	Subernarekna	Rajghat	9.45	10.36	12.69	19/06/2008	11.76	20-Aug-16 00	10	9	90.00
118	Burhabalang	NH_5 _Road Bridge	7.21	8.13	9.50	12/10/1973	5.48	19-Aug-16 05	0	0	-
119	Baitarni	Anandpur	37.44	38.36	41.35	23-09-2011	36.80	18-Aug-16 22	0	0	-
120	Baitarni	Akhuapada	17.83	17.83	21.95	16/08/1960	17.86	19-Aug-16 09	1	1	100.00
121	Brahmani	Jenapur	22.00	23.00	24.78	20/08/1975	21.28	05-Aug-16 15	0	0	-
122	Rushikuluya	Purushottampur	15.83	16.83	19.65	04/11/1990	15.03	07-Oct-16 18	0	0	-
123	Vamsadhara	Gunupur	83.00	84.00	88.75	17/09/1980	82.29	06-Aug-16 12	0	0	-
124	Vamsadhara	Kashinagar	53.60	54.60	58.93	18/09/1980	54.02	06-Aug-16 15	4	4	100.00
125	Mahanadi	Hirakud Dam		FRL=192.02	192.30	30/01/1998	192.11	13-Oct-16 21	67	66	98.51
126	Mahanadi	Naraj	25.41	26.41	27.61	31/08/1982	25.44	08-Jul-16 15	0	0	-
127	Mahanadi	Alipingal Devi	10.85	11.76	13.11	11-09-2011	6.99	08-Dec-16 15	0	0	-
128	Mahanadi	Nimapara	9.85	10.76	11.60	31/08/1982	4.26	08-May-16 03	0	0	-
	Rajasthan										
128	Banas	Bisalpur Dam		FRL=315.5			315.50	14-Sep-16 08	7	7	100.00
	Tamilnadu										
129	Cauvery	Mettur Dam		FRL=240.79			230.94	28-Sep-16 08	63	46	73.02
130	Bhavani	Bhavanisagar Dam		FRL=280.42			267.13	11-Aug-16 08	0	0	-
131	Cauvery	Grand Anicut					64.31	01-Oct-16 08	9	8	88.89
132	Vaigai	Vaigai Dam		FRL=279.2			266.45	11-Aug-16 08	0	0	-
133	Kosasthaliyar	Poondi Satyamurthy rsv		FRL=42.67			39.21	20-Dec-16 08	10	6	60.00
	Telagana										
134	Manjira	Singur Dam		FRL 523.6	523.60	15/10/1999	523.60	01-Oct-16 08	14	12	85.71
135	Manjira	Nizamsagar Dam		FRL 428.24	428.24	15/10/1999	428.24	29-Sep-16 18	13	12	92.31
136	Godavari	Sriram Sagar		FRL 332.54	332.72	13/10/1990	332.54	28-Sep-16 14	22	20	90.91
137	Godavari	Kaleswaram	103.50	104.75	107.05	15/08/1986	101.65	13-Jul-16 08	0	0	0.00
138	Godavari	Eturunagaram	73.32	75.79	77.66	24/08/1990	74.72	13-Jul-16 00	11	11	100.00
139	Godavari	Dummagudam	53.00	55.00	60.25	16/08/1986	54.30	12-Jul-16 13	6	6	100.00
140	Godavari	Bhadrachalam	45.72	48.77	55.66	16/08/1986	48.58	12-Jul-16 18	11	11	100.00

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					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	4	5	6	7	8	9	10	11	12
141	Krishna	Priyadarshini	318.52		318.50	09-10-2012	318.50	22-Jul-16 20	56	46	82.14
142	Kaddamvagu	Kaddam Dam		FRL 213.21			213.36	13-Oct-16 06	3	3	100.00
143	Godavari	Sripada Yellampally Dam		FRL 148			147.84	19-Sep-16 06	18	13	72.22
	Tripura										
144	Manu	Kailashar	24.34	25.34	25.79	07/06/1993	24.21	15-Sep-16 10	0	0	-
145	Gumti	Sonamura	11.50	12.50	14.42	23/07/1993	10.67	01-Sep-16 22	0	0	-
	Uttar Pradesh										
146	Ganga	Narora Barrage		PL= 180.79 at D/S	180.61	23/09/2010	179.070	22-Aug-16 00	50	49	98.00
147	Ganga	Kannauj	124.97	125.97	126.78	27/09/2010	125.300	05-Aug-16 20	20	20	100.00
148	Ganga	Ankinghat	123.00	124.00	124.49	28/09/2010	123.450	05-Aug-16 07	29	29	100.00
149	Ganga	Kanpur	113.00	114.00	114.08	29/09/2010	112.640	07-Aug-16 04	33	33	100.00
150	Ganga	Dalmau	98.36	99.36	99.84	03/08/1973	98.290	20-Aug-16 14	0	0	-
151	Ganga	Phphamau	83.73	84.73	87.98	08/09/1978	86.300	24-Aug-16 18	11	11	100.00
152	Ganga	Allahabad Chhatnag	83.73	84.73	88.03	08/09/1978	85.600	24-Aug-16 04	10	10	100.00
153	Ganga	Mirzapur	76.72	77.72	80.34	09/09/1978	78.550	25-Aug-16 19	10	10	100.00
154	Ganga	Varanasi	70.26	71.26	73.90	09/09/1978	72.560	25-Aug-16 12	12	12	100.00
155	Ganga	Ghazipur	62.11	63.11	65.22	09/09/1978	65.040	26-Aug-16 08	21	21	100.00
156	Ganga	Ballia	56.62	57.62	60.25	14/09/2003	60.390	25-Aug-16 01	39	39	100.00
157	Ramganga	Moradabad	189.60	190.60	192.88	21/09/2010	190.100	26-Jul-16 00	5	5	100.00
158	Ramganga	Bareilly	162.70	163.70	162.88	06/8/1978	160.580	02-Aug-16 16	0	0	-
159	Yamuna	Mawi	230.00	230.85	232.45	26/09/1988	230.60	13-Aug-16 12	14	13	92.86
160	Yamuna	Mathura	164.20	165.20	169.73	08/09/1978	165.30	15-Aug-16 08	37	37	100.00
161	Yamuna	Agra	151.40	152.40	154.76	09/09/1978	150.00	16-Aug-16 14	0	0	-
162	Yamuna	Etawa	120.92	121.92	126.13	11/09/1978	119.38	17-Aug-16 19	0	0	-
163	Yamuna	Auraiya	112.00	113.00	118.19	25/08/1996	113.27	23-Aug-16 20	4	2	50.00
164	Yamuna	Kalpi	107.00	108.00	112.98	25/08/1996	108.98	24-Aug-16 10	5	3	60.00
165	Yamuna	Hamirpur	102.63	103.63	108.59	12/09/1983	104.94	23-Aug-16 08	5	4	80.00
166	Yamuna	Chilaghat	99.00	100.00	105.16	06/09/1978	102.10	23-Aug-16 00	10	6	60.00
167	Yamuna	Naini	83.74	84.74	87.99	08/09/1978	86.07	24-Aug-16 05	12	7	58.33
168	Betwa	Mohana	121.66	122.66	133.69	11/09/1983	124.41	21-Aug-16 13	3	0	0.00
169	Betwa	Sahjina	103.54	104.54	108.67	12/09/1983	105.02	23-Aug-16 03	6	4	66.67
170	Ken	Banda	103.00	104.00	113.29	07/0720/05	109.97	21-Aug-16 11	19	7	36.84
171	Gomati	Lucknow HanumanSetu	108.50	109.50	110.85	10/09/1971	104.92	17-Aug-16 05	0	0	-
172	Gomati	Jaunpur	73.07	74.07	77.74	22/09/1971	71.110	22-Aug-16 14	0	0	-
173	SAI	Raibareli	100.00	101.00	104.81	17/09/1982	110.57	16-Aug-16 10	3	3	100.00
174	Ghaghra	Elgin Bridge	105.07	106.07	107.56	10/10/2009	106.886	20-Jul-16 08	71	69	97.18
175	Ghaghra	Ayodhya	91.73	92.73	94.01	11/10/2009	93.100	01-Aug-16 12	58	57	98.28

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					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	4	5	6	7	8	9	10	11	12
176	Ghaghra	Turtipar	63.01	64.01	66.00	28/08/1998	64.410	02-Aug-16 23	47	47	100.00
177	Rapti	Balrampur	103.62	104.62	105.25	11/09/2000	105.200	29-Jul-16 15	26	25	96.15
178	Rapti	Bansi	83.90	84.90	85.82	21/08/1998	84.980	02-Aug-16 09	14	14	100.00
179	Rapti	Gorakpur Birdghat	73.98	74.98	77.54	23/08/1998	75.290	31-Jul-16 14	13	13	100.00
180	Gandak	Khadda	95.00	96.00	97.50	23/07/2002	95.88	23-Jul-16 15	76	76	100.00
181	Rihand	Rihand Dam		FRL=268.22			265.97	06-Sep-16 08	13	10	76.92
	Uttarakhand										
182	Alaknanda	Srinagar	539.00	540.00	536.85	05/09/1995	535.15	15-Jul-16 13	5	5	100.00
183	Ganga	Rishikesh	339.50	340.50	341.72	05/09/1995	339.61	10-Aug-16 15	8	8	100.00
184	Ganga	Haridwar	293.00	294.00	296.30	19/09/2010	293.60	12-Aug-16 10	12	12	100.00
	West Bengal										
186	Ganga	Farakka	21.25	22.25	25.14	07/09/1998	24.200	28-Aug-16 22	174	173	99.43
187	Mayurakshi	Tilpara Barrage		PL= 62.79	67.05	27/09/1978	62.789	05-Sep-16 23	8	8	100.00
188	Mayurakshi	Narayanpur	26.99	27.99	29.69	27/09/1995	26.52	12-Aug-16 06	0	0	-
189	Ajoy	Gheropara	38.42	39.42	43.94	27/09/1978	140.20	11-Aug-16 16	0	0	-
190	Damodar	Durgapur Barrage		PL = 64.47	64.47	31/10/2002	64.47	Several Times	62	62	100.00
191	Mundeshwari	Harinkhola	11.80	12.80	14.58	29/09/1978	12.75	24-Aug-16 00	2	2	100.00
192	Kangsabati	Kangsabati Dam		FRL=134.11	134.71	02/09/1978	133.09	09-Sep-16 00	27	27	100.00
193	Kangsabati	Mohanpur	24.73	25.73	29.87	02/09/1978	23.66	01-Aug-16 18	0	0	-
194	Raidak-I	Tufanganj	34.22	35.30	36.36	21/07/1993	35.30	24-Jul-16 00	21	19	90.48
195	Torsa	Ghughumari	39.80	40.41	41.46	03/08/2000	40.71	23-Jul-16 00	53	52	98.11
196	Jaldhaka	NH-31	80.00	80.90	81.33	28/08/1972	80.50	24-Jul-16 13	35	34	97.14
197	Jaldhaka	Mathabhanga	47.70	48.20	49.85	07/09/2007	49.03	24-Jul-16 21	18	15	83.33
198	Tista	Domohani	85.65	85.95	89.30	14/10/1968	86.23	24-Jul-16 12	46	44	95.65
199	Tista	Mekhliganj	65.45	65.95	66.45	13/07/1996	65.60	24-Jul-16 21	3	3	100.00
							Total Forecasts		***6239***	***5948***	**95.34**
							Level Forecasts		**4969**	**4891**	**98.43**
							Inflow Forecast		**1270**	**1057**	**83.23**

Performance of Flood Forecasting Stations (Divisionwise) in India during Flood Season 2016

Sl. No	Division	Level Forecasts only					Inflow Forecasts only					Total Forecast Stations				
		Stns.	F/c issued for	Total	Within Limit	Accuracy	Stns.	F/c issued for	Total	Within Limit	Accuracy	Stns.	F/c issued for	Total	Within Limit	Accuracy
1	Himalayan Ganga Divn, Dehradun	3	3	25	25	100.00	0	0	0	0	-	3	3	25	25	100.00
2	Middle Ganga Division 1, Lucknow	6	6	229	227	99.13	0	0	0	0	-	6	6	229	227	99.13
3	Middle Ganga Division 2, Lucknow	8	5	90	90	100.00	1	1	50	49	98.00	9	6	140	139	99.29
4	Middle Ganga Division 3, Varanasi	7	6	103	103	100.00	2	2	27	19	70.37	9	8	130	122	93.85
5	Lower Ganga Division I, Patna	17	13	985	980	99.49	0	0	0	0	-	17	13	985	980	99.49
6	Lower Ganga Division 2, Patna	18	18	776	766	98.71	0	0	0	0	-	18	18	776	766	98.71
7	Upper Yamuna Divn, Delhi	4	3	72	70	97.22	1	0	0	0	-	5	3	72	70	97.22
8	Chambal Division, Jaipur	0	0	0	0		2	2	15	8	53.33	2	2	15	8	53.33
9	Lower Yamuna Divn, Agra	10	8	64	31	48.44	0	0	0	0	-	10	8	64	31	48.44
10	Damodar Divn, Asansol	4	1	2	2	100.00	7	7	274	274	100.00	11	8	276	276	100.00
11	Upper Brahmaputra Divn, Dibrugarh	14	14	1452	1446	99.59	0	0	0	0	-	14	14	1452	1446	99.59
12	Middle Brahmaputra Divn, Guwahati	10	8	533	530	99.44	0	0	0	0	-	10	8	533	530	99.44
13	Lower Brahmaputra Divn, Jalpaiguri	10	10	542	531	97.97	0	0	0	0	-	10	10	542	531	97.97
14	Eastern Rivers Divn, Bhubaneswar	9	4	18	16	88.89	3	1	9	5	55.56	12	5	27	21	77.78
15	Mahanadi Divn, Burla	3	0	0	0	-	1	1	67	66	98.51	4	1	67	66	98.51
16	Lower Godavari Divn, Hyderabad	14	7	57	56	98.25	7	6	75	64	85.33	21	13	132	120	90.91
17	Lower Krishna Divn, Hyderabad	3	0	0	0	-	8	7	246	216	87.80	11	7	246	216	87.80
18	Mahi Divn, Gandhinagar	2	1	3	1	33.33	3	2	35	34	97.14	5	3	38	35	92.11
19	Tapi Divn,Surat	5	1	4	3	75.00	3	3	150	146	97.33	8	4	154	149	96.75
20	Narmada Divn, Bhopal	2	2	14	14	100.00	0	0	0	0	-	2	2	14	14	100.00
21	Chenab Divn. Jammu	1	0	0	0	-	0	0	0	0	-	1	0	0	0	-
22	Southern River Divn. Coimbtr.	0	0	0	0	-	4	2	72	54	75.00	4	2	72	54	75.00
23	Hydrology Divn. Chennai	1	0	0	0	-	2	2	14	9	64.29	3	2	14	9	64.29
24	Cauvery Divn. Bangalore	0	0	0	0	-	4	4	236	113	47.88	4	4	236	113	47.88
Total		**151**	**110**	**4969**	**4891**	**98.43**	**48**	**40**	**1270**	**1057**	**83.23**	**199**	**150**	**6239**	**5948**	**95.34**

Performance of Flood Forecasting Stations (Major Basinwise) in India during Flood Season 2016

Sl. No	Name of the Major River basin	Total no.of FF sites			No.of FF sites where no forecast was issued			Level Forecasts			Inflow Forecasts			Overall Forecasts		
		Total no	Level FF sites	Inflow FF sites	Total no	Level FF sites	Inflow FF sites	Total No.	Within limits	% of Accu-racy	Total No.	Within limits	% of Accu-racy	Total No.	Within limits	% of Accu-racy
1	Indus	1	1	0	1	1	0	0	0	-	0	0	-	0	0	-
2	Ganga	90	77	13	15	14	1	2346	2294	97.78	366	350	95.63	2712	2644	97.49
3	Brahmaputra	28	28	0	0	0	0	2328	2309	99.18	0	0	-	2328	2309	99.18
4	Barak and others	6	6	0	2	2	0	199	198	99.50	0	0	-	199	198	99.50
5	Godavari	21	14	7	8	7	1	57	56	98.25	75	64	85.33	132	120	90.91
6	Krishna	11	3	8	4	3	1	0	0	-	246	216	87.80	246	216	87.80
7	Cauvery	7	0	7	1	0	1	0	0	-	308	167	54.22	308	167	54.22
8	Subarnarekha	4	3	1	1	1	0	13	11	84.62	9	5	55.56	22	16	72.73
9	Brahmani and Baitarni	3	3	0	2	2	0	1	1	100.00	0	0	-	1	1	100.00
10	Mahanadi	4	3	1	3	3	0	0	0	-	67	66	98.51	67	66	98.51
11	Pennar	2	1	1	1	1	0	0	0	-	4	3	75.00	4	3	75.00
12	Mahi	2	1	1	0	0	0	3	1	33.33	16	16	100.00	19	17	89.47
13	Sabarmati	2	1	1	1	1	0	0	0	-	19	18	94.74	19	18	94.74
14	Narmada	4	4	0	2	2	0	14	14	100.00	0	0	-	14	14	100.00
15	Tapi	3	1	2	1	1	0	0	0	-	137	133	97.08	137	133	97.08
16	West Flowing rivers from Tapi to Tadri	3	2	1	1	1	0	4	3	75.00	13	13	100.00	17	16	94.12
17	East flowing rivers between Mahanadi and Pennar	5	3	2	4	2	2	4	4	100.00	0	0	-	4	4	100.00
18	East flowing rivers between Pennar and Kanyakumari	2	0	2	1	0	1	0	0	-	10	6	60.00	10	6	60.00
19	West flowing rivers of Kutch and saurashtra including Luni	1	0	1	1	0	1	0	0	-	0	0	-	0	0	-
Total		**199**	**151**	**48**	**49**	**41**	**8**	**4969**	**4891**	**98.43**	**1270**	**1057**	**83.23**	**6239**	**5948**	**95.34**

Annex VI

Performance of Flood Forecasting Stations (Statewise) in India during Flood Season 2016

Sl. No	Name of the Major River basin	Total no.of FF sites			No.of FF sites where no forecast was issued			Level Forecasts			Inflow Forecasts			Overall Forecasts		
		Total no	Level FF sites	Inflow FF sites	Total no	Level FF sites	Inflow FF sites	Total No.	Within limits	Accuracy (%)	Total No.	Within limits	Accuracy (%)	Total No.	Within limits	Accuracy (%)
1	Andhra Pradesh	12	5	7	6	3	3	13	13	100.00	79	65	82.28	92	78	84.78
2	Arunachal Pradesh	1	1	0	0	0	0	94	92	97.87	0	0	-	94	92	97.87
3	Assam	25	25	0	0	0	0	2257	2248	99.60	0	0	-	2257	2248	99.60
4	Bihar	32	32	0	4	4	0	1451	1437	99.04	0	0	-	1451	1437	99.04
5	Chattisgarh	1	1	0	0	0	0	4	4	100.00	0	0	-	4	4	100.00
6	Daman & Diu	1	1	0	1	1	0	0	0	-	0	0	-	0	0	-
7	Gujarat	11	6	5	5	4	1	7	4	57.14	79	76	96.20	86	80	93.02
8	Haryana	1	0	1	1	0	1	0	0	-	0	0	-	0	0	-
9	Jharkhand	7	2	5	0	0	0	63	62	98.41	186	182	97.85	249	244	97.99
10	Jammu and Kashmir	1	1	0	1	1	0	0	0	-	0	0	-	0	0	-
11	Karnataka	8	1	7	1	1	0	0	0	-	351	221	62.96	351	221	62.96
12	Madhya Pradesh	4	2	2	0	0	0	14	14	100.00	22	10	45.45	36	24	66.67
13	Maharashtra	10	7	3	7	6	1	12	11	91.67	111	108	97.30	123	119	96.75
14	NCT, DELHI	2	2	0	1	1	0	21	20	95.24	0	0	-	21	20	95.24
15	Odisha	12	11	1	8	8	0	15	14	93.33	67	66	98.51	82	80	97.56
16	Rajasthan	1	0	1	0	0	0	0	0	-	7	7	-	7	7	100.00
17	Tamilnadu	5	0	5	2	0	2	0	0	-	82	60	73.17	82	60	73.17
18	Telangana	10	4	6	1	1	0	28	28	100.00	126	106	84.13	154	134	87.01
19	Tripura	2	2	0	2	2	0	0	0	-	0	0	-	0	0	-
20	Uttar Pradesh	36	34	2	6	6	0	613	577	94.13	63	59	93.65	676	636	94.08
21	Uttarakhand	3	3	0	0	0	0	25	25	100.00	0	0	-	25	25	100.00
22	West Bengal	14	11	3	3	3	0	352	342	97.16	97	97	100.00	449	439	97.77
Total		**199**	**151**	**48**	**49**	**41**	**8**	**4969**	**4891**	**98.43**	**1270**	**1057**	**83.23**	**6239**	**5948**	**95.34**

FLOOD FORECASTING PERFORMANCE FROM 2000 TO 2016

Year	No.of Level Forecasts issued			No.of Inflow Forecasts issued			Total No.of Forecasts issued		
	Total	Within +/-15 cm of deviation from actual	Accuracy (%)	Total	Within +/- 20% cumec of deviation from actual	Accuracy (%)	Total	Within +/- 15 cm or +/- 20% cumec of deviation from actual	Accuracy (%)
2000	5622	5504	97.90	821	747	90.99	6443	6251	97.02
2001	4606	4533	98.42	857	809	94.40	5463	5342	97.79
2002	3618	3549	98.09	623	602	96.63	4241	4151	97.88
2003	5989	5789	96.66	611	586	95.91	6600	6375	96.59
2004	4184	4042	96.61	705	654	92.77	4889	4696	96.05
2005	4323	4162	96.28	1295	1261	97.37	5618	5423	96.53
2006	5070	4827	95.21	1593	1550	97.30	6663	6377	95.71
2007	6516	6339	97.28	1707	1651	96.72	8223	7990	97.17
2008	5670	5551	97.90	1021	1003	98.24	6691	6554	97.95
2009	3343	3298	98.65	667	629	94.30	4010	3927	97.93
2010	6491	6390	98.44	1028	988	96.11	7519	7378	98.12
2011	4848	4795	98.91	1143	1109	97.03	5991	5904	98.55
2012	4200	4136	98.47	831	803	96.63	5031	4939	98.17
2013	5741	5471	95.30	1319	1289	97.73	7060	6760	95.75
2014	3884	3804	97.94	888	863	97.18	4772	4667	97.80
2015	3500	3429	97.97	572	562	98.25	4072	3991	98.01
2016	4969	4891	98.43	1270	1057	83.23	6239	5948	95.34
Average	4940	4813	97.43	1007	970	96.33	5948	5782	97.21

Unprecedented flood events in India under CWC FF & W Network - 2016 flood season										
Sl. No	River	Station	State	Danger level in metres	Existing Highest Flood Level (HFL)		New HFL		Duration	
					Level in metres	Date of occurrence	Level	Date and Time of Occurrence	From	To
1	Ganga	Ballia	Uttar Pradesh	57.615	60.25	14/09/2003	60.39	25-Aug-16 01	20-Aug-16 01	29-Aug-16 03
2	Ganga	Patna Gandhighat	Bihar	48.60	50.27	14/08/1994	50.52	21-Aug-16 05	20-Aug-16 18	22-Aug-16 07
3	Ganga	Hathidah	Bihar	41.76	43.15	07/08/1971	43.17	22-Aug-16 00	21-Aug-16 22	23-Aug-16 05
4	Ganga	Bhagalpur	Bihar	33.68	34.20	17/09/2003	34.72	26-Aug-16 07	22-Aug-16 07	30-Aug-16 15

High Flood Events during Flood Season - 2016

Sl.No	River	Station	State	District	Danger level in metres	Existing HFL		Peak Level attained in 2016		Duration of High Flood	
						Level in metres	Date of occurrence	Level	Date/Time	From	To
1	Brahmaputra	Goalpara	Assam	Goalpara	36.27	37.43	31/07/1954	37.00	28-Jul-16 14	27-Jul-16 19	29-Jul-16 08
2	Beki	Beki Road Bridge	Assam	Barpeta	45.10	46.20	04-08-2000	45.99	25-Jul-16 23	22-Jul-16 22	23-Jul-16 13
										24-Jul-16 13	28-Jul-16 00
3	Brahmaputra	Dhubri	Assam	Dhubri	28.62	30.36	28-08-1988	30.00	28-Jul-16 15	27-Jul-16 15	30-Jul-16 11
4	Sankosh	Golokganj	Assam	Dhubri	29.94	30.95	08-09-2007	30.78	26-Jul-16 16	21-Jul-16 09	21-Jul-16 15
										22-Jul-16 23	29-Jul-16 01
5	Brahmaputra	Dibrugarh	Assam	Dibrugarh	105.7	106.48	3-40/09/1998	106.08	25-Jul-16 15	23-Jul-16 08	24-Jul-16 10
										25-Jul-16 11	25-Jul-16 22
6	Brahmaputra	Tezpur	Assam	Sonitpur	65.23	66.59	27-08-1988	66.22	26-Jul-16 20	26-Jul-16 03	27-Jul-16 22
7	Brahmaputra	Neamatighat	Assam	Jorhat	85.04	87.37	11-07-1991	86.87	25-Jul-16 22	25-Jul-16 22	26-Jul-16 07
8	Jia-Bharali	NT Road X-ing Jiabharali	Assam	Sonitpur	77.00	78.50	26-07-2007	78.00	26-Jul-16 06	26-Jul-16 06	26-Jul-16 08
9	Kampur	Kopili/Kampur	Assam	Nagaon	60.50	*61.79	20-07-2004	61.66	19-May-16 06	18-May-16 20	19-May-16 18
10	Ganga	Patna Dighaghat	Bihar	Patna	50.45	52.52	23/08/1975	52.12	21-Aug-16 06	20-Aug-16 23	21-Aug-16 12
11	Ganga	Patna Gandhighat	Bihar	Patna	48.60	50.27	14/08/1994	50.52	21-Aug-16 05	20-Aug-16 03	20-Aug-16 17
										22-Aug-16 08	29-Aug-16 06
12	Ganga	Hathidah	Bihar	Patna	41.76	43.15	07/08/1971	43.17	22-Aug-16 00	20-Aug-16 15	21-Aug-16 21
										23-Aug-16 06	30-Aug-16 11
13	Ganga	Bhagalpur	Bihar	Bhagalpur	33.68	34.20	17/09/2003	34.72	26-Aug-16 07	19-Aug-16 16	22-Aug-16 06
										30-Aug-16 16	01-Sep-16 23
14	Ganga	Kahalgaon	Bihar	Bhagalpur	31.09	32.87	17/09/2003	32.84	27-Aug-16 17	22-Aug-16 06	02-Sep-16 03
15	Sone	Maner	Bihar	Patna	52.00	53.79	10/09/1976	53.70	21-Aug-16 05	20-Aug-16 16	23-Aug-16 18
16	Burhi Gandak	Khagaria	Bihar	Khagaria	36.58	39.22	1976	38.30	31-Aug-16 01	26-Aug-16 00	27-Aug-16 03
17	Kosi	Kursela	Bihar	Katihar	30.00	32.04	06/09/1998	31.59	27-Aug-16 07	26-Aug-16 21	28-Aug-16 06
18	Mahananda	Jhawa	Bihar	Katihar	31.40	33.51	14/08/1987	33.30	28-Jul-16 06	27-Jul-16 02	28-Jul-16 22
19	Ganga	Ghazipur	Uttar Pradesh	Ghazipur	63.11	65.22	09/09/1978	65.04	26-Aug-16 08	22-Aug-16 05	27-Aug-16 23
20	Ganga	Ballia	Uttar Pradesh	Ballia	57.62	60.25	14/09/2003	60.390	25-Aug-16 01	20-Aug-16 17	28-Aug-16 21
21	Rapti	Balrampur	Uttar Pradesh	Balrampur	104.62	105.25	11/09/2000	105.200	29-Jul-16 15	28-Jul-16 15	01-Aug-16 10

Low and Moderate flood events on main Ganga and its tributaries- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	Date/Time	From	To	No.of days	From	To	No.of days
1	Alaknanda	Srinagar	Uttrakhand	535.00	536.00	535.15	15-Jul-16 13	01-Jul-16 11	01-Jul-16 12	1	-	-	-
								15-Jul-16 10	15-Jul-16 14	1	-	-	-
								16-Jul-16 01	16-Jul-16 02	1	-	-	-
								17-Jul-16 20	18-Jul-16 03	2	-	-	-
2	Ganga	Rishikesh	Uttarakhand	339.50	340.50	339.61	10-Aug-16 15	17-Jul-16 05	17-Jul-16 06	1	-	-	-
								18-Jul-16 02	18-Jul-16 06	1	-	-	-
								10-Aug-16 12	12-Aug-16 14	3	-	-	-
								17-Aug-16 22	17-Aug-16 22	1	-	-	-
3	Ganga	Haridwar	Uttarakhand	293.00	294.00	293.60	02-Aug-16 10	16-Jul-16 16	16-Jul-16 19	1	-	-	-
								17-Jul-16 02	18-Jul-16 15	2	-	-	-
								24-Jul-16 04	24-Jul-16 06	1	-	-	-
								10-Aug-16 12	11-Aug-16 19	2	-	-	-
								12-Aug-16 04	12-Aug-16 16	1	-	-	-
								17-Aug-16 22	18-Aug-16 04	2	-	-	-
4	Ganga	Kannauj	Uttar Pradesh	124.97	125.97	125.300	05-Aug-16 20	27-Jul-16 13	08-Aug-16 08	13	-	-	-
								16-Aug-16 03	20-Aug-16 20	5	-	-	-
								21-Aug-16 23	23-Aug-16 14	3	-	-	-
5	Ganga	Ankinghat	Uttar Pradesh	123.00	124.00	123.450	05-Aug-16 07	21-Jul-16 13	25-Jul-16 00	5	-	-	-
								26-Jul-16 15	09-Aug-16 10	15	-	-	-
								15-Aug-16 09	24-Aug-16 13	10	-	-	-
6	Ganga	Kanpur	Uttar Pradesh	113.00	114.00	112.640	07-Aug-16 04	22-Jul-16 13	25-Jul-16 18	4	-	-	-
								27-Jul-16 01	24-Aug-16 18	29	-	-	-
7	Ganga	Dalmau	Uttar Pradesh	98.36	99.36	98.290	20-Aug-16 14	-	-	-	-	-	-
8	Ganga	Phaphamau	Uttar Pradesh	83.73	84.73	86.300	24-Aug-16 18	17-Aug-16 23	28-Aug-16 09	12	19-Aug-16 10	27-Aug-16 10	9
9	Ganga	Allahabad (Chhatnag)	Uttar Pradesh	83.73	84.73	85.600	24-Aug-16 04	18-Aug-16 15	27-Aug-16 13	10	21-Aug-16 07	26-Aug-16 11	6
10	Ganga	Mirzapur	Uttar Pradesh	76.72	77.72	78.550	25-Aug-16 19	18-Aug-16 14	28-Aug-16 07	11	21-Aug-16 01	27-Aug-16 03	7
11	Ganga	Varanasi	Uttar Pradesh	70.26	71.26	72.560	25-Aug-16 12	17-Aug-16 20	29-Aug-16 09	13	18-Aug-16 22	28-Aug-16 10	11
12	Ganga	Ghazipur	Uttar Pradesh	62.11	63.11	65.040	26-Aug-16 08	10-Aug-16 11	31-Aug-16 03	22	12-Aug-16 04	14-Aug-16 04	3
											17-Aug-16 16	30-Aug-16 01	14
13	Ganga	Buxar	Bihar	59.32	60.32	61.26	24-Aug-16 11	10-Aug-16 21	31-Aug-16 08	22	18-Aug-16 14	29-Aug-16 16	12
14	Ganga	Ballia	Uttar Pradesh	56.62	57.62	60.390	25-Aug-16 01	12-Jul-16 03	14-Jul-16 01	3	09-Aug-16 10	01-Sep-16 10	24
								15-Aug-16 21	23-Jul-16 00	8	-	-	-
								07-Aug-16 18	04-Sep-16 22	29			
15	Ganga	Patna (Dighaghat)	Bihar	49.45	50.45	52.120	21-Aug-16 06	03-Aug-16 19	05-Aug-16 04	3	13-Aug-16 19	31-Aug-16 01	19
								09-Aug-16 20	01-Sep-16 15	24			

Low and Moderate flood events on main Ganga and its tributaries- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	Date/Time	From	To	No.of days	From	To	No.of days
16	Ganga	Patna (Gandhighat)	Bihar	47.60	48.60	50.520	21-Aug-16 05	17-Jul-16 13	14-Sep-16 12	60	11-Aug-16 10	01-Sep-16 04	22
								30-Sep-16 17	03-Oct-16 16	4			
17	Ganga	Hathidah	Bihar	40.76	41.76	43.170	22-Aug-16 00	18-Jul-16 18	15-Sep-16 04	60	12-Aug-16 12	02-Sep-16 00	21
								01-Oct-16 09	04-Oct-16 04	4			
18	Ganga	Munger	Bihar	38.33	39.33	40.070	25-Aug-16 09	14-Aug-16 00	02-Sep-16 21	21	20-Aug-16 21	31-Aug-16 17	12
19	Ganga	Bhagalpur	Bihar	32.68	33.68	34.720	26-Aug-16 07	19-Jul-16 20	05-Sep-16 07	49	15-Aug-16 13	02-Sep-16 11	19
20	Ganga	Colgong/ Kahalgaon	Bihar	30.09	31.09	32.840	27-Aug-16 17	15-Jul-16 09	24-Sep-16 00	71	31-Jul-16 13	08-08-16: 12	9
								29-Sep-16 10	08-Oct-16 01	10	11-Aug-16 23	05-Sep-16 16	25
21	Ganga	Sahibganj	Jharkhand	26.25	27.25	29.120	26-Aug-16 22	18-Jul-16 07	10-Sep-16 05	55	28-Jul-16 10	09-Aug-16 21	13
								02-Oct-16 22	07-Oct-16 03	6	12-Aug-16 18	05-Sep-16 10	25
22	Ganga	Farakka	West Bengal	21.25	22.25	24.200	28-Aug-16 22	17-Jul-16 05	10-Oct-16 02	86	20-Jul-16 17	16-Sep-16 10	59
								14-Oct-16 07	16-Oct-16 04	3	02-Oct-16 21	06-Oct-16 11	5
23	Ramganga	Moradabad	Uttar Pradesh	189.60	190.60	190.100	26-Jul-16 00	24-Jul-16 00	26-Jul-16 18	3	-	-	-
								27-Jul-16 17	29-Jul-16 04	3	-	-	-
24	Ramganga	Bareilly	Uttar Pradesh	162.70	163.70	160.580	02-Aug-16 16	-	-	-	-	-	-
25	Yamuna	Mawi	Uttar Pradesh	230.00	230.85	230.60	13-Aug-16 12	17-Jul-16 21	19-Jul-16 21	3	-	-	-
								28/07/2016 16	29-Jul-16 02	2	-	-	-
								02/08/2016 07	04-Aug-16 05	3	-	-	-
								11-Aug-16 15	11-Aug-16 21	1	-	-	-
								12-Aug-16 13	14-Aug-16 10	3	-	-	-
26	Yamuna	Delhi Rly Bridge	NCT Delhi	204.00	204.83	204.90	14-Aug-16 04	19-Jul-16 02	20-Jul-16 11	2	13-Aug-16 22	14-Aug-16 10	2
								03-Aug-16 06	04-Aug-16 21	2	-	-	-
								12-Aug-16 12	13-Aug-16 22	2	-	-	-
								14-Aug-16 11	16-Aug-16 19	3	-	-	-
								19-Aug-16 21	20-Aug-16 16	2	-	-	-
27	Yamuna	Mathura	Uttar Pradesh	164.20	165.20	165.30	15-Aug-16 08	19-Jul-16 11	19-Jul-16 21	1	14-Aug-16 23	16-Aug-16 18	3
								20-Jul-16 02	24-Jul-16 20	5	-	-	-
								31-Jul-16 09	09-Aug-16 16	10	-	-	-
								10-Aug-16 23	14-Aug-16 23	5	-	-	-
								16-Aug-16 19	28-Aug-16 04	13	-	-	-
								01-Sep-16 02	06-Sep-16 13	6	-	-	-
28	Yamuna	Agra	Uttar Pradesh	151.40	152.40	150.00	16-Aug-16 14	-	-	-	-	-	-
29	Yamuna	Etawah	Uttar Pradesh	120.92	121.92	119.38	17-Aug-16 19	-	-	-	-	-	-
30	Yamuna	Auraiya	Uttar Pradesh	112.00	113.00	113.27	23-Aug-16 20	23-Aug-16 01	23-Aug-16 13	1	23-Aug-16 13	24-Aug-16 16	2
								24-Aug-16 16	25-Aug-16 07	2			

Low and Moderate flood events on main Ganga and its tributaries- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	Date/Time	From	To	No.of days	From	To	No.of days
31	Yamuna	Kalpi	Uttar Pradesh	107.00	108.00	108.98	24-Aug-16 10	22-Aug-16 22	25-Aug-16 10	4	23-Aug-16 04	25-Aug-16 10	3
								25-Aug-16 10	26-Aug-16 01	2			
32	Yamuna	Hamirpur	Uttar Pradesh	102.63	103.63	104.94	23-Aug-16 08	21-Aug-16 20	22-Aug-16 05	2	22-Aug-16 04	25-Aug-16 04	4
								25-Aug-16 04	25-Aug-16 19	1			
33	Yamuna	Chillaghat	Uttar Pradesh	99.00	100.00	102.10	23-Aug-16 00	20-Aug-16 19	21-Aug-16 05	2	21-Aug-16 05	25-Aug-16 19	5
								25-Aug-16 19	26-Aug-16 09	2			
34	Yamuna	Naini	Uttar Pradesh	83.74	84.74	86.07	24-Aug-16 05	18-Aug-16 01	20-Aug-16 02	3	20-Aug-16 02	27-Aug-16 06	8
								27-Aug-16 06	28-Aug-16 02	2			
35	Sahibi	Dhansa Regulator	NCT Delhi	211.44	212.44								
36	Betwa	Mohana	Uttar Pradesh	121.66	122.66	124.41	21-Aug-16 13	20-Aug-16 18	20-Aug-16 22	1	20-Aug-16 22	22-Aug-16 05	3
								22-Aug-16 05	22-Aug-16 11	1			
37	Betwa	Sahjina	Uttar Pradesh	103.54	104.54	105.02	23-Aug-16 03	21-Aug-16 15	22-Aug-16 11	2	22-Aug-16 11	23-Aug-16 16	2
								23-Aug-16 16	25-Aug-16 04	3			
38	Ken	Banda	Uttar Pradesh	103.00	104.00	109.97	21-Aug-16 11	07-Jul-16 14	07-Jul-16 19	1	07-Jul-16 19	10-Jul-16 16	4
								10-Jul-16 16	10-Jul-16 20	1	17-Aug-16 11	18-Aug-16 14	2
								17-Aug-16 03	17-Aug-16 11	1	18-Aug-16 16	22-Aug-16 23	5
								18-Aug-16 14	18-Aug-16 16	1			
								22-Aug-16 23	23-Aug-16 03	2			
39	Gomati	Lucknow (Hanuman setu)	Uttar Pradesh	108.50	109.50	104.92	17-Aug-16 05	-	-	-	-	-	-
40	Gomati	Jaunpur	Uttar Pradesh	73.07	74.07	71.110	22-Aug-16 01	-	-	-	-	-	-
41	Sai	Rae- Bareilly	Uttar Pradesh	100.00	101.00	100.57	16-Aug-16 10	15-Aug-16 22	18-Aug-16 15	4	-	-	-
42	Ghaghra	Elgin Bridge	Uttar Pradesh	105.07	106.07	106.886	20-Jul-16 08	03-Jul-16 12	13-Jul-16 20	11	13-Jul-16 21	15-Jul-16 10	3
								15-Jul-16 10	16-Jul-16 12	2	16-Jul-16 13	19-Aug-16 22	35
								19-Aug-16 23	05-Sep-16 10	18	15-Sep-16 12	15-Sep-16 16	1
								14-Sep-16 02	15-Sep-16 11	2			
								15-Sep-16 17	18-Sep-16 05	4			
								24-Sep-16 04	25-Sep-16 22	2			
43	Ghaghra	Ayodhya	Uttar Pradesh	91.73	92.73	93.100	01-Aug-16 12	05-Jul-16 05	19-Jul-16 00	14	19-Jul-16 01	27-Jul-16 06	9
								27-Jul-16 07	27-Jul-16 20	1	27-Jul-16 21	07-Aug-16 06	12
								07-Aug-16 07	08-Aug-16 09	2	08-Aug-16 10	15-Aug-16 16	8
								15-Aug-16 17	26-Aug-16 13	12	-	-	-
								14-Sep-16 19	17-Sep-16 21	4	-	-	-
								25-Sep-16 04	26-Sep-16 00	1	-	-	-
44	Ghaghra	Turtipar	Uttar Pradesh	63.01	64.01	64.410	02-Aug-16 23	07-Jul-16 14	09-Jul-16 22	3	21-Jul-16 08	08-Aug-16 02	19
								15-Jul-16 11	21-Jul-16 07	7	-	-	-
								08-Aug-16 03	25-Aug-16 06	18	-	-	-
								16-Sep-16 16	18-Sep-16 15	3	-	-	-
45	Ghaghra	Darauli	Bihar	59.82	60.82	60.95	02-Aug-16 20	18-Jul-16 23	25-Aug-16 07	39	31-Jul-16 05	07-Aug-16 04	8
								17-Sep-16 06	18-Sep-16 21	2			

Low and Moderate flood events on main Ganga and its tributaries- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	Date/Time	From	To	No.of days	From	To	No.of days
46	Ghaghra	Gangpur Siswan	Bihar	56.04	57.04	57.47	21-Aug-16 07	16-Jul-16 00	29-08-2016 5:00	46	22-Jul-16 09	26-Jul-16 02	5
								17-Sep-16 00	19-09-2016 10:00	4	30-Jul-16 13	08-Aug-16 14	10
								-	-		10-Aug-16 18	24-Aug-16 00	14
47	Ghaghra	Chhapra	Bihar	52.68	53.68	53.850	21-Aug-16 08	20-08-2016 13:00	29-08-2016 12:00	10	21-Aug-16 02	21-Aug-16 17	1
48	Rapti	Balrampur	Uttar Pradesh	103.62	104.62	105.200	29-Jul-16 15	06-Jul-16 13	07-Jul-16 23	2	24-Jul-16 05	27-Jul-16 14	5
								18-Jul-16 19	24-Jul-16 04	7	01-Aug-16 11	03-Aug-16 07	3
								03-Aug-16 07	08-Aug-16 15	6	-	-	-
								10-Aug-16 21	11-Aug-16 08	2	-	-	-
								17-Aug-16 04	19-Aug-16 02	3	-	-	-
49	Rapti	Bansi	Uttar Pradesh	83.90	84.90	84.980	02-Aug-16 09	25-Jul-16 08	30-Jul-16 17	6	30-Jul-16 18	04-Aug-16 13	6
								04-Aug-16 14	07-Aug-16 15	4	-	-	-
50	Rapti	Gorakhpur (Birdghat)	Uttar Pradesh	73.98	74.98	75.290	31-Jul-16 14	26-Jul-16 09	29-Jul-16 01	4	29-Jul-16 02	04-Aug-16 15	7
								04-Aug-16 16	08-Aug-16 04	5	-	-	-
51	Sone	Inderpuri	Bihar	107.20	108.20	108.10	20-Aug-16 04	19-Aug-16 19	20-Aug-16 21	2	-	-	-
52	Sone	Koelwar	Bihar	54.52	55.52	57.08	20-Aug-16 15	13-Aug-16 18	14-Aug-16 16	2	20-08-16: 01	21-08-16: 11	2
								19-Aug-16 15	22-Aug-16 07	4	-	-	-
								23-Aug-16 07	25-Aug-16 02	3	-	-	-
53	Sone	Maner	Bihar	51.00	52.00	53.70	21-Aug-16 05	11-08-2016 23:00	02-09-2016 9:00	23	19-08-16: 00	31-08-16: 05	14
54	PunPun	Sripalpur	Bihar	49.60	50.60	53.34	13-Sep-16 13	18-Jul-16 08	23-Jul-16 00	5	18-Jul-16 12	20-Jul-16 16	3
								12-Aug-16 13	30-Aug-16 16	19	14-Aug-16 06	29-Aug-16 02	16
								06-Sep-16 18	24-Sep-16 10	19	07-Sep-16 01	22-Sep-16 11	16
								26-Sep-16 03	07-Oct-16 14	12	26-Sep-16 11	06-Oct-16 17	11
								09-Oct-16 12	18-Oct-16 11	10	10-Oct-16 07	17-Oct-16 09	8
55	Gandak	Khadda	Uttar Pradesh	95.00	96.00	95.88	23-Jul-16 15	01-Jul-16 15	04-Jul-16 12	4	-	-	-
								04-Jul-16 18	05-Jul-16 10	2	-	-	-
								11-Jul-16 12	12-Jul-16 20	2	-	-	-
								16-Jul-16 15	19-Jul-16 18	4	-	-	-
								21-Jul-16 10	01-Aug-16 08	14	-	-	-
								02-Sep-16 08	02-Sep-16 09	1	-	-	-
								03-Sep-16 16	05-Sep-16 14	3	-	-	-
								08-Sep-16 14	09-Sep-16 07	2	-	-	-
								11-Sep-16 15	12-Sep-16 03	2	-	-	-
								13-Sep-16 08	13-Sep-16 21	1	-	-	-
								18-Sep-16 08	19-Sep-16 14	2	-	-	-
56	Gandak	Chatia	Bihar	68.15	69.15	68.56	31-Jul-16 06	29-Jul-16 16	02-Aug-16 01	5	-	-	-
57	Gandak	Rewaghat	Bihar	53.41	54.41	54.36	31-Aug-16 23	24-Jul-16 01	04-Aug-16 19	12	-	-	-
58	Gandak	Hazipur	Bihar	49.32	50.32	50.39	21-Aug-16 04	14-Aug-16 04	30-Aug-16 15	17	21-Aug-16 00	21-Aug-16 18	2
59	Burhi Gandak	Lalbeghiaghat	Bihar	62.20	63.20	61.77	24-Jul-16 10	-	-	-	-	-	-
60	Burhi Gandak	Muzaffarpur (Sikandarpur	Bihar	51.53	52.53	50.29	04-Aug-16 09	-	-	-	-	-	-

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Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	Date/Time	From	To	No.of days	From	To	No.of days
61	Burhi Gandak	Samastipur	Bihar	45.02	46.02	43.63	04-Aug-16 05	-	-	-	-	-	-
62	Burhi Gandak	Rosera	Bihar	41.63	42.63	41.19	18-Sep-16 05	-	-	-	-	-	-
63	Burhi Gandak	Khagaria	Bihar	35.58	36.58	38.30	31-Aug-16 01	19-Jul-16 06	16-Sep-16 00	59	05-Aug-16 02	05-Aug-16 20	1
								02-Oct-16 05	05-Oct-16 01	4	13-Aug-16 04	03-Sep-16 09	22
64	Bagmati	Benibad	Bihar	47.68	48.68	49.37	24-Jul-16 06	16-Jun-16 02	18-Jun-16 20	3	02-Jul-16 20	03-Jul-16 15	2
								22-Jun-16 18	24-Jun-16 04	3	19-Jul-16 03	02-Aug-16 09	15
								25-Jun-16 08	26-Jun-16 18	2	12-Sep-16 06	27-Sep-16 18	16
								29-Jun-16 10	30-Jun-16 12	2	29-Sep-16 10	30-Sep-16 12	02
								02-Jul-16 08	07-Jul-16 02	6	-	-	-
								17-Jul-16 18	07-Aug-16 09	22	-	-	-
								10-Aug-16 11	11-Aug-16 19	2	-	-	-
								17-Aug-16 13	19-Aug-16 13	3	-	-	-
								03-Sep-16 04	05-Oct-16 02	33	-	-	-
								05-Oct-16 09	07-Oct-16 01	3	-	-	-
65	Bagmati	Hayaghat	Bihar	44.72	45.72	45.06	26-Sep-16 19	23-Sep-16 17	01-Oct-16 05	9	-	-	-
66	Adhwara Group	Kamtaul	Bihar	49.00	50.00	50.80	28-Sep-16 21	03-Jul-16 12	06-Jul-16 22	4	28-Jul-16 20	29-Jul-16 18	2
								24-Jul-16 05	27-Jul-16 01	4	31-Jul-16 12	01-Aug-16 15	2
								27-Jul-16 08	07-Aug-16 16	12	14-Sep-16 10	04-Oct-16 20	21
								08-Sep-16 11	08-Sep-16 18	1	-	-	-
								12-Sep-16 11	13-Oct-16 14	32	-	-	-
67	Adhwara Group	Ekmighat	Bihar	45.94	46.94	46.68	27-Sep-16 01	28-Jul-16 04	05-Aug-16 12	9	-	-	-
								16-Sep-16 06	07-Oct-16 20	22	-	-	-
68	Kamla Balan	Jhanjharpur	Bihar	49.00	50.00	52.18	22-Sep-16 14	15-Jun-16 11	15-Jun-16 22	1	24-Jun-16 15	25-Jun-16 15	2
								16-Jun-16 20	17-Jun-16 17	2	20-Jul-16 16	21-Jul-16 04	2
								21-Jun-16 18	23-Jun-16 22	3	25-Jul-16 17	28-Jul-16 01	4
								24-Jun-16 08	28-Jun-16 18	5	29-Jul-16 09	30-Jul-16 11	2
								30-Jun-16 14	06-Jul-16 07	7	02-Aug-16 10	03-Aug-16 06	2
								20-Jul-16 10	07-Aug-16 10	18	31-Aug-16 18	03-Sep-16 23	4
								17-Aug-16 11	18-Aug-16 12	2	04-Sep-16 08	09-Sep-16 23	6
								29-Aug-16 17	30-Aug-16 09	2	10-Sep-16 11	14-Sep-16 03	5
								31-Aug-16 11	19-Oct-16 20	20	15-Sep-16 09	15-Sep-16 23	1
								-	-	-	16-Sep-16 13	17-Sep-16 02	2
								-	-	-	17-Sep-16 10	27-Sep-16 12	11
								-	-	-	30-Sep-16 13	01-Oct-16 00	1
								-	-	-	04-Oct-16 09	04-Oct-16 23	1
								-	-	-	13-Oct-16 13	14-Oct-16 07	2
69	Kosi	Basua	Bihar	46.75	47.75	47.36	27-Jul-16 05	21-Jun-16 18	24-Jun-16 15	4	-	-	-
								26-Jun-16 08	26-Jun-16 22	1	-	-	-
								03-Jul-16 19	04-Jul-16 20	2	-	-	-
								17-Jul-16 08	20-Jul-16 04	4	-	-	-
								24-Jul-16 06	04-Aug-16 06	12	-	-	-
								03-Sep-16 06	09-Sep-16 02	7	-	-	-
								13-Sep-16 10	18-Sep-16 05	6	-	-	-
								22-Sep-16 15	27-Sep-16 16	6	-	-	-

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Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	Date/Time	From	To	No.of days	From	To	No.of days
70	Kosi	Baltara	Bihar	32.85	33.85	35.31	28-Jul-16 01	22-Jun-16 01	21-Oct-16 04	122	26-06-2016 23:00	27-06-2016 8:00	2
								-	-	-	17-07-2016 20:00	22-08-2016 5:00	37
								-	-	-	23-Aug-16 19	24-Aug-16 23	2
								-	-	-	02-Sep-16 02	14-Oct-16 06	43
71	Kosi	Kursela	Bihar	29.00	30.00	31.59	27-Aug-16 07	18-Jul-16 19	19-Sep-16 22	64	21-Jul-16 02	22-Jul-16 02	2
								03-Oct-16 03	04-Oct-16 18	2	22-Jul-16 00	24-Jul-16 04	3
								-	-	-	26-Jul-16 05	29-Jul-16 14	4
								-	-	-	01-Aug-16 08	08-Aug-16 06	8
								-	-	-	-	-	-
72	Mahananda	Dhengraghat	Bihar	34.65	35.65	37.23	27-Jul-16 17	22-Sep-16 09	29-Jun-16 20	8	25-Jun-16 15	26-Jun-16 14	2
								02-Jul-16 07	03-Jul-16 23	2	18-Jul-16 06	01-Aug-16 23	15
								17-Jul-16 08	04-Aug-16 23	19	21-Sep-16 19	24-Sep-16 17	4
								02-Sep-16 11	08-Sep-16 00	6	25-Sep-16 19	29-Sep-16 04	5
								08-Sep-16 13	09-Sep-16 16	2	13-Oct-16 04	16-Oct-16 05	4
								10-Sep-16 14	02-Oct-16 04	23	-	-	-
								09-Oct-16 13	11-Oct-16 04	3	-	-	-
								12-Oct-16 00	18-Oct-16 01	8	-	-	-
73	Mahananda	Jhawa	Bihar	30.40	31.40	33.30	28-Jul-16 06	26-Jun-16 11	27-Jun-16 05	2	20-Jul-16 21	02-08-2016 17:00	14
								18-Jul-16 10	05-Aug-16 09	19	23-Sep-16 06	23-09-2016 12:00	1
								04-Sep-16 06	06-Sep-16 23	3	27-Sep-16 04	28-09-2016 17:00	2
								09-Sep-16 07	09-Sep-16 22	1	14-Oct-16 01	14-10-2016 15:00	1
								12-Sep-16 12	16-Sep-16 02	5	-	-	-
								17-Sep-16 19	20-Sep-16 04	4	-	-	-
								21-Sep-16 15	02-Oct-16 00	12	-	-	-
								10-Oct-16 02	11-Oct-16 04	2	-	-	-
								12-Oct-16 23	17-Oct-16 13	6	-	-	-
74	Mayurakshi	Narayanpur	West Bengal	26.99	27.99	26.52	12-Aug-16 06	-	-	-	-	-	-
75	Ajoy	Gheropara	West Bengal	38.42	39.42	38.40	12-Aug-16 07	-	-	-	-	-	-
76	Mundeshwari	Harinkhola	West Bengal	11.80	12.80	12.75	24-Aug-16 00	23-Aug-16 06	24-Aug-16 11	2	-	-	-
77	Kangsabati	Mohanpur	West Bengal	24.73	25.73	23.66	01-Aug-16 18	-	-	-	-	-	-

Low and Moderate flood events on main Brahamaputra and its tributaries- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
1	Siang	Passighat	Arunachal Pradesh	152.96	153.96	154.80	23-Jul-16 06	21-06-2016 3:00	25-06-2016 21:00	5	22-07-2016 16:00	26-07-2016 8:00	5
								01-07-2016 3:00	12-07-2016 0:00	12	-	-	-
								14-07-2016 20:00	14-07-2016 23:00	1	-	-	-
								18-07-2016 17:00	30-07-2016 5:00	13	-	-	-
								08-09-2016 22:00	10-09-2016 3:00	3	-	-	-
								24-09-2016 8:00	27-09-2016 3:00	4	-	-	-
2	Brahmaputra	Dibrugarh	Assam	104.70	105.70	106.08	25-Jul-16 15	18-05-2016 2:00	19-05-2016 23:00	02	22-07-2016 16:00	26-07-2016 21:00	05
								20-06-2016 0:00	29-06-2016 20:00	10	-	-	-
								30-06-2016 2:00	04-08-2016 16:00	36	-	-	-
								07-08-2016 1:00	08-08-2016 23:00	02	-	-	-
								02-09-2016 12:00	13-09-2016 1:00	12	-	-	-
								24-09-2016 3:00	29-09-2016 4:00	06	-	-	-
								11-10-2016 2:00	15-10-2016 7:00	05	-	-	-
3	Brahmaputra	Neamatighat	Assam	84.04	85.04	86.87	25-Jul-16 22	01-05-2016 0:00	04-05-2016 7:00	04	18-05-2016 19:00	20-05-2016 19:00	03
								18-05-2016 1:00	30-05-2016 1:00	13	19-06-2016 0:00	04-08-2016 13:00	47
								02-06-2016 3:00	02-06-2016 21:00	1	08-08-2016 10:00	09-08-2016 10:00	02
								11-06-2016 0:00	29-08-2016 3:00	79	03-09-2016 11:00	13-09-2016 23:00	11
								29-08-2016 16:00	06-10-2016 14:00	39	24-09-2016 21:00	30-09-2016 2:00	07
								10-10-2016 11:00	19-10-2016 6:00	10	11-10-2016 19:00	16-10-2016 4:00	06
4	Brahmaputra	Tezpur	Assam	64.23	65.23	66.22	26-Jul-16 20	21-06-2016 19:00	04-08-2016 16:00	45	04-07-2016 4:00	08-07-2016 2:00	05
								06-09-2016 14:00	07-09-2016 9:00	02	21-07-2016 2:00	31-07-2016 0:00	11
								08-09-2016 0:00	14-09-2016 11:00	07	-	-	-
								26-09-2016 3:00	01-10-2016 10:00	06	-	-	-
								13-10-2016 3:00	17-10-2016 5:00	05	-	-	-
5	Brahmaputra	Guwahati	Assam	48.68	49.68	50.57	27-Jul-16 19	23-06-2016 18:00	28-06-2016 5:00	06	06-07-2016 11:00	07-07-2016 18:00	02
								03-07-2016 10:00	04-08-2016 1:00	33	25-07-2016 8:00	30-07-2016 16:00	06
								10-09-2016 8:00	13-09-2016 23:00	04	-	-	-
								27-09-2016 14:00	30-09-2016 22:00	04	-	-	-
								15-10-2016 17:00	16-10-2016 21:00	02	-	-	-
6	Brahmaputra	Goalpara	Assam	35.27	36.27	37.00	28-Jul-16 14	24-06-2016 6:00	29-06-2016 5:00	06	24-07-2016 3:00	01-08-2016 5:00	09
								03-07-2016 18:00	06-08-2016 5:00	35	-	-	-
								12-09-2016 10:00	14-09-2016 22:00	03	-	-	-
								29-09-2016 4:00	01-10-2016 19:00	03	-	-	-

Low and Moderate flood events on main Brahamaputra and its tributaries- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
7	Brahmaputra	Dhubri	Assam	27.62	28.62	30.00	28-Jul-16 15	20-06-2016 18:00	16-08-2016 5:00	58	25-06-2016 1:00	28-06-2016 20:00	04
								07-09-2016 6:00	18-09-2016 4:00	12	05-07-2016 9:00	15-07-2016 10:00	11
								26-09-2016 18:00	05-10-2016 11:00	10	18-07-2016 0:00	05-08-2016 14:00	20
								14-10-2016 11:00	20-10-2016 4:00	07	-	-	-
8	Buridehing	Naharkatia	Assam	119.40	120.40	119.49	24-Jul-16 14	24-07-2016 6:00	25-07-2016 0:00	02	-	-	-
9	Buridehing	Chenimari/Khwong	Assam	101.11	102.11	103.64	27-Jul-16 04	01-05-2016 0:00	03-05-2016 15:00	03	01-05-2016 0:00	01-05-2016 2:00	01
								18-05-2016 1:00	20-05-2016 21:00	03	20-07-2016 6:00	20-07-2016 13:00	01
								05-07-2016 8:00	07-07-2016 11:00	03	23-07-2016 23:00	30-07-2016 9:00	08
								17-07-2016 21:00	31-07-2016 14:00	15	-	-	-
								11-09-2016 6:00	12-09-2016 3:00	02	-	-	-
10	Subansiri	Badatighat	Assam	81.53	82.53	82.91	25-Jul-16 15	22-06-2016 1:00	27-06-2016 12:00	06	04-07-2016 10:00	05-07-2016 12:00	02
								01-07-2016 22:00	10-07-2016 6:00	10	24-07-2016 5:00	28-07-2016 18:00	05
								15-07-2016 19:00	17-07-2016 13:00	03	-	-	-
								19-07-2016 16:00	02-08-2016 13:00	15	-	-	-
								10-09-2016 5:00	12-09-2016 8:00	03	-	-	-
11	Dikhow	Sivasagar	Assam	91.4	92.4	93.30	17-Jul-16 18	13-06-2016 4:00	16-06-2016 14:00	04	13-06-2016 8:00	15-06-2016 15:00	03
								18-06-2016 13:00	20-06-2016 13:00	03	18-06-2016 17:00	19-06-2016 19:00	02
								04-07-2016 3:00	09-07-2016 16:00	06	04-07-2016 20:00	06-07-2016 6:00	03
								12-07-2016 10:00	14-07-2016 2:00	03	07-07-2016 16:00	08-07-2016 12:00	02
								15-07-2016 11:00	20-07-2016 4:00	06	16-07-2016 3:00	19-07-2016 0:00	04
								24-07-2016 3:00	29-07-2016 1:00	06	26-07-2016 18:00	27-07-2016 2:00	02
								07-08-2016 16:00	08-08-2016 5:00	02	27-07-2016 12:00	27-07-2016 12:00	01
								12-08-2016 17:00	16-08-2016 12:00	05	15-08-2016 19:00	16-08-2016 1:00	02
								08-09-2016 15:00	11-09-2016 6:00	04	-	-	-
12	Desang	Nanglamoraghat	Assam	93.46	94.46	95.30	11-Sep-16 20	01-05-2016 0:00	02-05-2016 12:00	02	01-05-2016 0:00	01-05-2016 9:00	01
								17-05-2016 17:00	19-05-2016 15:00	03	14-06-2016 10:00	17-06-2016 8:00	04
								13-06-2016 11:00	18-06-2016 4:00	06	28-07-2016 3:00	29-07-2016 13:00	02
								24-06-2016 5:00	27-06-2016 4:00	04	10-09-2016 8:00	13-09-2016 5:00	04
								04-07-2016 6:00	09-07-2016 21:00	06	13-10-2016 4:00	14-10-2016 9:00	02
								17-07-2016 17:00	19-07-2016 11:00	03	-	-	-
								24-07-2016 22:00	25-07-2016 3:00	02	-	-	-
								25-07-2016 18:00	30-07-2016 19:00	06	-	-	-
								06-09-2016 8:00	07-09-2016 9:00	02	-	-	-
								09-09-2016 23:00	13-09-2016 18:00	05	-	-	-
								25-09-2016 12:00	26-09-2016 9:00	02	-	-	-
								12-10-2016 17:00	15-10-2016 3:00	04	-	-	-

Low and Moderate flood events on main Brahamaputra and its tributaries- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
13	Dhansiri(S)	Golaghat	Assam	88.50	89.50	89.95	07-Jul-16 08	19-06-2016 4:00	20-06-2016 1:00	02	05-07-2016 4:00	05-07-2016 15:00	01
								04-07-2016 4:00	09-07-2016 16:00	06	06-07-2016 1:00	08-07-2016 19:00	03
								10-07-2016 15:00	15-07-2016 14:00	06	13-07-2016 4:00	13-07-2016 23:00	01
								17-07-2016 8:00	18-07-2016 4:00	02	14-08-2016 3:00	15-08-2016 2:00	02
								08-08-2016 3:00	17-08-2016 17:00	10	09-09-2016 1:00	09-09-2016 15:00	01
								31-08-2016 7:00	01-09-2016 4:00	02	-	-	-
								05-09-2016 16:00	13-09-2016 16:00	09	-	-	-
								19-09-2016 6:00	20-09-2016 2:00	02	-	-	-
								21-09-2016 12:00	22-09-2016 8:00	02	-	-	-
								22-09-2016 17:00	23-09-2016 18:00	01	-	-	-
14	Dhansiri(S)	Numaligarh	Assam	76.42	77.42	79.12	08-Jul-16 07	16-05-2016 18:00	18-05-2016 14:00	03	17-06-2016 14:00	24-06-2016 22:00	08
								22-05-2016 17:00	24-05-2016 8:00	03	28-06-2016 21:00	01-07-2016 6:00	04
								26-05-2016 5:00	27-05-2016 0:00	02	02-07-2016 21:00	02-08-2016 8:00	32
								15-06-2016 2:00	05-10-2016 22:00	113	05-08-2016 16:00	19-08-2016 21:00	15
								07-10-2016 7:00	07-10-2016 21:00	01	31-08-2016 10:00	02-09-2016 11:00	03
								08-10-2016 8:00	11-10-2016 4:00	04	05-09-2016 5:00	17-09-2016 13:00	13
								11-10-2016 23:00	16-10-2016 3:00	06	18-09-2016 12:00	29-09-2016 12:00	12
								-	-	-	30-09-2016 23:00	01-10-2016 4:00	02
15	Kopili	Kampur	Assam	59.50	60.50	61.66	19-May-16 06	26-04-2016 8:00	26-04-2016 18:00	01	18-05-2016 9:00	20-05-2016 5:00	03
								18-05-2016 5:00	21-05-2016 12:00	04	23-05-2016 22:00	24-05-2016 9:00	02
								23-05-2016 6:00	25-05-2016 8:00	03	-	-	-
16	Kopili	Dharamtul	Assam	55.00	56.00	55.40	28-Jul-16 19	18-05-2016 19:00	20-05-2016 20:00	03	-	-	-
								27-07-2016 7:00	01-08-2016 12:00	06	-	-	-

Low and Moderate flood events on main Brahamaputra and its tributaries- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
17	Jiabharali	NT.Rd.X-ing	Assam	76.00	77.00	78.00	26-Jul-16 06	22-04-2016 8:00	22-04-2016 18:00	01	10-06-2016 13:00	10-06-2016 15:00	01
								06-05-2016 17:00	07-05-2016 1:00	02	11-06-2016 13:00	11-06-2016 16:00	01
								09-05-2016 10:00	09-05-2016 20:00	01	14-06-2016 10:00	14-06-2016 18:00	01
								15-05-2016 13:00	15-05-2016 21:00	01	15-06-2016 12:00	15-06-2016 12:00	01
								16-05-2016 7:00	20-05-2016 5:00	05	19-06-2016 4:00	19-06-2016 17:00	01
								21-05-2016 15:00	22-05-2016 1:00	02	20-06-2016 11:00	20-06-2016 21:00	01
								27-05-2016 10:00	28-05-2016 5:00	02	22-06-2016 15:00	22-06-2016 21:00	01
								30-05-2016 6:00	30-05-2016 6:00	01	23-06-2016 4:00	23-06-2016 23:00	01
								30-05-2016 16:00	30-05-2016 22:00	01	24-06-2016 1:00	26-06-2016 0:00	03
								06-06-2016 23:00	18-08-2016 6:00	74	29-06-2016 9:00	29-06-2016 14:00	01
								18-08-2016 11:00	18-08-2016 19:00	01	30-06-2016 5:00	06-07-2016 16:00	07
								19-08-2016 13:00	19-08-2016 15:00	01	08-07-2016 11:00	08-07-2016 14:00	01
								22-08-2016 3:00	23-08-2016 0:00	02	11-07-2016 9:00	11-07-2016 16:00	01
								23-08-2016 10:00	23-08-2016 17:00	01	17-07-2016 13:00	18-07-2016 17:00	02
								24-08-2016 10:00	24-08-2016 14:00	01	19-07-2016 5:00	30-07-2016 18:00	12
								31-08-2016 7:00	07-10-2016 11:00	37	31-07-2016 6:00	31-07-2016 8:00	01
								07-10-2016 21:00	21-10-2016 5:00	15	31-07-2016 15:00	31-07-2016 18:00	01
								-	-	-	01-09-2016 12:00	01-09-2016 16:00	01
								-	-	-	02-09-2016 11:00	03-09-2016 2:00	02
								-	-	-	03-09-2016 11:00	04-09-2016 18:00	02
								-	-	-	05-09-2016 9:00	06-09-2016 17:00	02
								-	-	-	08-09-2016 8:00	08-09-2016 12:00	01
								-	-	-	09-09-2016 4:00	10-09-2016 3:00	02
								-	-	-	11-09-2016 12:00	12-09-2016 6:00	02
								-	-	-	19-09-2016 11:00	20-09-2016 2:00	01
								-	-	-	20-09-2016 9:00	20-09-2016 16:00	01
								-	-	-	21-09-2016 18:00	27-09-2016 17:00	07
								-	-	-	27-09-2016 23:00	28-09-2016 1:00	02
								-	-	-	28-09-2016 9:00	28-09-2016 16:00	01
								-	-	-	09-10-2016 7:00	09-10-2016 18:00	01
								-	-	-	10-10-2016 9:00	10-10-2016 14:00	01
								-	-	-	11-10-2016 4:00	11-10-2016 18:00	01
								-	-	-	12-10-2016 13:00	14-10-2016 19:00	03

Low and Moderate flood events on main Brahamaputra and its tributaries- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
18	Puthimari	Puthimari _NHX	Assam	50.81	51.81	53.97	27-Jul-16 08	17-05-2016 3:00	20-05-2016 5:00	04	23-06-2016 14:00	25-06-2016 11:00	03
								08-06-2016 8:00	08-06-2016 13:00	01	17-07-2016 20:00	18-07-2016 9:00	02
								18-06-2016 10:00	19-06-2016 15:00	02	20-07-2016 13:00	22-07-2016 0:00	03
								21-06-2016 9:00	28-06-2016 17:00	08	22-07-2016 15:00	31-07-2017 20:00	10
								04-07-2016 4:00	15-07-2016 5:00	12	13-10-2016 15:00	13-10-2016 19:00	01
								15-07-2016 11:00	15-07-2016 17:00	01	-	-	-
								16-07-2016 9:00	30-08-2016 5:00	15	-	-	-
								31-08-2016 2:00	30-09-2016 5:00	31	-	-	-
								30-09-2016 11:00	01-10-2016 5:00	01	26-07-2016 17:00	27-07-2016 0:00	02
								11-10-2016 18:00	18-10-2016 17:00	08	-	-	-
19	Pagladia	Pagladia_NTX	Assam	51.75	52.75	52.81	26-Jul-16 19	22-06-2016 18:00	23-06-2016 1:00	02	-	-	-
								23-06-2016 15:00	26-06-2016 4:00	03	-	-	-
								17-07-2016 6:00	17-07-2016 8:00	01	-	-	-
								17-07-2016 14:00	18-07-2016 12:00	01	-	-	-
								22-07-2016 13:00	28-07-2016 23:00	07	19-05-2016 3:00	21-05-2016 9:00	03
								21-09-2016 6:00	22-09-2016 3:00	02	23-05-2016 14:00	24-05-2016 13:00	02
20	Barak	APGhat	Assam	18.83	19.83	20.63	20-May-16 08	18-05-2016 13:00	21-05-2016 23:00	04	01-09-2016 18:00	03-09-2016 12:00	03
								22-05-2016 23:00	26-05-2016 2:00	05	07-09-2016 12:00	08-09-2016 4:00	02
								03-07-2016 14:00	05-07-2016 20:00	03	08-09-2016 16:00	08-09-2016 23:00	01
								01-09-2016 4:00	04-09-2016 22:00	04	18-05-2016 19:00	20-05-2016 22:00	03
								06-09-2016 1:00	11-09-2016 3:00	06	23-05-2016 3:00	24-05-2016 11:00	02
21	Katakhal	Matizuri	Assam	19.27	20.27	21.69	19-May-16 17	18-05-2016 14:00	21-05-2016 16:00	04	01-09-2016 12:00	03-09-2016 1:00	03
								22-05-2016 23:00	25-05-2016 15:00	04	15-09-2016 1:00	16-09-2016 9:00	04
								01-09-2016 5:00	04-09-2016 23:00	04	18-05-2016 21:00	21-05-2016 13:00	04
								15-09-2016 0:00	16-09-2016 16:00	03	23-05-2016 3:00	25-05-2016 12:00	03
22	Barak	Badarpurghat	Assam	15.85	16.85	17.67	20-May-16 00	18-05-2016 8:00	18-05-2016 21:00	01	01-09-2016 19:00	03-09-2016 15:00	03
								21-05-2016 13:00	23-05-2016 3:00	03	-	-	-
								25-05-2016 12:00	28-05-2016 0:00	04	-	-	-
								18-06-2016 15:00	21-06-2016 9:00	04	-	-	-
								03-07-2016 20:00	07-07-2016 21:00	05	-	-	-
								01-09-2016 8:00	01-09-2016 19:00	01	-	-	-
								03-09-2016 15:00	12-09-2016 6:00	10	21-05-2016 15:00	26-05-2016 14:00	06
								15-09-2016 3:00	16-09-2016 11:00	02	02-09-2016 1:00	04-09-2016 1:00	03
23	Kushiyara	Karimganj	Assam	13.94	14.94	15.81	23-May-16 22	19-05-2016 18:00	29-05-2016 16:00	11	07-09-2016 7:00	10-09-2016 13:00	04
								19-06-2016 21:00	21-06-2016 5:00	03	-	-	-
								02-07-2016 9:00	09-07-2016 15:00	08	-	-	-
								17-07-2016 21:00	22-07-2016 17:00	06	-	-	-
								01-09-2016 14:00	13-09-2016 5:00	13	-	-	-
								15-09-2016 0:00	16-09-2016 16:00	02	-	-	-
24	Manu	Kailashar	Tripura	24.34	25.34	24.21	15-Sep-16 10	-	-	-	24-06-2016 15:00	25-06-2016 6:00	02
25	Gumti	Sonamura	Tripura	11.50	12.50	10.67	01-Sep-16 22	-	-	-	01-07-2016 2:00	01-07-2016 10:00	01
26	Manas	Manas NH- Crossing	Assam	47.81	48.42	48.63	24-Jun-16 22	24-06-2016 8:00	25-06-2016 17:00	02	04-07-2016 14:00	05-07-2016 2:00	02

Low and Moderate flood events on main Brahamaputra and its tributaries- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
27	Beki	Beki Rd. Bridge	Assam	44.10	45.10	45.99	25-Jul-16 23	16-06-2016 13:00	17-06-2016 9:00	02	05-07-2016 9:00	05-07-2016 23:00	01
								18-06-2016 12:00	21-08-2016 1:00	65	06-07-2016 12:00	06-07-2016 23:00	01
								22-08-2016 11:00	23-08-2016 2:00	02	09-07-2016 17:00	09-07-2016 20:00	01
								02-09-2016 8:00	15-09-2016 3:00	14	10-07-2016 12:00	10-07-2016 23:00	01
								16-09-2016 8:00	02-10-2016 5:00	17	11-07-2016 11:00	11-07-2016 22:00	01
								12-10-2016 6:00	21-10-2016 5:00	10	17-07-2016 14:00	18-07-2016 18:00	02
								-	-	-	20-07-2016 0:00	01-08-2016 17:00	14
								-	-	-	12-10-2016 19:00	14-10-2016 22:00	03
								-	-	-	18-07-2016 5:00	19-07-2016 12:00	02
											20-07-2016 18:00	30-07-2016 11:00	11
28	Sankosh	Golokganj	Assam	28.94	29.94	30.78	26-Jul-16 16	24-06-2016 14:00	27-06-2016 12:00	04	-	-	-
								02-07-2016 15:00	04-07-2016 7:00	03	-	-	-
								04-07-2016 18:00	08-07-2016 7:00	04	-	-	-
								10-07-2016 3:00	12-07-2016 22:00	03	-	-	-
								17-07-2016 5:00	03-08-2016 4:00	18	-	-	-
								26-09-2016 6:00	28-09-2016 1:00	03	20-07-2016 14:00	20-07-2016 19:00	01
								13-10-2016 11:00	14-10-2016 8:00	02	23-07-2016 9:00	23-07-2016 18:00	01
29	Teesta	Domohani	W.B.	85.65	85.95	86.23	24-Jul-16 12	21-06-2016 12:00	21-06-2016 20:00	01	24-07-2016 8:00	24-07-2016 19:00	01
								22-06-2016 1:00	22-06-2016 7:00	01	26-07-2016 10:00	26-07-2016 21:00	01
								24-06-2016 13:00	24-06-2016 23:00	01	-	-	-
								06-07-2016 9:00	06-07-2016 16:00	01	-	-	-
								16-07-2016 9:00	16-07-2016 19:00	01	-	-	-
								17-07-2016 7:00	17-07-2016 19:00	01	-	-	-
								19-07-2016 6:00	21-07-2016 6:00	03	-	-	-
								21-07-2016 10:00	28-07-2016 13:00	08	-	-	-
								29-07-2016 0:00	29-07-2016 19:00	01	-	-	-
								30-07-2016 1:00	30-07-2016 23:00	01	-	-	-
								02-08-2016 12:00	02-08-2016 16:00	01	-	-	-
								03-09-2016 12:00	03-09-2016 20:00	01	-	-	-
30	Teesta	Mekhliganj	W.B.	65.45	65.95	65.60	24-Jul-16 21	24-07-2016 17:00	25-07-2016 0:00	01	-	-	-
								14-10-2016 17:00	14-10-2016 21:00	01	-	-	-
31	Jaldhaka	N H 31	W.B.	80.00	80.90	80.50	24-Jul-16 13	30-06-2016 11:00	30-06-2016 17:00	01	-	-	-
								01-07-2016 4:00	01-07-2016 21:00	01	-	-	-
								17-07-2016 7:00	18-07-2016 1:00	02	-	-	-
								19-07-2016 10:00	20-07-2016 3:00	02	-	-	-
								20-07-2016 7:00	20-07-2016 20:00	01	-	-	-
								21-07-2016 18:00	22-07-2016 0:00	01	23-07-2016 21:00	24-07-2016 0:00	01
								22-07-2016 8:00	27-07-2016 2:00	06	24-07-2016 15:00	25-07-2016 7:00	02

Low and Moderate flood events on main Brahamaputra and its tributaries- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
32	Jaldhaka	Mathabhanga	W.B.	47.70	48.20	49.03	24-Jul-16 21	22-07-2016 21:00	27-07-2016 8:00	06	25-07-2016 23:00	26-07-2016 0:00	01
								-	-	-	22-07-2016 17:00	23-07-2016 6:00	02
								-	-	-	23-07-2016 9:00	23-07-2016 13:00	01
33	Torsa	Ghughumari	W. B.	39.80	40.41	40.71	23-Jul-16 00	21-06-2016 16:00	23-06-2016 15:00	03	24-07-2016 16:00	26-07-2016 7:00	03
								24-06-2016 6:00	26-06-2016 14:00	03	-	-	-
								01-07-2016 18:00	02-07-2016 0:00	01	-	-	-
								16-07-2016 17:00	18-07-2016 12:00	03	-	-	-
								20-07-2016 7:00	21-07-2016 13:00	02	-	-	-
								21-07-2016 21:00	28-07-2016 15:00	07	-	-	-
								30-07-2016 9:00	30-07-2016 14:00	01	24-07-2016 0:00	24-07-2016 6:00	01
								25-09-2016 12:00	26-09-2016 15:00	02	-	-	-
34	Radak-I	Tufanganj	W. B.	34.22	35.30	**35.30**	24-Jul-16 00	22-06-2016 21:00	23-06-2016 19:00	02	-	-	-
								24-06-2016 3:00	27-06-2016 4:00	04			
								23-07-2016 0:00	28-07-2016 9:00	07			

Low and Moderate flood events on various river systems (excluding Ganga and Brahmaputra basins)- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	Time	From	To	No. of days	From	To	No. of days
1	Subernarekna	Jamshedpur	Jharkhand	122.5	123.5	123.58	19-Aug-16 05	18/08/2016 11:00	18/08/2016 18:00	1	18/08/2016 18:00	19/08/2016 06:00	2
								19/08/2016 06:00	19/08/2016 09:00	1			
2	Subernarekna	Rajghat	Odisha	9.45	10.36	11.76	20-Aug-16 00	19-Aug-16 04	21-Aug-16 17	3	19-Aug-16 07	20-Aug-16 23	2
								24-Aug-16 13	25-Aug-16 06	2	-	-	-
								06-Sep-16 09	08-Sep-16 17	3	06-Sep-16 15	08-Sep-16 07	3
3	Burhabalang	NH_5 _Road Bridge	Odisha	7.21	8.13	5.48	19-Aug-16 05	-	-	-	-	-	-
4	Baitarni	Anandpur	Odisha	37.44	38.36	36.80	18-Aug-16 22	-	-	-	-	-	-
5	Baitarni	Akhuapada	Odisha		17.83	17.86	19-Aug-16 09	-	-	-	19-08-2016 6:00	19-Aug-16 12	1
6	Brahmani	Jenapur	Odisha	22.00	23.00	21.28	05-Aug-16 15	-	-	-	-	-	-
7	Rushikuluya	Purushottampur	Odisha	15.83	16.83	15.03	07-Oct-16 18	-	-	-	-	-	-
8	Vamsadhara	Gunupur	Odisha	83.00	84.00	82.29	06-Aug-16 12	-	-	-	-	-	-
9	Vamsadhara	Kashinagar	Odisha	53.60	54.60	54.02	06-Aug-16 15	06-Aug-16 03	06-Aug-16 18	1	-	-	-
								09-Oct-16 11	10-Oct-16 00	2	-	-	-
10	Mahanadi	Naraj	Odisha	25.41	26.41	25.44	08-Jul-16 15	-	-	-	-	-	-
11	Mahanadi	Alipingal Devi	Odisha	10.85	11.76	6.99	08-Dec-16 15	-	-	-	-	-	-
12	Mahanadi	Nimapara	Odisha	9.85	10.76	4.26	08-May-16 03	-	-	-	-	-	-
13	Godavari	Kopergaon	Maharashtra	490.90	493.68	495.95	08-Aug-16 14	02-Aug-16 16	03-Aug-16 00	1	03-Aug-16 00	04-Aug-16 06	
								04-Aug-16 06	05-Aug-16 08	1	-	-	-
								06-Aug-16 18	08-Aug-16 02	2	-	-	-
14	Godavari	Gangakhed	Maharashtra	374.00	375.00	365.27	17-Sep-16 10	-	-	-	-	-	-
15	Godavari	Nanded	Maharashtra	353.00	354.00	347.35	17-Sep-16 03	-	-	-	-	-	-
16	Godavari	Kaleswaram	Telangana	103.50	104.75	101.65	13-Jul-16 08	-	-	-	-	-	-
17	Godavari	Eturunagaram	Telangana	73.29	75.79	74.72	13-Jul-16 00	10-Jul-16 18	13-Jul-16 17	3	-	-	-
18	Godavari	Dummagudam	Telangana	53.00	55.00	54.30	12-Jul-16 13	11-Jul-16 09	13-Jul-16 09	3	-	-	-
19	Godavari	Bhadrachalam	Telangana	45.72	48.77	48.58	12-Jul-16 18	11-Jul-16 07	14-Jul-16 14	4	-	-	-
20	Godavari	Kunavaram	Andhra Pradesh	37.74	39.24	38.88	13-Jul-16 06	12-Jul-16 08	14-Jul-16 00	3	-	-	-

Low and Moderate flood events on various river systems (excluding Ganga and Brahmaputra basins)- 2016 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2016		Flood period above warning level			Flood period above danger level		
						Level in metres	Time	From	To	No. of days	From	To	No. of days
21	Godavari	Rajamundry	Andhra Pradesh	17.68	19.51	17.34	13-Jul-16 14	-	-	-	-	-	-
22	Godavari	Dowalaiswaram	Andhra Pradesh	14.25	16.08	15.18	13-Jul-16 18	12-Jul-16 05	14-Jul-16 23	3	-	-	-
23	Wainganga	Bhandara	Maharashtra	244.00	244.50	243.08	07-Aug-16 16	-	-	-	-	-	-
24	Wainganga	Pauni	Maharashtra	226.73	227.73	226.05	10-Jul-16 06	-	-	-	-	-	-
25	Wardha	Balharsha	Maharashtra	171.50	174.00	171.07	12-Jul-16 23	-	-	-	-	-	-
26	Indravati	Jagdalpur	Chhatisgarh	539.50	540.80	540.32	11-Jul-16 08	-	-	-	-	-	-
27	Krishna	Arjunwad	Maharashtra	542.07	543.29								
28	Bhima	Deongaon	Karnataka	402.00	404.50	399.80	06-Oct-16 12	-	-	-	-	-	-
29	Tungabhadra	Mantralayam	Andhra Pradesh	310.00	312.00	308.59	07-Sep-16 00	-	-	-	-	-	-
30	Pennar	Nellore	Andhra Pradesh	15.91	17.28								
31	Sabarmati	Ahmedabad Shubhash Bridge	Gujarat	44.09	45.34	41.77	20-Jun-16 12	-	-	-	-	-	
32	Mahi	Wanakbori	Gujarat	71.00	72.54	73.70	22-Aug-16 02	21-Aug-16 14	22-Aug-16 12	**2**	-	-	
33	Naramada	Mandla	Madhya Pradesh	437.20	437.80	437.76	07-Aug-16 22	06-Aug-16 14	07-Aug-16 01	2	-	-	-
								07-Aug-16 19	08-Aug-16 03	2	-	-	-
34	Naramada	Hoshangabad	Madhya Pradesh	292.83	293.83	294.40	12-Jul-16 18	12-Jul-16 17	12-Jul-16 22	1	12-Jul-16 23	13-Jul-16 14	2
35	Naramada	Garudeswar	Gujarat	30.48	31.09	21.99	10-Aug-16 12	-	-	-	-	-	-
36	Naramada	Bharuch	Gujarat	6.71	7.31	6.15	11-Aug-16 14	-	-	-	-	-	-
37	Tapi	Surat	Gujarat	8.50	9.50	4.90	05-Jun-16 15	-	-	-	-	-	-
38	Damanganga	Vapi Town	Gujarat	18.20	19.20	18.70	02-Aug-16 20	02-Aug-16 17	03-Aug-16 02	**2**	-	-	-
39	Damanganga	Daman	Dadra & Nagar Have	2.60	3.40	2.20	02-Aug-16 19	-	-	-	-	-	-
40	Jhelum	Rammunshibagh	Jammu & Kashmir	1585.53	1586.45	1584.7	28-Jul-16 16	-	-	-	-	-	-