GOVERNMENT OF INDIA
CENTRAL WATER COMMISSION
FLOOD FORECAST MONITORING DIRECTORATE

Uttarakhand Floods on the bank of River Mandakini in Rudraprayag June, 2013

FLOOD FORECASTING AND WARNING NETWORK PERFORMANCE APPRAISAL REPORT 2013

NEW DELHI – 110066 **July 2014**

Member (RM)
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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. It comprises of 175 Flood Forecasting Stations including 28 inflow forecast in 9 major river basins and 71 sub basins of the country. It covers 15 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 October through its 20 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 28 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 2013 witnessed unprecedented flood events at 3 stations in the rivers Alaknanda, Ganga and Yamuna in the country. High Flood Situation was witnessed at 21 stations in River Brahmaputra in Assam; River Yamuna at Delhi Railway Bridge; River Alaknanda and Ganga in Uttarakhand; Rivers Subarnarekha, Burhabalang in Odisha; River Ganga, Ghaghra and Rapti in Uttar Pradesh, River Wardha in Maharashtra and River Ganga, Ghaghra and Kosi in Bihar. The year witnessed moderate to low intensity floods in many other parts of India. The highlight was the floods in October in association with Cyclonic Storm "Phailin" when flood/inflow forecast stations in Odisha got heavy flows in association with very heavy to exceptionally heavy rainfall.

During the year 2013, a total of 7060 forecasts were issued out of which 6760 forecasts (95.75%) were found to be within the limits of accuracy. The number of level forecasts issued during the year 2013 were 5741 out of which 5471 (95.30%) was within the limit of accuracy of ±0.15 m. The number of inflow forecasts issued was 1319 out of which 1289 (97.73%) were within limits of accuracy of $\pm$ 20%.

The Telemetry data have been received in all Divisions. Chambal Division (Jaipur), ERD (Bhubaneshwar), Mahanadi Division (Burla), LKD (Hyderabad) etc. are

successfully using Telemetry data for flood forecasting through Mathematical Model. Other Divisions are also making attempt to use the Telemetry data by developing MIKE 11 model for Flood Forecasting in their jurisdictions.

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.

India Meteorological Department (IMD) through its Flood Meteorological Offices (FMO) also helped in this endeavour by providing all the Meteorological inputs for formulation of Flood Forecasts. CWC wishes to place its acknowledgements for the services provided by IMD through its various FMOs.

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 attached to this Directorate during flood duties in the flood season of 2012 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 improving performance, innovations in evaluation, modernization as well as computerization, year after year, will be further accelerated to achieve greater accuracy 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 **(K N KESHRI)**
July, 2014 **Member (RM)**

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EXECUTIVE SUMMARY

0.1 Meteorological Situation

During 2013, the rainfall for the country as a whole, for the season (June-September) was 106 % of its long period average (LPA). Seasonal rainfall was 109% of its LPA over Northwest India, 123% of its LPA over Central India, 115% of its LPA over south Peninsula and 72% of its LPA over Northeast (NE) India. Out of the total 36 meteorological subdivisions, 14 subdivisions constituting 48% of the total area of the country received excess season rainfall, 16 subdivisions (38% of the total area of the country) received normal season rainfall and the remaining 6 subdivisions (14% of the total area of the country) received deficient season rainfall. Monthly rainfall over the country as a whole was 132% of LPA in June, 106% of LPA in July, 98% of LPA in August and 86% of LPA in September. Southwest monsoon current advanced over the Andaman Sea 3 days earlier than its normal data of 20th May and set in over Kerala on its normal date of 1st June. The southwest monsoon covered the entire country by 16th June, about 1 month earlier than its normal date of 15th July. The withdrawal of monsoon from west Rajasthan commenced on 9th September compared to its normal date of 1st September. After 19th, further withdrawal of southwest monsoon was stalled with the successive formation of two low pressure areas and their westward movement across the central parts of the country. During the season, 2 monsoon depressions and 16 monsoon low pressure areas were formed as against the normal of 6 monsoon depressions and 6 monsoon low pressure areas per season. During October, Very Severe Cyclonic Storm "Phailin" formed over Bay of Bengal on 9th October 2013 and crossed Odisha coast on 12th October 2013.

0.2 Flood Situation

During the year 2013, three of the level forecasting sites namely, Srinagar on river Alaknanda, Mawi on river Yamuna and Bhagalpur on river Ganga crossed the Highest Flood Level and experienced Unprecedented Flood.

High Flood Situation was witnessed at 21 sites viz., River Alaknanda at Srinagar, River Ganga at Rishikesh, Haridwar, Ghazipur, Ballia, Patna (Gandhighat), Hathidah, Bhagalpur and Kahalgaon, River Yamuna at Mawi and Delhi Railway Bridge, River Ghaghra at Elgin Bridge and Gangpur Siswan, River Rapti at Balrampur, River Kosi at Basua, River Brahmaputra at Dibrugarh and Neamatighat, River Desang at Nanglamoraghat, River Wardha at Balharsha, River Subarnarekha at Rajghat and River Burhabalang at N H 5 Road Bridge.

Moderate to Low floods were witnessed in most of basins at various Flood Forecasting Stations. No forecasts were issued for 35 stations as they did not cross warning level or warning criteria.

The highlights of this year's flood included the severe flooding in Uttarakhand in June 2013 in association with early onset of South West Monsoon, continuous Moderate Flood in Lower Yamuna and Chambal Basins which gave rise to flooding in main Ganga after the confluence with Yamuna. The low flood in Upper Yamuna during February 2013 was also a highlight of this year and CWC issued forecast for this flood.

0.3 Flood Forecasting Performance

During the year 2013, 7060 forecasts were issued out of which 6760 forecasts (95.75%) were found to be within the limits of accuracy. The number of level forecasts issued during the year 2013 were 5741 out of which 5471 (95.3%) was within the limit of accuracy of ± 0.15 m. The number of inflow forecasts issued was 1319 out of which 1289 (97.73%) were within limits of accuracy of ±20%.

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 Oragnisation, Coimbatore being organisations supporting the Flood Forecasting Activities	11
6.	No. of Superintending Engineer's offices including one Flood Forecast Monitoring Directorate at CWC headquarter	14
7.	No. of present Flood Forecasting Divisions No. of Divisions supporting FF Activities	20 05
8.	No. of Control Room/Sub-Divisions engaged in flood forecasting work	64
9.	No. of inter-state rivers (main/tributaries) covered by flood forecasting programme	71
10.	No. of states including union -territories covered under F.F. Programme	17
11.	No. of forecasting sites	175
12.	No. of gauge and gauge & discharge sites	878
13.	No. of wireless stations including Control Rooms)	544
14.	No. of Telemetry Stations installed/under installation during IX,X and XI Plans	445
15.	Maximum no. of forecasts issued in any one year Second Highest no. of forecasts issued	8566 (in 1990) 8223 (in 2007)
16.	No. of forecasts issued in flood season 2010	7519
17.	No. of forecasts issued in flood season 2011	5991
18.	No. of forecasts issued in flood season 2012	5031
19.	No. of forecasts issued in flood season 2013	7060

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 and now the river forecasting has been expanded over the years to cover nine major inter-state flood prone river basins, which comprises of 71 sub-river basins traversing the country. The year-wise positions of the number of flood forecasting sites till the flood season 2013 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	No. of Flood Forecasting Sites	Year	No. of Flood Forecasting Sites
1958	01	2001	159
1965	02	2002	161
1969	43	2003	166
1977	77	2004	172
1980	84	2005	173
1985	145	2006	175
1987	147	2007	175
1990	157	2011	175
		2013	175

The "National Flood Forecasting and Warning Network" of Central Water Commission, which comprised of 175 flood forecasting sites including 28 inflow forecasting sites in flood season 2013 is shown in **Map-1.** The number of flood forecasting sites on each of the nine major inter-state river systems, which constitutes 71 river sub-basins in the country, are given in the **Table 1.2**.

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

S. No.	Major Interstate River Systems	Type of Forecasting Sites		Total
		Level Forecasting	Inflow Forecasting	
1	Ganga & its tributaries	77	10	87
2	Brahmaputra & its tributaries	27	00	27
3	Barak System	05	00	05
4	Eastern Rivers	08	01	09
5	Mahanadi	03	01	04
6	Godavari	14	04	18
7	Krishna	03	06	09
8	West Flowing Rivers	09	06	15
9	Southern River System (Pennar)	01	00	01
Total		147	28	175

The above flood forecasting network covers the following 15 states, one Union Territory and NCT of Delhi as shown in the **Table 1.3**

Table 1.3 Statewise Flood Forecasting Network in CWC

Sl. No.	State	Type of Forecasting sites		Total Forecasting sites
		Stage forecasting	Inflow forecasting	
1	Andhra Pradesh	9	7	16
2	Assam	24	0	24
3	Bihar	32	0	32
4	Chhattisgarh	1	0	1
5	Gujarat	6	5	11
6	Haryana	0	1	1
7	Jharkhand	1	4	5
8	Karnataka	1	3	4
9	Madhya Pradesh	2	1	3
10	Maharashtra	7	2	9
11	Orissa	11	1	12
12	Tripura	2	0	2
13	Uttarakhand	3	0	3
14	Uttar Pradesh	34	1	35
15	West Bengal	11	3	14
16	Dadra & Nagar Haveli	1	0	1
17	NCT of Delhi	2	0	2
Total		147	28	175

Central Water Commission through its twenty 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 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 and unprecedented flood situations 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 2006.

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. As discussed in the previous section, the criteria for issue of High and Unprecedented floods are applicable only to level forecast. However, they are not applicable for inflow forecasts. In view of the unprecedented floods in Krishna, it is high time that similar criteria are fixed for inflow forecasts too. Locally some of the reservoirs in Krishna and Godavari Basins have categorized certain inflow figures for warning downstream areas for Low, Moderate, High and Unprecedented situations, it has still not been recommended for all the reservoirs in the country as a whole. The categorization of inflow shall be done taking into account the total live storage of the reservoir and the largest design flood discharging capacity and the likely effect of this discharge on the downstream areas, for each inflow forecast stations. 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. Thus, the criteria should cover all the aspects of the flood pattern at the reservoir as well as the downstream.

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 2013-14 was Rs. 2.94 Crore only including that 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 salient features of all Flood Forecasting Sites, The details of all the sites basin-wise as well as Statewise during the flood season 2013, 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/ or under installation at 445 stations for automatic data 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 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) and Division to CWC Headquarters (100 to 500 Watts). VHF sets are used for short distance communication (i.e. from river to Site office).

Wireless network works on pre-fixed schedules only. The schedules are decided by the respective field divisions and intimated well in advance to all the stations under their jurisdiction for strict compliance. The wireless

schedules from divisions to CFCR are generally operated between 0700-0800 for collecting 06 hrs data, 0900- 1000 for collecting 08 hrs data, 1000-1100 for collecting forecast, 1530-1630 for collecting 1500 hrs data and 1830-1930 hours for collecting 18 hrs on normal days and throughout night in case of High or Unprecedented Flood Situations.

1.7b Telemetry

Sensor based data collection and satellite based communication was installed at 223 sites upto X plan for real time hourly water levels, hourly rainfall and other important meteorological parameters, established in Krishna, Godavari, Mahanadi, Chambal Damodar Yamuna and Brahmaputra Basins.. Two earth stations (DDRGS) located at Jaipur and Burla are receiving through INSAT/Kalpana satellite, the data from remote stations for further transmission to the respective modelling centre through VSAT. The data received was used mainly by the divisions issuing forecast by MIKE-11. Data from 52 sites was not received because of theft, vandalism and damage due to floods. Installation of sensor based Telemetry System at 222 sites was in progress.

1.8 DAMAGE DUE TO FLOODS/ HEAVY RAINS BETWEEN 1953 TO 2013

The damage due to floods for the entire country was estimated to be Rs.10092.70 Crore during the flood season 2013. The average annual damages to crops, houses and public utilities from the year 1953 to 2013 as reported by the States/UT's are of the order of Rs. 3800.175 Crore, the maximum annual damage being Rs.32551.758 Crore during 2009.

A comparative details showing the details of damages occurred during the flood season 2010 to 2013 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, 2011 to 2013

Sl. No.	Items	Flood damages during Year the Year				Flood Damages during 1953-2013	
		2011	2012	2013 (tentative)	Average 1953-2013 (tentative)	Maximum	
						Year	Damage
1	Area affected (in mha)	1.895	2.141	0.746	7.035	1978	17.5
2	Population affected (in millions)	15.973	14.689	17.809	31.900	1978	70.45
3	Damaged to Crops(area in mha)	2.718	1.95	1.693	3.725	2005	12.299
4	Damaged to crops(value in Rs. Crore)	1393.847	1534.108	3159.674	1159.072	2003	7307.23
5	Damaged to houses (in numbers)	1152518	174526	593838	1226403.869	1978	3507542
6	Damaged to houses (value in Rs. Crore)	410.475	240.573	509.176	559.395	2009	10809.80
7	Cattle lost (in number)	35982	31558	153779	96464.541	1979	618248
8	Human lives lost (in numbers)	1761	933	1924	1646.033	1977	11316
9	Damaged to public Utilities (in Rs. Crores)	6053.57	9169.968	3008.120	2006.252	2009	17509.353
10	Total damages to crops, houses & public utilities (in Rs. Crores)	7857.892	10944.649	10092.70	3800.175	2009	32541.758

1.9 ANALYSIS OF PERFORMANCE OF FLOOD FORECASTING NETWORK

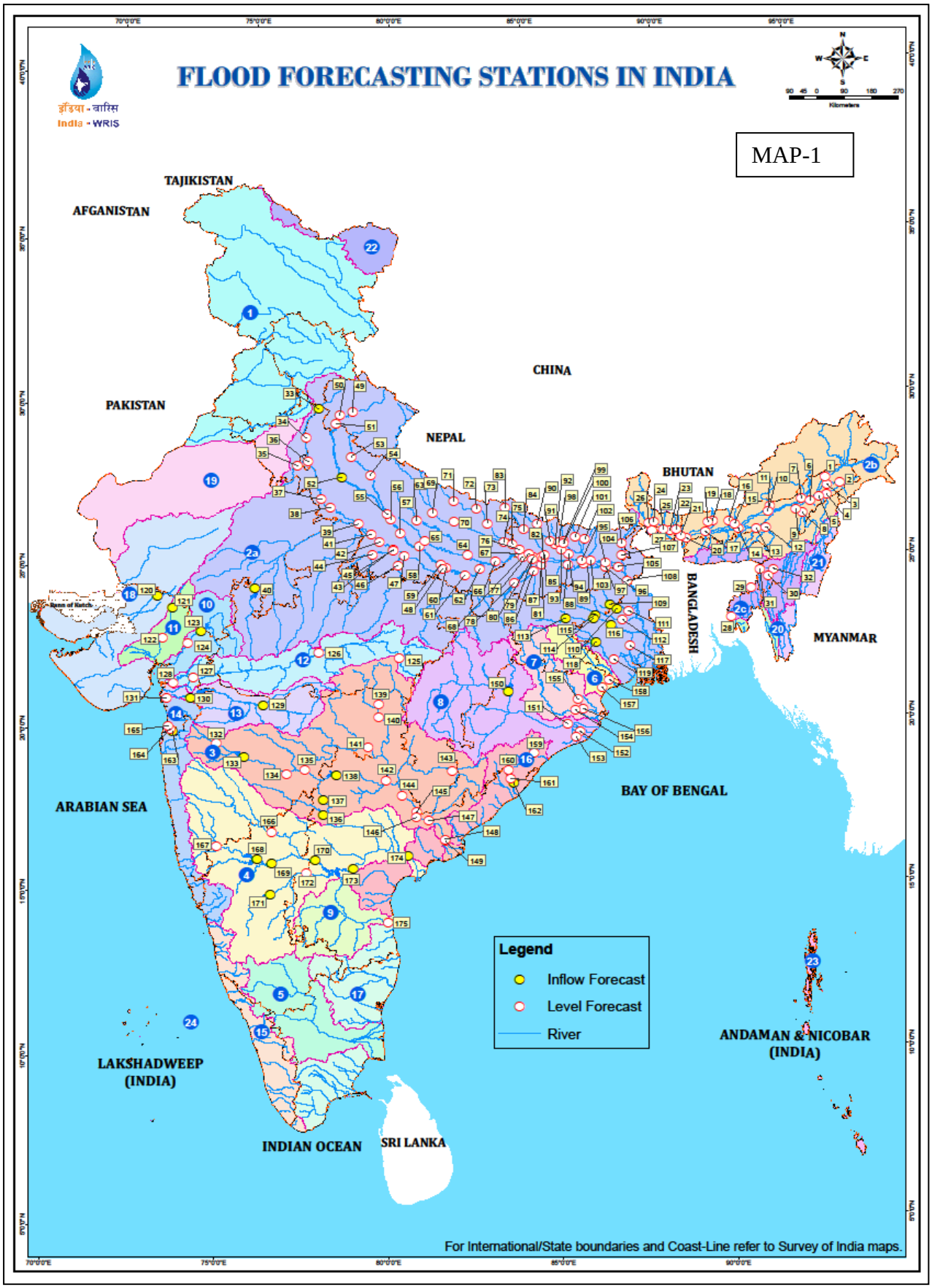
CWC carries out analysis and appraisal of the forecasting work, at the end of monsoon season. Based on this, measures for improvements, if necessary, are identified. A summary of the performance of the work carried out by the field divisions during the flood season 2013 presented in chapter-3. While the performance of the flood forecasting system is satisfactory, yet there is constant endeavor for improving the performance 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. Fourteen Circle Offices and twenty five 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**



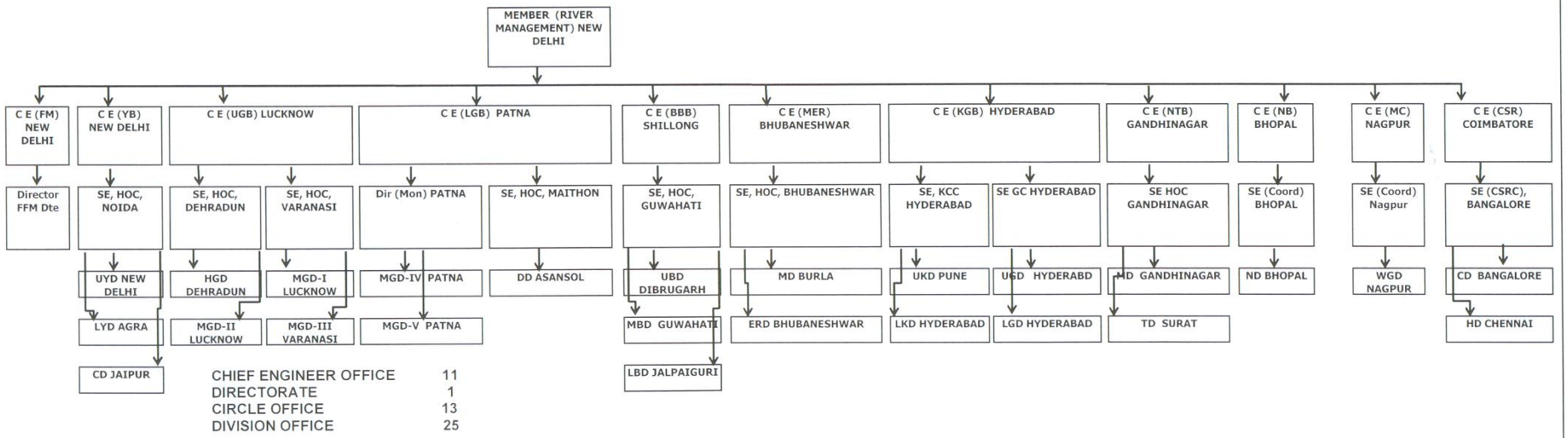
Map -1: Flood Forecasting Network in India

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

List of Flood Forecasting Stations											
Sl. No.	**Name of Forecast Station**	**Sl. No.**	**Name of Forecast Station**	**Sl. No.**	**Name of Forecast Station**	**Sl. No.**	**Name of Forecast Station**	**Sl. No.**	**Name of Forecast Station**	**Sl. No.**	**Name of Forecast Station**
1	Dibrugarh	34	Mawi	67	Ballia	100	Hayaghat	133	Jaikwadi Dam	166	Deongaon Bridge
2	Naharkatia	35	Dhansa Regulator	68	Buxar	101	Jhanjarpur	134	Gangakhed	167	Arjunwad
3	Chenimari (Khowang)	36	Delhi Railway Bridge	69	Elgin Bridge	102	Basua	135	Nanded	168	Almatti Dam
4	Nanglamoraghat	37	Mathura	70	Ayodhya	103	Balthara	136	Singur Dam	169	Narayanpur Dam
5	Sibsagar	38	Agra	71	Balrampur	104	Kursela	137	Nizamsagar Dam	170	PD Jurala Project
6	Neamatighat	39	Etawah	72	Bansi	105	Sahibganj	138	Sriramsagar	171	Tungabhadra Dam
7	Badatighat	40	Gandhisagar Dam	73	Gorakhpur (Birdghat)	106	Dengraghat	139	Bhandara	172	Mantralayam
8	Golaghat	41	Auraiya	74	Turtipar	107	Jhawa	140	Pauni	173	Srisailam Dam
9	Numaligarh	42	Kalpi	75	Darauli	108	Farakka Barrage	141	Balharsha	174	Prakasam Barrage
10	N T Road Crossing (Jiabharali)	43	Hamirpur	76	Gangpur Siswan	109	Massanjore Dam	142	Kaleswaram	175	Nellore Anicut
11	Tezpur	44	Mohana	77	Chhapra	110	Tilpara Barrage	143	Jagdalpur		
12	Kampur	45	Sahjina	78	Inderpuri	111	Narayanpur	144	Eturunagaram		
13	Dharamtul	46	Banda	79	Koelwar	112	Gheropara	145	Dummagudem		
14	Guwahati (D C Court)	47	Chillaghat	80	Maner	113	Tenughat Dam	146	Bhadrachalam		
15	NH Crossing (Puthimari)	48	Naini	81	Patna (Dighaghat)	114	Panchet Dam	147	Kunavaram		
16	NT Road Crossing (Pagladiya)	49	Srinagar	82	Patna (Gandhighat)	115	Maithon Dam	148	Rajahmundry GNV Railway Bridge		
17	Goalpara	50	Rishikesh	83	Khadda	116	Durgapur Barrage	149	Dowlaiswaram Barrage		
18	Beki Road Bridge	51	Hardwar	84	Chatia	117	Harinkhola	150	Hirakud Dam		
19	NH Crossing (Manas)	52	Narora Barrage	85	Hazipur	118	Kangsabati Dam	151	Naraj		
20	Dhubri	53	Moradabad	86	Kamtaul	119	Mohanpur	152	Alipingal		
21	Golokganj	54	Bareilly	87	Sripalpur	120	Dantiwada Dam	153	Nimapara		
22	Tufangunj	55	Kannauj (Gurnatia)	88	Hathidah	121	Dharoi Dam	154	Jenapur Expressway		
23	Ghugumari	56	Ankinghat	89	Munger	122	Subash Bridge (Ahmedabad)	155	Anandpur		
24	NH 31	57	Kanpur	90	Lalbeghiaghat	123	Kadana Dam	156	Akhuapada		
25	Mathabhanga	58	Dalmau	91	Muzzafarpur (Sikandarpur)	124	Wanakbori Weir	157	NH 5 Road Bridge		
26	Domohani Road Bridge	59	Phaphamau	92	Rewaghat	125	Mandla	158	Rajghat		
27	Mekhliganj	60	Allahabad (Chhatnag)	93	Samastipur	126	Hoshangabad	159	Purushottampur		
28	Sonamura	61	Mirzapur	94	Rosera	127	Garudeshwar	160	Gunupur		
29	Kailashahar	62	Varanasi	95	Khagaria	128	Bharuch	161	Kashinagar		
30	Matizuri	63	Hanuman Setu(Lucknow)	96	Bhagalpur	129	Hathnur Dam	162	Gotta Barrage		
31	Karimgunj	64	Jaunpur	97	Colgong/Kahalgaon	130	Ukai Dam	163	Madhuban Dam		
32	Annapurnaghat (Silchar)	65	Rae-Bareilly	98	Benibad	131	Surat	164	Daman		
33	Tajewala Barrage (Hathnikund Barrage)	66	Ghazipur	99	Ekmighat	132	Kopergaon	165	Vapi Town		

Fig -1.1

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



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 supplyiog 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 2013, the Hydrology 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 15th June to 15th October. However, the bulletins during non-monsoon period in first week of November in association with Depression were not uploaded in the Website by FMO, Hyderabad. Other FMOs have not uploaded their bulletins in the concerned websites of Regional or Meteorological Centres. 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 445 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 first year of the 12th Plan there is a proposal to install 125 automatic data collection units in various river basins and IMD has provided the Station Index numbers/ Time slot/ Frequency for these 125 stations. Another 81 stations have been identified for upgradation during the year 2013-14 for which, IMD has been approached for providing Station IDs etc.

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 2013

- For the country as a whole, the rainfall for the season (June-September) was 106 % of its long period average (LPA).

- Seasonal rainfall was 109% of its LPA over Northwest India, 123% of its LPA over Central India, 115% of its LPA over south Peninsula and 72% of its LPA over Northeast (NE) India.

- Out of the total 36 meteorological subdivisions, 14 subdivisions constituting 48% of the total area of the country received excess season rainfall, 16 subdivisions (38% of the total area of the country) received normal season rainfall and the remaining 6 subdivisions (14% of the total area of the country) received deficient season rainfall.

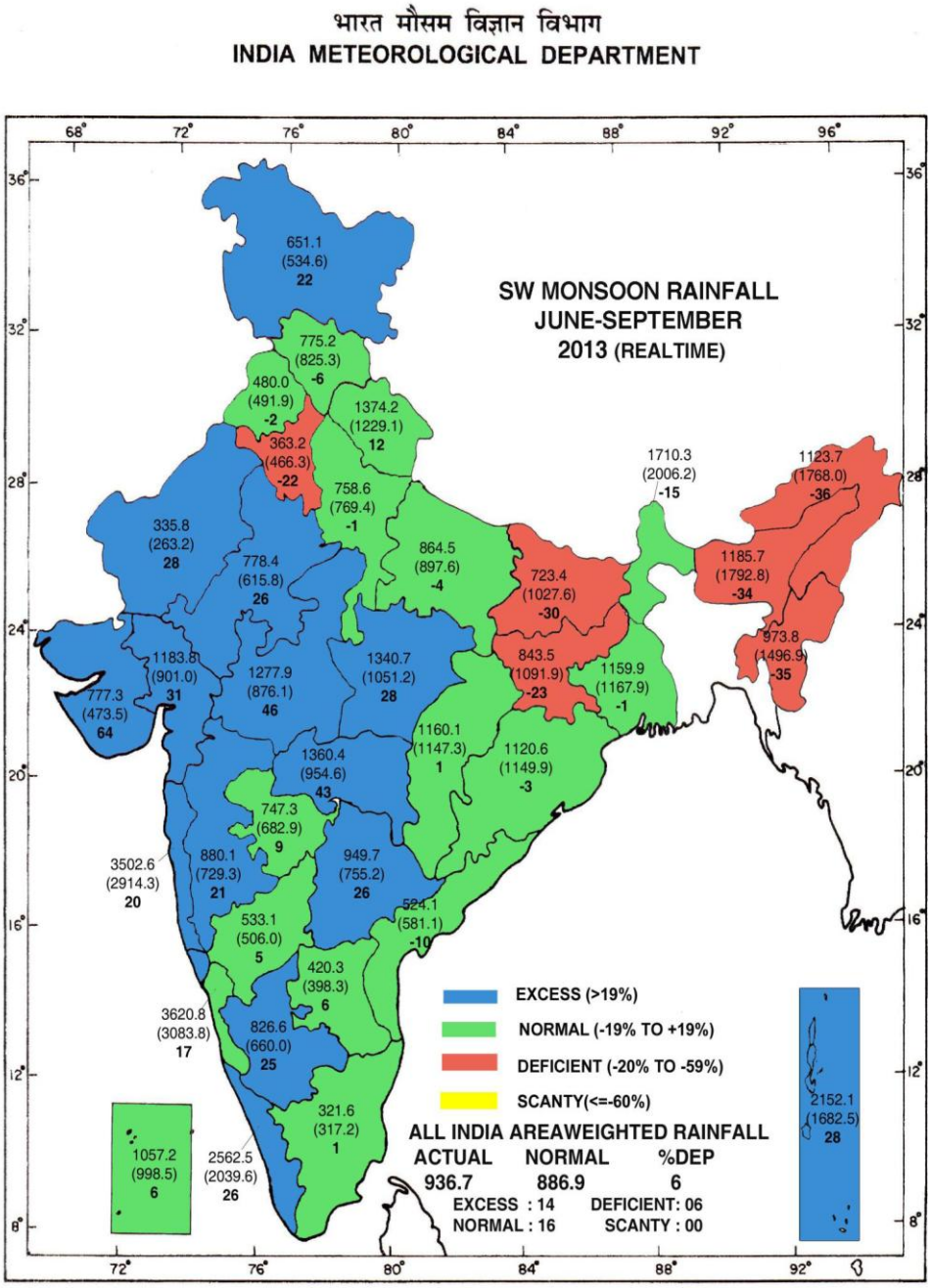
- Monthly rainfall over the country as a whole was 132% of LPA in June, 106% of LPA in July, 98% of LPA in August and 86% of LPA in September.

- Out of the total of 641 districts, 100 were affected by moderate meteorological drought (seasonal rainfall deficiency of 26% to 50%), while 39 were affected by severe meteorological drought (seasonal rainfall deficiency of 51% to 99%)

- Southwest monsoon current advanced over the Andaman Sea 3 days earlier than its normal data of 20th May and set in over Kerala on its normal date of 1st June. The southwest monsoon covered the entire country by 16th June, about 1 month earlier than its normal date of 15th July.

- The withdrawal of monsoon from west Rajasthan commenced on 9th September compared to its normal date of 1st September. After 19th, further withdrawal of southwest monsoon was stalled with the successive formation of two low pressure areas and their westward movement across the central parts of the country.

- The sub-divisionwise South West Monsoon rainfall during June to September 2013 is shown in the Following **Map-2.**



Map-2 Sub-divisionwise South West Monsoon rainfall during 2013

2.3 ONSET OF SOUTH-WEST MONSOON SEASON 2013

Associated with the formation of Cyclonic Storm Mahasen (10th - 16th May) over southeast Bay of Bengal, low level cross equatorial monsoon flow strengthened over south Andaman Sea and adjoining south Bay of Bengal. This subsequently resulted in the advance of southwest monsoon over Andaman Sea and some parts of southeast Bay of Bengal on 17th May, 3 days before the normal date of 20th May. Cross equatorial flow over the Arabian Sea remained strong since the advance of southwest monsoon over the Andaman Sea.

The southwest monsoon set in over Kerala on 1st June, on its normal date. The same day, monsoon advanced over entire south Arabian Sea, Maldives-Comorin area, Lakshadweep, some parts of central Arabian Sea, entire Kerala, some parts of Coastal & South Interior Karnataka and most parts of Tamil Nadu. Convectively active phase of the Madden - Julian Oscillation (MJO) and the associated systematic northward propagation of the east-west shear zone at the mid-tropospheric levels during the subsequent period helped faster advance of monsoon and increased rainfall activity over the country.

The pace of advance of southwest monsoon this year had been the fastest during the period 1941-2013. Since the onset took place over Kerala on 1st June, it rapidly covered the south peninsula and northeast India by 9th June and central, eastern parts and western Himalayan region by 15th June. This was also aided by the formation and west- northwestward movement of a low pressure area along the east-west trough during the same period. On 16th June, presence of this low pressure area over east Rajasthan & neighbourhood superposed with a trough in the mid & upper tropospheric westerlies provided conditions conducive for the large scale convection and wide spread monsoon rains over northwest India. This helped monsoon to advance of monsoon over the entire country on 16th June, about a month earlier than its normal date of 15th July.

Fig.2.1 shows the isochrones of advance of monsoon 2013.

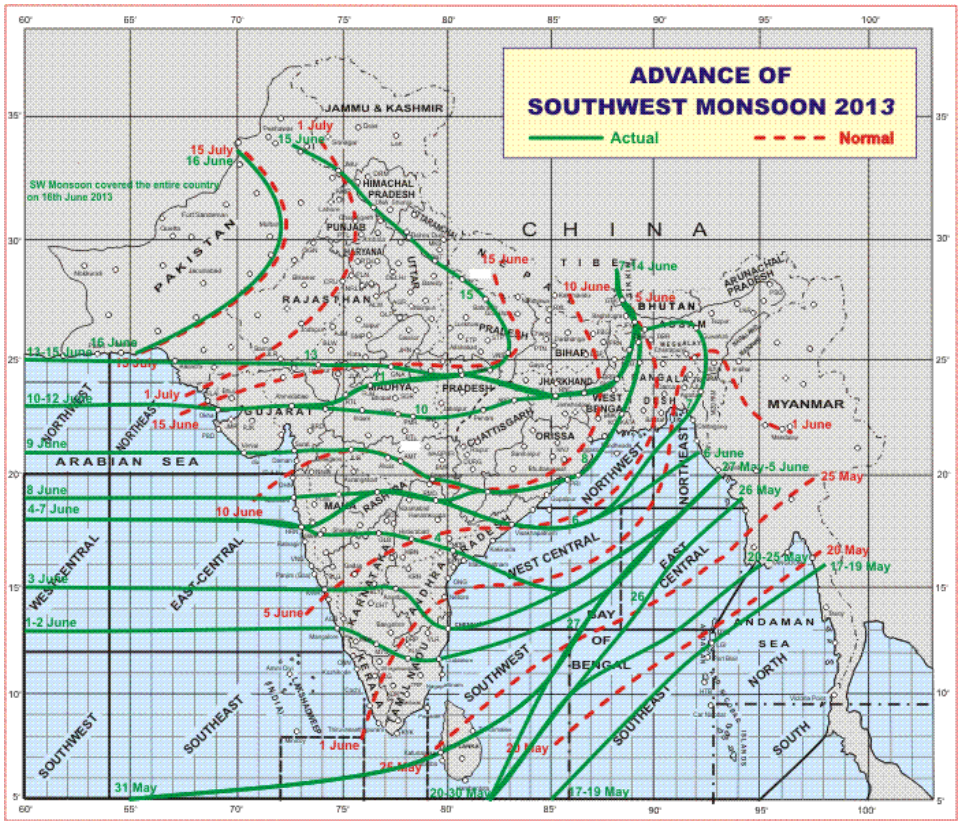


Fig. 2.1 Advance of southwest Monsoon–2013**.**

2.4 CHIEF SYNOPTIC FEATURES

Strong cross equatorial flow prevailed during June and July. It gradually weakened during the latter half of the season. The axis of monsoon trough remained in its near normal position and extended upto lower tropospheric levels without its characteristic southward tilt with height during most parts of the season. The seasonal 'heat low' weakened from the beginning of September. Subsequently, the axis of monsoon trough also weakened and thereby became less delineated at mean sea level since 4th September.

Though no typical break situation developed during the season, the rainfall pattern from the end of August to the first week of September resembled break like, as a consequence to the overall weakening of the monsoon circulation.

During the season, only 2 monsoon depressions were formed against a normal of 6 depressions per season. However, 16 monsoon low pressure areas were formed against a normal of 6 low pressure areas per season. The tracks of the 2 monsoon depressions are given in **Fig.2.2** One depression formed over the Bay of Bengal in the month of July and another formed over land in August. During the last about 30 years, there were two years (1984 and 1996) when 18 low pressure areas had formed in the monsoon season. During each of both these years, 3 low pressure areas had intensified into depressions. Out of the sixteen low pressure areas formed during this season, 12 formed over the Bay of Bengal, 3 formed over land and one formed over the Arabian Sea. The month wise break up is 3 in June, 4 in July, 5 in August and 4 in September. The first low pressure area (4^{th}-5^{th}June) formed over the Arabian Sea under the influence of cyclonic circulation embedded in the shear zone during the onset phase. Though it was short lived, the formation of this low pressure area stalled the advance of the Monsoon over the Arabian Sea for 3 days (5^{th} - 7^{th} June). However, the second low pressure area which formed over the Bay of Bengal moved west-northwestwards during 12^{th} – 17^{th} June upto Rajasthan and Haryana and its interaction with a trough in the mid & upper tropospheric westerlies helped the monsoon to cover the entire country. During July one low pressure area (10^{th}-13^{th} July) formed over land and 3 low pressure areas (15^{th} – 17^{th} July, 19^{th}-25^{th} July, 25^{th}-29^{th} July) formed over the Bay of Bengal. All these 4 low pressure areas and one depression (30^{th}-31^{st} July) that formed over the Bay of Bengal moved northwestward along the monsoon trough and helped to maintain the monsoon activity over the region.

The cyclogenesis during the second half of the season had a major contribution from the remnant vortices from the east. A land depression formed during 20^{th}-22^{nd} August over Gangetic West Bengal and adjoining northwest Bay of Bengal dissipated over east Madhya Pradesh. The five low pressure areas that formed in the month of August were mostly of short duration. Two dissipated in-situ and were of 1 day duration, two moved up to east Uttar Pradesh and adjoining areas and the low pressure area during 9^{th}-

11th August dissipated over west Uttar Pradesh and adjoining areas of east Rajasthan. Monsoon activity in general remained weak over areas outside central and east India.

During the first fortnight of the September, rainfall was mainly confined to east, northeast and south peninsula. With the formation of a low pressure area over northwest Bay of Bengal on 19th September and its westward movement across the central parts of the country, the monsoon activity revived. Even after the dissipation of the low pressure area on 23rd, the remnant of the system as an upper air cyclonic circulation remained quasi-stationary over Gujarat State. Under the influence of this cyclonic circulation, another low pressure area formed over Kutch & neighbourhood on 27th September and became less marked on 30th. The last low pressure area of the season formed over northwest Bay of Bengal and adjoining coastal areas of West Bengal and Odisha on 28th evening and persisted there till the last day of the season.

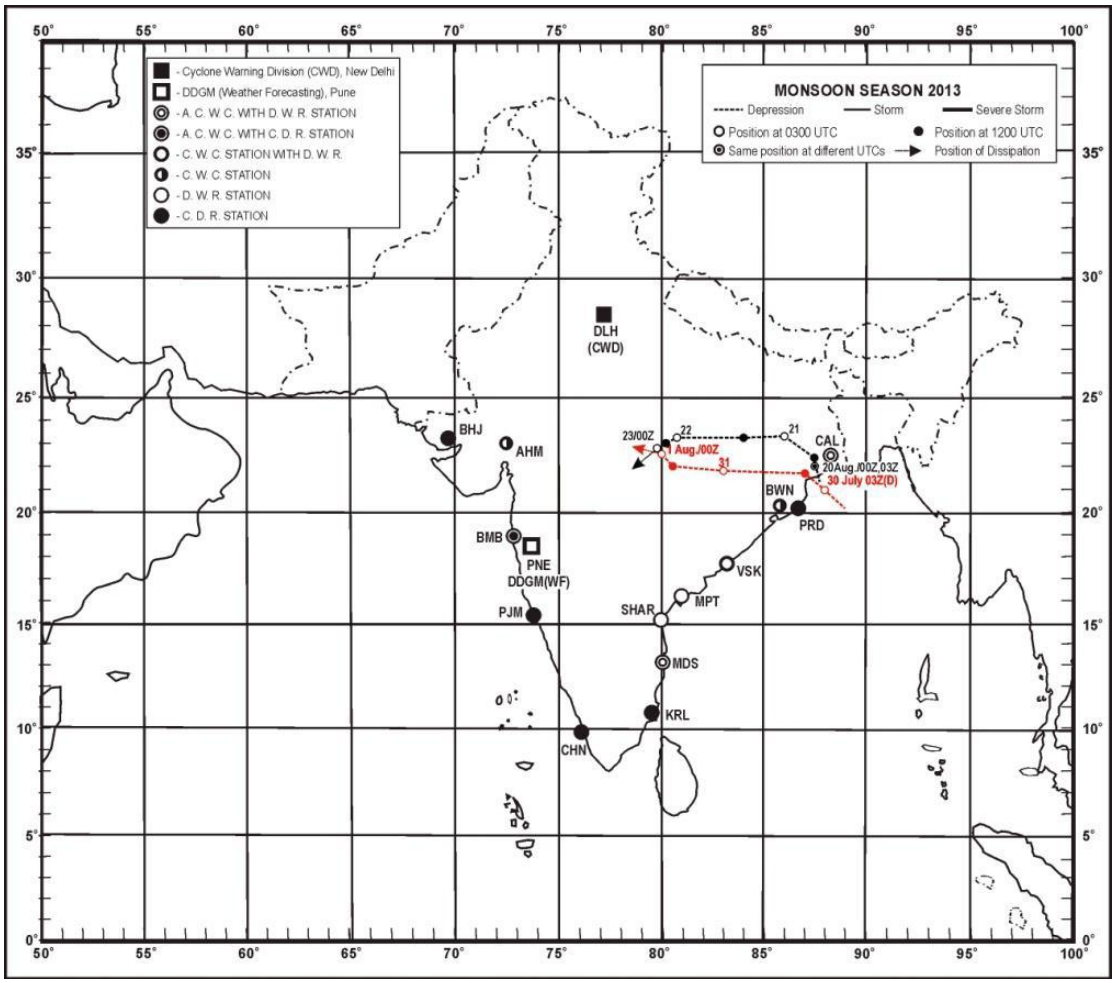


Fig. 2.2 Movement of monsoon depressions during 2013

2.5 Very Severe Cyclonic Storm "Phailin"

A Very Severe Cyclonic Storm (VSCS) PHAILIN originated from a remnant cyclonic circulation from the South China Sea. The cyclonic circulation lay as a low pressure are over Tenasserim coast on 6th October 2013. It lay over north Andaman Sea as a well marked low pressure area on 7th October. It concentrated into a depression over the same region on 8th October near latitude 12.00N and longitude 96.00E. Moving west-northwestwards, it intensified into a deep depression on 9th morning and further into cyclonic storm (CS), '**PHAILIN'** in the same day evening. Moving northwestwards, it further intensified into a severe cyclonic storm (SCS) in the morning and into a VSCS in the forenoon of 10th Oct. over east central Bay of Bengal.

The VSCS, **PHAILIN** crossed Odisha & adjoining north Andhra Pradesh coast near Gopalpur (Odisha) around 1030 hrs IST of 12th October 2013 with a sustained maximum surface wind speed of 200-210 kmph gusting to 220 kmph. The salient features of this storm are as follows.

- VSCS PHAILIN is the most intense cyclone that crossed India coast after Odisha Super Cyclone of 29th October 1999.
- There was rapid intensification of the system from 10th Oct. morning to 11th October morning leading to an increase in wind speed from 45 knots to 115 knots.
- At the time of landfall on 12th Oct, maximum sustained surface wind speed in association with the cyclone was about 115 knots (215 kmph) and estimated central pressure was 940 hPa with pressure drop of 66 hPa at the centre compared to surroundings
- It caused very heavy to extremely heavy rainfall over Odisha leading to floods, and strong gale wind leading to large scale structural damage and storm surge leading to coastal inundation over Odisha.
- Maximum rainfall occurred over northeast sector of the system centre at the time of landfall. Maximum 24 hr cumulative rainfall of 38 cm has been reported over Banki in Cuttack district of Odisha.

The track of VSCS "Phailin" is shown in **Fig. 2.3** and the Radar image of Doppler Weather Radar at Visakhapatnam is shown in **Fig. 2.4**

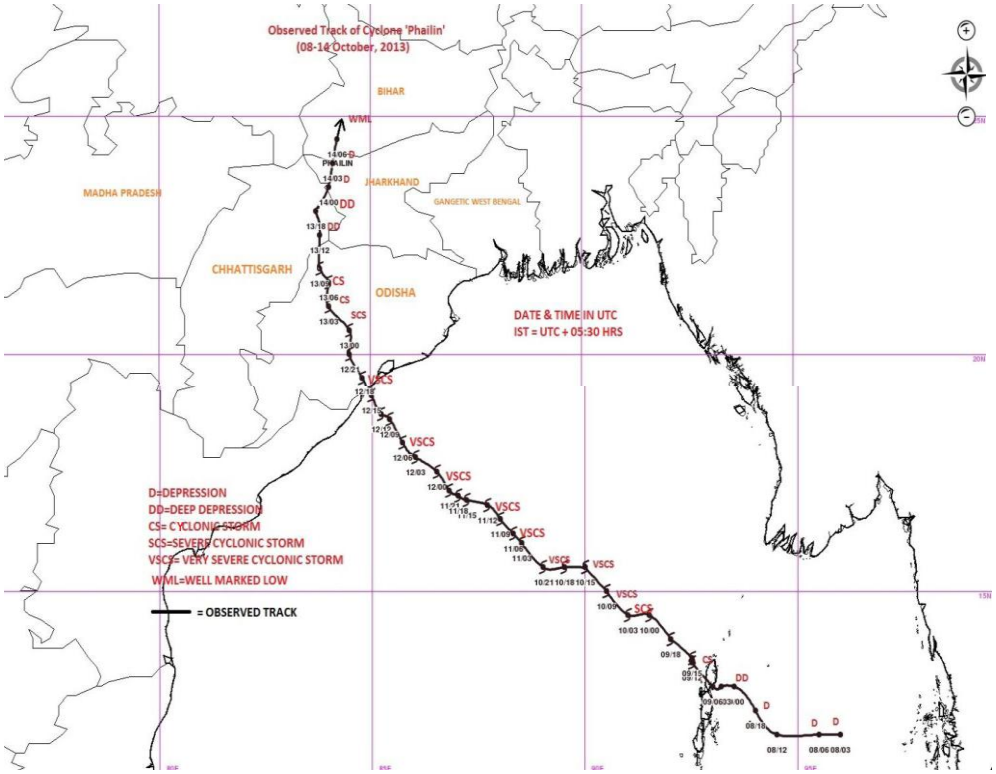


Fig. 2.3 Observed track of VSCS PHAILIN during 8th-14th October 2013.

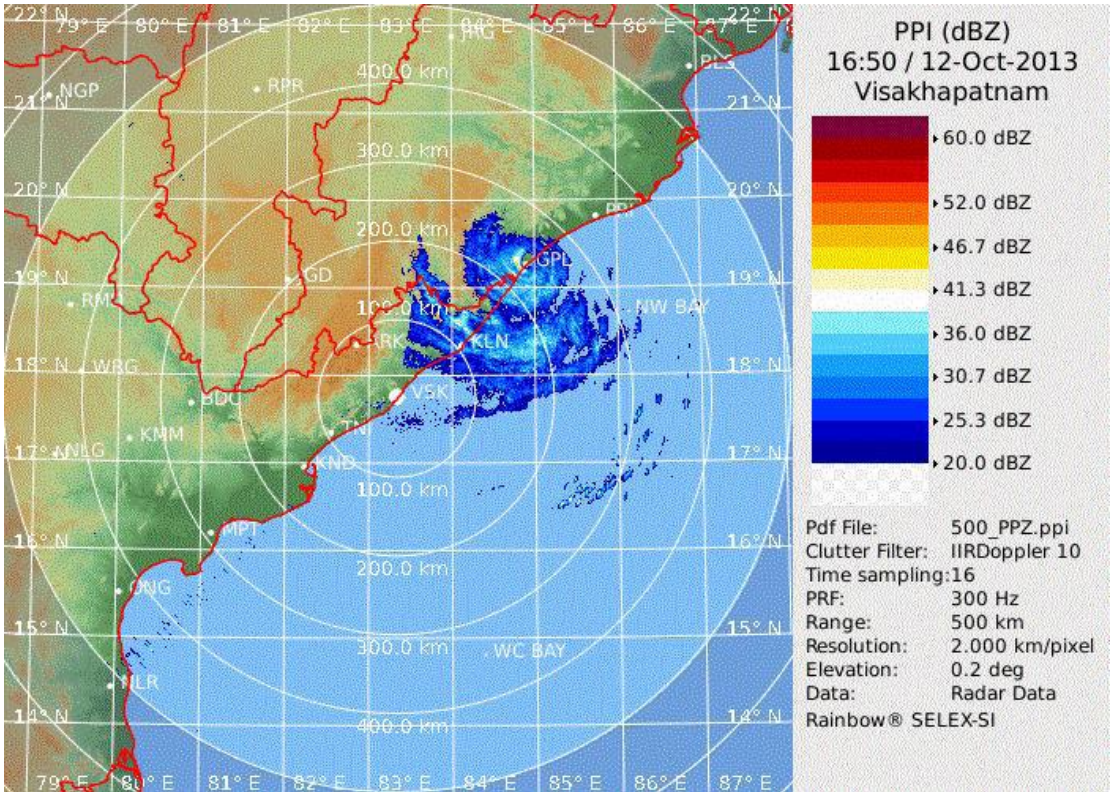


Fig. 2.4: Visakhapatnam RADAR imageries based on 1650 UTC of 12thOctober 2013

2.6 WITHDRAWAL OF SOUTHWEST MONSOON

The weather over the western parts of Rajasthan remained mainly dry for more than a fortnight (from 27th August). A change over in the lower tropospheric circulation pattern over the region from cyclonic to anti cyclonic during 8th - 9th September resulted in the withdrawal of southwest monsoon from the region. Hence the withdrawal of southwest monsoon commenced from 9th September and the withdrawal line passed through Ganganagar, Bikaner and Barmer during 9th-18th September. The Southwest Monsoon withdrew from entire Jammu & Kashmir, Himachal Pradesh and Punjab; some parts of Haryana; some more parts of Rajasthan and some parts of Kutch on 19th and the withdrawal line passed through Kalpa, Hissar, Jodhpur and Naliya. However, an almost complete revival in the monsoon activity occurred from the 3rd week of September. With the successive formation of two low pressure areas and their westward movement across the central parts of the country caused the east-west trough to remain active contributing to above normal rainfall during this period. This development has stalled the further withdrawal of southwest monsoon.

The withdrawal was further delayed due to the formation of "Phailin" and finally the south west monsoon withdrew from the entire country on 21st October 2013.

Fig.2.5 shows the isochrones of withdrawal of monsoon 2013.

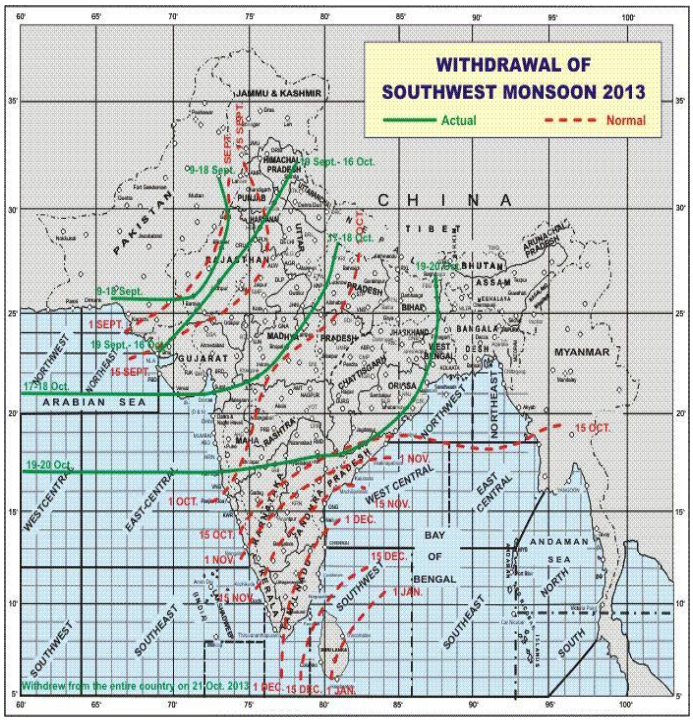


Fig. 2.5 Isochrones of withdrawal of southwest monsoon - 2013

2.7 Formation of Well marked low pressure area between 24th and 27th October 2013

A well-marked low pressure area formed in West-central Bay of Bengal on 23rd and was lying over Coastal Andhra Pradesh and adjoining areas on 24th and 25th October and weakened to a low pressure area on 26th and was lying over Telangana and neighbourhood. On 27th, the low pressure area was seen over North Coastal Andhra Pradesh and neighbourhood and became less marked in the evening of 27th.

Source:

1. End of season report published by IMD
2. Preliminary reports on Phailin given in IMD website Cyclone Page.
3. 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. However, the analysis of the forecasts data of individual sites has indicated that the application of uniform criteria to all sites is misleading especially for flashy rivers where rate of change in river level / inflow is sudden / abrupt and large in magnitude. Therefore, there is a need of setting different yardsticks for judging accuracy of flood forecasts for flashy and flat rivers.

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. This factor is not presently being taken into account while judging the accuracy of forecasts.

3.3 FLOOD FORECASTING ACTIVITIES

The flood forecasting activities like data collection, forecast formulation and its dissemination during 2013 covered various river basins and States. A total of 5031 forecast were issued during 2013. The performance of flood forecasting Divisionwise, Major Basinwise, Statewise and for the period 2000 to 2013 are given from **Annex-IV to VII.**

3.4 RIVERWISE DETAILS OF FLOOD FORECASTING ACTIVITES & ACCURACY OF FORECAST

3.4.1 Brahmaputra Basin

During the flood season 2013, analysis of the flood forecasts issued reveals that out of 1744 forecasts (24.70% of 7060 forecast) were issued for 23 sites located on the main Brahmaputra and tributaries. Out of these, 1726 forecasts (98.97%) were found within permissible limit of accuracy.

3.4.2 Barak and Meghna Basin

During the flood season 2013, 48 forecasts (0.68% of 7060) were issued for four sites. Out of these, 48 forecasts (100%) were found within permissible limit of accuracy. No forecast was issued for one site.

3.4.3 Ganga Basin

During the flood season 2013, 3190 forecasts (45.18% of 7060) were issued for 71 sites, out of total 87 sites located on the main Ganga and its tributaries. No forecast was issued for the remaining 16 sites. Out of these, 3081 forecasts (96.58%) were found within permissible limit of accuracy.

3.4.4 Eastern Rivers Basins including Mahanadi

During the flood season 2013, 221 forecasts (3.13% of 7060) were issued for eight sites out of nine sites on Eastern Rivers (excluding Mahanadi Basin) and 202 (91.40%) forecasts were found within permissible limit of accuracy. No forecasts were issued for one station. Also 85 forecasts (1.20% of 7060) were issued for two sites out of four located on the Mahanadi river basin, of which 84 forecasts (98.82%) were found within permissible limit of accuracy. Forecasts were not issued for two stations.

3.4.5 Godavari Basin

During the flood season 2013, 749 forecasts (10.61% of 7060) were issued for 13 forecasting sites out of 18 sites, out of which 626 forecasts were found with 83.58% accuracy. No forecasts were issued for the remaining five flood forecasting sites.

3.4.6 Krishna Basin

During the flood season 2013, 564 forecasts (7.99% of 7060) were issued for eight forecasting sites out of nine sites and 538 forecasts (95.39 %) were found within permissible limit of accuracy. No forecast was issued for one site in Krishna basin.

3.4.7 Southern Rivers Basin

Since the North Pennar River did not cross Warning Level, no forecast was issued for one site in Southern River System.

3.4.8 West Flowing Rivers

During the flood season 2013, for the West-flowing Rivers which comprises of the Narmada, the Tapi etc, 459 forecasts (6.50% of 7060) were issued for 11 sites, out of fifteen sites. 455 forecasts (99.13 %) were found within permissible limit of accuracy. Forecasts were not issued for four sites.

The Basinwise – Riverwise flood forecasting information in India during flood season 2013 is given in **Annex-II.**

3.5 STATEWISE FLOOD FORECASTING PERFORMANCE

There are 15 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 2013, is given in **Annex –III.** Their salient features are as under:

3.5.1 Andhra Pradesh

In the state of Andhra Pradesh, there were sixteen forecasting sites including seven inflow sites. Forecasts were issued for fourteen forecasting sites out of which there were 6 inflow and 8 level sites.

It is revealed that 921 forecasts (601 level and 320 inflow) were issued out of which 814 forecasts (510 level and 304 inflow) were within limits respectively (88.38%). No forecasts were issued for 2 stations.

3.5.2 Assam

In the state of Assam, there were 24 forecasting sites and all of them were level forecasting sites. Forecasts were issued for 21 sites. It is seen that during 2013 season, 1592 forecasts were issued out of which 1586 forecasts (99.62%) were found within limit of accuracy.

River Brahmaputra at Dibrugarh, Neamatighat and River Desang at Nanglamoraghat flowed in High Flood Situation.

3.5.3 Bihar

In the state of Bihar, there were 32 level forecasting sites. Forecasts were issued for 27 sites during the year 2013. Out of 1393 forecasts issued

during the flood season 2013, 1393 forecasts (100%) were found within limit of accuracy. No forecasts were issued for 5 stations.

River Ganga at Bhagalpur flowed in Unprecedented Flood Situation.

River Ganga at Patna (Gandhighat), Hathidah, Bhagalpur and Kahalgaon, River Ghaghra at Gangpur Siswan and River Kosi at Basua flowed in High Flood Situation.

3.5.4 Chhattisgarh

In the state of Chhattisgarh there was only one level flood forecasting site (i.e. Jagdalpur) on the Indravati River (a tributary of the Godavari River). 27 flood forecast were issued for this station during the flood season 2013 out of which 22 (81.48%) were within the limits of accuracy.

3.5.5 Gujarat

There were 11 flood forecasting sites in the state of Gujarat including five inflow forecasting sites. However, forecasts were issued for eight sites. Out of 220 forecasts issued (63 level and 157 inflow), 217 forecasts (63 level and 154 inflow) (98.64%) were found within limits of accuracy during the flood season 2013. No forecasts were issued for 3 stations.

3.5.6 Haryana

Neither any hydrological data was collected nor was any forecast issued for the lone site Tajewala weir on the river Yamuna in the state of Haryana during the flood season 2013 also. Instead data from an upstream site, namely, Hathni Kund Barrage were collected. However, no inflow forecasts were issued due to very little travel time available from base station. The Hathnikund Reservoir also released an unprecedented outflow of **806464** cusec (0600 hrs on 17-06-2013).

3.5.7 Jharkhand

In the state of Jharkhand, there were four inflow and one level flood forecasting sites. Flood forecasts were issued for all of them. During the flood season 2013, Out of 205 (76 level and 129 inflow) forecasts issued, 205 (76 level and 129 inflow) forecasts (100 %) were found within limit of accuracy.

3.5.8 Karnataka

There were four flood forecasting sites in the state of Karnataka which includes three inflow forecasting sites and one level forecasting site. During the flood season 2013, out of 246 forecasts (3 level and 243 inflow) issued for 4 stations, 235 (2 level and 233 inflow) forecasts (95.53%) were found within limit of accuracy.

3.5.9 Madhya Pradesh

In the state of Madhya Pradesh, there were two level forecasting sites on the river Narmada and one inflow forecast site at Gandhisagar on river Chambal. During the flood season 2013, forecasts were issued for one level and inflow sites. Out of 64 forecasts issued (47 level and 17 inflow), 63 (46 level and 17 inflow) (98.44%) forecasts were found within the limit of accuracy. No forecasts were issued for one station.

3.5.10 Maharashtra

There were nine forecasting sites including two inflow forecasting sites, in the state of Maharashtra. During the flood season 2013, forecasts were issued for one inflow forecast station and three level stations. Total 322 forecasts were issued (130 levels+192 inflows) during 2013 out of which 295 (103 levels+192 inflows) were in limit (91.96%). No forecasts were issued for 5 stations.

River Wardha at Balharsha flowed in High Flood Situation during the year 2013.

River Wardha at Ghugus, a base Stations for forecast station Balharsha crossed its previous HFL.

3.5.11 Odisha

In the state of Odisha, there were eleven level flood forecasting sites and one inflow forecasting site i.e. Hirakud Dam on the main river Mahanadi. During the flood season 2013, 295 (216 level and 79 inflow) forecasts were issued for 8 level and 1 inflow forecast stations out of which 276 (198 level and 78 inflow) (93.56 %) were found within limit of accuracy. No forecasts were issued for 3 stations.

For FF Stations

River Subarnarekha at Rajghat and River Burhabalang at N H 5 Road Bridge flowed in High Flood Situation.

For Base Station

River Burhabalang at Baripada crossed its previous HFL

3.5.12 Tripura

There were two level forecasting sites in the state of Tripura namely, Kailashahar on river Manu and Sonamura on river Gumti. Forecast was issued for one station. Out of 2 forecasts issued, 2 were within limit (100%). No Forecasts were issued for one station.

3.5.13 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 Haridwar and Rishikesh in 2013. 51 forecasts were issued out of which 46 (90.20%) were within limit of accuracy. No forecasts were issued for 1 station.

For the FF Stations

River Alaknanda at Srinagar flowed in Unprecedented Flood Situation.
River Ganga at Rishikesh and Haridwar flowed in High Flood Situation.

For the Base Stations

River Mandakini crossed HFL at Chandrapuri and Rudraprayag.
River Alaknanda crossed HFL at Rudraprayag
River Ganga crossed HFL at Deoprayag.

3.5.14 Uttar Pradesh

There were 35 flood forecasting sites in the state of Uttar Pradesh, which includes one inflow forecasting site at Narora barrage (U/S) on the river Ganga and 34 level forecasting stations. During the flood season 2013, forecasts were issued for 29 stations. Out of 1221 level forecasts (1127 level and 94 inflow), 1121 forecasts (1027 level and 94 inflow) (91.81%) were found within limit of accuracy. No forecasts were issued for 6 stations.

River Yamuna at Mawi crossed its previous HFL and flowed in Unprecedented Flood Situation.

River Yamuna at Mawi, River Ganga at Ghazipur and Ballia, River Ghaghra at Elgin Bridge and river Rapti at Balrampur flowed in High Flood Situation.

3.5.15 West Bengal

In the state of West Bengal, there were 14 flood forecasting sites, which include three inflow forecasting sites. During the flood season 2013, forecasts were issued for 12 sites (9 level and 3 inflow stations). Out of 451 forecasts (363 level and 88 inflow), 437 forecasts (349 level and 88 inflow) (96.90 %) were found within limit of accuracy. No forecasts were issued for two stations.

3.5.16 Dadra & Nagar Haveli

In the Union Territory of Dadra & Nagar Haveli, there was only one flood forecasting site at Daman on river Damanganga. No flood forecast was issued for the site during the flood season 2013.

3.5.17 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 2013, Out of 50 forecasts (only level), 48 forecasts (96%) were within limits of accuracy.

River Yamuna at Delhi Railway Bridge flowed in High Flood Situation.

The performance of flood forecasting Stations (Divisionwise) in India during flood season 2013 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**.

3.6 AN OVERVIEW OF FLOOD FORECASTING PERFORMANCE

During the flood season 2013, an average number of flood forecasts issued per forecasting site were 40.34. The number of forecasting sites where the performance accuracy of the issued forecasts was found to be above 95.75 % (National average for flood season 2013) was 96 sites (54.85 %) which include 81 sites (46.28 %) 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 93 (53.14%).

The flood forecasting performance of the level forecasting as well as inflow forecasting sites from 2000 to 2013 is given in **Annex-VII** and from 2000 to 2013 as **Fig.3.1.**

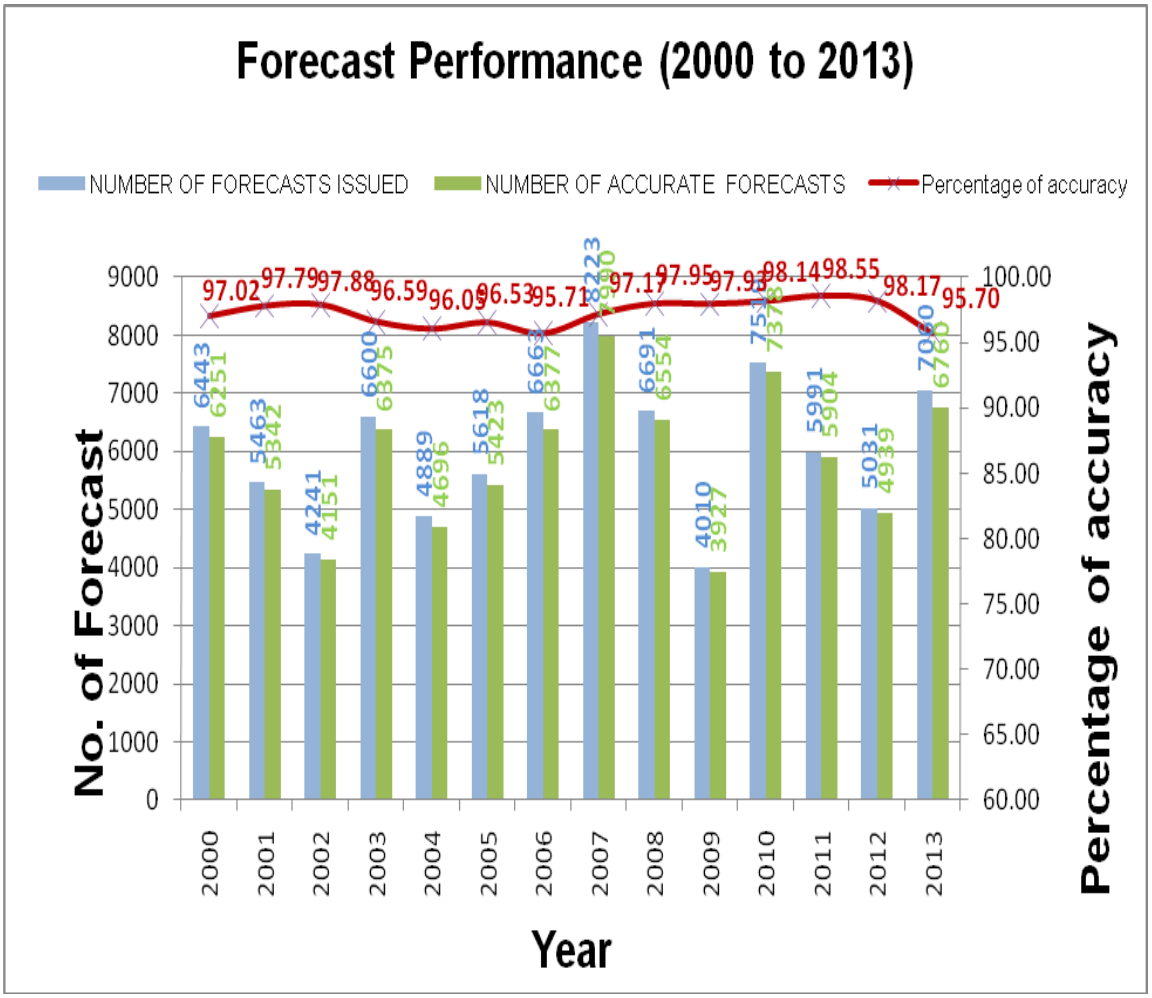


Fig.3.1 Flood Forecast Performance from 2000 to 2013

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 2013 season varies from a maximum of 100% for Barak and its tributaries, Eastern Rivers System and Mahanadi basin to a minimum of 88.8% for the Godavari basin. The overall accuracy performance was of the order of 98.17% for the country as a whole.

Sitewise "Forecast Performance" out of 175 operational sites in flood season 2013 is shown in **Table 3.1**.

Table 3.1 Site wise "Forecast Performance" of flood forecasting sites of CWC in Flood Season, 2013

Sl. No.	Details of sites within different range of permissible limit of accuracy (±15cm,±20%cumec)	Flood Season 2013	
		No. of Sites	% age
1	Sites with performance accuracy between 0.0 % to 25.0%	0	0%
2	Sites with performance accuracy between 25.1 % to 50.0%	1	0.71%
3	Sites with performance accuracy between 50.1 % to 75.0%	11	7.86%
4	Sites with performance accuracy between 75.1 % to 99.99%	47	33.57%
5	Sites with 100% performance accuracy i.e. where all forecasts issued were within permissible limit of accuracy	81	57.86%
6	Total sites where forecasts were issued	140	100

CHAPTER – 4

RIVERWISE APPRAISAL OF FLOOD EVENTS

4.1 GENERAL

All the 175 flood forecasting sites including 28 inflow forecasting sites were operational i.e. where desired hydrological data was observed/ collected, during the flood season 2013. Unprecedented floods, exceeding previous highest flood levels (HFL), were observed in three stations namely Srinagar on river Alaknanda, Mawi on river Yamuna and Bhagalpur on river Ganga during the year 2013. The levels were recorded within 0.5 m of their respective H.F.L at 21 sites exclusively.

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 2013**.** Moderate and low flood events were observed as listed at **Annex-X to XII,** for the year 2013. River wise flood events are described in the following paragraphs.

4.2 GANGA BASIN

The Ganga basin comprises of the main stream Ganga and its tributaries / sub- tributaries which were covered under the CWC's Flood Forecasting Network. During the flood season 2013, there were 87 flood forecasting sites in the whole Ganga Basin, which included 77 stage and 10 inflow forecasting sites. The details are given below.

During the flood season 2013, Unprecedented Flood Situation was witnessed at Srinagar on river Alaknanda, Mawi on river Yamuna and Bhagalpur on river Ganga.

High flood events occurred at Srinagar on river Alaknanda, Rishikesh, Haridwar, Ghazipur, Ballia, Patna (Gandhighat), Hathidah, Bhagalpur, Kahalgaon on river Ganga, Elgin Bridge, Gangpur Siswan on river Ghaghra, Balrampur, on river Rapti and Basua on river Kosi under Ganga Basin. Refer Annex-IX. The occurrence of Moderate and low flood events is given in Annex-X.

4.3 BRAHMAPUTRA BASIN

The Flood Forecasting and Warning Network of the Central Water Commission carried on the main river Brahmaputra and its 16 tributaries / sub-tributaries during the flood season 2011. The details are shown below.

During the flood season 2013, no stations under Brahmaputra basin witnessed Unprecedented Flood Situation. **However, Dibrugarh, Neamatighat, on River Brahmaputra and River Desang at**

Nanglamoraghat flowed above High Flood Situation (Annex-IX) and many of the other stations flowed in moderate and low flood situation during the season and these are shown in **Annex-XI**.

4.4 BARAK AND MEGHNA SYSTEM

The Barak and Meghna River System under the Flood Forecasting and Warning Network of the Central Water Commission covers five rivers, namely the Barak, the Katakhal, the Kushiyara, the Manu and the Gumti rivers. The river system enters into Bangladesh in the downstream of Silchar in Assam.

There were five level flood forecasting sites in the Barak & Meghna basins system, namely Annapurna Ghat, Matizuri, Karimganj, Kailashahar and Sonamura respectively one each on Barak, Katakhal, Kushiyara, Manu and Gumti rivers. The sites AP Ghat, Matizuri and Karimganj are in Assam and the Kailashahar and Sonamura are in Tripura. The occurrence of Moderate & low floods is given in **Annex-XI**.

4.5 EASTERN RIVERS SYSTEM

The Eastern Rivers under the Flood Forecasting and Warning Network of Central water Commission are the Subarnarekha, the Burhabalang, the Baitarani, the Brahmani, the Rushikulia and the Vamsadhara.

There are nine flood forecasting sites including one inflow forecasting site at Gotta Barrage located in the state of Andhra Pradesh. Remaining all the 8 level forecasting sites are in the state of Odisha. During the flood season 2013, flood forecasts were issued for eight stations.

River Subarnarekha at Rajghat and River Burhabalang at N H 5 Road Bridge flowed in High Flood Situation (Annex-IX). The occurrence of Moderate and low floods is given in **Annex-XII**.

4.6 MAHANADI BASIN

In the Mahanadi basin, Central Water Commission has so far covered only the main stream Mahanadi under its Flood Forecasting and Warning Network setup. There were four flood forecasting sites, one being the inflow forecasting site at Hirakud Dam in Odisha. During the flood season 2013, all the sites were operational in Mahanadi River. Forecasts were issued for one inflow and one level forecast stations. Details of moderate and low flood events observed are given in **Annex-XII**.

4.7 GODAVARI BASIN

The Flood Forecasting and Warning Network of Central Water Commission, covers of the main river Godavari and four of its main tributaries, namely, the Wardha, Wainganga, the Manjira and the Indravathi rivers. There

were 18 flood forecasting sites which were operational during the flood seasons 2013. Out of these, 12 sites were on the main Godavari River including two inflow forecasting sites, Jaikwadi dam and Sriramsagar (Pochampad), one in Wardha river, two each on the Manjira and Wainganga rivers, and one in the Indravathi river. Two sites on Manjira, namely, Singur dam & Nizamsagar Dam were also inflow forecasting sites.

During 2013 season Balharsha on river Wardha flowed in high flood situation (Annex-IX). The details of low and moderate flood events are shown in **Annex-XII**.

4.8 KRISHNA BASIN

Flood Forecasting and Warning Network of Central Water Commission, covers of the main river Krishna, two of its main tributaries, namely, the Tungabhadra, and the Bhima. There were eight flood forecasting sites on these rivers, which were operational during the flood season, 2013. Out of these sites, five sites (all inflow forecasting sites) are on the main river Krishna, two on the Tungabhadra (one level & other inflow forecasting site) and one on the Bhima. The details of low and moderate flood events are shown in **Annex-XII**.

4.9 SOUTHERN RIVER SYSTEM

There was one forecasting site at Nellore on the Pennar River. During 2013, no forecast was necessary, as the river did not cross warning level.

4.10 WEST FLOWING RIVERS

The important west flowing rivers include the Banas, the Sabarmati, the Mahi, the Narmada, the Tapi and the Damanganga. The Flood forecasting and Warning Network of Central Water Commission covers all the above rivers. There were fifteen flood forecasting sites on the above rivers, including six inflow forecasting sites. One site on the Banas at Dantiwada Dam is an inflow forecasting. One level forecasting and one inflow forecasting sites exist on each of rivers, the Sabarmati and the Mahi. There are four sites (all stage forecasting sites) on the Narmada. Two inflows and one level forecasting site are located on the Tapi and one inflow and two level forecasting sites are on the Damanganga. During 2013, inflow forecasts were issued for five dams. Level forecasts were issued for Wanakbori on river Mahi, Hoshangabad, Garudeshwar, Bharuch on river Narmada and Surat on river Tapi. Details are given in **Annex-XII.**

4.11 AN OVERVIEW OF FORECAST EVENTS

The highlight of this year is as follows:

4.11.1 Unprecedented Flood Situation

4.11.1.1 Srinagar on river Alaknanda

- Very heavy to exceptionally very heavy rainfall recorded during the period 14th to 18th June 2013. Maximum rainfall of the order of 34 cm was recorded in the catchment areas of rivers Alaknanda resulting in rise in water levels in most of the rivers.
- River Mandakini crossed it previous HFL at CWC HO Site Chandrapuri (Uttarakhand) and Rudraprayag, River Alaknanda crossed HFL at Rudraprayag and Srinagar (new HFL 537.90m and previous HFL 536.85m), River Ganga crossed previous HFL at Deoprayag during 16th-17th June.
- Since the Warning Level was very high, no flood forecast was issued for this station during the above flood spell.

4.11.1.2 Mawi on river Yamuna

- Very heavy to exceptionally very heavy rainfall occurred during the period 14th to 18th June 2013. Maximum rainfall of the order of 41 cm was recorded at Paonta in Himachal Pradesh in the catchment areas of rivers Yamuna and its tributaries. This gave rise to rapid rise in water levels in upstream and middle reaches of Yamuna.
- At Hathnikund Barrage, the releases into Yamuna river have gradually increased from 45683 cusec (0600 hrs on 16-06-2013) to 806464 cusec (0600 hrs on 17-06-2013) and thereafter, the releases decreased rapidly to less than 20000 cusec(0600 hrs on 22-06-2013).
- The release of 8.06 lakh cusec is the highest on record at Hathnikund Barrage. Before this a maximum of 7.06 lakh cusec and 7.44 lakh cusec was released during 1978 and 2010 respectively.
- River Yamuna crossed the previous Highest Flood Level (HFL of 232.45m) at Mawi in Uttar Pradesh on 18th June 2013 attaining peak level of 232.75m

4.11.1.3 Bhagalpur on river Ganga

- River Ganga flowed in Unprecedented Flood Situation (Water Level has exceeded the previous Highest Flood Level (HFL)) at Bhagalpur in Bihar during the period 29th August to 7th September 2013. The river attained new HFL of 34.50m (previous HFL 34.20m) between 3rd to 4th September.

This was in association with heavy rainfall in its catchment as well as heavy flows in Ganga downstream of its confluence with Yamuna.

4.11.2 High Flood events

High Flood Situation was witnessed in 21 flood forecasting stations in the basins of Ganga, Yamuna, Ghaghra, Rapti and Kosi flowing in Uttarakhand, Uttar Pradesh and Bihar, Brahmaputra, Desang in Assam, Wardha in Maharashtra, Subarnarekha and Burhabalang in Odisha.

4.11.3 Moderate to Low flood events and inflow forecasts

Moderate to low flood events were witnessed in 116 stations and inflow forecasts were issued in 24 IF Stations.

4.11.4 No Forecasts

No flood forecasts were issued at 35 flood forecast stations (31 level and 4 inflow) as they did not cross warning level or flows above criteria in case of inflow forecasts.

4.11.5 Flood events in association with "Phailin"

The VSCS, **PHAILIN** crossed Odisha & adjoining north Andhra Pradesh coast near Gopalpur (Odisha) around 1030 hrs IST of 12th October 2013 with a sustained maximum surface wind speed of 200-210 kmph gusting to 220 kmph. Very Severe Cyclonic storm 'Phailin' during the period 12^{th} to 16^{th} October 2013 gave rise to heavy to very heavy rainfall in the States of Odisha, Jharkhand, West Bengal, Bihar.

Due to this rainfall situation, High flood situation was witnessed in Subarnarekha and Burhabalang basins, Moderate to low floods were witnessed in Ganga, Damodar, Ajoy, Kangsabati, Tista, Bagmati, Punpun, Kosi, Kamlabalan basins.

A total of 162 flood forecasts were issued and Special reports on flood situations were issued on daily basis to various agencies for taking up relief and rescue operations. Details of "Phailin" related rainfall and flood situation is given in **Annex-XIII**

4.11.6 Flood Situation Reports for other basins

Flood situation reports for various basins such as Sutlej, Bhakra, West flowing rivers of Rajasthan, Narmada, Cauvery and Edamalayar basins were issued by collecting and compiling reservoir level and water level observations from various State Government and CWC field offices during the flood season to give the latest status on flood situation to Secretary (WR). Flood situation reports were sent to all higher authorities in association with various waves of floods in the country as well as for specific basins.

4.11.7 Flood events during February 2013 on river Yamuna

Due to very heavy rainfall in association with a Western Disturbance moving over Uttarakhand, heavy rainfall occurred in Himachal Pradesh, Uttarakhand and in the plains of Western Uttar Pradesh, Haryana and Delhi which gave rise to a low flood event in February 2013. Due to availability of telemetry data in the Central Flood Control Room this wave of flood was noticed and flood forecasts were issued by the concerned division for the flood forecast stations at Mawi and Delhi Railway Bridge.

CHAPTER 5

DIVISIONWISE USE OF TELEMETRY AND MATHEMATICAL MODEL DURING FLOOD SEASON 2013

5.1 CHAMBAL DIVISION, JAIPUR

The Telemetry system in Chambal Basin was established in the year 1999, under Dam Safety Assurance and Rehabilitation Project (DSARP), with a view to improve the quality/accuracy of the forecast and to enhance the warning time through automated Data collection and transmission system by adopting the latest technology of communication and techniques of flood forecasting formulation.

Under this Division, Telemetry Systems with various sensors like Rain Fall Sensors, Water Level Sensors, Temperature Sensors, Wind Speed and Wind direction sensors, Radiation Sensors etc have been installed at 22 sites in the upper catchment of Gandhisagar Reservoir out of 30 remote sites. The data at all the 22 sites are automatically collected from each sensor for the each hour is recorded by DCP installed at each of these sites. Most of the sites are having water level as well as rainfall sensor common.

The inflow flood forecast for Gandhi Sagar Dam is being formulated by using MIKE-11 software developed by DHI using Telemetry system data. Water level from 13 telemetry sites installed in the reservoir catchment is observed on hourly basis and is transmitted to control room on hourly basis. These Real time hourly rainfall and water level received through telemetry systems are used for formulation of the forecast. During 2013, 17 forecasts were issued for Gandhisagar Dam using Telemetry system and Mathematical Model, out of which all 17 forecasts were within the limit of accuracy i.e. ±20%.

The MIKE 11 model of Gandhisagar Dam consists of rainfall—runoff model (NAM) of various sub-basins viz. SUB-1, SUB-2C, SUB-4, SUB-5, SUB-6, SUB-7, SUB-8 WITH CATCHMENT AREAS 2804, 108, 1761, 2065, 2373, 2672, and 1598 sq km respectively and coupled with Hydrodynamic model and Boundary conditions. Boundary conditions at two stations namely Tal on river Chambal and Mahidpur on river Shipra have been incorporated in the model. Water level and discharge data of these two sites have been incorporated in the model.

5.2 EASTERN RIVER DIVISION (ERD), BHUBANESHWAR

There are thirty three (33) Telemetry stations installed under ERD, Bhubaneswar on the Rivers Subarnarekha, Burhabalang, Baitarni, Brahmani, Rishikulya and Vamsadhara with most of the stations observing the parameters as Water Level and Rainfall except some stations observing Evaporation, Pressure, RH, Sun radiation, Wind direction, Wind Speed in

addition to Water Level and Rainfall. Telemetry data were used in flood forecasting calculations using MIKE 11 and NWSRFS.

For the entire monsoon of 2013, forecasts for sites Anandpur (Baitarni), Gunupur and Kashinagar on Vamsadhara were calculated daily by MIKE-11 irrespective of whether the water levels crossed the warning levels or not. The results obtained were encouraging, especially when the precipitation in the basin was significant, the difference between actual and forecasted value matched very closely.

5.2.1 MIKE 11 FOR VAMSADHARA BASIN

For Vamsadhara basin, MIKE 11 is being run for the last four years. Cross sectional surveys have been done and data have been entered in the Hydrodynamic module at various levels and the results were encouraging. Every year a few modifications/upgradation are done taking into considerations for the experience gathered during the previous monsoon season with an eye to increase the effectiveness of the simulation files.

5.2.2 MIKE 11 FOR BAITARNI BASIN

MIKE 11 was also run daily during 2013 for Baitarni basin to help in issuing forecast for the site Anandpur. The site is flashy in nature and the travel time from its base station Swampatna, varies from 5-7 hours. Though there are only two cross sections available in the basin, yet the results are encouraging. Anandpur forecasts can be issued from the results of MIKE-11 with full confidence and within reasonable accuracy if more cross-sections are made available for which action is being initiated.

5.2.3 MIKE 11 FOR SUBARNAREKHA BASIN

During 2013, a humble beginning was made by incorporating Subarnarekha basin in MIKE-11. The work of calibration of the basin was completed earlier using past data and trial run was done daily using real time data during monsoon 2013. The results are encouraging and from next year it can be of great assistance to the forecast team. To increase the effectiveness of the programme, cross sectional data along the river is required to be incorporated in the Hydrodynamic model. It is proposed that cross sectional survey along the river will be carried out in the coming year and then the data will be incorporated in the programme.

5.3 MAHANADI DIVISION, CWC, Burla

Fourty one (41) stations were installed under IX/X Plan. During season 2013, all 41 stations did not report any reliable data at all from June to September while in October, most of the stations started reporting data.

Mike-11 model has been developed for formulation of inflow forecast to Hirakud Dam and the same was run during monsoon with satisfactory results. The model has been developed during DSARP under IX Plan. The

software key received under the IX Plan has outlived its utility and a new software and software key has to be procured for this division to continue running the model in the changed operating system softwares available in the computer.

5.4 LOWER GODAVARI DIVISION, HYDERABAD (GODAVARI CIRCLE, HYDERABAD)

Under the X Plan scheme "Establishment and Modernisation of flood forecasting including Inflow Forecasting", all the 63 proposed Telemetry Stations have already been installed and data from these stations were received on real –time basis. The stations transmit hourly water levels and rainfall every 15 minutes. Real – time data from telemetry is also additionally being used for flood forecasting purpose from the year 2008 onwards.

Mike-11 forecast model had been under development for the reach between Perur and Bhadrachalam. Already a model was set up for the reach in the office of CE, KGBO, Hyderabad. The model is now under trial – run. The Flood Control Application Directorate, CWC, New Delhi is actively working with KGBO to improve the model so that it can be used in real time forecast. Model calibration work has already been taken up by Morphology Directorate, CWC, New Delhi for Jaikwadi Dam. The main aim of Mike-11 usage is to modernize the methodology of flood forecasting formulation and to give it much needed look of sophistication which is lacking in the conventional method. Efforts will be made to use Mike-11 more and more in the years to come.

5.5 LOWER KRISHNA DIVISION, HYDERABAD (KRISHNA AND PENNAR BASINS/KRISHNA AND COORDINATION CIRCLE)

A total of forty one (41) Telemetry Stations, have been installed in the Krishna Basin under the X plan scheme of Establishment and Modernization of Flood Forecasting Network including Inflow Forecast during the year 2007. The data from 21 stations out of 41 stations have been received on real time basis during the monsoon period (June to September 2013) and effectively used in flood forecast formulation while rest 20 stations did not reported reliable data during the above period. Further, during October 2013, 40 stations reported data in the modelling centre. Water level data from Sadalga through Telemetry was used for formulation of Inflow Forecast to Almatti Dam.

During training models were setup for inflow forecast of Srisailam and Almatti Dam. The models will be tried during monsoon season.

CHAPTER 6

RESPONSE FROM USER AGENCIES

6.1 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.

6.2 Appreciation letters received during flood season 2013

Abstract of some of the messages received by our field unit during the flood season 2013 are given below:

6.2.1 Deputy Relief Commissioner, Ex-Officio Deputy Secretary to Government, Revenue & Disaster Management Department (Special Relief), Government of Odisha, Bhubaneswar. Lr. no: 3347/SRC dated 19.12.2013

"The river levels and forecast received from the Central Water Commission were extremely useful. We look forward to similar cooperation in future"

6.2.2 Collector, Hoshangabad, Madhya Pradesh Lr. No: 449/Steno/Rahat/2013, Dt 10.10.2013 (*Translated from Hindi Version*)

During flood, CWC, Hoshangabad provides information on the rivers Narmada and Tawa. Due to this work, it seems great that CWC plays major role in providing information to public. This should be continued in future so that CWC information could be utilized to prevent the loss of life and wealth. The informations by CWC on the forecasts issues are extremely useful. Hence CWC Hoshangabad is appreciated for the FF work that will be continued in future."

6.2.3 Executive Engineer, Flood Control Division, Rosera Government of Bihar. Lr. no: 29/Rosera/dated 10.01.2014 (*Translated from Hindi Version*)

The daily Flood Forecast received from CWC in respect of Burhi Gandak and Kosi rivers is very useful for us. We expect same cooperation further for Bihar Government.

6.2.4 Executive Engineer, Flood Control Division, Begusarai, Government of Bihar. Lr. no: 07/Begusarai/dated 03.01.2014 (*Translated from Hindi Version*)

Flood related information such as Water Levels of rivers and rainfall is provided by CWC during flood season. Based on this information, the security arrangements for embankments are done. This office thanks CWC for providing such information and expects same cooperation during forthcoming Flood seasons.

6.2.5 Executive Engineer, Flood Control Division, Samastipur, Government of Bihar. Lr. no: 789/Samastipur/dated 05.12.2013 (*Translated from Hindi Version*)

Flood forecast during 2013 is praiseworthy. The information such as daily bulletin of Flood Forecast and rainfall in respect of the rivers lying under this subdivision is very useful. It is stated that such information should continued in future so that protection and rescue operation may be handled properly. Thanks to related officers for providing such information during flood season.

6.2.6 Evaluation Certificate by District Officer, District Disaster Management Branch, Khagaria, Bihar. Lr. no: 877/Samastipur/dated 03.12.2013 (*Translated from Hindi Version*)

The office received regularly present and forecasted water level information in respect of Burhi Gandak and Kosi rivers along with rainfall w.e.f. 15.06.2013 to 15.10.2013 from CWC, Kosi Sub Division, Kalisthan, Begusarai.

Analysis of present and forecasted water level help in framing the flood control assessment plan. Daily water level bulletin was very easily understandable. This office thanks CWC for providing such information and expects same cooperation during forthcoming years of Flood seasons.

6.2.7 Office of Chief Engineer, Water Resources Department, Samastipur, Government of Bihar. Lr. no: 3061/dated 03.12.2014 (*Translated from Hindi Version*)

The information related to flood forecast provided by your office during the flood period 15.06.2013 to 18.10.2013 was very much useful. Thanks for such information.

This office expects same cooperation during forthcoming years of Flood seasons.

6.2.8 Office of Executive Engineer, Flood Control Division No 2, Khagaria, Government of Bihar. Lr. no: 1332/Khagaria/dated 27.11.2013 and Lr. no: 1476/Khagaria/dated 28.11.2013 (*Translated from Hindi Version*)

The information pertaining to daily water level provided by CWC during the period 15.06.2013 to 18.10.2013 helped a lot to this office while assessing the flood related issues. This office expects same cooperation during forthcoming years of Flood seasons.

6.2.9 Sub Divisional Officer, Begusarai, Government of Bihar. Lr. no: 2182/ dated 23.11.2013 (*Translated from Hindi Version*)

The regular information pertaining to daily water levels of rivers provided by CWC during the flood season 2013 has helped a lot to this office while ensuring the flood preparedness. This office expects same cooperation in future.

6.2.10 District Collector, Supaul, Government of Bihar. Lr. no: 1481-2/dated 21.11.2013 (*Translated from Hindi Version*)

The information pertaining to daily flood bulletin along with other information provided by CWC during flood season 2013 helped a lot to this office while ensuring the flood preparedness. So, my suggestion is not only to continue same cooperation in future but to ensure the availability of such information with quickest means of communication to this office.

6.2.11 Executive Engineer, Eastern Embankment Division, Supaul, Government of Bihar. Lr. no: 1800/dated 11.11.2013 (*Translated from Hindi Version*)

The information pertaining to daily flood bulletin along with other information provided by CWC office helped a lot to this office while ensuring the flood alertness etc. The works done by CWC is praiseworthy.

6.3 Appreciation Certificate

Appreciation Certificate given by District Collector, Hoshangabad on the occasion of Republic Day 2014 to Shri Shashi Ranjan Srivastav, Junior Engineer, CWC, Hoshangabad for the active participation in flood forecasting work during monsoon 2013 and for timely accurate information which helped in reduction of loss of life and properties.

गणतंत्र दिवस समारोह 2014

जिला – होशंगाबाद (म.प्र.)

आओ बनायें अपना मध्यप्रदेश

प्रशस्ति-पत्र

श्री/श्रीमती/सुश्री शशिरंजन श्रीवास्तव, कनिष्ठ अभियंता, केंद्रीय जल आयोग, होशंगाबाद के द्वारा किये गये "मानसून 2013 के दौरान बाढ़ पूर्वानुमान के कार्य में अधिक भूमिका निभाते हुए समयबद्ध सटीक जानकारी देकर जन धन की हानि को आंकने को कम करने हेतु" सराहनीय कार्य के लिए यह प्रशस्ति–पत्र गणतंत्र दिवस समारोह 2014 के अवसर पर प्रदान किया जाता है।

मैं इनके उज्जवल भविष्य की कामना करता हूँ।

26 जनवरी 2014

(राहुल जैन)
कलेक्टर
होशंगाबाद

ANNEXURES-I to XIII

Annex-I

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	WL (m)	DL (m)	HFL		Mode of Data Collection	Methodology/ Model used for FF Formulation	Remarks
											(m)	Year			
1	Srinagar	Alaknanda/Ganga	Srinagar/Garhwal/ Uttarakhand	30.22	78.78	1.1 Rudraprayag (06)	HGD/HOCD/UGBO	Uttarakhand	539.00	540.00	536.85	1995	Wireless/ Telemetry	Conventional	Forecast never issued because HFL<WL
2	Rishikesh	Ganga/Ganga	Rishikesh/Dehradun/Uttarakhand	30.11	78.31	2.1 Deoprayag (08) 2.2 Marora (05)	HGD/HOCD/ UGBO	Uttarakhand	339.50	340.50	341.72	1995	Wireless/ Telemetry	Conventional	
3	Hardwar	Ganga/Ganga	Hardwar/Hardwar/ Uttarakhand	29.98	78.19	3.1 Deoprayag (09) 3.2 Marora (06)	HGD/HOCD/ UGBO	Uttarakhand	293.00	294.00	296.30	2010	Wireless/ Telemetry	Conventional	
4	Moradabad	Ramganga/Ganga	Moradabad/Moradabad/Uttar Pradesh	28.83	78.80	4.1 Kalagarh (36)	MGD2/HOCD/ UGBO	West Uttar Prasdesh	189.60	190.60	192.88	2010	Wireless/ Telemetry	Conventional	
5	Bareilly	Ramganga/Ganga	Bareilly/Bareilly/ Uttar pradesh	28.30	79.37	5.1 Moradabad (28)	MGD2/HOCD/ UGBO	West Uttar Prasdesh	162.70	163.70	162.88	1978	Wireless/ Telemetry	Conventional	
6	Kannauj	Ganga/Ganga	Kannauj/Kannauj/ Uttar Pradesh	27.02	79.97	6.1 Narora (D/s) (48)	MGD2/HOCD/ UGBO	West Uttar Prasdesh	124.97	125.97	126.78	2010	Wireless	Conventional	
7	Ankinghat	Ganga/Ganga	Ankinghat/Kanpur/ Uttar Pradesh	26.93	80.03	7.1 Narora (D/s) (48) 7.2 Bareilly (48) 7.3 Fathegarh (12) 7.4 Dabri (12)	MGD2/HOCD/ UGBO	East Uttar Prasdesh	123.00	124.00	124.49	2010	Wireless/ Telemetry	Conventional	
8	Kanpur	Ganga/Ganga	Kanpur/Kanpur/ Uttar Pradesh	26.47	80.38	8.1 Fathegarh (24) 8.2 Dabri (24) 8.3 Ankinghat (12)	MGD2/HOCD/ UGBO	East Uttar Prasdesh	113.00	114.00	114.08	2010	Wireless/ Telemetry	Conventional	
9	Dalmau	Ganga/Ganga	Rae-barerilly/ Rae-barerilly/ Uttar Pradesh	26.06	81.03	9.1 Ankninghat (28) 9.2 Kanpur (16)	MGD2/HOCD/ UGBO	East Uttar Prasdesh	98.36	99.36	99.84	1973	Wireless/ Telemetry	Conventional	
10	Phaphamau	Ganga/Ganga	Allahabad/ Allahabad/ Uttar Pradesh	25.47	83.11	10.1 Kanpur (30) 10.2 Chillaghat (24)	MGD3/HOCV/ UGBO	East Uttar Prasdesh	83.73	84.73	87.98	1978	Wireless/ Telemetry	Conventional	
11	Mawi	Yamuna/Ganga	Panipat/ Muzzafarpur/ Uttar Pradesh	29.38	77.07	11.1 Kalanur (18-30)	UYD/HOCN/ YBO	West Uttar Pradesh	230.00	230.85	232.45	1988	Wireless/ Telemetry	Conventional	
12	Delhi Railway Bridge	Yamuna/Ganga	Delhi/Delhi/ NCT Delhi	28.66	77.25	12.1 Mawi (18-32)	UYD/HOCN/ YBO	Haryana Chandigarh& Delhi	204.00	204.83	207.49	1978	Wireless/ Telemetry	Conventional	
13	Dhansa Regulator	Sahibi/Yamuna/ Ganga	Delhi/Delhi/ NCT Delhi	28.53	76.87	13.1 Dadri (48) 13.2 Masani (48)	UYD/HOCN/ YBO	Haryana Chandigarh& Delhi	211.44	212.44	213.58	1977	Wireless	Conventional	
14	Mathura	Yamuna/Ganga	Mathura/Mathura/ Uttar Pradesh	27.51	77.69	14.1 Mohana (20-33)	UYD/HOCN/ YBO	West Uttar Pradesh	164.20	165.20	169.73	1978	Wireless/ Telemetry	Conventional	

Annex-I

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	WL (m)	DL (m)	HFL		Mode of Data Collection	Methodology/ Model used for FF Formulation	Remarks
											(m)	Year			
15	Agra	Yamuna/Ganga	Agra/Agra/ Uttar Pradesh	27.19	78.03	15.1 Mathura (216-4)	LYD/HOCN/ YBO	West Uttar Pradesh	151.40	152.40	154.76	1978	Wireless/ Telemetry	Conventional	
16	Etawah	Yamuna/Ganga	Etawah/Etawah/ Uttar Pradesh	26.75	78.99	16.1 Agra (20-45)	LYD/HOCN/ YBO	West Uttar Pradesh	120.92	121.92	126.13	1978	Wireless/ Telemetry	Conventional	
17	Auraiya	Yamuna/Ganga	Auraiya/Auraiya/ Uttar Pradesh	26.42	79.48	17.1 Etawah (21-24) 17.2 Dhaulpur (15-36)	LYD/HOCN/ YBO	West Uttar Pradesh	112.00	113.00	118.19	1996	Wireless/ Telemetry	Conventional	
18	Kalpi	Yamuna/Ganga	Kalpi/Jalaun/ Uttar Pradesh	26.13	79.76	18.1 Etawah (21-27) 18.2 Dhaulpur (15-42)	LYD/HOCN/ YBO	West Uttar Pradesh	107.00	108.00	112.98	1996	Wireless/ Telemetry	Conventional	
19	Hamirpur	Yamuna/Ganga	Hamirpur/Hamirpur/ Uttar Pradesh	25.96	80.16	19.1 Auraiya (15)	LYD/HOCN/ YBO	East Uttar Prasdesh	102.63	103.63	108.59	1983	Wireless/ Telemetry	Conventional	
20	Chillaghat	Yamuna/Ganga	Banda/Banda/ Uttar Pradesh	25.77	80.53	20.1 Hamirpur (12)	LYD/HOCN/ YBO	East Uttar Prasdesh	99.00	100.00	105.16	1978	Wireless/ Telemetry	Conventional	
21	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	121.66	122.66	133.69	1983	Wireless/ Telemetry	Conventional	
22	Sahjiana	Betwa/Yamuna/ Ganga	Hamirpur/Hamirpur/ Uttar Pradesh	25.95	80.15	22.1 Mohana (18-24)	LYD/HOCN/ YBO	East Uttar Prasdesh	103.54	104.54	108.67	1983	Wireless/ Telemetry	Conventional	
23	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	103.00	104.00	113.29	2005	Wireless/ Telemetry	Conventional	
24	Naini	Yamuna/Ganga	Allahabad/ Allahabad/ Uttar Pradesh	25.42	81.84	24.1 Chillaghat (18-24)	LYD/HOCN/ YBO	East Uttar Prasdesh	83.74	84.74	87.99	1978	Wireless/ Telemetry	Conventional	
25	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	83.73	84.73	88.03	1978	Wireless/ Telemetry	Conventional	
26	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	76.72	77.72	80.34	1978	Wireless/ Telemetry	Conventional	
27	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	70.26	71.26	73.90	1978	Wireless/ Telemetry	Conventional	
28	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	100.00	101.00	104.81	1982	Wireless/ Telemetry	Conventional	

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											(m)	Year			
29	Hanuman Setu	Gomti/Ganga	Lucknow/Lucknow/ Uttar Pradesh	26.86	80.95	29.1 Bhatpurwaghat (48)	MGD2/HOCD/ UGBO	East Uttar Prasdesh	108.50	109.50	110.85	1971	Wireless	Conventional	
30	Jaunpur	Gomti/Ganga	Jaunpur/Jaunpur/ Uttar Pradesh	25.75	82.69	30.1 Sultanpur (24)	MGD3/HOCV/ UGBO	East Uttar Prasdesh	73.07	74.07	77.74	1971	Wireless/ Telemetry	Conventional	
31	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	62.11	63.11	65.22	1978	Wireless/ Telemetry	Conventional	
32	Buxar	Ganga/Ganga	Buxar/Buxar/Bihar	25.58	83.97	32.1 Allahabad (30)	MGD5/HOCP/ LGBO	Bihar	59.32	60.32	62.09	1948	Wireless/ Telemetry	Conventional	
33	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	105.07	106.07	107.56	2009	Wireless/ Telemetry	Conventional	
34	Ayodhya	Ghaghra/Ganga	Ayodhya/Faizbad/ Uttara Pradesh	26.81	82.21	34.1 Elgin Bridge (18-24)	MGD1/HOCV/ UGBO	East Uttar Prasdesh	91.73	92.73	94.01	2009	Wireless/ Telemetry	Conventional	
35	Balrampur	Rapti/Ghaghra/ Ganga	Balrampur/ Balrampur/ Uttar Pradesh	27.44	82.23	35.1 Kakardhari (18-24)	MGD1/HOCV/ UGBO	East Uttar Prasdesh	103.62	104.62	105.25	2000	Wireless/ Telemetry	Conventional	
36	Bansi	Rapti/Ghaghra/ Ganga	Bansi/ Siddarthnagar/ Uttar Pradesh	27.18	82.93	36.1 Balrampur (18-24)	MGD1/HOCV/ UGBO	East Uttar Prasdesh	83.90	84.90	85.82	1998	Wireless/ Telemetry	Conventional	
37	Gorakhpur (Birdghat)	Rapti/Ghaghra/ Ganga	Gorahpur/ Gorakhpur/ Uttar Pradesh	26.73	83.35	37.1 Bansi (18-24)	MGD1/HOCV/ UGBO	East Uttar Prasdesh	73.98	74.98	77.54	1998	Wireless/ Telemetry	Conventional	
38	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	63.01	64.01	66.00	1998	Wireless/ Telemetry	Conventional	
39	Darauli	Ghaghra/Ganga	Darauli/Siwan/Bihar	26.07	84.13	39.1 Elgin Bridge (54) 39.2 Gorakhpur (Birdghat) (28)	MGD5/HOCP/ LGBO	Bihar	59.82	60.82	61.74	1998	Wireless	Conventional	
40	Gangpur Siswan	Ghaghra/Ganga	Siwan/Siwan/Bihar	25.91	84.39	40.1 Turtipar (20)	MGD5/HOCP/ LGBO	Bihar	56.04	57.04	58.01	1983	Wireless	Conventional	
41	Chhapra	Ghaghra/Ganga	Chhapra/Saran/Bihar	25.76	84.79	41.1 Gangpur Siswan (16)	MGD5/HOCP/ LGBO	Bihar	52.68	53.68	54.59	1982	Wireless	Conventional	
42	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	56.62	57.62	60.25	2003	Wireless/ Telemetry	Conventional	

Annex-I

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											(m)	Year			
43	Inderpuri	Sone/Ganga	Inderpuri/Rohtas/ Bihar	24.84	84.13	43.1 Chopan (12) 43.2 Daltonganj (12)	MGD5/HOCP/ LGBO	Bihar	107.20	108.20	108.85	1975	Wireless	Conventional	
44	Koelwar	Sone/Ganga	Koelwar/Bhojpur/ Bihar	25.57	84.79	44.1 Inderpuri (10-15)	MGD5/HOCP/ LGBO	Bihar	54.52	55.52	58.88	1971	Wireless	Conventional	
45	Maner	Sone/Ganga	Maner/Patna/Bihar	25.70	84.86	45.1 Gandhighat (8)	MGD5/HOCP/ LGBO	Bihar	51.00	52.00	53.79	1976	Wireless	Conventional	
46	Sripalpur	Punpun/Ganga	Sripalpur/Patna/Bihar	25.50	85.11	46.1 Kinjer (24)	MGD5/HOCP/ LGBO	Bihar	49.60	50.60	53.91	1976	Wireless	Conventional	
47	Patna (Dighaghat)	Ganga/Ganga	Patna/ Patna/ Bihar	25.64	85.10	47.1 Allahabad (30) 47.2 Patna (Gandhighat) (04)	MGD5/HOCP/ LGBO	Bihar	49.45	50.45	52.52	1975	Wireless	Conventional	
48	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	47.60	48.60	50.27	1994	Wireless/ Telemetry	Conventional	
49	Hathidah	Ganga/Ganga	Hathidah/Patna/Bihar	25.37	85.99	49.1 Gandhighat (16)	MGD5/HOCP/ LGBO	Bihar	40.76	41.76	43.15	1971	Wireless/ Telemetry	Conventional	
50	Munger	Ganga/Ganga	Munger/Munger/ Bihar	25.38	86.46	50.1 Gandhighat (24)	MGD5/HOCP/ LGBO	Bihar	38.33	39.33	40.99	1976	Wireless/ Telemetry	Conventional	
51	Khadda	Gandak/Ganga	Deoria/Kushinagar/ Uttar Pradesh	27.19	83.95	51.1 Triveni (07)	MGD4/HOCP/ LGBO	Bihar	95.00	96.00	97.50	2002	Wireless	Conventional	
52	Chatia	Gandak/Ganga	Ariraj West Champaran/ Motihari/ Bihar	26.50	84.54	52.1 Triveni (24)	MGD4/HOCP/ LGBO	Bihar	68.15	69.15	70.04	2002	Wireless	Conventional	
53	Rewaghat	Gandak/Ganga	Muzzafarpur/Muzzafarpur/Bihar	25.99	85.05	53.1 Chatia (20)	MGD5/HOCP/ LGBO	Bihar	53.41	54.41	55.41	1986	Wireless	Conventional	
54	Hazipur	Gandak/Ganga	Hazipur/Vaishali/ Bihar	25.69	85.20	54.1 Rewaghat (16)	MGD5/HOCP/ LGBO	Bihar	49.32	50.32	50.93	1948	Wireless	Conventional	
55	Lalbeghiaghat	Burhi Gandak/ Ganga	Dhaka/Motihari/Bihar	26.65	85.03	55.1 Chainpatia (24)	MGD4/HOCP/ LGBO	Bihar	62.20	63.20	67.09	1975	Wireless	Conventional	
56	Muzzafarpur (Sikandarpur)	Burhi Gandak/ Ganga	Sikandarpur/Muzzafarpur/Bihar	26.14	85.39	56.1 Ahirwala(S) (22)	MGD4/HOCP/ LGBO	Bihar	51.53	52.53	54.29	1987	Wireless	Conventional	

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											(m)	Year			
57	Samastipur	Burhi Gandak/ Ganga	Samastipur/Samastipur/Bihar	25.86	85.79	57.1 Sikandarpur (20)	MGD4/HOCP/ LGBO	Bihar	45.02	46.02	49.38	1987	Wireless	Conventional	
58	Rosera	Burhi Gandak/ Ganga	Rosera/Samastipur/ Bihar	25.74	86.02	58.1 Sikandarpur (28)	MGD4/HOCP/ LGBO	Bihar	41.63	42.63	46.35	1987	Wireless	Conventional	
59	Khagaria	Burhi Gandak/ Ganga	Khagaria/Khagaria/ Bihar	25.50	86.48	59.1 Sikandarpur (24) 59.2 Gandhighat (24)	MGD4/HOCP/ LGBO	Bihar	35.58	36.58	39.22	1976	Wireless	Conventional	
60	Benibad	Bagmati/Ganga	Benibad/Muzzafarpur/ Bihar	26.20	85.67	60.1 Runisaidpur (24)	MGD4/HOCP/ LGBO	Bihar	47.68	48.68	50.01	2004	Wireless/ Telemetry	Conventional	
61	Hayaghat	Bagmati/Ganga	Hayaghat Papermill/Darbhanga/ Bihar	26.08	85.89	61.1 Benibad (24) 61.2 Ekmighat (24)	MGD4/HOCP/ LGBO	Bihar	44.72	45.72	48.96	1987	Wireless/ Telemetry	Conventional	
62	Kamtaul	Adhwara Group/Ganga	Kamtaul Market/Darbhanga/ Bihar	26.33	85.85	62.1 Sonebarsa (24)	MGD4/HOCP/ LGBO	Bihar	49.00	50.00	52.99	1987	Wireless/ Telemetry	Conventional	
63	Ekmighat	Adhwara Group/Ganga	Laheria Seria/Darbhanga/ Bihar	26.12	85.88	63.1 Saulighat (24)	MGD4/HOCP/ LGBO	Bihar	45.94	46.94	49.52	2004	Wireless/ Telemetry	Conventional	
64	Jhanjharpur	Kamlabalan/ Ganga	Jhanjharpur/Madhubani/ Bihar	26.27	86.27	64.1 Jainagar (8)	MGD4/HOCP/ LGBO	Bihar	49.00	50.00	53.01	2004	Wireless	Conventional	
65	Bhagalpur	Ganga/Ganga	Bhagalpur/Bhagalpur/Bihar	25.27	87.02	65.1 Gandhighat (32)	MGD5/HOCP/ LGBO	Bihar	32.68	33.68	34.20	2003	Wireless/ Telemetry	Conventional	
66	Colgong/Kahalgaon	Ganga/Ganga	Colgong/Bhagalpur/ Bihar	25.27	87.23	66.1 Gandhighat (38)	MGD5/HOCP/ LGBO	Bihar	30.09	31.09	32.87	2003	Wireless/ Telemetry	Conventional	
67	Basua	Kosi/Ganga	Supaul/Supaul/Bihar	26.13	86.58	67.1 Birpur (16)	MGD4/HOCP/ LGBO	Bihar	46.75	47.75	49.17	2010	Wireless	Conventional	
68	Balthara	Kosi/Ganga	Choutham/Khagaria/ Bihar	25.54	86.72	68.1 Basua (24) 68.2 Hayaghat (24)	MGD4/HOCP/ LGBO	Bihar	32.85	33.85	36.40	1987	Wireless	Conventional	
69	Kursela	Kosi/Ganga	Kusela/Katihar/Bihar	25.42	87.23	69.1 Basua (24) 69.2 Hathidah (24)	MGD4/HOCP/ LGBO	Bihar	29.00	30.00	32.04	1998	Wireless	Conventional	
70	Sahibganj	Ganga/Ganga	Sahibganj/Sahibganj/Jharkhand	25.25	87.64	70.1 Bhagalpur (22)	MGD5/HOCP/ LGBO	Jharkhand	26.25	27.25	30.91	1998	Wireless	Conventional	

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											(m)	Year			
71	Dengraghat	Mahananda/ Ganga	Bayasi/Purnes/Bihar	25.85	87.81	71.1 Taibpur (24) 71.2 Chargharia (24)	MGD4/HOCP/ LGBO	Bihar	34.65	35.65	38.09	1968	Wireless	Conventional	
72	Jhawa	Mahananda/ Ganga	Jhawa/Katihar/Bihar	25.43	87.76	72.1 Dhengraghat (16) 72.2 Araria (16)	MGD4/HOCP/ LGBO	Bihar	30.40	31.40	33.51	1987	Wireless	Conventional	
73	Farakka Barrage	Ganga/Ganga	Farakka/Murshidabad/ West Bengal	24.80	87.92	73.1 Bhagalpur (36)	MGD4/HOCP/ LGBO	Gangetic West Bengal	21.25	22.25	25.14	1998	Wireless	Conventional	
74	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	104.70	105.70	106.48	1998	Wireless/ Telemetry	Conventional	
75	Naharkatia	Buridehing/ Brahmaputra	Naharkatia/ Dibrugarh/ Assam	27.29	95.33	75.1 Margherita (10)	UBD/HOCG/ BBBO	Assam and Meghalaya	119.40	120.40	122.69	1973	Wireless	Conventional	
76	Chenimari (Khowang)	Buridehing/ Brahmaputra	Khowang/ Dibrugarh/ Assam	27.31	94.88	76.1 Naharkatia (21)	UBD/HOCG/ BBBO	Assam and Meghalaya	101.11	102.11	103.92	1988	Wireless	Conventional	
77	Nanglamoraghat	Desang/ Brahmaputra	Sibsagar/Sibsagar/ Assam	26.99	94.78	77.1 Dillighat (18)	UBD/HOCG/ BBBO	Assam and Meghalaya	93.46	94.46	96.49	1998	Wireless	Conventional	
78	Sibsagar	Dikhow/ Brahmaputra	Sibsagar/Sibsagar/ Assam	26.98	94.58	78.1 Bihubar (09)	UBD/HOCG/ BBBO	Assam and Meghalaya	91.40	92.40	95.62	1974	Wireless	Conventional	
79	Badatighat	Subansiri/ Brahmaputra	Bihuparia/ Lakhimpur/ Assam	26.95	93.96	79.1 Chouldhowaghat (18)	UBD/HOCG/ BBBO	Assam and Meghalaya	81.53	82.53	86.84	1972	Wireless	Conventional	
80	Neamatighat	Brahmaputra/ Brahmaputra	Neamatighat/ Jorhat/ Assam	26.86	94.25	80.1 Dibrugarh (24) 80.2 Chenimari (24)	UBD/HOCG/ BBBO	Assam and Meghalaya	84.04	85.04	87.37	1991	Wireless/ Telemetry	Conventional	
81	Tezpur	Brahmaputra/ Brahmaputra	Tezpur/ Sonitpur/ Assam	26.62	92.80	81.1 Neamatighat (24)	UBD/HOCG/ BBBO	Assam and Meghalaya	64.23	65.23	66.59	1988	Wireless/ Telemetry	Conventional	
82	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	88.50	89.50	91.30	1986	Wireless	Conventional	
83	Numaligarh	Dhansisri (S)/ Brahmaputra	Numaligarh/ Golaghat/ Assam	26.63	93.73	83.1 Golaghat (10)	UBD/HOCG/ BBBO	Assam and Meghalaya	76.42	77.42	79.87	1985	Wireless	Conventional	
84	N T Road Crossing	Jia- Bharali/ Brahmaputra	Balipara/Sonitpur/ Assam	26.81	92.88	84.1 Seppa (9)	UBD/HOCG/ BBBO	Assam and Meghalaya	76.00	77.00	78.50	2007	Wireless	Conventional	

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85	Kampur	Kopili/ Brahmaputra	Kampur/ Nagaon/ Assam	26.15	92.65	85.1 Kheronighat (24)	UBD/HOCG/ BBBO	Assam and Meghalaya	59.50	60.50	61.86	1973	Wireless	Conventional	
86	Dharamtul	Kopili/ Brahmaputra	Dharamtul/Morigaon/Assa m	26.17	92.36	86.1 Kampur (15)	UBD/HOCG/ BBBO	Assam and Meghalaya	55.00	56.00	58.09	2004	Wireless	Conventional	
87	Guwahati D C Court	Brahmaputra/ Brahmaputra	Guwahati/Kamrup/ Assam	26.19	91.74	87.1 Tezpur (24)	MBD/HOCG/ BBBO	Assam and Meghalaya	48.68	49.68	51.46	2004	Wireless/ Telemetry	Conventional	
88	N H Crossing	Puthimari/ Brahmaputra	Rangia/ kamrup/ Assam	26.44	91.56	88.1 DRF (13)	MBD/HOCG/ BBBO	Assam and Meghalaya	50.81	51.81	55.08	2008	Wireless/ Telemetry	Conventional	
89	N T Road Crossing	Pagladiya/ Brahmaputra	Nalbari/Nalbari/ Assam	26.45	91.46	89.1 Melabazar (12)	MBD/HOCG/ BBBO	Assam and Meghalaya	51.75	52.75	55.45	2004	Wireless/ Telemetry	Conventional	
90	Road Bridge	Beki/ Brahmaputra	Sorbhog/ Barpeta/ Assam	26.49	90.91	90.1 Kurijampa (12) (Bhutan)	LBD/HOCG/ BBBO	Assam and Meghalaya	44.10	45.10	46.20	2000	Wireless	Conventional	
91	N H Crossing	Manas/ Brahmaputra	Bijni/ Bongaigaon/ Assam	26.46	90.75	91.1 Panbari (6)	LBD/HOCG/ BBBO	Assam and Meghalaya	47.81	48.42	50.08	1984	Wireless	Conventional	
92	Goalpara	Brahmaputra/ Brahmaputra	Goalpara/ Goalpara/ Assam	26.20	90.58	92.1 Guwahati (24)	MBD/HOCG/ BBBO	Assam and Meghalaya	35.27	36.27	37.43	1954	Wireless/ Telemetry	Conventional	
93	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	28.94	29.94	30.95	2007	Wireless/ Telemetry	Conventional	
94	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	80.00	80.90	81.33	1972	Wireless	Conventional	
95	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	47.70	48.20	49.85	2007	Wireless	Conventional	
96	Ghughumari	Torsa	Coochbehar/Coochbehar/ West Bengal	26.29	89.46	96.1 Hasimara (8)	LBD/HOCG/ BBBO	Sub Himalayan West Bengal & Sikkim	39.80	40.41	41.46	2000	Wireless	Conventional	
97	Tufangunj	Raidak -I	Tufangunj/ Coochbehar/ west Bengal	26.31	89.68	97.1 Chepan (12)	LBD/HOCG/ BBBO	Sub Himalayan West Bengal & Sikkim	34.22	35.30	36.36	1993	Wireless	Conventional	
98	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	85.65	85.95	89.30	1968	Wireless	Conventional	

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99	Mekhligunj	Tista	Mekhligunj/ Coochbehar/ West Bengal	26.33	88.85	99.1 Domohani Rd Brdige (6)	LBD/HOCG/ BBBO	Sub Himalayan West Bengal & Sikkim	65.45	65.95	66.45	1996	Wireless	Conventional	
100	Dhubri	Brahmaputra/ Brahmaputra	Dhubri/Dhubri/ Assam	26.01	89.99	100.1 Goalpara (15)	LBD/HOCG/ BBBO	Assam and Meghalaya	27.62	28.62	30.36	1988	Wireless/ Telemetry	Conventional	
101	Annapurnaghat (Silchar)	Barak/ Barak	Silchar/Silchar/ Assam	24.83	92.80	101.1 Chottabekra (18)	MBD/HOCG/ BBBO	Assam and Meghalaya	18.83	19.83	21.84	1989	Wireless	Conventional	
102	Matizuri	Katakhal/Barak	Hailakhandi/ Hailakhandi/ Assam	24.85	92.61	102.1 Gharmura (12)	MBD/HOCG/ BBBO	Assam and Meghalaya	19.27	20.27	22.73	2007	Wireless	Conventional	
103	Karimgunj	Kushiyara/Barak	Karimgunj/Karimgunj/Assa m	24.87	92.36	103.1 Annapurnaghat (12)	MBD/HOCG/ BBBO	Assam and Meghalaya	13.94	14.94	16.57	2010	Wireless	Conventional	
104	Kailashshar	Manu	Kailashshar/ North Tripura Tripura	24.32	91.99	104.1 Manughat (18-24)	MBD/HOCG/ BBBO	NMMT	24.34	25.34	25.79	1993	Wirless	Conventional	
105	Sonamura	Gumti	Sonamura/ West Tripura/ Tripura	23.47	91.27	105.1 Amarpur (15-21)	MBD/HOCG/ BBBO	NMMT	11.50	12.50	14.42	1993	Wireless	Conventional	
106	Narayanpur	Mayurakshi/ Ganga	Kandi/Murshidabad/ West Bengal	23.88	87.99	106.1 Tilpara Barrage (12-18)	DD/HOCM/ LGBO	Gangetic West Bengal	26.99	27.99	29.69	1995	Wireless	Conventional	
107	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	38.42	39.42	43.94	1978	Wireless	Conventional	
108	Harinkhola	Mundeshwari/ West Benagl	Arambagh/Hooghly/ West Bengal	22.88	87.78	108.1 Durgapur Barrage (20-26)	DD/HOCM/ LGBO	Gangetic West Bengal	11.80	12.80	14.58	1978	Wireless/ Telemetry	Conventional	
109	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	24.73	25.73	29.87	1978	Wireless	Conventional	
110	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	9.45	10.36	12.69	2008	Wireless/ Telemetry	Conventional	
111	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	7.21	8.13	9.50	1973	Wireless	Conventional	
112	Anandpur	Baitrani/East Flowing Rivers	Anandpur/ Keonjargarh/ Odisha	21.22	86.11	112.1 Swampatna (6-7)	ERD/HOCB/ MERO	Odisha	37.44	38.36	41.35	2011	Wireless/ Telemetry	Conventional/ Mathematical	

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113	Akhuapada	Baitrani/East Flowing Rivers	Akhuapada/ Bhadrak/ Odisha	20.92	86.28	113.1 Anandpur (18-20)	ERD/HOCB/ MERO	Odisha	17.83	17.83	21.56	1960	Wireless/ Telemetry	Conventional	
114	Jenapur Expressway	Brahmani/East Flowing Rivers	Jenapur/Jajpur/ odisha	20.88	86.01	114.1 Talcher (18-20)	ERD/HOCB/ MERO	Odisha	22.00	23.00	24.78	1975	Wireless/ Telemetry	Conventional	
115	Naraj	Mahanadi/ Mahanadi	Cuttack/ Cuttack/Odisha	20.47	85.77	115.1 Tikarapara (18-20)	ERD/HOCB/ MERO	Odisha	25.41	26.41	27.61	1982	Wireless	Conventional/ Mathematical	
116	Alipingal	Devi/Mahanadi	Alipingal/Jagitsinghpur/ Odisha	20.07	86.17	116.1 Naraj (12)	ERD/HOCB/ MERO	Odisha	10.85	11.76	13.11	2011	Wireless/ Telemetry	Conventional	
117	Nimapara	Kushbhadra/ Mahanadi	Nimapara/Puri/ Odisha	20.06	86.01	117.1 Naraj (12)	ERD/HOCB/ MERO	Odisha	9.85	10.76	11.60	1982	Wireless/ Telemetry	Conventional	
118	Purushottampur	Rishikulya/ East Flowing Rivers	Purushottampur/ Ganjam/ Odisha	19.50	84.87	118.1 Sorada (18-20)	ERD/HOCB/ MERO	Odisha	15.83	16.83	19.65	1990	Wireless/ Telemetry	Conventional	
119	Gunupur	Vamshadara/East Flowing Rivers	Gunupur/Koraput/ Odisha	19.08	83.81	119.1 Kutragada (03-06)	ERD/HOCB/ MERO	Odisha	83.00	84.00	88.75	1980	Wireless/ Telemetry	Conventional	
120	Kashinagar	Vamshadara/East Flowing Rivers	Kashinagar/Ganjam/ Odisha	18.85	83.87	120.1 Kutragada (06-09)	ERD/HOCB/ MERO	Odisha	53.60	54.60	58.93	1980	Wireless/ Telemetry	Conventional/ Mathematical	
121	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	437.20	437.80	439.41	1974	Wireless	Conventional	
122	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	292.83	293.83	300.90	1973	Wireless	Conventional	
123	Garudeshwar	Narmada/ Narmada	Garudeshwar/ Bharuch/Gujarat	21.89	73.65	123.1 Sardar sarovar dam (12)	TD/HOCG/ NTBO	Gujarat	30.48	31.09	41.65	1970	Wireless/ Telemetry	Conventional	
124	Bharuch	Narmada/ Narmada	Bharuch/Bharuch/ Gujarat	21.70	73.00	124.1 Garudeshwar (12)	TD/HOCG/ NTBO	Gujarat	6.71	7.31	12.65	1970	Wireless/ Telemetry	Conventional	
125	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	44.09	45.34	47.45	2006	Wireless/ Telemetry	Conventional	
126	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	71.00	72.54	76.10	2006	Wireless/ Telemetry	Conventional	

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127	Surat	Tapi/ Tapi	Surat/Surat/Gujarat	21.20	72.82	127.1 Hatnur Dam (24)	TD/HOCG/ NTBO	Gujarat	8.50	9.50	12.50	2006	Wireless/ Telemetry	Conventional	
128	Vapi Town	Damanganga/ West Flowing Rivers	Vapi Town/ Valsad/Gujarat	20.37	72.88	128.1 Madhuban Dam (03-06)	TD/HOCG/ NTBO	Gujarat	18.20	19.20	23.76	1976	Wireless/ Telemetry	Conventional	
129	Daman	Damanganga/ West Flowing Rivers	Daman/Daman/Diu	20.41	72.84	129.1 Madhuban Dam (05-09)	TD/HOCG/ NTBO	Gujarat	2.60	3.40	4.00	2004	Wireless/ Telemetry	Conventional	
130	Kopergaon	Godavari/ Godavari	Kopergaon/Ahmednagar/Maharashtra	19.89	74.49	130.1 N M Weir (05-06)	LGD/GC/ KGBO	Marathwada	490.90	493.68	499.17	1969	Wireless/ Telemetry	Conventional	
131	Gangakhed	Godavari/ Godavari	Gangakhed/Parbhani/Maharashtra	18.98	76.75	131.1 Dhalegaon (15-18)	LGD/GC/ KGBO	Marathwada	374.00	375.00	377.57	1947	Wireless/ Telemetry	Conventional	
132	Nanded	Godavari/ Godavari	Nanded/Nanded/ Maharastra	19.15	77.31	132.1 Dhalegaon (24-27) 132.2 Purna (03-06)	LGD/GC/ KGBO	Marathwada	353.00	354.00	357.10	2006	Wireless/ Telemetry	Conventional	
133	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	244.00	244.50	250.90	2005	Wireless/ Telemetry	Conventional	
134	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	226.73	227.73	232.35	1994	Wireless/ Telemetry	Conventional	
135	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	171.50	174.00	176.00	1986	Wireless/ Telemetry	Conventional	
136	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	103.50	104.75	107.05	1986	Wireless/ Telemetry	Conventional	
137	Jagdalpur	Indravathi/ Godavari	Jagdalpur/ Bastar/ Chhatisgarh	19.09	82.03	137.1 Nowrangpur (06-24) 137.2 Kosagumda (06-24)	LGD/GC/ KGBO	Chhatisgarh	539.50	540.80	544.68	1973	Wireless/ Telemetry	Conventional	
138	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	73.29	75.79	77.66	1990	Wireless/ Telemetry	Conventional	
139	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	53.00	55.00	60.25	1986	Wireless/ Telemetry	Conventional	
140	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	45.72	48.77	55.66	1986	Wireless/ Telemetry	Conventional	

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141	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	37.74	39.24	51.30	1986	Wireless	Conventional	
142	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	17.68	19.51	20.48	1986	Wireless/ Telemetry	Conventional	
143	Dowlaiswaram Barrage	Godavari/ Godavari	Dowlaiswaram/ East Godavari/ Andhra Pradesh	16.94	81.78	143.1 Koida (15)	LGD/GC/ KGBO	Coastal Andhra Pradesh	14.25	16.08	18.36	1986	Wireless/ Telemetry	Conventional	
144	Arjunwad	Krishna/Krishna	Arjunwad/ Kolhapur/ Maharashtra	16.78	74.63	144.1 Karad (24) 144.2 Samdoli (21)	LKD/KCC/ KGBO	Madhya Maharashtra	542.07	543.29	543.69	2005			Not in Operation. State Government is not interested
145	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	402.00	404.50	407.34	2006	Wireless/ Telemetry	Conventional	
146	Mantralayam	Tungabhadra	Mantralayam/ Kurnool/ Andhra Pradesh	15.94	77.42	146.1 Ollenur (18) 146.2 T Ramapuram (18)	LKD/KCC/ KGBO	Rayalaseema	310.00	312.00	318.77	2009	Wireless/ Telemetry	Conventional	
147	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)	LKD/KCC/ KGBO	Coastal Andhra Pradesh	15.91	17.28	18.70	1882	Wireless	Conventional	
148	Narora Barrage	Ganga/Ganga	Narora/ Bulanshahar/ Uttar Pradesh	28.19	78.40	148.1 Haridwar (48)	MGD2/HOCD/ UGBO	West Uttar Pradesh	NA	NA	NA	NA	Wireless	Conventional	
149	Tajewala Barrage (Hathnikund Barrage)	Yamuna/Ganga	Yamunanagar/ Yamunanagar/ Haryana	30.31	77.58	149.1 Paonta (06)	UYD/HOCN/ YBO	Haryana Chandigarh& Delhi					Wireless		Inflow Forecast Not in Operation
150	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	399.90	399.90	399.90	2011	Telemetry	Mathematical	
151	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	121.31		122.87	1999	Wireless/ Telemetry	Conventional	
152	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	62.79		67.05	1978	Wireless/ Telemetry	Conventional	
153	Tenughat Dam	Damodar/Ganga	Tenughat Dam	23.72	85.84	153.1 Hendgir (24) 153.2 Ramgarh (24)	DD/HOCM/ LGBO	Jharkhand	268.83		265.56	1985	Wireless/ Telemetry	Conventional	
154	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	132.59		132.89	1959	Wireless/ Telemetry	Conventional	

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											(m)	Year			
155	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	64.47		64.47	2011	Wireless/ Telemetry	Conventional	
156	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	150.88		151.79	1959	Wireless/ Telemetry	Conventional	
157	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	134.11		134.71	1978	Wireless	Conventional	
158	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	192.02		192.30	1978	Wireless/ Telemetry	Conventional/ Mathematical	
159	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	34.84		39.92	1999	Wireless/ Telemetry	Conventional	
160	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	182.88	185.06	186.04	1973	Wireless/ Telemetry	Conventional	
161	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	187.45	192.25	189.63	1990	Wireless/ Telemetry	Conventional	
162	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	126.19	127.71	127.74	1989	Wireless/ Telemetry	Conventional	
163	Hathnur Dam	Tapi/ Tapi	Hathnur Dam/ Jalgaon/ Maharashtra	21.07	75.95	163.1 Burhanpur (12) 163.2 Yerli (12)	TD/HOCG/ NTBO	Marathwada	212.02	214.00	214.00	1989	Wireless/ Telemetry	Conventional	
164	Ukai Dam	Tapi/ Tapi	Ukai Dam/ Surat/ Gujarat	21.25	73.59	164.1 Gidadhe (6) 164.2 Sarangkheda (6)	TD/HOCG/ NTBO	Gujarat	102.41	105.16	105.51	1990	Wireless/ Telemetry	Conventional	
165	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	79.86	82.40	80.60	1993	Wireless/ Telemetry	Conventional	
166	Jailwadi Dam	Godavari/Godavari	Paithan/ Aurangabad/ Maharashtra	19.48	75.37	166.1 N M Weir (12)	LGD/GC/ KGBO	Marathwada	463.91	465.58	464.69	1990	Wireless	Conventional	
167	Singur Dam	Manjira/ Godavari	Singur Dam/ Medak/ Andhra Pradesh	17.75	77.93	167.1 Saigaon (24)	LGD/GC/ KGBO	Telangana	523.60	523.60	523.60	1999	Wireless	Conventional	
168	Nizamsagar Dam	Manjira/ Godavari	Nizamsagar dam/ Nizamabad/ Andhra Pradesh	18.22	77.96	168.1 Singur Dam (24)	LGD/GC/ KGBO	Telangana	428.24	428.24	428.24	1999	Wireless	Conventional	

Annex-I

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	WL (m)	DL (m)	HFL		Mode of Data Collection	Methodology/ Model used for FF Formulation	Remarks
											(m)	Year			
169	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	332.54	333.15	332.72	1990	Wireless	Conventional	
170	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	519.60	519.60	519.60	2004	Wireless	Conventional	
171	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 (08)	LKD/KCC/ KGBO	North Interior Karnataka	492.25	492.25	492.11	1997	Wireless	Conventional	
172	Priyadharshini Jurala Project	Krishna/ krishna	Gadwal/ Mahbubnagar/ Andhra Pradesh	16.33	77.70	172.1 Huvinahedgi (18) 172.2 Yadgir (18) 172.3 Deosugur (06)	LKD/KCC/ KGBO	Telangana	318.52	318.52	318.20	2009	Wireless	Conventional	
173	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	497.74	497.74	497.74	1992	Wireless	Conventional	
174	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	269.75	271.88	273.25	2009	Wireless	Conventional	
175	Prakasam Barrage	Krishna/ krishna	Vijayawada/ Krishna/ Andhra Pradesh	16.50	80.60	175.1 Wadenapalli (24) 175.2 Madhira (12) 175.3 Polampally (12) 175.4 Paleru Bridge (12) 175.5 Keesara (12)	LKD/KCC/ KGBO	Coastal Andhra Pradesh	18.30		21.50	1903	Wireless	Conventional	

Basinwise -Riverwise- Flood Forecasting Information in India during Flood Season 2013												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2013				
						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
	Ganga Basin											
1	Alaknanda	Srinagar	Uttarakhand	539.00	540.00	536.85	05/09/1995	537.90	17/Jun/13 23	0	0	
2	Ganga	Rishikesh	Uttarakhand	339.50	340.50	341.72	05/09/1995	341.45	17/Jun/13 12	22	21	95.45
3	Ganga	Haridwar	Uttarakhand	293.00	294.00	296.30	19/09/2010	295.90	17/Jun/13 19	29	25	86.21
4	Ganga	Narora Barrage	Uttar Pradesh			180.61	23/09/2010	179.65	20/Jun/13 19	94	94	100
5	Ganga	Kannauj	Uttar Pradesh	124.97	125.97	126.78	27/09/2010	125.40	14/Aug/13 05	27	27	100
6	Ganga	Ankinghat	Uttar Pradesh	123.00	124.00	124.49	28/09/2010	123.73	16/Aug/13 14	57	57	100
7	Ganga	Kanpur	Uttar Pradesh	113.00	114.00	114.08	29/09/2010	112.91	16/Aug/13 16	58	58	100
8	Ganga	Dalmau	Uttar Pradesh	98.36	99.36	99.84	03/08/1973	98.82	17/Aug/13 04	21	21	100
9	Ganga	Phphamau	Uttar Pradesh	83.73	84.73	87.98	08/09/1978	86.82	26/Aug/13 04	28	25	89.29
10	Ganga	Allahabad Chhatnag	Uttar Pradesh	83.73	84.73	88.03	08/09/1978	86.04	26/Aug/13 06	21	17	80.95
11	Ganga	Mirzapur	Uttar Pradesh	76.72	77.72	80.34	09/09/1978	79.05	27/Aug/13 01	23	23	100
12	Ganga	Varanasi	Uttar Pradesh	70.26	71.26	73.90	09/09/1978	72.63	27/Aug/13 04	30	30	100
13	Ganga	Ghazipur	Uttar Pradesh	62.11	63.11	65.22	09/09/1978	65.02	28/Aug/13 14	40	39	97.50
14	Ganga	Buxar	Bihar	59.32	60.32	62.09	1948	61.44	29/Aug/13 05	39	39	100
15	Ganga	Ballia	Uttar Pradesh	56.62	57.62	60.25	14/09/2003	60.14	29/Aug/13 03	58	58	100
16	Ganga	Patna Dighaghat	Bihar	49.45	50.45	52.52	23/08/1975	50.94	02/Sep/13 06	45	45	100
17	Ganga	Patna Gandhighat	Bihar	47.60	48.60	50.27	14/08/1994	49.90	01/Sep/13 08	70	70	100
18	Ganga	Hathidah	Bihar	40.76	41.76	43.15	07/08/1971	42.89	02/Sep/13 01	58	58	100
19	Ganga	Munger	Bihar	38.33	39.33	40.99	19/09/1976	39.84	03/Sep/13 07	42	42	100
20	Ganga	Bhagalpur	Bihar	32.68	33.68	34.20	17/09/2003	34.50	03/Sep/13 22	49	49	100
21	Ganga	Kahalgaon	Bihar	30.09	31.09	32.87	17/09/2003	32.45	04/Sep/13 06	75	75	100
22	Ganga	Sahibgunj	Jharkhand	26.25	27.25	30.91	1998	29.08	05/Sep/13 01	76	76	100
23	Ganga	Farakka	West Bengal	21.25	22.25	25.14	07/09/1998	24.40	06/Sep/13 04	160	158	98.75
24	Ramganga	Moradabad	Uttar Pradesh	189.60	190.60	192.88	21/09/2010	190.23	30/Aug/13 17	20	20	100
25	Ramganga	Bareilly	Uttar Pradesh	162.70	163.70	162.88	06/8/1978	160.62	31/Aug/13 00	0	0	
26	Yamuna	Tajewala Weir	Haryana			328.27	03/09/1978	338.90	17/Jun/13 06	0	0	
27	Yamuna	Mawi	Uttar Pradesh	230.00	230.85	232.45	26/09/1988	232.75	18/Jun/13 11	44	42	95.45
28	Yamuna	Delhi Rly Bridge	NCT Delhi	204.00	204.83	207.49	06/09/1978	207.32	19/Jun/13 19	50	48	96.00
29	Yamuna	Mathura	Uttar Pradesh	164.20	165.20	169.73	08/09/1978	166.03	22/Jun/13 16	56	55	98.21
30	Yamuna	Agra	Uttar Pradesh	151.40	152.40	154.76	09/09/1978	150.76	23/Jun/13 03	0	0	
31	Yamuna	Etawa	Uttar Pradesh	120.92	121.92	126.13	11/09/1978	120.16	13/Aug/13 08	0	0	
32	Yamuna	Auraiya	Uttar Pradesh	112.00	113.00	118.19	25/08/1996	113.81	27/Aug/13 03	13	8	61.54
33	Yamuna	Kalpi	Uttar Pradesh	107.00	108.00	112.98	25/08/1996	109.55	26/Aug/13 20	17	10	58.82
34	Yamuna	Hamirpur	Uttar Pradesh	102.63	103.63	108.59	12/09/1983	106.33	25/Aug/13 11	21	12	57.14
35	Yamuna	Chilaghat	Uttar Pradesh	99.00	100.00	105.16	06/09/1978	103.33	25/Aug/13 12	42	30	71.43
36	Yamuna	Naini	Uttar Pradesh	83.74	84.74	87.99	08/09/1978	86.60	26/Aug/13 21	28	19	67.86
37	Sahibi	Dhansa	NCT Delhi	211.44	212.44	213.58	06/08/1977	210.03	02/Sep/13 08	0	0	
38	Chambal	Gandhisagar Dam	Madhya Pradesh	399.99				399.90	28/Sep/13 00	17	17	100
39	Betwa	Mohana	Uttar Pradesh	121.66	122.66	133.69	11/09/1983	124.34	30/Jul/13 08	6	2	33.33
40	Betwa	Sahjina	Uttar Pradesh	103.54	104.54	108.67	12/09/1983	106.61	25/Aug/13 03	23	12	52.17
41	Ken	Banda	Uttar Pradesh	103.00	104.00	113.29	07/0720/05	108.46	24/Aug/13 13	20	11	55.00

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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
42	Gomati	Lucknow	Uttar Pradesh	108.50	109.50	110.85	10/09/1971	105.91	30/Jun/13 05	0	0	
43	Gomati	Jaunpur	Uttar Pradesh	73.07	74.07	77.74	22/09/1971	70.75	03/Jul/13 10	0	0	
44	SAI	Raibareli	Uttar Pradesh	100.00	101.00	104.81	17/09/1982	99.52	03/Jul/13 06	0	0	
45	Ghaghra	Elgin Bridge	Uttar Pradesh	105.07	106.07	107.56	10/10/2009	107.12	22/Jul/13 08	89	80	89.89
46	Ghaghra	Ayodhya	Uttar Pradesh	91.73	92.73	94.01	11/10/2009	93.34	23/Jul/13 10	83	79	95.18
47	Ghaghra	Turtipar	Uttar Pradesh	63.01	64.01	66.00	28/08/1998	64.69	25/Jul/13 19	89	87	97.75
48	Ghaghra	Darauli	Bihar	59.82	60.82	61.74	29/08/1998	61.15	31/Aug/13 18	86	86	100
49	Ghaghra	Gangpur Siswan	Bihar	56.04	57.04	58.01	18/09/1983	57.60	01/Sep/13 05	78	78	100
50	Ghaghra	Chhapra	Bihar	52.68	53.68	54.59	03/09/1982	53.85	01/Sep/13 19	33	33	100
51	Rapti	Balrampur	Uttar Pradesh	103.62	104.62	105.25	11/09/2000	104.89	25/Jul/13 10	64	61	95.31
52	Rapti	Bansi	Uttar Pradesh	83.90	84.90	85.82	21/08/1998	84.84	28/Jul/13 20	56	54	96.43
53	Rapti	Gorakpur Birdghat	Uttar Pradesh	73.98	74.98	77.54	23/08/1998	75.12	13/Jul/13 19	59	56	94.91
54	Sone	Inderpuri	Bihar	107.20	108.20	108.85	23/08/1975	105.70	25/Aug/13 10	0	0	
55	Sone	Koelwar	Bihar	54.52	55.52	58.88	20/07/1971	53.84	26/Aug/13 06	0	0	
56	Sone	Maner	Bihar	51.00	52.00	53.79	10/09/1976	52.79	01/Sep/13 08	45	45	100
57	PunPun	Sripalpur	Bihar	49.60	50.60	53.91	18/09/1976	51.58	05/Sep/13 07	24	24	100
58	Gandak	Khadda	Uttar Pradesh	95.00	96.00	97.50	23/07/2002	95.80	23/Jul/13 10	34	34	100
59	Gandak	Chatia	Bihar	68.15	69.15	70.04	26/07/2002	67.52	27/Jul/13 23	0	0	
60	Gandak	Rewaghat	Bihar	53.41	54.41	55.41	17/09/1986	54.33	29/Jul/13 02	27	27	100
61	Gandak	Hazipur	Bihar	49.32	50.32	50.93	1948	50.12	29/Aug/13 08	40	40	100
62	Burhi Gandak	Lalbeghiaghat	Bihar	62.20	63.20	67.09	30/07/1975	62.38	14/Jul/13 05	3	3	100
63	Burhi Gandak	Muzaffarpur	Bihar	51.53	52.53	54.29	15/08/1987	51.46	16/Jul/13 13	0	0	
64	Burhi Gandak	Samastipur	Bihar	45.02	46.02	49.38	15/08/1987	44.85	17/Jul/13 19	0	0	
65	Burhi Gandak	Rosera	Bihar	41.63	42.63	46.35	16/08/1987	41.79	18/Jul/13 11	3	3	100
66	Burhi Gandak	Khagaria	Bihar	35.58	36.58	39.22	1976	38.67	01/Sep/13 19	63	63	100
67	Bagmati	Benibad	Bihar	47.68	48.68	50.01	12/07/2004	49.35	13/Jul/13 07	77	77	100
68	Bagmati	Hayaghat	Bihar	44.72	45.72	48.96	14/08/1987	45.25	15/Jul/13 18	4	4	100
69	Adhwara Group	Kamtaul	Bihar	49.00	50.00	52.99	12/08/1987	49.45	12/Jul/13 19	3	3	100
70	Adhwara Group	Ekmighat	Bihar	45.94	46.94	49.52	12/07/2004	46.16	14/Jul/13 22	3	3	100
71	Kamla Balan	Jhanjharpur	Bihar	49.00	50.00	53.01	10/07/2004	51.09	06/Sep/13 23	48	48	100
72	Kosi	Basua	Bihar	46.75	47.75	49.17	25/08/2010	48.68	11/Jul/13 19	205	205	100
73	Kosi	Baltara	Bihar	32.85	33.85	36.40	15/08/1987	33.54	07/Sep/13 12	42	42	100
74	Kosi	Kursela	Bihar	29.00	30.00	32.04	06/09/1998	30.91	10/Aug/13 18	73	73	100
75	Mahananda	Dhengraghat	Bihar	34.65	35.65	38.09	1968	37.28	12/Jul/13 10	54	54	100
76	Mahananda	Jhawa	Bihar	30.40	31.40	33.51	14/08/1987	32.93	13/Jul/13 08	104	104	100
77	Mayurakshi	Massanjore Dam	Jharkhand	121.31		122.87	25/09/1999	119.375	19/Oct/13 18	3	3	100
78	Mayurakshi	Tilpara Barrage	West Bengal	62.79		67.05	27/09/1978	62.789	21/Aug/13 20	5	5	100
79	Mayurakshi	Narayanpur	West Bengal	26.99	27.99	29.69	27/09/1995	24.60	22/Aug/13 17	0	0	
80	Ajoy	Gheropara	West Bengal	38.42	39.42	43.94	27/09/1978	39.16	15/Oct/13 02	1	1	100
81	Damodar	Tenughat Dam	Jharkhand	268.83		265.56	17/09/1985	262.57	03/Oct/13 01	35	35	100
82	Damodar	Panchet Dam	Jharkhand	132.59		132.89	02/10/1959	130.71	15/Oct/13 03	65	65	100
83	Damodar	Durgapur Barrage	West Bengal	64.47		64.47	31/10/2002	64.47	15/Oct/13 16	43	43	100
84	Barakar	Maithon Dam	Jharkhand	150.88		151.79	02/10/1959	150.81	15/Oct/13 02	26	26	100
85	Mundeshwari	Harinkhola	West Bengal	11.80	12.80	14.58	29/09/1978	12.97	16/Oct/13 06	3	3	100
86	Kangsabati	Kangsabati Dam	West Bengal	134.11		134.71	02/09/1978	134.02	14/Oct/13 08	40	40	100
87	Kangsabati	Mohanpur	West Bengal	24.73	25.73	29.87	02/09/1978	26.02	15/Oct/13 05	1	1	100

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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
	Brahmaputra Basin											
88	Brahmaputra	Dibrugrah	Assam	104.70	105.70	106.48	03/09/1998	106.01	06/Sep/13 06	96	95	98.96
89	Brahmaputra	Neamatighat	Assam	84.04	85.04	87.37	11/07/1991	86.88	06/Sep/13 16	90	90	100
90	Brahmaputra	Tezpur	Assam	64.23	65.23	66.59	27/08/1988	65.87	07/Sep/13 23	44	44	100
91	Brahmaputra	Guwahati	Assam	48.68	49.68	51.46	21/07/2004	49.79	08/Sep/13 18	24	24	100
92	Brahmaputra	Goalpara	Assam	35.27	36.27	37.43	31/07/1954	36.36	09/Sep/13 07	34	34	100
93	Brahmaputra	Dhubri	Assam	27.62	28.62	30.36	28/08/1988	29.30	10/Sep/13 01	126	126	100
94	Burhidihing	Naharkatia	Assam	119.40	120.40	122.69	17/06/1973	118.47	05/Jul/13 13	0	0	
95	Burhidihing	Khowang	Assam	101.11	102.11	103.92	25/08/1988	102.33	10/Jul/13 22	21	21	100
96	Desang	Nanglamoraghat	Assam	93.46	94.46	96.49	06/09/1998	96.10	19/Aug/13 07	52	52	100
97	Dikhow	Shivsagar	Assam	91.40	92.40	95.62	08/07/1974	93.72	18/Aug/13 01	62	62	100
98	Subansiri	Badatighat	Assam	81.53	82.53	86.84	28/06/1972	82.22	07/Sep/13 20	25	25	100
99	Dhansiri (S)	Golaghat	Assam	88.50	89.50	91.30	11/10/1986	90.22	06/Aug/13 23	49	48	97.96
100	Dhansiri (S)	Numaligarh	Assam	76.42	77.42	79.87	24/09/1985	79.23	07/Aug/13 22	230	230	100
101	Jiabharali	Jiabharali_NTX	Assam	76.00	77.00	78.50	26/07/2007	77.90	06/Jul/13 21	288	286	99.31
102	Kopilli	Kampur	Assam	59.50	60.50	61.86	16/06/1973	59.03	10/Jun/13 20	0	0	
103	Kopilli	Dharmatul	Assam	55.00	56.00	58.09	21/07/2004	54.47	17/Aug/13 21	0	0	
104	Puthimari	Puthimari _NHX	Assam	50.81	51.81	55.08	31/08/2008	52.75	06/Sep/13 23	174	174	100
105	Pagladiya	Pagladia_NTX	Assam	51.75	52.75	55.45	08/07/2004	52.40	07/Sep/13 06	6	6	100
106	Beki	Beki NHX	Assam	44.10	45.10	46.20	04/08/2000	45.65	22/Jul/13 18	174	174	100
107	Manas	Manas NHX	Assam	47.81	48.42	50.08	15/09/1984	48.07	07/Sep/13 12	6	6	100
108	Sankosh	Golakganj	Assam	28.94	29.94	30.95	08/09/2007	29.92	11/Jul/13 02	45	43	95.56
109	Raidak-I	Tufanganj	West Bengal	34.22	35.30	36.36	21/07/1993	35.84	10/Jul/13 09	21	14	66.67
110	Torsa	Ghughumari	West Bengal	39.80	40.41	41.46	03/08/2000	40.22	10/Jul/13 08	29	29	100
111	Jaldhaka	NH-31	West Bengal	80.00	80.90	81.33	28/08/1972	80.20	10/Jul/13 12	14	14	100
112	Jaldhaka	Mathabhanga	West Bengal	47.70	48.20	49.85	07/09/2007	48.00	10/Jul/13 05	1	1	100
113	Tista	Domohani	West Bengal	85.65	85.95	89.30	14/10/1968	86.19	09/Jul/13 03	133	128	96.24
114	Tista	Mekhliganj	West Bengal	65.45	65.95	66.45	13/07/1996	65.37	10/Jul/13 11	0	0	
	Barak & Meghna Basins											
115	Barak	APGhat	Assam	18.83	19.83	21.84	01/08/1989	19.66	18/Aug/13 12	8	8	100
116	Katakhal	Matizuri	Assam	19.27	20.27	22.73	10/09/2007	22.17	17/Aug/13 18	24	24	100
117	Kushiyara	Karimganj	Assam	13.94	14.94	16.57	10/06/2010	14.97	18/Aug/13 20	14	14	100
118	Manu	Kailashar	Tripura	24.34	25.34	25.79	07/06/1993	23.10	19/Aug/13 22	0	0	
119	Gumti	Sonamura	Tripura	11.50	12.50	14.42	23/07/1993	12.03	06/Sep/13 05	2	2	100
	Eastern Rivers (Excluding Mahanadi)											
120	Subernarekna	Rajghat	Orissa	9.45	10.36	12.69	19/06/2008	12.42	15/Oct/13 01	30	28	93.33
121	Burhabalang	NH_5 _Road Bridge	Orissa	7.21	8.13	9.50	12/10/1973	9.24	14/Oct/13 08	26	24	92.31
122	Baitarni	Anandpur	Orissa	37.44	38.36	41.35	23/09/2011	40.74	13/Oct/13 23	21	18	85.71
123	Baitarni	Akhuapada	Orissa		17.83	21.95	16/08/1960	19.87	14/Oct/13 13	17	16	94.12
124	Brahmani	Jenapur	Orissa	22.00	23.00	24.78	20/08/1975	21.76	14/Oct/13 09	0	0	
125	Rushikuluya	Purushottampur	Orissa	15.83	16.83	19.65	04/11/1990	18.65	13/Oct/13 18	16	13	81.25
126	Vamsadhara	Gunupur	Orissa	83.00	84.00	88.75	17/09/1980	83.82	24/Oct/13 16	7	7	100
127	Vamsadhara	Kashinagar	Orissa	53.60	54.60	58.93	18/09/1980	55.35	24/Oct/13 15	93	86	92.47
128	Vamsadhara	Gotta Barrage	Andhra Pradesh	34.84	34.84	39.92	07/10/1999			11	10	90.91

Basinwise -Riverwise- Flood Forecasting Information in India during Flood Season 2013												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2013		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	13.00
	Mahanadi Basin											
129	Mahanadi	Hirakud Dam	Orissa	192.02		192.30	30/01/1998	192.03	29/Sep/13 13	79	78	98.73
130	Mahanadi	Naraj	Orissa	25.41	26.41	27.61	31/08/1982	26.16	01/Aug/13 17	6	6	100
131	Mahanadi	Alipingal Devi	Orissa	10.85	11.76	13.11	11/09/2011	9.15	02/Aug/13 05	0	0	
132	Mahanadi	Nimapara	Orissa	9.85	10.76	11.60	31/08/1982	7.96	02/Aug/13 12	0	0	
	Godavari Basin											
133	Godavari	Kopergaon	Maharashtra	490.90	493.68	499.17	1969	489.92	25/Sep/13 08	0	0	
134	Godavari	Jaikwadi Dam	Maharashtra	463.91		464.69	12/10/1990	459.29	17/Oct/13 19	0	0	
135	Godavari	Gangakhed	Maharashtra	374.00	375.00	377.57	1947	368.12	19/Sep/13 12	0	0	
136	Godavari	Nanded	Maharashtra	353.00	354.00	357.10	06/08/2006	346.45	24/Jul/13 13	0	0	
137	Godavari	Sriram Sagar	Andhra Pradesh	332.54		332.72	13/10/1990	332.54	05/Aug/13 13	20	16	80.00
138	Godavari	Kaleswaram	Andhra Pradesh	103.50	104.75	107.05	15/08/1986	104.81	02/Aug/13 19	37	27	72.97
139	Godavari	Eturunagaram	Andhra Pradesh	73.29	75.79	77.66	24/08/1990	76.04	02/Aug/13 11	93	76	81.72
140	Godavari	Dummagudam	Andhra Pradesh	53.00	55.00	60.25	16/08/1986	56.80	03/Aug/13 03	78	64	82.05
141	Godavari	Bhadrachalam	Andhra Pradesh	45.72	48.77	55.66	16/08/1986	51.38	03/Aug/13 05	105	86	81.90
142	Godavari	Kunavaram	Andhra Pradesh	37.74	39.24	51.30	16/08/1986	43.26	04/Aug/13 05	96	78	81.25
143	Godavari	Rajamundri	Andhra Pradesh	17.68	19.51	20.48	16/08/1986	18.68	04/Aug/13 10	60	57	95.00
144	Godavari	Dowalaiswaram	Andhra Pradesh	14.25	16.08	18.36	16/08/1986	16.46	04/Aug/13 02	102	96	94.12
145	Wardha	Balharsha	Maharashtra	171.50	174.00	176.00	15/08/1986	175.68	03/Aug/13 05	79	59	74.68
146	Wainganga	Bhandara	Maharashtra	244.00	244.50	250.90	16/09/2005	245.70	27/Jul/13 14	34	31	91.18
147	Wainganga	Pauni	Maharashtra	226.73	227.73	232.35	07/09/1994	229.75	24/Aug/13 12	17	13	76.47
148	Manjira	Singur Dam	Andhra Pradesh	523.60		523.60	15/10/1999	523.00	31/Oct/13 06	1	1	100
149	Manjira	Nizamsagar Dam	Andhra Pradesh	428.24		428.24	15/10/1999	428.24	28/Oct/13 06	0	0	
150	Indravati	Jagdalpur	Chhatisgarh	539.50	540.80	544.68	09/07/1973	542.06	15/Jun/13 05	27	22	81.48
	Krishna Basin											
151	Krishna	Arjunwad	Maharashtra	542.07	543.29	543.69	05/08/2005			0	0	
152	Krishna	Alamati Dam	Karnataka	519.60		519.60	18/09/2002	519.60	10/Aug/13 08	31	28	90.32
153	Krishna	Narayanpur Dam	Karnataka	492.25		492.22	26/09/2008	492.25	08/Aug/13 17	49	45	91.84
154	Krishna	Priyadarshini	Andhra Pradesh	318.52		318.20	02/10/2009	318.50	23/Aug/13 12	68	65	95.59
155	Krishna	Srisailam Dam	Andhra Pradesh	269.75		273.25	03/10/2009	269.75	19/Aug/13 01	99	92	92.93
156	Krishna	Prakasham Barrage	Andhra Pradesh	18.30		21.50	07/10/1903	17.78	26/Oct/13 17	121	120	99.17
157	Bhima	Deongaon	Karnataka	402.00	404.50	407.34	13/08/2006	403.00	22/Sep/13 05	3	2	66.67
158	Tungbhadra	Tungabhadra Dam	Karnataka	497.74		497.74	05/10/1992	497.74	12/Aug/13 05	163	160	98.16
159	Tungbhadra	Mantralayam	Andhra Pradesh	310.00	312.00	318.77	02/10/2009	311.39	05/Aug/13 23	30	26	86.67
	Southern River System:											
160	Pennar	Nellore	Andhra Pradesh	15.91	17.28	18.70	30/11/1882	13.02	30/Nov/13 08	0	0	
	Western River Systems:											
161	Banas	Dantiwada Dam	Gujarat	182.88	185.06	186.04	01/09/1973	175.73	14/Oct/13 17	2	2	100
162	Sabarmati	Dharoi Dam	Gujarat	187.45	192.25	189.63	03/09/1990	186.91	14/Oct/13 14	0	0	
163	Sabarmati	Ahmedabad	Gujarat	44.09	45.34	47.45	19/08/2006	41.97	06/Sep/13 21	0	0	
164	Mahi	Kadana Dam	Gujarat	126.19	127.71	127.74	09/09/1989	127.69	05/Oct/13 13	21	21	100
165	Mahi	Wanakbori	Gujarat	71.00	72.54	76.10	12/08/2006	72.01	02/Aug/13 19	16	16	100
166	Naramada	Mandla	Madhya Pradesh	437.20	437.80	439.41	18/08/1974	436.77	09/Aug/13 15	0	0	
167	Naramada	Hoshangabad	Madhya Pradesh	292.83	293.83	300.90	30/08/1973	299.50	23/Aug/13 20	47	46	97.87
168	Naramada	Garudeswar	Gujarat	30.48	31.09	41.65	06/09/1970	34.86	25/Aug/13 00	9	9	100
169	Naramada	Bharuch	Gujarat	6.71	7.31	12.65	07/09/1970	10.90	25/Aug/13 00	32	32	100
170	Tapi	Hatnur Dam	Maharashtra	212.00	214.00	214.00	12/10/1989	214.01	16/Oct/13 00	192	192	100

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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
171	Tapi	Ukai Dam	Gujarat	102.41	105.16	105.51	08/10/1990	105.05	11/Oct/13 00	127	124	97.64
172	Tapi	Surat	Gujarat	8.50	9.50	12.50	09/08/2006	9.80	24/Sep/13 00	6	6	100
173	Damanganga	Madhuban Dam	Gujarat	79.86	82.40	80.60	27/09/1993	80.10	03/Oct/13 00	7	7	100
174	Damanganga	Vapi Town	Gujarat	18.20	19.20	23.76	03/08/2004	16.50	02/Aug/13 00	0	0	
175	Damanganga	Daman	Dadra & Nagar Haveli	2.60	3.40	4.00	03/08/2004	2.10	22/Jul/13 00	0	0	
								Total Forecasts		***7060***	***6760***	**95.75**
								Level Forecasts		**5741**	**5471**	**95.30**
								Inflow Forecast		**1319**	**1289**	**97.73**

Statewise Flood Forecasting Information In India during Flood Season 2013

Sl. No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2013		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										
	Andhra Pradesh										
1	Vamsadhara	Gotta Barrage	34.84	34.84	39.92	07/10/1999			11	10	90.91
2	Godavari	Sriram Sagar	332.54		332.72	13/10/1990	332.54	05/Aug/13 13	20	16	80.00
3	Godavari	Kaleswaram	103.50	104.75	107.05	15/08/1986	104.81	02/Aug/13 19	37	27	72.97
4	Godavari	Eturunagaram	73.29	75.79	77.66	24/08/1990	76.04	02/Aug/13 11	93	76	81.72
5	Godavari	Dummagudam	53.00	55.00	60.25	16/08/1986	56.80	03/Aug/13 03	78	64	82.05
6	Godavari	Bhadrachalam	45.72	48.77	55.66	16/08/1986	51.38	03/Aug/13 05	105	86	81.90
7	Godavari	Kunavaram	37.74	39.24	51.30	16/08/1986	43.26	04/Aug/13 05	96	78	81.25
8	Godavari	Rajamundri	17.68	19.51	20.48	16/08/1986	18.68	04/Aug/13 10	60	57	95.00
9	Godavari	Dowalaiswaram	14.25	16.08	18.36	16/08/1986	16.46	04/Aug/13 02	102	96	94.12
10	Manjira	Singur Dam	523.60		523.60	15/10/1999	523.00	31/Oct/13 06	1	1	100
11	Manjira	Nizamsagar Dam	428.24		428.24	15/10/1999	428.24	28/Oct/13 06	0	0	
12	Krishna	Priyadarshini	318.52		318.20	02/10/2009	318.50	23/Aug/13 12	68	65	95.59
13	Krishna	Srisailam Dam	269.75		273.25	03/10/2009	269.75	19/Aug/13 01	99	92	92.93
14	Krishna	Prakasham Barrage	18.30		21.50	07/10/1903	17.78	26/Oct/13 17	121	120	99.17
15	Tungbhadra	Mantralayam	310.00	312.00	318.77	02/10/2009	311.39	05/Aug/13 23	30	26	86.67
16	Pennar	Nellore	15.91	17.28	18.70	30/11/1882	13.02	30/Nov/13 08	0	0	
	Assam										
17	Brahmaputra	Dibrugarh	104.70	105.70	106.48	03/09/1998	106.01	06/Sep/13 06	96	95	98.96
18	Brahmaputra	Neamatighat	84.04	85.04	87.37	11/07/1991	86.88	06/Sep/13 16	90	90	100
19	Brahmaputra	Tezpur	64.23	65.23	66.59	27/08/1988	65.87	07/Sep/13 23	44	44	100
20	Brahmaputra	Guwahati	48.68	49.68	51.46	21/07/2004	49.79	08/Sep/13 18	24	24	100
21	Brahmaputra	Goalpara	35.27	36.27	37.43	31/07/1954	36.36	09/Sep/13 07	34	34	100
22	Brahmaputra	Dhubri	27.62	28.62	30.36	28/08/1988	29.30	10/Sep/13 01	126	126	100
23	Burhidihing	Naharkatia	119.40	120.40	122.69	17/06/1973	118.47	05/Jul/13 13	0	0	
24	Burhidihing	Khowang	101.11	102.11	103.92	25/08/1988	102.33	10/Jul/13 22	21	21	100
25	Desang	Nanglamoraghat	93.46	94.46	96.49	06/09/1998	96.10	19/Aug/13 07	52	52	100
26	Dikhow	Shivsagar	91.40	92.40	95.62	08/07/1974	93.72	18/Aug/13 01	62	62	100
27	Subansiri	Badatighat	81.53	82.53	86.84	28/06/1972	82.22	07/Sep/13 20	25	25	100
28	Dhansiri (S)	Golaghat	88.50	89.50	91.30	11/10/1986	90.22	06/Aug/13 23	49	48	97.96
29	Dhansiri (S)	Numaligarh	76.42	77.42	79.87	24/09/1985	79.23	07/Aug/13 22	230	230	100
30	Jiabharali	Jiabharali_NTX	76.00	77.00	78.50	26/07/2007	77.90	06/Jul/13 21	288	286	99.31
31	Kopilli	Kampur	59.50	60.50	61.86	16/06/1973	59.03	10/Jun/13 20	0	0	
32	Kopilli	Dharmatul	55.00	56.00	58.09	21/07/2004	54.47	17/Aug/13 21	0	0	
33	Puthimari	Puthimari_NHX	50.81	51.81	55.08	31/08/2008	52.75	06/Sep/13 23	174	174	100
34	Pagladiya	Pagladia_NTX	51.75	52.75	55.45	08/07/2004	52.40	07/Sep/13 06	6	6	100
35	Beki	Beki NHX	44.10	45.10	46.20	04/08/2000	45.65	22/Jul/13 18	174	174	100
36	Manas	Manas NHX	47.81	48.42	50.08	15/09/1984	48.07	07/Sep/13 12	6	6	100
37	Sankosh	Golakganj	28.94	29.94	30.95	08/09/2007	29.92	11/Jul/13 02	45	43	95.56
38	Barak	APGhat	18.83	19.83	21.84	01/08/1989	19.66	18/Aug/13 12	8	8	100
39	Katakhal	Matizuri	19.27	20.27	22.73	10/09/2007	22.17	17/Aug/13 18	24	24	100
40	Kushiyara	Karimganj	13.94	14.94	16.57	10/06/2010	14.97	18/Aug/13 20	14	14	100

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					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2										
	Bihar										
41	Ganga	Buxar	59.32	60.32	62.09	1948	61.44	29/Aug/13 05	39	39	100
42	Ganga	Patna Gandhighat	49.45	50.45	52.52	23/08/1975	50.94	02/Sep/13 06	45	45	100
43	Ganga	Patna Dighaghat	47.60	48.60	50.27	14/08/1994	49.90	01/Sep/13 08	70	70	100
44	Ganga	Hathidah	40.76	41.76	43.15	07/08/1971	42.89	02/Sep/13 01	58	58	100
45	Ganga	Munger	38.33	39.33	40.99	19/09/1976	39.84	03/Sep/13 07	42	42	100
46	Ganga	Bhagalpur	32.68	33.68	34.20	17/09/2003	34.50	03/Sep/13 22	49	49	100
47	Ganga	Kahalgaon	30.09	31.09	32.87	17/09/2003	32.45	04/Sep/13 06	75	75	100
48	Ghaghra	Darauli	59.82	60.82	61.74	29/08/1998	61.15	31/Aug/13 18	86	86	100
49	Ghaghra	Gangpur Siswan	56.04	57.04	58.01	18/09/1983	57.60	01/Sep/13 05	78	78	100
50	Ghaghra	Chhapra	52.68	53.68	54.59	03/09/1982	53.85	01/Sep/13 19	33	33	100
51	Sone	Inderpuri	107.20	108.20	108.85	23/08/1975	105.70	25/Aug/13 10	0	0	
52	Sone	Koelwar	54.52	55.52	58.88	20/07/1971	53.84	26/Aug/13 06	0	0	
53	Sone	Maner	51.00	52.00	53.79	10/09/1976	52.79	01/Sep/13 08	45	45	100
54	PunPun	Sripalpur	49.60	50.60	53.91	18/09/1976	51.58	05/Sep/13 07	24	24	100
55	Gandak	Chatia	68.15	69.15	70.04	26/07/2002	67.52	27/Jul/13 23	0	0	
56	Gandak	Rewaghat	53.41	54.41	55.41	17/09/1986	54.33	29/Jul/13 02	27	27	100
57	Gandak	Hazipur	49.32	50.32	50.93	1948	50.12	29/Aug/13 08	40	40	100
58	Burhi Gandak	Lalbeghiaghat	62.20	63.20	67.09	30/07/1975	62.38	14/Jul/13 05	3	3	100
59	Burhi Gandak	Muzaffarpur	51.53	52.53	54.29	15/08/1987	51.46	16/Jul/13 13	0	0	
60	Burhi Gandak	Samastipur	45.02	46.02	49.38	15/08/1987	44.85	17/Jul/13 19	0	0	
61	Burhi Gandak	Rosera	41.63	42.63	46.35	16/08/1987	41.79	18/Jul/13 11	3	3	100
62	Burhi Gandak	Khagaria	35.58	36.58	39.22	1976	38.67	01/Sep/13 19	63	63	100
63	Bagmati	Benibad	47.68	48.68	50.01	12/07/2004	49.35	13/Jul/13 07	77	77	100
64	Bagmati	Hayaghat	44.72	45.72	48.96	14/08/1987	45.25	15/Jul/13 18	4	4	100
65	Adhwara Group	Kamtaul	49.00	50.00	52.99	12/08/1987	49.45	12/Jul/13 19	3	3	100
66	Adhwara Group	Ekmighat	45.94	46.94	49.52	12/07/2004	46.16	14/Jul/13 22	3	3	100
67	Kamla Balan	Jhanjharpur	49.00	50.00	53.01	10/07/2004	51.09	06/Sep/13 23	48	48	100
68	Kosi	Basua	46.75	47.75	49.17	25/08/2010	48.68	11/Jul/13 19	205	205	100
69	Kosi	Baltara	32.85	33.85	36.40	15/08/1987	33.54	07/Sep/13 12	42	42	100
70	Kosi	Kursela	29.00	30.00	32.04	06/09/1998	30.91	10/Aug/13 18	73	73	100
71	Mahananda	Dhengraghat	34.65	35.65	38.09	1968	37.28	12/Jul/13 10	54	54	100
72	Mahananda	Jhawa	30.40	31.40	33.51	14/08/1987	32.93	13/Jul/13 08	104	104	100
	Chhatisgarh										
73	Indravati	Jagdalpur	539.50	540.80	544.68	09/07/1973	542.06	15/Jun/13 05	27	22	81.48
	Dadra & Nagar Haveli										
74	Damanganga	Daman	2.60	3.40	4.00	03/08/2004	2.10	22/Jul/13 00	0	0	
	Gujarat										
75	Banas	Dantiwada Dam	182.88	185.06	186.04	01/09/1973	175.73	14/Oct/13 17	2	2	100
76	Sabarmati	Dharoi Dam	187.45	192.25	189.63	03/09/1990	186.91	14/Oct/13 14	0	0	
77	Sabarmati	Ahmedabad	44.09	45.34	47.45	19/08/2006	41.97	06/Sep/13 21	0	0	
78	Mahi	Kadana Dam	126.19	127.71	127.74	09/09/1989	127.69	05/Oct/13 13	21	21	100
79	Mahi	Wanakbori	71.00	72.54	76.10	12/08/2006	72.01	02/Aug/13 19	16	16	100
80	Naramada	Garudeswar	30.48	31.09	41.65	06/09/1970	34.86	25/Aug/13 00	9	9	100
81	Naramada	Bharuch	6.71	7.31	12.65	07/09/1970	10.90	25/Aug/13 00	32	32	100
82	Tapi	Ukai Dam	102.41	105.16	105.51	08/10/1990	105.05	11/Oct/13 00	127	124	97.64
83	Tapi	Surat	8.50	9.50	12.50	09/08/2006	9.80	24/Sep/13 00	6	6	100
84	Damanganga	Madhuban Dam	79.86	82.40	80.60	27/09/1993	80.10	03/Oct/13 00	7	7	100
85	Damanganga	Vapi Town	18.20	19.20	23.76	03/08/2004	16.50	02/Aug/13 00	0	0	

Statewise Flood Forecasting Information In India during Flood Season 2013

Sl. No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2013		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										
	Haryana										
86	Yamuna	Tajewala Weir	PL=323.70		328.27	03/09/1978	338.90	17/Jun/13 06	0	0	
	Jharkhand										
87	Ganga	Sahibgunj	26.25	27.25	30.91	1998	29.08	05/Sep/13 01	76	76	100
88	Mayurakshi	Massanjore Dam	FRL = 121.31		122.87	25/09/1999	119.375	19/Oct/13 18	3	3	100
89	Damodar	Tenughat Dam	FRL = 268.83		265.56	17/09/1985	262.57	03/Oct/13 01	35	35	100
90	Damodar	Panchet Dam	FRL = 132.59		132.89	02/10/1959	130.71	15/Oct/13 03	65	65	100
91	Barakar	Maithon Dam	FRL= 150.88		151.79	02/10/1959	150.81	15/Oct/13 02	26	26	100
	Karnataka										
92	Krishna	Alamati Dam	FRL=519.60		519.60	18/09/2002	519.60	10/Aug/13 08	31	28	90.32
93	Krishna	Narayanpur Dam	FRL=492.25		492.22	26/09/2008	492.25	08/Aug/13 17	49	45	91.84
94	Bhima	Deongaon	402.00	404.50	407.34	13/08/2006	403.00	22/Sep/13 05	3	2	66.67
95	Tungbhadra	Tungabhadra Dam	FRL=497.74		497.74	05/10/1992	497.74	12/Aug/13 05	163	160	98.16
	Madhya Pradesh										
96	Chambal	Gandhisagar Dam	FRL+399.99				399.90	28/Sep/13 00	17	17	100
97	Naramada	Mandla	437.20	437.80	439.41	18/08/1974	436.77	09/Aug/13 15	0	0	
98	Naramada	Hoshangabad	292.83	293.83	300.90	30/08/1973	299.50	23/Aug/13 20	47	46	97.87
	Maharashtra										
99	Godavari	Kopergaon	490.90	493.68	499.17	1969	489.92	25/Sep/13 08	0	0	
100	Godavari	Jaikwadi Dam	FRL=463.91		464.69	12/10/1990	459.29	17/Oct/13 19	0	0	
101	Godavari	Gangakhed	374.00	375.00	377.57	1947	368.12	19/Sep/13 12	0	0	
102	Godavari	Nanded	353.00	354.00	357.10	06/08/2006	346.45	24/Jul/13 13	0	0	
103	Wardha	Balharsha	171.50	174.00	176.00	15/08/1986	175.68	03/Aug/13 05	79	59	74.68
104	Wainganga	Bhandara	244.00	244.50	250.90	16/09/2005	245.70	27/Jul/13 14	34	31	91.18
105	Wainganga	Pauni	226.73	227.73	232.35	07/09/1994	229.75	24/Aug/13 12	17	13	76.47
106	Krishna	Arjunwad	542.07	543.29	543.69	05/08/2005			0	0	
107	Tapi	Hatnur Dam	212.02	214.00	214.00	12/10/1989	214.01	16/Oct/13 00	192	192	100
	NCT Delhi										
108	Yamuna	Delhi Rly Bridge	204.00	204.83	207.49	06/09/1978	207.32	19/Jun/13 19	50	48	96.00
109	Sahibi	Dhansa	211.44	212.44	213.58	06/08/1977	210.03	02/Sep/13 08	0	0	
	Odisha										
110	Subernarekna	Rajghat	9.45	10.36	12.69	19/06/2008	12.42	15/Oct/13 01	30	28	93.33
111	Burhabalang	NH_5 _Road Bridge	7.21	8.13	9.50	12/10/1973	9.24	14/Oct/13 08	26	24	92.31
112	Baitarni	Anandpur	37.44	38.36	41.35	23/09/2011	40.74	13/Oct/13 23	21	18	85.71
113	Baitarni	Akhuapada	17.83	17.83	21.95	16/08/1960	19.87	14/Oct/13 13	17	16	94.12
114	Brahmani	Jenapur	22.00	23.00	24.78	20/08/1975	21.76	14/Oct/13 09	0	0	
115	Rushikuluya	Purushottampur	15.83	16.83	19.65	04/11/1990	18.65	13/Oct/13 18	16	13	81.25
116	Vamsadhara	Gunupur	83.00	84.00	88.75	17/09/1980	83.82	24/Oct/13 16	7	7	100
117	Vamsadhara	Kashinagar	53.60	54.60	58.93	18/09/1980	55.35	24/Oct/13 15	93	86	92.47
118	Mahanadi	Hirakud Dam	FRL=192.02		192.30	30/01/1998	192.03	29/Sep/13 13	79	78	98.73
119	Mahanadi	Naraj	25.41	26.41	27.61	31/08/1982	26.16	01/Aug/13 17	6	6	100.00
120	Mahanadi	Alipingal Devi	10.85	11.76	13.11	11/09/2011	9.15	02/Aug/13 05	0	0	
121	Mahanadi	Nimapara	9.85	10.76	11.60	31/08/1982	7.96	02/Aug/13 12	0	0	
	Tripura										
122	Manu	Kailashar	24.34	25.34	25.79	07/06/1993	23.10	19/Aug/13 22	0	0	
123	Gumti	Sonamura	11.50	12.50	14.42	23/07/1993	12.03	06/Sep/13 05	2	2	100

Statewise Flood Forecasting Information In India during Flood Season 2013

Sl. No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2013		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										
	Uttar Pradesh										
124	Ganga	Narora Barrage	PL= 180.79 at D/S		180.61	23/09/2010	179.65	20/Jun/13 19	94	94	100
125	Ganga	Kannauj	124.97	125.97	126.78	27/09/2010	125.40	14/Aug/13 05	27	27	100
126	Ganga	Ankinghat	123.00	124.00	124.49	28/09/2010	123.73	16/Aug/13 14	57	57	100
127	Ganga	Kanpur	113.00	114.00	114.08	29/09/2010	112.91	16/Aug/13 16	58	58	100
128	Ganga	Dalmau	98.36	99.36	99.84	03/08/1973	98.82	17/Aug/13 04	21	21	100
129	Ganga	Phphamau	83.73	84.73	87.98	08/09/1978	86.82	26/Aug/13 04	28	25	89.29
130	Ganga	Allahabad	83.73	84.73	88.03	08/09/1978	86.04	26/Aug/13 06	21	17	80.95
131	Ganga	Mirzapur	76.72	77.72	80.34	09/09/1978	79.05	27/Aug/13 01	23	23	100
132	Ganga	Varanasi	70.26	71.26	73.90	09/09/1978	72.63	27/Aug/13 04	30	30	100
133	Ganga	Ghazipur	62.11	63.11	65.22	09/09/1978	65.02	28/Aug/13 14	40	39	97.50
134	Ganga	Ballia	56.62	57.62	60.25	14/09/2003	60.14	29/Aug/13 03	58	58	100
135	Ramganga	Moradabad	189.60	190.60	192.88	21/09/2010	190.23	30/Aug/13 17	20	20	100
136	Ramganga	Bareilly	162.70	163.70	162.88	06/8/1978	160.62	31/Aug/13 00	0	0	
137	Yamuna	Mawi	230.00	230.85	232.45	26/09/1988	232.75	18/Jun/13 11	44	42	95.45
138	Yamuna	Mathura	164.20	165.20	169.73	08/09/1978	166.03	22/Jun/13 16	56	55	98.21
139	Yamuna	Agra	151.40	152.40	154.76	09/09/1978	150.76	23/Jun/13 03	0	0	
140	Yamuna	Etawa	120.92	121.92	126.13	11/09/1978	120.16	13/Aug/13 08	0	0	
141	Yamuna	Auraiya	112.00	113.00	118.19	25/08/1996	113.81	27/Aug/13 03	13	8	61.54
142	Yamuna	Kalpi	107.00	108.00	112.98	25/08/1996	109.55	26/Aug/13 20	17	10	58.82
143	Yamuna	Hamirpur	102.63	103.63	108.59	12/09/1983	106.33	25/Aug/13 11	21	12	57.14
144	Yamuna	Chilaghat	99.00	100.00	105.16	06/09/1978	103.33	25/Aug/13 12	42	30	71.43
145	Yamuna	Naini	83.74	84.74	87.99	08/09/1978	86.60	26/Aug/13 21	28	19	67.86
146	Betwa	Mohana	121.66	122.66	133.69	11/09/1983	124.34	30/Jul/13 08	6	2	33.33
147	Betwa	Sahjina	103.54	104.54	108.67	12/09/1983	106.61	25/Aug/13 03	23	12	52.17
148	Ken	Banda	103.00	104.00	113.29	07/0720/05	108.46	24/Aug/13 13	20	11	55.00
149	Gomati	Lucknow	108.50	109.50	110.85	10/09/1971	105.91	30/Jun/13 05	0	0	
150	Gomati	Jaunpur	73.07	74.07	77.74	22/09/1971	70.75	03/Jul/13 10	0	0	
151	SAI	Raibareli	100.00	101.00	104.81	17/09/1982	99.52	03/Jul/13 06	0	0	
152	Ghaghra	Elgin Bridge	105.07	106.07	107.56	10/10/2009	107.12	22/Jul/13 08	89	80	89.89
153	Ghaghra	Ayodhya	91.73	92.73	94.01	11/10/2009	93.34	23/Jul/13 10	83	79	95.18
154	Ghaghra	Turtipar	63.01	64.01	66.00	28/08/1998	64.69	25/Jul/13 19	89	87	97.75
155	Rapti	Balrampur	103.62	104.62	105.25	11/09/2000	104.89	25/Jul/13 10	64	61	95.31
156	Rapti	Bansi	83.90	84.90	85.82	21/08/1998	84.84	28/Jul/13 20	56	54	96.43
157	Rapti	Gorakpur Birdghat	73.98	74.98	77.54	23/08/1998	75.12	13/Jul/13 19	59	56	94.91
158	Gandak	Khadda	95.00	96.00	97.50	23/07/2002	95.80	23/Jul/13 10	34	34	100
	Uttarakhand										
159	Alaknanda	Srinagar	539.00	540.00	536.85	05/09/1995	537.90	17/Jun/13 23	0	0	
160	Ganga	Rishikesh	339.50	340.50	341.72	05/09/1995	341.45	17/Jun/13 12	22	21	95.45
161	Ganga	Haridwar	293.00	294.00	296.30	19/09/2010	295.90	17/Jun/13 19	29	25	86.21
	West Bengal										
162	Ganga	Farakka	21.25	22.25	25.14	07/09/1998	24.40	06/Sep/13 04	160	158	98.75
163	Mayurakshi	Tilpara Barrage	PL= 62.79		67.05	27/09/1978	62.789	21/Aug/13 20	5	5	100
164	Mayurakshi	Narayanpur	26.99	27.99	29.69	27/09/1995	24.60	22/Aug/13 17	0	0	
165	Ajoy	Gheropara	38.42	39.42	43.94	27/09/1978	39.16	15/Oct/13 02	1	1	100
166	Damodar	Durgapur Barrage	PL = 64.47		64.47	31/10/2002	64.47	15/Oct/13 16	43	43	100
167	Mundeshwari	Harinkhola	11.80	12.80	14.58	29/09/1978	12.97	16/Oct/13 06	3	3	100
168	Kangsabati	Kangsabati Dam	FRL=134.11		134.71	02/09/1978	134.02	14/Oct/13 08	40	40	100
169	Kangsabati	Mohanpur	24.73	25.73	29.87	02/09/1978	26.02	15/Oct/13 05	1	1	100
170	Raidak-I	Tufanganj	34.22	35.30	36.36	21/07/1993	35.84	10/Jul/13 09	21	14	66.67

Statewise Flood Forecasting Information In India during Flood Season 2013

Sl. No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2013				
					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										
171	Torsa	Ghughumari	39.80	40.41	41.46	03/08/2000	40.22	10/Jul/13 08	29	29	100
172	Jaldhaka	NH-31	80.00	80.90	81.33	28/08/1972	80.20	10/Jul/13 12	14	14	100
173	Jaldhaka	Mathabhanga	47.70	48.20	49.85	07/09/2007	48.00	10/Jul/13 05	1	1	100.00
174	Tista	Domohani	85.65	85.95	89.30	14/10/1968	86.19	09/Jul/13 03	133	128	96.24
175	Tista	Mekhliganj	65.45	65.95	66.45	13/07/1996	65.37	10/Jul/13 11	0	0	
							Total Forecasts		***7060***	***6760***	**95.75**
							Level Forecasts		**5741**	**5471**	**95.30**
							Inflow Forecast		**1319**	**1289**	**97.73**

Performance of Flood Forecasting Stations (Divisionwise) in India during Flood Season 2013

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	2	51	46	90.20	0	0	0	0		3	2	51	46	90.20
2	Middle Ganga Division 1, Lucknow	6	6	440	417	94.77	0	0	0	0		6	6	440	417	94.77
3	Middle Ganga Division 2, Lucknow	8	5	183	183	100.00	1	1	94	94	100.00	9	6	277	277	100.00
4	Middle Ganga Division 3, Varanasi	7	6	200	192	96.00	0	0	0	0		7	6	200	192	96.00
5	Middle Ganga Division 4, Patna	17	14	716	716	100.00	0	0	0	0		17	14	716	716	100.00
6	Middle Ganga Division 5, Patna	18	16	947	945	100.00	0	0	0	0		18	16	947	945	99.79
7	Upper Yamuna Divn, Delhi	4	3	150	145	96.67	1	0	0	0		5	3	150	145	96.67
8	Chambal Division, Jaipur	0	0	0	0		1	1	17	17	100.00	1	1	17	17	100.00
9	Lower Yamuna Divn, Agra	10	8	170	104	61.18	0	0	0	0		10	8	170	104	61.18
10	Damodar Divn, Asansol	4	3	5	5	100.00	7	7	217	217	100.00	11	10	222	222	100.00
11	Upper Brahmaputra Divn, Dibrugarh	13	10	957	953	99.58	0	0	0	0		13	10	957	953	99.58
12	Middle Brahmaputra Divn, Guwahati	9	8	286	286	100.00	0	0	0	0		9	8	286	286	100.00
13	Lower Brahmaputra Divn, Jalpaiguri	10	9	549	535	97.45	0	0	0	0		10	9	549	535	97.45
14	Eastern Rivers Divn, Bhubaneswar	8	7	210	192	91.43	1	1	11	10	90.91	9	8	221	202	91.40
15	Mahanadi Divn, Burla	3	1	6	6	100.00	1	1	79	78	98.73	4	2	85	84	98.82
16	Lower Godavari Divn, Hyderabad	14	11	728	609	83.65	4	2	21	17	80.95	18	13	749	626	83.58
17	Lower Krishna Divn, Hyderabad	4	2	33	28	84.85	6	6	531	510	96.05	10	8	564	538	95.39
18	Mahi Divn, Ahmedabad	2	1	16	16	100.00	3	2	23	23	100.00	5	3	39	39	100.00
19	Tapi Divn,Surat	5	3	47	47	100.00	3	3	326	323	99.08	8	6	373	370	99.20
20	Narmada Divn, Bhopal	2	1	47	46	97.87	0	0	0	0		2	1	47	46	97.87
Total		**147**	**116**	**5741**	**5471**	**95.30**	**28**	**24**	**1319**	**1289**	**97.73**	**175**	**140**	**7060**	**6760**	**95.75**

Performance of Flood Forecasting Stations (Major Basinwise) in India during Flood Season 2013

Sl. No	Name of the Major River basin	Total no.of FF sites			No.of FF sites where no forecast was required			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	Ganga and its tributaries	87	77	10	16	15	1	2862	2753	96.19	328	328	100.00	3190	3081	96.58
2	Brahamputra and its tributaries	27	27	0	4	4	0	1744	1726	98.97	0	0		1744	1726	98.97
3	Barak and its tributaries	5	5	0	1	1	0	48	48	100.00	0	0		48	48	100.00
4	Eastern Rivers	9	8	1	1	1	0	210	192	91.43	11	10	90.91	221	202	91.40
5	Mahanadi and its tributaries	4	3	1	2	2	0	6	6	100.00	79	78	98.73	85	84	98.82
6	Godavari and its tributaries	18	14	4	5	3	2	728	609	83.65	21	17	80.95	749	626	83.58
7	Krishna and its tributaries	9	3	6	1	1	0	33	28	84.85	531	510	96.05	564	538	95.39
8	West Flowing rivers	15	9	6	4	3	1	110	109	99.09	349	346	99.14	459	455	99.13
9	Southern rivers	1	1	0	1	1	0	0	0		0	0		0	0	
Total		**175**	**147**	**28**	**35**	**31**	**4**	**5741**	**5471**	**95.30**	**1319**	**1289**	**97.73**	**7060**	**6760**	**95.75**

Annex VI

Performance of Flood Forecasting Stations (Statewise) in India during Flood Season 2013

Sl. No	Name of the Major River basin	Total no.of FF sites			No.of FF sites where no forecast was required			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	16	9	7	2	1	1	601	510	84.86	320	304	95.00	921	814	88.38
2	Assam	24	24	0	3	3	0	1592	1586	99.62	0	0		1592	1586	99.62
3	Bihar	32	32	0	5	5	0	1393	1393	100.00	0	0		1393	1393	100.00
4	Chattisgarh	1	1	0	0	0	0	27	22	81.48	0	0		27	22	81.48
5	Gujarat	11	6	5	3	2	1	63	63	100.00	157	154	98.09	220	217	98.64
6	Karnataka	4	1	3	0	0	0	3	2	66.67	243	233	95.88	246	235	95.53
7	Maharashtra	9	7	2	5	4	1	130	103	79.23	192	192	100.00	322	295	91.61
8	Madhya Pradesh	3	2	1	1	1	0	47	46	97.87	17	17	100.00	64	63	98.44
9	Odisha	12	11	1	3	3	0	216	198	91.67	79	78	98.73	295	276	93.56
10	Tripura	2	2	0	1	1	0	2	2	100.00	0	0		2	2	100.00
11	Uttar Pradesh	35	34	1	6	6	0	1127	1027	91.13	94	94	100.00	1221	1121	91.81
12	Uttarakhand	3	3	0	1	1	0	51	46	90.20	0	0		51	46	90.20
13	West Bengal	14	11	3	2	2	0	363	349	96.14	88	88	100.00	451	437	96.90
14	NCT, DELHI	2	2	0	1	1	0	50	48	96.00	0	0		50	48	96.00
15	D,NH	1	1	0	1	1	0	0	0		0	0		0	0	
16	Haryana	1	0	1	1	0	1	0	0		0	0		0	0	
17	Jharkhand	5	1	4	0	0	0	76	76	100.00	129	129	100.00	205	205	100.00
Total		**175**	**147**	**28**	**35**	**31**	**4**	**5741**	**5471**	**95.30**	**1319**	**1289**	**97.73**	**7060**	**6760**	**95.75**

FLOOD FORECASTING PERFORMANCE FROM 2000 TO 2013

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
Average	5016	4885	97.44	1016	977	95.87	6032	5862	97.23

Unprecedented flood events in India under CWC FF & W Network - 2013 flood season									
Sl .No	River	Station	State	Danger level in metres	Highest Flood Level (HFL)		New HFL		
					Level in metres	Date of occurrence	Level	From	To
1	Alaknanda	Srinagar	Uttarakhand	540.00	536.85	05/09/1995	537.90	17/06/2013 23:00	17/06/2013 23:00
2	Yamuna	Mawi	Uttar Pradesh	230.85	232.45	26/09/1988	232.75	18/06/2013 11:00	18/06/2013 14:00
3	Ganga	Bhagalpur	Bihar	33.68	34.20	17/09/2003	34.50	03/09/2013 22:00	04/09/2013 20:00

High Flood Events during Flood Season - 2013

Sl.No	River	Station	State	District	Danger level in metres	Existing HFL		Peak Level attained in 2013	Date and Time of Occurrence	Duration of High Flood	
						Level in metres	Date of occurrence			From	To
1	Alaknanda	Srinagar	Uttarakhand	Garhwal	540.00	536.85	05.09.1995	537.9	17/06/2013 23:00	16/06/13: 22	18/06/13: 06
2	Ganga	Rishikesh	Uttarakhand	Haridwar	340.50	341.72	05.09.1995	341.45	17/06/2013 12:00	17/06/13: 10	17/06/13: 16
3	Ganga	Haridwar	Uttarakhand	Haridwar	294.00	296.30	19.09.2010	295.90	17/06/2013 19:00	17/06/13: 15	17/06/13: 22
4	Ganga	Ghazipur	Uttar Pradesh	Ghazipur	63.11	65.22	09.09.1978	65.02	28/08/2013 16:00	26/08/13: 06	01/09/13: 01
5	Ganga	Ballia	Uttar Pradesh	Ballia	57.62	60.25	14.09.2003	59.94	04/08/2013 21:00	03/08/13: 06	07/08/13: 15
								59.81	17/08/2013 06:00	16/08/13: 12	18/08/13: 14
								60.14	29/08/2013 06:00	25/08/13: 11	04/09/13: 04
6	Ganga	Patna (Gandhighat)	Bihar	Patna	48.60	50.27	14.08.1994	49.90	02/09/2013 06:00	28/08/13: 10	04/09/13: 11
7	Ganga	Hatidah	Bihar	Patna	41.76	43.15	07.08.1971	42.89	02/09/2013 18:00	26/08/13: 20	06/09/13: 15
8	Ganga	Bhagalpur	Bihar	Bhagalpur	33.68	34.20	17.09.2003	33.89	08/08/2013 18:00	05/08/13: 21	12/08/13: 05
								34.50	03/09/2013 22:00	16/08/13: 17	09/09/13: 12
9	Ganga	Kahalgaon	Bihar	Bhagalpur	31.09	32.87	17.09.2003	32.45	04/09/2013 06:00	02/09/13: 06	06/09/13: 18
10	Yamuna	Mawi	Uttar Pradesh	Muzzafarnagar	230.85	232.45	26.09.1988	232.75	18/06/2013 11:00	19/06/13: 02	19/06/13: 16
11	Yamuna	Delhi Railway Bridge	NCT, Delhi	Delhi	204.83	207.49	06.09.1978	207.32	19/06/2013 19:00	19/06/13: 15	20/06/13: 13
12	Ghaghra	Elgin Bridge	Uttar Pradesh	Barabanki	106.07	107.56	10.10.2009	107.046	21/07/2013 20:00	22/07/13: 06	23/07/13: 03
13	Ghaghra	Gangpur Siswan	Bihar	Siwan	57.04	58.01	18.09.1983	57.57	19/08/2013 19:00	19/08/13: 04	22/08/13: 16
								57.60	01/09/2013 06:00	31/08/13: 06	03/09/13: 02
14	Rapti	Balrampur	Uttar Pradesh	Balrampur	104.62	105.25	11.09.2000	104.75	14/07/2013 06:00	14/07/13: 05	14/07/13: 14
								104.89	25/07/2013 10:00	24/07/13: 09	27/07/13: 08
								104.78	28/08/2013 08:00	29/08/13: 05	31/08/13: 03
								104.80	05/09/2013 18:00	04/09/13: 13	05/09/13: 02
15	Kosi	Basua	Bihar	Supaul	47.75	49.17	25.08.2010	48.68	11/07/2013 19:00	11/07/13: 18	12/07/13: 05
16	Brahmaputra	Dibrugarh	Assam	Dibrugarh	105.70	106.48	03/09/1998	106.01	06/09/2013 06:00	06/09/13: 04	06/09/13: 15
17	Brahmaputra	Neamatighat	Assam	Jorhat	85.04	87.37	11.07.1991	86.88	06/09/2013 16:00	06/09/13: 15	06/09/13: 20
18	Desang	Nanglamoraghat	Assam	Sibsagar	94.46	96.49	06.09.1998	96.10	19/08/2013 07:00	18/08/13: 19	19/08/13: 19
19	Wardha	Balharsha	Maharashtra	Chandrapur	174.00	176.00	15.08.1986	175.68	03/08/2013 05:00	02/08/13: 20	03/08/13: 17
20	Subarnarekha	Rajghat	Odisha	Balasore	10.36	12.69	19.06.2008	12.42	15/10/2013 01:00	14/10/13: 16	15/10/13: 12
21	Burhabalang	NH-5 Road Bridge	Odisha	Balasore	8.13	9.50	12.10.1973	9.24	14/10/2013 08:00	14/10/13: 01	14/10/13: 15

High Flood Level= HFL-0.50 M

Low and Moderate flood events on main Ganga and its tributaries- 2013 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2013		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	Alaknanada	Srinagar	Uttarakhand	539.00	540.00	537.90	17/06/13: 23	––	––	––	––	––	––
2	Ganga	Rishikesh	Uttarakhand	339.50	340.50	341.45	17/06/13: 12	16/06/13: 17	18/06/13: 19	3	17/06/13: 04	18/06/13: 09	2
								08/07/13: 12	08/07/13: 19	1			
								23/07/13: 18	26/07/13: 00	4			
								09/08/13: 12	11/08/13: 20	3			
								13/08/13: 11	17/08/13: 11	5			
3	Ganga	Haridwar	Uttarakhand	293.00	294.00	295.90	17/06/13: 19	16/06/13: 16	19/06/13: 14	4	16/06/13: 20	18/06/13: 12	3
								08/07/13: 11	08/07/13: 21	1			
								23/07/13: 17	27/07/13: 12	5			
								29/07/13: 11	29/07/13: 11	1			
								03/08/13: 15	03/08/13: 16	1			
								06/08/13: 13	17/08/13: 14	12	13/08/13: 16	13/08/13: 20	1
4	Ganga	Kannauj	Uttar Pradesh	124.97	125.97	125.4	14/08/2013 05:	13/07/2013	15/07/2013	3	––	––	––
								22/07/2013	03/08/2013	13			
								10/08/2013	23/08/2013	14			
5	Ganga	Ankinghat	Uttar Pradesh	123.00	124.00	123.73	16/08/2013 14:	22/06/2013	26/06/2013	5	––	––	––
								28/06/2013	02/07/2013	5			
								11/07/2013	17/07/2013	7			
								19/07/2013	07/08/2013	20			
								09/08/2013	25/08/2013	17			
								01/09/2013	04/09/2013	5			
6	Ganga	Kanpur	Uttar Pradesh	112.00	114.00	112.91	16/08/2013 16:	23/06/2013	26/06/2013	4	––	––	––
								29/06/2013	02/07/2013	4			
								12/07/2013	26/08/2013	46			
								02/09/2013	05/09/2013	4			
7	Ganga	Dalmau	Uttar Pradesh	98.36	99.36	98.82	17/08/2013 19:	27/07/2013	04/08/2013	9	––	––	––
								12/08/2013	24/08/2013	13			
8	Ganga	Phphamau	Uttar Pradesh	83.73	84.73	86.82	26.08.2013 04:	31/07/2013 14:00	06/08/2013 19:00	7	01/08/2013 11:00	05/08/2013 16:00	5
								12/08/2013 17:00	19/08/2013 14:00	8	13/08/2013 15:00	16/08/2013 20:00	4
								21/08/2013 20:00	03/09/2013 11:00	14	22/08/2013 20:00	02/09/2013 07:00	12
9	Ganga	Allahabad (Chhatnag)	Uttar Pradesh	83.73	84.73	86.04	26.08.2013 06:	01/08/2013 05:00	05/08/2013 23:00	5	23/08/2013 17:00	30/09/2013 09:00	8
								13/08/2013 08:00	17/08/2013 05:00	5			
								22/08/2013 15:00	02/09/2013 15:00	12			
10	Ganga	Mirzapur	Uttar Pradesh	76.72	77.72	79.05	27.08.2013 01:	01/08/2013 09:00	06/08/2013 13:00	6	23/08/2013 21:00	01/09/2013 14:00	10
								13/08/2013 11:00	18/08/2013 05:00	6			
								22/08/2013 17:00	03/09/2013 11:00	13			
11	Ganga	Varanasi	Uttar Pradesh	70.26	71.26	72.63	27.08.2013 04:	01/08/2013 01:00	07/08/2013 21:00	7	02/08/2013 07:00	06/08/2013 12:00	5
								13/08/2013 03:00	04/09/2013 12:00	23	14/08/2013 10:00	17/08/2013 17:00	4
											23/08/2013 13:00	03/09/2013 07:00	12
12	Ganga	Ghazipur	Uttar Pradesh	62.11	63.11	65.02	28.08.2013 14:	29/07/2013 12:00	11/08/2013 02:00	14	31/07/2013 09:00	08/08/2013 21:00	9
								11/08/2013 18:00	06/09/2013 18:00	27	13/08/2013 01:00	05/09/2013 08:00	24
13	Ganga	Ballia	Uttar Pradesh	56.62	57.62	60.14	29.08.2013 03:	21/07/2013 18:00	10/09/2013 18:00	82	25/07/2013 03:00	08/09/2013 10:00	46

Low and Moderate flood events on main Ganga and its tributaries- 2013 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2013		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
14	Ganga	Buxar	Bihar	59.32	60.32	61.44	29.08.2013 05:	30/07/2013 07:00	07/09/2013 06:00	40	01/08/2013 13:00	14/08/2013 11:00	14
15	Ganga	Patna (Dighaghat)	Bihar	49.45	50.45	50.94	02.09.2013 05:	26/07/2013 01:00	08/09/2013 17:00	45	16/08/2013 04:00	06/09/2013 01:00	22
16	Ganga	Patna (Gandhighat)	Bihar	47.60	48.60	49.9	01/09/2013 08:	02/07/2013 22:00	12/09/2013 12:00	73	25/07/2013 18:00	08/09/2013 20:00	46
17	Ganga	Hathidah	Bihar	40.76	41.76	42.89	02/09/2013 01:	14/07/2013 16:00	18/07/2013 00:00	4	27/07/2013 20:00	09/09/2013 08:00	45
								20/07/2013 02:00	13/09/2013 07:00	56			
18	Ganga	Munger	Bihar	38.33	39.33	39.84	03/09/2013 07:	30/07/2013 09:00	10/09/2013 03:00	43	19/08/2013 07:00	23/08/2013 02:00	5
											27/08/2013 04:00	07/09/2013 02:00	12
19	Ganga	Bhagalpur	Bihar	32.68	33.68	34.50	03/09/2013 22:	25/07/2013 15:00	12/09/2013 00:00	49	05/08/2013 13:00	12/08/2013 06:00	8
											16/08/2013 12:00	09/09/2013 10:00	25
20	Ganga	Kahalgaon	Bihar	30.09	31.09	32.45	04/09/2013 06	04/07/2013 07:00	16/09/2013 16:00	75	27/07/2013 09:00	12/09/2013 00:00	47
21	Ganga	Sahibganj	Jharkhand	26.25	27.25	29.08	05/09/2013 01	03/07/2013 14:00	16/09/2013 18:00	76	15/07/2013 13:00	18/07/2013 11:00	4
								18/10/2013 14:00	19/10/2013 00:00	1	25/07/2013 07:00	13/09/2013 05:00	51
22	Ganga	Farakka	West Bengal	21.25	22.25	24.40	06/09/2013 04	04/07/2013 03:00	18/09/2013 18:00	77	11/07/2013 10:00	14/09/2013 12:00	66
								15/10/2013 08:00	19/10/2013 00:00	4			
23	Ramganga	Moradabad	Uttar Pradesh	189.60	190.60	190.23	30/08/2013 07	18/06/2013	20/06/2013	3	——	——	——
								10/08/2013	19/08/2013	10			
								23/08/2013	24/08/2013	2			
24	Ramganga	Bareilly	Uttar Pradesh	162.70	163.70	160.62	31/08/2013 00	——	——	——	——	——	——
25	Yamuna	Mawi	Uttar Pradesh	230.00	230.85	232.75	18/06/2013 11	17/06/2013 03:00	22/06/2013 16:00	6	17/06/2013 12:00	20/06/2013 10:00	4
								26/06/2013 02:00	26/06/2013 14:00	1	21/07/2013 06:00	21/07/2013 06:00	1
								20/07/2013 00:00	26/07/2013 20:00	7	23/07/2013 01:00	23/07/2013 02:00	1
								02/08/2013 06:00	02/08/2013 14:00	1			
								07/08/2013 02:00	18/08/2013 06:00	12			
								22/08/2013 10:00	22/08/2013 19:00	1			
26	Yamuna	Delhi Rly. Bridge	Delhi	204.00	204.83	207.32	19/06/2013 19	17/06/2013 23:00	22/06/2013 07:00	6	18/06/2013 07:00	21/06/2013 06:00	4
								26/06/2013 14:00	27/06/2013 01:00	2	21/07/2013 16:00	23/07/2013 17:00	3
								21/07/2013 09:00	27/07/2013 10:00	7	10/08/2013 07:00	10/08/2013 10:00	1
								07/08/2013 10:00	25/08/2013 16:00	19	14/08/2013 08:00	15/08/2013 14:00	2
								09/08/2013 08:00	10/08/2013 06:00	2			
								10/08/2013 11:00	14/08/2013 07:00	5			
								15/08/2013 15:00	25/08/2013 12:00	11			
27	Sahibi	Dhansa Regulator	NCT Delhi	211.44	212.44	210.03	02/Sep/13 08	——	——	——	——	——	——
28	Yamuna	Mathura	Uttar Pradesh	164.20	165.20	166.03	22/06/2013 16	19/06/2013 16:00	29/06/2013 22:00	11	21/06/2013 11:00	23/06/2013 11:00	3
								01/07/2013 15:00	01/07/2013 17:00	1	11/08/2013 19:00	12/08/2013 14:00	2
								11/07/2013 17:00	13/07/2013 02:00	3	15/08/2013 17:00	19/08/2013 13:00	5
								22/07/2013 08:00	31/07/2013 14:00	10			
								04/08/2013 03:00	06/09/2013 13:00	34			
29	Yamuna	Agra	Uttar Pradesh	151.40	152.40	150.76	23/06/2013 03	——	——	——	——	——	——
30	Yamuna	Etawah	Uttar Pradesh	120.92	121.92	120.16	13/08/2013 08	——	——	——	——	——	——
31	Yamuna	Auraiya	Uttar Pradesh	112.00	113.00	113.81	27/08/2013 03	30/07/2013 18:00	01/08/2013 16:00	3	31/07/2013 12:00	01/08/2013 04:00	2
								11/08/2013 17:00	14/08/2013 14:00	4	12/08/2013 02:00	13/08/2013 15:00	2
								22/08/2013 17:00	28/08/2013 16:00	7	23/08/2013 09:00	24/08/2013 05:00	2
											26/08/2013 02:00	27/08/2013 21:00	2
32	Yamuna	Kalpi	Uttar Pradesh	107.00	108.00	109.55	26/08/2013 20	30/07/2013 23:00	04/08/2013 12:00	6	31/07/2013 09:00	01/08/2013 22:00	2
								11/08/2013 18:00	14/08/2013 18:00	4	11/08/2013 23:00	14/08/2013 03:00	4
								22/08/2013 15:00	29/08/2013 05:00	8	22/08/2013 23:00	28/08/2013 18:00	7
33	Yamuna	Hamirpur	Uttar Pradesh	102.63	103.63	106.33	25/08/2013 11	30/07/2013 20:00	04/08/2013 23:00	6	30/07/2013 21:00	04/08/2013 01:00	6
								11/08/2013 12:00	15/08/2013 02:00	5	11/08/2013 18:00	14/08/2013 11:00	4
								22/08/2013 05:00	29/08/2013 20:00	8	22/08/2013 17:00	28/08/2013 18:00	7
34	Yamuna	Chillaghat	Uttar Pradesh	99.00	100.00	103.33	25/08/2013 12:00	30/07/2013 19:00	05/08/2013 00:00	6	31/07/2013 04:00	04/08/2013 04:00	5
								11/08/2013 14:00	15/08/2013 15:00	5	11/08/2013 22:00	14/08/2013 20:00	4
								21/08/2013 18:00	01/09/2013 03:00	12	22/08/2013 10:00	29/08/2013 01:00	8

Low and Moderate flood events on main Ganga and its tributaries- 2013 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2013		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
35	Yamuna	Naini	Uttar Pradesh	83.74	84.74	86.6	26/08/2013 21:00	30/07/2013 19:00	05/08/2013 00:00	6	31/07/2013 04:00	04/08/2013 04:00	5
								11/08/2013 14:00	15/08/2013 15:00	5	11/08/2013 22:00	14/08/2013 20:00	4
								21/08/2013 18:00	01/09/2013 03:00	12	22/08/2013 10:00	29/08/2013 01:00	8
36	Betwa	Mohana	Uttar Pradesh	121.66	122.66	124.34	30/07/2013 18:00	29/07/2013 17:00	31/07/2013 12:00	3	29/07/2013 22:00	31/07/2013 08:00	3
								10/08/2013 17:00	12/08/2013 06:00	3	11/08/2013 03:00	12/08/2013 02:00	2
								24/08/2013 02:00	25/08/2013 04:00	2	24/08/2013 08:00	24/08/2013 22:00	1
37	Betwa	Sahijina	Uttar Pradesh	103.54	104.54	106.61	25/08/2013 03:00	30/07/2013 16:00	04/08/2013 02:00	6	30/07/2013 23:00	01/08/2013 16:00	3
								11/08/2013 14:00	14/08/2013 10:00	4	11/08/2013 21:00	13/08/2013 18:00	3
								22/08/2013 13:00	28/08/2013 15:00	5	23/08/2013 05:00	27/08/2013 07:00	5
38	Ken	Banda	Uttar Pradesh	103.00	104.00	108.46	24/08/2013 13:00	28/06/2013 14:00	28/06/2013 10:00	1	28/06/2013 19:00	30/06/2013 04:00	3
								29/07/2013 09:00	29/07/2013 19:00	1	29/07/2013 14:00	30/07/2013 12:00	2
								10/08/2013 12:00	12/08/2013 03:00	3	10/08/2013 16:00	11/08/2013 04:00	2
								20/08/2013 06:00	26/08/2013 07:00	7	20/08/2013 17:00	25/08/2013 21:00	6
								30/08/2013 21:00	31/08/2013 20:00	2	31/08/2013 03:00	31/08/2013 11:00	1
39	Gomati	Lucknow (Hanumansetu)	Uttar Pradesh	108.50	109.50	105.91	30/Jun/13 05	––	––	––	––	––	––
40	Gomati	Jaunpur	Uttar Pradehs	73.07	74.07	70.75	03/Jul/13 10	––	––	––	––	––	––
41	Sai	Rae-Barielly	Uttar Pradesh	100.00	101.00	99.52	03/Jul/13 06	––	––	––	––	––	––
42	Ghaghra	Elgin Bridge	Uttar Pradesh	105.070	106.070	107.116	22.07.13(0800)	18/06/2013 11:00	14/09/2013 04:00	89	18/06/2013 22:00	22/06/2013 16:00	5
								15/09/2013 03:00	15/09/2013 23:00	1	26/06/2013 05:00	01/07/2013 04:00	6
											07/07/2013 07:00	31/07/2013 16:00	25
											01/08/2013 13:00	02/08/2013 09:00	2
											07/08/2013 07:00	22/08/2013 22:00	16
											28/08/2013 03:00	30/08/2013 18:00	3
43	Ghaghra	Ayodhya	Uttar Pradesh	91.730	92.730	93.340	23.07.13(1000)	19.06.13(0200)	09.09.13(0700)	83	20.06.13(1000)	23.06.13(0300)	4
								10.09.13(1100)	11.09.13(0700)	2	28.06.13(0800)	29.06.13(0600)	02
											10.07.13(1400)	30.07.13(1400)	21
											08.08.13(1100)	12.08.13(1700)	5
											15.08.13(1000)	20.08.13(0800)	6
44	Ghaghra	Turtipar	Uttar Pradesh	63.010	64.010	64.690	25.07.13(1900)	20.06.13(0700)	26.06.13(0400)	7	21.06.13(1900)	23.06.13(2100)	3
								26.06.13(1300)	16.09.13(2200)	83	30.06.13(0400)	03.07.13(0600)	4
											09.07.13(1700)	01.08.13(2300)	24
											09.08.13(0800)	24.08.13(2400)	16
											28.08.13(2400)	08.09.13(1200)	12
45	Rapti	Balrampur	Uttar Pradesh	103.620	104.620	104.890	25.07.13(1000)	19.06.13(1200)	22.06.13(0600)	4	13.07.13(0500)	14.07.13(2400)	2
								30.06.13(2200)	02.07.13(2400)	3	22.07.13(0600)	23.07.13(0200)	2
								10.07.13(0400)	03.08.13(1000)	25	23.07.13(1800)	27.07.13(2100)	5
								06.08.13(2300)	24.08.13(1300)	19	28.08.13(1600)	31.08.13(1000)	4
								27.08.13(0200)	11.09.13(1700)	16	04.09.13(1700)	06.09.13(1700)	3
46	Rapti	Bansi	Uttar Pradesh	83.900	84.900	84.835	28.07.13(2000)	01.07.13(0400)	04.07.13(1000)	4	_	_	_
								11.07.13(2000)	02.08.13(1800)	23	_	_	_
								09.08.13(1900)	22.08.13(1900)	14	_	_	_
								28.08.13(0200)	13.09.13(0300)	17	_	_	_
47	Rapti	Birdghat	Uttar Pradesh	73.980	74.980	75.120	13.07.13(1900)	30.06.13(1800)	08.07.13(1900)	9	12.07.13(2100)	15.07.13(0800)	4
								09.07.13(1500)	22.07.13(0600)	14	27.07.13(2000)	28.07.13(1000)	2
								23.07.13(0200)	02.08.13(2300)	11	05.09.13(1200)	08.09.13(0800)	4
								11.08.13(0400)	19.08.13(0400)	9	_	_	_
								29.08.13(1000)	15.09.13(1000)	18	_	_	_

Low and Moderate flood events on main Ganga and its tributaries- 2013 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2013		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
48	Ghaghra	Darauli	Bihar	59.82	60.82	61.15	31-08-2013 18-24	20/06/2013 16:00	25/06/2013 16:00	6	23/07/2013 06:00	01/08/2013 02:00	10
								27/06/2013 07:00	15/09/2013 05:00	81	09/08/2013 21:00	24/08/2013 13:00	16
49	Ghaghra	Gangpur Siswan	Bihar	56.04	57.04	57.6	01/09/2013 05:00	21/06/2013 02:00	26/06/2013 03:00	6	25/07/2013 21:00	29/07/2013 18:00	5
								30/06/2013 06:00	05/07/2013 08:00	6	10/08/2013 02:00	26/08/2013 20:00	17
								08/07/2013 22:00	13/09/2013 22:00	68	28/08/2013 22:00	08/09/2013 14:00	12
50	Ghaghra	Chapra	Bihar	52.68	53.68	53.85	01-09-2013 19-24	01/08/2013 11:00	09/08/2013 08:00	9	28/08/2013 21:00	04/09/2013 04:00	8
								14/08/2013 04:00	06/09/2013 16:00	24			
51	Sone	Inderpuri	Bihar	107.20	108.20	105.70	25/Aug/13 10	---	---	---	---	---	
52	Sone	Koelwar	Bihar	54.52	55.52	53.84	26/Aug/13 06	---	---	---	---	---	
53	Sone	Maner	Bihar	51.00	52.00	52.79	01-09-2013 08-24	25/07/2013 02:00	08/09/2013 05:00	46	31/07/2013 03:00	09/08/2013 18:00	10
											31/08/2013 24:00	05/09/2013 23:00	6
54	Punpun	Sripalpur	Bihar	49.60	50.60	51.58	05/Sep/13 07	17/08/2013 22:00	24/08/2013 04:00	8	01/09/2013 17:00	01/09/2013 19:00	1
								28/08/2013 09:00	08/09/2013 06:00	12	03/09/2013 07:00	07/09/2013 03:00	5
								15/10/2013 12:00	18/10/2013 24:00	4	15/10/2013 19:00	18/10/2013 18:00	4
55	Gandak	Khadda	U.P	95.00	96.00	95.80	23/Jul/13 10	17.06.13/1100 hrs.	20.06.13/0400 hrs.	4	---	---	---
								06.07.13/1900 hrs.	13.07.13/2400 hrs.	8	---	---	---
								19.07.13/2000 hrs.	21.07.13/0200 hrs.	3	---	---	---
								2.07.13/0900 hrs.	24.07.13/0800 hrs.	3	---	---	---
								25.07.13/0900 hrs.	27.07.13/1100 hrs.	3	---	---	---
								03.09.13/2200 hrs.	04.09.13/2200 hrs.	2	---	---	---
56	Gandak	Chatia	Bihar	68.15	69.15	67.52	27/Jul/13 23	---	---	---	---	---	---
57	Gandak	Rewaghat	Bihar	53.41	54.41	54.33	29/Jul/13 02	21/06/2013 02:00	22/06/2013 07:00	2	---	---	---
								11/07/2013 20:00	16/07/2013 17:00	6	---	---	---
								21/07/2013 20:00	01/08/2013 05:00	12	---	---	---
								08/08/2013 23:00	18/08/2013 02:00	11	---	---	---
								04/09/2013 22:00	07/09/2013 03:00	4	---	---	---
58	Gandak	Hazipur	Bihar	49.32	50.32	50.12	29/Aug/13 08	27/07/2013 04:00	10/08/2013 22:00	15	---	---	---
								13/08/2013 20:00	07/09/2013 08:00	26	---	---	---
59	Burhigandak	Lalbegiaghat	Bihar	62.20	63.20	62.38	14.07.13/0500 hrs.	13.07.13/0300 hrs.	15.07.13/1800 hrs.	3	---	---	---
60	Burhigandak	Sikandarpur	Bihar	51.53	52.53	51.46	16.07.13/1300 hrs.	---	---	---	---	---	---
61	Burhigandak	Samastipur	Bihar	45.02	46.02	44.85	17.07.13/1900 hrs.	---	---	---	---	---	---
62	Burhigandak	Rosera	Bihar	41.63	42.63	41.79	18.07.13/1100 hrs.	16.07.13/1400 hrs.	19.07.13/1000 hrs.	4	---	---	---
63	Burhigandak	Khagaria	Bihar	35.58	36.58	38.67	01.09.13/1900 hrs.	13.07.13/0300 hrs.	13.09.13/1600 hrs.	63	28.07.13/0100 hrs.	11.09.13/0500	46
64	Bagmati	Benibad	Bihar	47.68	48.68	49.350	13.07.13/0700hrs	19.06.13/1200hrs	23.06.13/0300hrs	5	08.07.13/1000hrs	16.07.13/0400hrs	9
								25.0613/0900hrs	29.0613/1000hrs	5	13.08.13/1600hrs	13.08.13/2300hrs	1
								30.06.13/1900hrs	03.07.13/0400hrs	4	15.08.13/0200hrs	15.08.13/1800hrs	1
								07.07.13/0100hrs	19.07.13/1000hrs	20	18.08.13/1600hrs	20.08.13/0900hrs	3
								20.07.13/2200 hrs.	22.07.13/1600hrs	3	03.09.13/0700hrs	09.09.13/1000hrs	7
								23.07.13/0500hrs	29.07.13/1800hrs	7	---	---	---
								01.08.13/2400hrs	03.08.13/0600hrs	3	---	---	---
								05.08.13/1300hrs	06.08.13/0700hrs	2	---	---	---
								07.08.13/0800hrs	02.09.13/0500hrs	27	---	---	---
								02.09.13/1300hrs	15.09.13/0200hrs	14	---	---	---
								16.09.13/2300hrs	18.09.13/1800hrs	3	---	---	---
65	Bagmati	Hayaghat	Bihar	44.72	45.72	45.250	15.07.13/1800 hrs.	13.07.13/2100 hrs.	17.07.13/2100 hrs.	5	---	---	---
66	Adhwara Group	Kamtaul	Bihar	49.00	50.00	49.45	12.07.13/1900 hrs.	11.07.13/0300 hrs.	14.07.13/0300 hrs.	4	---	---	---
67	Adhwara Group	Ekmighat	Bihar	45.94	46.94	46.16	14.07.13/2200 hrs.	13.07.13/2100 hrs.	16.07.13/1200 hrs.	4	---	---	---

Low and Moderate flood events on main Ganga and its tributaries- 2013 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2013		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
68	Kamla Balan	Jhanjharpur	Bihar	49.00	50.00	51.09	06.09.13/2300 hrs.	18.06.13/2300 hrs.	19.06.13/1600 hrs.	2	10.07.13/0400 hrs.	10.07.13/1100 hrs.	1
								24.06.13/0200 hrs.	25.06.13/2400 hrs.	2	10.07.13/2100 hrs	11.07.13/1900 hrs.	2
								07.07.13/2000 hrs.	08.07.13/0700 hrs.	2	02.09.13/1100 hrs.	02.09.13/2200 hrs.	1
								08.07.13/1500 hrs.	09.07.13/1400 hrs.	2	03.09.13/0100 hrs.	05.09.13/2100 hrs.	3
								09.07.13/2200 hrs.	12.07.13/2100 hrs.	4	06.09.13/0100 hrs.	07.09.13/2400 hrs.	2
								16.08.13/1400 hrs.	19.08.13/0700 hrs.	4	09.09.13/0600 hrs.	10.09.13/0300 hrs.	2
								26.08.13/1400 hrs.	27.08.13/1400 hrs.	2			
								02.09.13/0300 hrs.	14.09.13/0600 hrs.	13			
								15.09.13/1500 hrs.	16.09.13/1400 hrs.	2			
								15.10.13/1600 hrs.	16.10.13/1300 hrs.	2			
69	Kosi	Basua	Bihar	46.75	47.75	48.68	11.07.13/1900 hrs.	25.06.13/1600 hrs.	05.10.13/0400 hrs.	93	08.07.13/2200 hrs.	15.07.13/2200 hrs.	8
								16.10.13/1000 hrs.	18.10.13/0400 hrs.	3	16.07.13/0800 hrs.	17.07.13/0100 hrs.	2
											17.07.13/2400 hrs.	02.08.13/0700 hrs.	17
											04.08.13/0300 hrs.	07.08.13/0900 hrs.	4
											10.08.13/0300 hrs.	23.08.13/1300 hrs.	14
											26.08.13/1500 hrs.	12.09.13/0600 hrs.	18
70	Kosi	Baltara	Bihar	32.85	33.85	33.54	07.09.13/1200 hrs.	10.07.13/1800 hrs.	02.08.13/0100 hrs.	24	---	---	---
								11.08.13/2400 hrs.	17.08.13/2400 hrs.	7	---	---	---
								19.08.13/1100 hrs.	23.08.13/0200 hrs.	5	---	---	---
								28.08.13/1500 hrs.	30.08.13/2400 hrs.	3	---	---	---
								03.09.13/1300 hrs.	13.09.13/0400 hrs.	11	---	---	---
71	Kosi	Kursela	Bihar	29.00	30.00	31.51	05.09.13/0100 hrs.	04.07.13/1400 hrs.	15.09.13/1000 hrs.	74	26.07.13/1400 hrs.	12.09.13/1800 hrs.	49
72	Mahananda	Dhengraghat	Bihar	34.65	35.65	37.28	12.07.13./1000hrs	28.06.13/0700hrs	02.07.13/2200hrs	5	06.07.13/1800hrs	16.07.13/2000hrs	11
								05.07.13/0700hrs	26.07.13/0500hrs	22	18.07.13./2400hrs	23.07.13/1800hrs	6
								06.08.13/0300hrs	15.08.13/1200hrs	10	06.08.13/2300hrs	08.08.13/1300hrs	3
								17.08.13/0200hrs	21.08.13/2200hrs	5	09.08.13/0700hrs	10.08.13/0200hrs	2
								27.08.13/2000hrs	29.08.13/1100hrs	3	10.08.13/1100hrs	12.08.13/0800hrs	3
								02.09.13/0700hrs	03.09.13/0700hrs	2	18.08.13/0600hrs	18.08.13/2100hrs	1
								03.09.13/2000hrs	12.09.13/2300hrs	10	07.09.13/0200hrs	09.09.13/0400hrs	3
73	Mahananda	Jhawa	Bihar	30.40	31.40	32.93	13.07.13/0800hrs	06.07.13/2100hrs	30.07.13/0300hrs	25	10.07.13/0100hrs	24.07.13/1900hrs	15
								06.08.13/1400hrs	24.08.13/0300hrs	19	07.08.13/1100hrs	08.08.13/2100hrs	2
								28.08.13/1300hrs	29.08.13/1300hrs	2	10.08.13/0100hrs	12.08.13/1900hrs	3
								03.09.13/0400hrs	03.09.13/16hrs	1	18.08.13/1800hrs	18.08.13/2400hrs	1
								03.09.13/2100hrs	13.09.13/1300hrs	11	07.09.13/1000hrs	09.09.13/0800hrs	3
74	Mayurakshi	Narayanpur	West Bengal	26.99	27.99	24.60	22/08/2013 17:00	---	---	---	---	---	---
75	Ajoy	Gheropara	West Bengal	38.42	39.42	39.16	15/10/2013 02:00	15/10/2013 01:00	15/10/2013 06:00	1	---	---	---
76	Mundeshwari	Harinkhola	West Bengal	11.80	12.80	12.97	16/10/2013 06:00	15/10/2013 13:00	17/10/2013 18:00	3	15/10/2013 21:00	16/10/2013 17:00	2
77	Kangsabati	Mohanpur	West Bengal	24.73	25.73	26.02	15/10/2013 05:00	14/10/2013 20:00	15/10/2013 20:00	2	15/10/2013 01:00	15/10/2013 10:00	1

Low and Moderate flood events on main Brahamaputra and its tributaries- 2013 flood season

Sl.	River	Station	State	Warning	Danger	Peak level in 2013		Flood period			Flood period		
						Level in metres	From	From	To	No.of days	From	To	No.of days
1	Brahmaputra	Dibrugarh	Assam	104.70	105.70	106.01	06/09/13:06-07	01/06/13:05	01/06/13:08	01	04/09/13:23	07/09/13:04	04
								27/06/13:08	02/08/13:17	37			
								08/08/13:21	10/08/13:19	03			
								02/09/13:17	11/09/13:05	10			
2	Brahmaputra	Neamatighat	Assam	84.04	85.04	86.88	06/09/13:16-20	31/05/13:22	05/06/13:22	06	28/06/13:03	02/08/13:06	36
								09/06/13:08	12/06/13:21	04	09/08/13:18	10/08/13:03	2
								26/06/13:11	23/08/13:21	59	03/09/13:21	11/09/13:12	9
								29/08/13:07	18/09/13:02	21	-	-	-
3	Brahmaputra	Tezpur	Assam	64.23	65.23	65.87	07/09/13:23-24	29/06/13:05	01/08/13:24	34	06/09/13:16	09/09/13:15	4
								11/08/13:05	11/08/13:21	1			
								05/09/13:02	12/09/13:13	8			
4	Brahmaputra	Guwahati	Assam	48.68	49.68	49.79	08/09/2013 (1800)	30/06/13(12)	02/07/13(07)	3	08/09/13(04)	09/09/13(17)	2
								09/07/13(21)	15/07/13(18)	7			
								22/07/13(20)	29/07/13(11)	8			
								06/09/13(14)	11/09/13(16)	6			
5	Brahmaputra	Goalpara	Assam	35.27	36.27	36.36	09/09/2013 (0700)	01/07/13(18)	02/07/13(24)	2	09/09/13(02)	10/09/13(19)	2
								08/07/13(17)	18/07/13(20)	11			
								19/07/13(23)	01/08/13(04)	14			
								06/09/13(23)	13/09/13(23)	8			
6	Brahmaputra	Dhubri	Assam	27.62	28.62	29.30	10.09.13 (0100)	30.06.13	19.08.13	51	10.07.13	17.07.13	8
								05.09.13	18.09.13	14	25.07.13	27.07.13	3
											07.09.13	13.09.13	7
7	Buridehing	Naharkatia	Assam	119.40	120.40	118.47	05/07/13:13-14	-	-	-	-	-	-
8	Buridehing	Chenimari	Assam	101.11	102.11	102.33	10/07/13:22-24	29/06/13:16	30/06/13:08	2	-	-	-
								05/07/13:05	19/07/13:13	15	06/07/13:02	07/07/13:14	2
								16/08/13:02	18/08/13:10	3	09/07/13:22	12/07/13:20	4
								06/09/13:14	08/09/13:07	3			-

Low and Moderate flood events on main Brahamaputra and its tributaries- 2013 flood season

Sl.	River	Station	State	Warning	Danger	Peak level in 2013		Flood period			Flood period		
						Level in metres	From	From	To	No.of days	From	To	No.of days
9	Subansiri	Badatighat	Assam	81.53	82.53	82.22	07/09/13:20-22	07/07/13:08	13/07/13:16	7	-	-	-
								22/07/13:03	24/07/13:17	3	-	-	-
								06/09/13:06	09/09/13:13	4	-	-	-
10	Dikhow	Sivasagar	Assam	91.4	92.4	93.72	18/08/13:01-02	28/06/13:13	01/07/13:24	4	28/06/13:19	29/06/13:05	3
								03/07/13:10	04/07/13:03	3	29/06/13:16	30/06/13:24	
								04/07/13:17	05/07/13:12		16/08/13:13	19/08/13:03	4
								12/07/13:19	14/07/13:04	3	-	-	-
								15/07/13:12	16/07/13:03	2	-	-	-
								17/07/13:12	18/07/13:09	2	-	-	-
								21/07/13:05	22/07/13:10	2	-	-	-
								27/07/13:19	28/07/13:14	2	-	-	-
								29/07/13:10	30/07/13:04	2	-	-	-
								06/08/13:05	07/08/13:18	2	-	-	-
								13:08:13:15	15/08/13:14	3	-	-	-
								16/08/13:11	19/08/13:16	4	-	-	-
								05/09/13:15	07/09/13:20	3	-	-	-
11	Desang	Nanglamoragh	Assam	93.46	94.46	96.10	19/08/13:07-09	15/05/13:01	15/05/13:15	1			
								08/06/13:08	12/06/13:11	5	05/07/13:19	07/07/13:13	3
								30/06/13:12	07/07/13:24	8	08/07/13:22	12/07/13:02	5
								07/08/13:01	14/07/13:10	8	16/08/13:23	21/08/13:07	6
								18/.07/13:07	19/07/13:02	2	-	-	-
								06/08/13:15	08/08/13:03	3	-	-	-
								16/08/13:09	21/08/13:17	6	-	-	-
								07/10/13:12	09/10/13:09	3	-	-	-
12	Dhansiri(s)	Golaghat	Assam	88.5	89.5	90.22	06/08/13:23-24	01/07/13:17	02/07/13:15	2	06/08/13:03	07/08/13:24	2
								17/07/13:09	19/07/13:11	3	08/08/13:01	08/08/13:10	1
								21/07/13:03	21/07/13:22	1	13/08/13:06	13/08/13:22	1
								27/07/13:13	30/07/13:02	4	-	-	-
								05/08/13:15	10/08/13:05	6	-	-	-
								11/08/13:23	17/08/13:11	7	-	-	-
								25/08/13:04	25/08/13:15	1	-	-	-
								28/08/13:20	29/08/13:22	2	-	-	-
								06/10/13:12	09/10/13:07	4	-	-	-
13	Dhansiri(s)	Numaligarh	Assam	76.42	77.42	79.23	07/08/13:22-24	15/05/13:01	16/05/13:20	7	26/06/13:12	26/06/13:14	1
								16/05/13:24	21/05/13:14		01/07/13:20	04/07/13:08	4
								23/06/13:15	16/09/13:10	86	13/07/13:04	15/07/13:13	3
								21/09/13:01	24/09/13:03	12	16/07/13:19	01/08/13:18	17
								24/09/13:16	29/09/13:15		02/08/13:04	20/08/13:20	19
								29/09/13:23	02/10/13:12		24/08/13:22	31/08/13:04	8
								06/10/13:02	14/10/13:17	9	06/09/13:24	08/09/13:09	4
											06/10/13:09	10/10/13:18	5

Low and Moderate flood events on main Brahamaputra and its tributaries- 2013 flood season

Sl.	River	Station	State	Warning	Danger	Peak level in 2013		Flood period			Flood period		
						Level in metres	From	From	To	No.of days	From	To	No.of days
14	Kopili	Kampur	Assam	59.5	60.5	59.03	10/06/13:20-21	-	-	-	-	-	-
15	Kopili	Dharamtul	Assam	55.00	56.00	54.47	17/08/13:21-24	-	-	-	-	-	-
16	Jiabharali	NT.Rd.X-ing	Assam	76.00	77.00	77.98	06/07/13:19-20	15/05/13:12	16/05/13:04	2	26/06/13:10	26/06/13/:15	1
								16/05/13:13	16/05/13:20		27/06/13:05	27/06/13:19	1
								24/05/13:13	24/05/13:20	1	28/06/13:03	30/06/13:18	3
								30/05/13:13	30/05/13:17	4	02/07/13:11	02/07/13:18	1
								30/05/13:22	02/06/13:23		03/07/13:03	03/07/13:23	1
								03/06/13:14	06/06/13:23	4	04/07/13:15	04/07/13:24	1
								07/06/13:05	08/06/13:04	4	05/07/13:08	10/07/13:18	11
								08/06/13:09	10/06/13:06		11/07/13:10	15/07/13:19	
								18/06/13:05	18/06/13:08	7	16/07/13:11	16/07/13:17	1
								18/06/13:16	24/06/13:03		17/07/13:15	17/07/13:21	1
								24/06/13:09	24/06/13:21	1	18/07/13:09	19/07/13:20	2
								25/06/13:07	03/08/13:09	9	20/07/13:02	20/07/13:13	1
								05/08/13:22	16/08/13:18	14	21/07/13:05	23/07/13:06	3
								17/08/13:09	18/08/13:14	2	23/07/13:11	23/07/13:16	
								19/08/13:05	19/08/13:09	1	24/07/13:12	24/07/13:20	1
								26/08/13:11	14/09/13:12	20	07/08/13:13	07/08/13:22	1
								15/09/13:01	15/09/13:17	1	08/08/13:07	08/08/13:11	1
								21/09/13:10	21/09/13:18	1	09/08/13:11	09/08/13:18	1
								25/09/13:17	26/09/13:08	4	10/08/13:09	11/08/13:10	2
								26/09/13:13	28/09/13:14		11/08/13:15	11/08/13:21	
								28/09/13:24	30/09/13:05	3	28/08/13:12	28/08/13:17	1
								05/10/13:11	05/10/13:17	1	30/08/13:02	30/08/13:12	1
								06/10/13:01	07/10/13:20	2	02/09/13:06	04/09/13:21	7
								-	-	-	05/09/13:03	08/09/13:09	
17	Puthimari	Puthimari _NHX	Assam	50.81	51.81	52.75	06/09/2013 (2300)	31/05/13(09)	02/06/13(04)	3	27/06/13(03)	27/06/13(07)	1
								26/06/13(22)	05/07/13(17)	10	08/07/13(17)	09/07/13(05)	2
								06/07/13(24)	30/07/13(17)	25	09/07/13(18)	11/07/13(05)	2
								30/07/13(20)	02/08/13(03)	2	22/07/13(13)	22/07/13(16)	1
								02/08/13(07)	04/08/13(17)	3	24/07/13(18)	25/07/13(03)	2
								05/08/13(23)	20/08/13(04)	16	10/08/13(06)	11/08/13(05)	2
								21/08/13(08)	24/08/13(24)	4	11/08/13(07)	12/08/13(12)	1
								26/08/13(12)	20/09/13(12)	26	14/08/13(16)	14/08/13(18)	1
								27/09/13(13)	28/09/13(04)	2	06/09/13(12)	08/09/13(23)	3
								06/10/13(16)	08/10/13(17)	3			
18	Pagladia	Pagladia_NTX	Assam	51.75	52.75	52.40	07/09/2013 (0600)	06/09/13(09)	09/09/13(05)	4	-	-	-
19	Barak	APGhat	Assam	18.83	19.83	19.66	18/08/2013 (1200)	16/08/13(16)	20/08/13(08)	5	-	-	-
20	Katakhal	Matizuri	Assam	19.27	20.27	22.17	17/08/2013 (1800)	15/08/13(19)	23/08/13(13)	9	16/08/13(15)	20/08/13(10)	5
								25/08/13(13)	29/08/13(11)	5	25/08/13(21)	28/08/13(14)	4
21	Kushiyara	Karimganj	Assam	13.94	14.94	14.97	18/08/2013 (2000)	16/08/13(03)	23/08/13(04)	8	18/08/13(16)	19/08/13(03)	2
22	Manu	Kailashar	Tripura	24.34	25.34	23.10	19/08/2013 (2200))	-	-	-	-	-	-
23	Gumti	Sonamura	Tripura	11.50	12.50	12.03	06/09/2013 (0500)	05/09/13(19)	06/09/13(17)	2	-	-	-
24	Manas	Manas NH- Crossing	Assam	47.81	48.42	48.07	07.09.13 (1200)	09.07.13	09.07.13	1	-	-	-
								07.09.13	08.09.13	2	-	-	-

Low and Moderate flood events on main Brahamaputra and its tributaries- 2013 flood season

Sl.	River	Station	State	Warning	Danger	Peak level in 2013		Flood period			Flood period		
						Level in metres	From	From	To	No.of days	From	To	No.of days
25	Beki	Beki Rd. Bridge	Assam	44.10	45.10	45.65	22.07.13 (1800)	30.05.13	02.06.13	4	05.07.13	05.07.13	1
								04.06.13	06.06.13	3	08.07.13	11.07.13	4
								09.06.13	10.06.13	2	13.07.13	13.07.13	1
								23.06.13	20.08.13	59	17.07.13	24.07.13	8
								26.08.13	17.09.13	23	11.08.13	12.08.13	2
											06.09.13	08.09.13	3
26	Sankosh	Golokganj	Assam	28.94	29.94	29.92	11.07.13 (0200)	06.07.13	16.07.13	11	-	-	-
								19.07.13	22.07.13	4	-	-	-
								12.08.13	14.08.13	3	-	-	-
								04.09.13	10.09.13	7	-	-	-
27	Teesta	Domohani	W.B.	85.65	85.95	86.19	09.07.13 (0300)	30.05.13	01.06.13	3	27.06.13	30.06.13	4
								04.06.13	06.06.13	3	05.07.13	10.07.13	6
								21.06.13	22.06.13	2	12.07.13	12.07.13	1
								24.06.13	15.07.13	22	01.09.13	02.09.13	2
								17.07.13	29.07.13	13	-	-	-
								31.07.13	01.08.13	2	-	-	-
								05.08.13	06.08.13	2	-	-	-
								09.08.13	12.08.13	4	-	-	-
								16.08.13	16.08.13	1	-	-	-
								21.08.13	21.08.13	1	-	-	-
								27.08.13	30.08.13	4	-	-	-
								01.09.13	08.09.13	8	-	-	-
								15.10.13	16.10.13	2	-	-	-
28	Teesta	Mekhliganj	W.B.	65.45	65.95	65.37	10.07.13 (1100)	-	-	-	-	-	-
29	Jaldhaka	N H 31	W.B.	80.00	80.90	80.20	10.07.13 (1200)	08.07.13	10.07.13	3	-	-	-
								12.07.13	12.07.13	1	-	-	-
								18.07.13	19.07.13	2	-	-	-
								06.08.13	06.08.13	1	-	-	-
								17.08.13	17.08.13	1	-	-	-
30	Jaldhaka	Mathabhanga	W.B.	47.70	48.20	48.00	10.07.13 (0500)	10.07.13	10.07.13	1	-	-	-
31	Torsa	Ghughumari	W. B.	39.80	40.41	40.22	10.07.13 (0800)	06.07.13	13.07.13	8	-	-	-
								18.07.13	20.07.13	3	-	-	-
								17.08.13	17.08.13	1	-	-	-
								06.09.13	07.09.13	2	-	-	-
32	Radak-I	Tufanganj	W. B.	34.22	35.30	35.84	10.07.13 (0900)	06.07..13	12.07.13	7	07.07.13	11.07.13	5
								04.09.13	09.09.13	6	06.09.13	07.09.13	2

Low and Moderate flood events on various river systems (excluding Ganga and Brahmaputra basins)- 2013 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2013		Flood period => warning level			Flood period => danger level		
						Level in metres	Time	From	To	No. of days	From	To	No. of days
1	Subernarekna	Rajghat	Orissa	9.45	10.36	12.42	15/Oct/13 01	30/07/13: 13	01/08/13: 21	3	30/07/2013 18:00	01/08/2013 06:00	3
								21/08/13: 03	25/08/13: 01	5	21/08/2013 12:00	24/08/2013 04:00	4
								02/10/13: 20	05/10/13: 06	4	03/10/2013 05:00	04/10/2013 12:00	2
								14/10/13: 00	17/10/13: 14	4	14/10/2013 02:00	16/10/2013 13:00	3
								26/10/13: 18	28/10/13: 15	3	27/10/2013 01:00	28/10/2013 16:00	2
2	Burhabalang	NH_5 _Road Bridge	Orissa	7.21	8.13	9.24	14/Oct/13 08	27/07/13: 00	27/07/13: 19	1	-	-	-
								31/07/13: 16	01/08/13: 00	2	-	-	-
								21/08/13: 04	22/08/13: 23	2	-	-	-
								01/10/13: 14	03/10/13: 22	3	-	-	-
								13/10/13: 07	15/10/13: 23	3	13/10/13: 18	15/10/13: 09	3
								25/10/13: 03	28/10/13: 00	4	-	-	-
3	Baitarni	Anandpur	Orissa	37.44	38.36	40.74	13/Oct/13 23	26/07/13: 22	27/07/13: 12	2	27/07/13: 01	27/07/13: 07	1
								30/07/13: 17	31/07/13: 21	2	30/07/13: 22	31/07/13: 04	2
								21/08/13: 02	22/08/13: 07	2	21/08/13: 07	21/08/13: 18	1
								20/09/13: 02	20/09/13: 18	1	20/09/13: 04	20/09/13: 15	1
								13/10/13: 08	15/10/13: 03	3	13/10/13: 11	14/10/13: 19	2
4	Baitarni	Akhuapada	Orissa		17.83	19.87	14/Oct/13 13	-	-	-	27/07/13: 03	28/07/13: 04	2
								-	-	-	30/07/13: 23	01/08/13: 14	3
								-	-	-	21/08/13: 06	23/08/13: 04	3
								-	-	-	20/09/13: 06	21/09/13: 12	2
								-	-	-	13/10/13: 10	16/10/13: 03	4
5	Brahmani	Jenapur	Orissa	22.00	23.00	21.76	14/Oct/13 09	-	-	-	-	-	-
6	Rushikuluya	Purushottampur	Orissa	15.83	16.83	18.65	13/Oct/13 18	13/10/13: 08	15/10/13: 21	3	13/10/13: 09	14/10/13: 16	2
								23/10/13: 14	28/10/13: 23	6	24/10/13: 15	28/10/13: 05	5
7	Vamsadhara	Gunupur	Orissa	83	84	83.82	24/Oct/13 16	13/10/13: 14	13/10/13: 22	1	-	-	-
								27/10/13: 18	28/10/13: 11	2	-	-	-
8	Vamsadhara	Kashinagar	Orissa	53.60	54.60	55.35	24/Oct/13 15	13/06/13: 11	14/06/13: 16	2	13/06/13: 14	13/06/13: 23	
								25/06/13: 15	26/06/13: 14	2	-	-	-
								26/06/13: 22	27/06/13: 07	2	-	-	-
								12/07/13: 22	13/07/13: 08	2	-	-	-
								23/07/13: 06	24/07/13: 20	2	-	-	-
								25/07/13: 23	26/07/13: 07	2	-	-	-
								27/07/13: 09	28/07/13: 10	2	-	-	-
								31/07/13: 18	01/08/13: 09	2	-	-	-
								02/08/13: 21	03/08/13: 06	2	-	-	-
								06/08/13: 13	07/08/13: 17	2	-	-	-
								10/08/13: 23	11/08/13: 06	2	-	-	-
								13/08/13: 21	14/08/13: 07	2	-	-	-
								13/10/13: 08	17/10/13: 19	5	13/10/13: 14	14/10/13: 02	2
								21/10/13: 23	22/10/13: 21	2			-
								23/10/13: 01	01/11/13: 00	10	24/10/13: 10	25/10/13: 10	2
9	Mahanadi	Naraj	Orissa	25.41	26.41	26.16	01/Aug/13 17	01/08/13: 05	03/08/13: 08	3	-	-	-
								11/10/13: 15	12/10/13 24:	2	-	-	-
10	Mahanadi	Alipingal Devi	Orissa	10.85	11.76	9.15	02/Aug/13 05	-	-	-	-	-	-
11	Mahanadi	Nimapara	Orissa	9.85	10.76	7.96	02/Aug/13 12	-	-	-	-	-	-

Annex XII

Low and Moderate flood events on various river systems (excluding Ganga and Brahmaputra basins)- 2013 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2013		Flood period => warning level			Flood period => danger level		
						Level in metres	Time	From	To	No. of days	From	To	No. of days
12	Godavari	Kopergaon	Maharashtra	490.90	493.68	489.92	25/Sep/13 08	-	-	-	-	-	-
13	Godavari	Gangakhed	Maharashtra	374.00	375.00	368.12	19/Sep/13 12	-	-	-	-	-	-
14	Godavari	Nanded	Maharashtra	353.00	354.00	346.45	24/Jul/13 13	-	-	-	-	-	-
15	Godavari	Kaleswaram	Andhra Pradesh	103.50	104.75	104.81	02/Aug/13 19	19/07/13: 21	20/07/13: 21	1	-	-	-
								23/07/13: 15	24/07/13: 22	2	-	-	-
								01/08/13: 15	04/08/13: 17	4	02/08/13: 17	02/08/2013 24:00	1
16	Godavari	Eturunagaram	Andhra Pradesh	73.29	75.79	76.04	02/Aug/13 11	18/07/13: 14	22/07/13: 15	5	-	-	-
								23/07/13: 08	28/07/13: 02	6	-	-	-
								01/08/13: 00	06/08/13: 03	6	02/08/13: 02	03/08/13: 07	2
17	Godavari	Dummagudem	Andhra Pradesh	53.00	55.00	56.80	03/Aug/13 03	19/07/13: 04	23/07/13: 05	5	19/07/13: 13	21/07/13: 13	3
								23/07/13: 20	26/07/13: 08	4	24/07/13: 12	25/07/13: 11	2
								27/07/13: 02	28/07/13: 02	2			
								01/08/13: 11	06/08/13: 04	6	01/08/13: 21	04/08/13: 22	4
18	Godavari	Bhadrachalam	Andhra Pradesh	45.72	48.77	51.38	03/Aug/13 05	18/07/13: 21	28/07/13: 21	11	19/07/13: 14	22/07/13: 00	4
								-	-	-	24/07/13: 08	25/07/13: 23	2
								01/08/13: 09	07/08/13: 08	7	01/08/13: 21	05/08/13: 18	5
19	Godavari	Kunavaram	Andhra Pradesh	37.74	39.24	43.26	04/Aug/13 05	19/07/13: 17	28/07/13: 15	10	20/07/13: 02	23/07/13: 14	4
								-	-	-	24/07/13: 11	26/07/13: 21	3
								02/08/13: 00	07/08/13: 11	6	02/08/13: 07	06/08/13: 22	5
20	Godavari	Rajamundry	Andhra Pradesh	17.68	19.51	18.68	04/Aug/13 10	20/07/13: 15	23/07/13: 07	4	-	-	-
								25/07/13: 04	26/07/13: 23	2	-	-	-
								02/08/13: 20	06/08/13: 20	5	-	-	-
21	Godavari	Dowalaiswaram	Andhra Pradesh	14.25	16.08	16.46	04/Aug/13 02	19/07/13: 18	29/07/13: 14	11	-	-	-
								02/08/13: 04	08/08/13: 11	7	03/08/13: 14	06/08/13: 00	3
22	Wardha	Balharsha	Maharashtra	171.50	174.00	175.68	03/Aug/13 05	16/07/13: 23	21/07/13: 09	6	17/07/13: 20	18/07/13: 16	2
								23/07/13: 19	26/07/13: 15	4			
								31/07/13: 23	05/08/13: 04	6	01/08/13: 16	04/08/13: 11	4
23	Wainganga	Bhandara	Maharashtra	244.00	244.50	245.70	27/Jul/13 14	16/07/13: 01	17/07/13: 03	2	16/07/13: 03	17/07/13: 01	2
								26/07/13: 14	28/07/13: 01	3	26/07/13: 18	27/07/13: 23	2
								19/08/13: 08	20/08/13: 04	3	19/08/13: 12	20/08/13: 01	2
								23/08/13: 02	24/08/13: 21	2	23/08/13: 16	24/08/13: 19	2
24	Wainganga	Pauni	Maharashtra	226.73	227.73	229.75	24/Aug/13 12	15/07/13: 23	17/07/13: 06	3	16/07/13: 11	16/07/13: 23	1
								26/07/13: 21	28/07/13: 02	3	-	-	-
								01/08/13: 09	02/08/13: 10	2	01/08/13: 22	02/08/13: 05	2
								22/08/13: 20	25/08/13: 03	4	23/08/13: 03	25/08/13: 01	3
25	Indravati	Jagdalpur	Chhatisgarh	539.50	540.80	542.06	15/Jun/13 05	13/06/13: 21	16/06/13: 08	4	14/06/13: 06	16/06/13: 02	3

Annex XII

Low and Moderate flood events on various river systems (excluding Ganga and Brahmaputra basins)- 2013 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2013		Flood period => warning level			Flood period => danger level		
						Level in metres	Time	From	To	No. of days	From	To	No. of days
26	Krishna	Arjunwad	Maharashtra	542.07	543.29			-	-	-	-	-	-
27	Bhima	Deongaon	Karnataka	402.00	404.50	403.00	22/Sep/13 05	21/09/13: 11	22/09/13: 15	2	-	-	-
28	Tungbhadra	Mantralayam	Andhra Pradesh	310.00	312.00	311.39	05/Aug/13 23	24/07/13: 17	08/08/13: 17	16	-	-	-
29	Pennar	Nellore	Andhra Pradesh	15.91	17.28	13.02	30/Nov/13 08	-	-	-	-	-	-
30	Sabarmati	Ahmedabad Shubhash Bridge	Gujarat	44.09	45.34	41.97	06/Sep/13 21	-	-	-	-	-	-
31	Mahi	Wanakbori	Gujarat	69.80	72.54	72.01	02/Aug/13 19	26/07/13: 09	28/07/13: 14	3	-	-	-
								31/07/13: 23	01/08/13: 13	2	-	-	-
								02/08/13: 07	03/08/13: 23	2	-	-	-
								14/08/13: 09	15/08/13: 09	2	-	-	-
32	Naramada	Mandla	Madhya Pradesh	437.20	437.80	436.77	09/Aug/13 15	-	-	-	-	-	-
33	Naramada	Hoshangabad	Madhya Pradesh	292.83	293.83	299.50	23/Aug/13 20	01/08/13: 04	02/08/13: 12	2	01/08/13: 08	02/08/13 07:00	2
								20/08/13: 12	25/08/2013 24:00	6	20/08/13: 19	25/08/13: 18	6
34	Naramada	Garudeswar	Gujarat	30.48	31.09	34.86	25/Aug/13 00	02/08/13: 15	03/08/13: 04	2	02/08/13: 19	02/08/13 24:00	1
								24/08/13: 04	26/08/13: 13	3	24/08/13: 05	26/08/13: 11	3
35	Naramada	Bharuch	Gujarat	6.71	7.31	10.90	25/Aug/13 00	02/08/13: 10	05/08/13: 07	4	02/08/13: 12	04/08/13: 22	3
								15/08/13: 11	15/08/13: 17	1	-	-	-
								22/08/13: 04	29/08/13: 06	8	22/08/13: 08	28/08/13: 18	7
								23/09/13: 08	26/09/13: 13	4	23/09/13: 11	26/09/13: 04	4
36	Tapi	Surat	Gujarat	8.50	9.50	9.80	24/Sep/13 00	23/09/13: 09	24/09/13: 14	2	23/09/13: 18	24/09/13: 12	2
37	Damanganga	Vapi Town	Gujarat	18.20	19.20	16.50	02/Aug/13 00	-	-	-	-	-	-
38	Damanganga	Daman	Dadra & Nagar Haveli	2.60	3.40	2.10	22/Jul/13 00	-	-	-	-	-	-

Annexure-XIII

Meteorological and Flood Situation in association with "Phailin"

Rainfall Situation

Moderate to rather heavy rainfall with isolated heavy rainfall occurred in Odisha on 12th October 2013. Heavy to very Heavy rainfall at a few places and extremely heavy rainfall at one or two places occurred in Odisha and Heavy to very heavy rainfall occurred in Srikakulam District of Andhra Pradesh and Subarnarekha basin of Jharkhand and West Bengal on 13th October. Heavy to very heavy rainfall occurred over Odisha, West Bengal, Jharkhand, Bihar and East Uttar Pradesh on 14th October. Moderate to Rather Heavy rainfall occurred in Bihar, West Bengal and East Uttar Pradesh on 15th October 2013. On 16th, East Uttar Pradesh received heavy rainfall whereas no significant rainfall was observed on 17th October 2013.

Chief Amounts of rainfall (above 50 mm) date wise:

12th October

Odisha: Akhuapada: 79.8, Alipingal: 68.6, Jenapur: 51.2.

13th October 2013

Andhra Pradesh: Sompeta: 145.3, Mandasa: 102.0, Amadalavalasa: 59.0, Tekkali: 53.0, Gara: 52.0.

Odisha: Balimundali: 305.4, Jaypur: 262.2, Mohana: 198.2, Balasore: 196.8, Borada: 173.4, Purushottampur: 162.0,Baripada: 143.8, Nimapara: 150.4, Naraj: 134.8, Talcher: 132.4, NH5 (Burhabalang) – 131.0, Thakurmunda: 130.2, Keonjhar: 113.2, Jamsolaghat: 106.6, Alipingal: 98.0, Swampatna: 97.0

Jharkhand: Tenughat Dam: 74.6, Ghatsila: 70.6, Jamshedpur: 69.2

West Bengal: Fekoghat: 128.8

14th October 2013

Odisha: Jamsaloghat: 135.2, Baripada: 127.6, Thakurmunda: 104.0, Balimundali: 93.6, Jaypur: 87.8

Jharkhand: Tenughat Dam: 154.2, Panchet Dam: 99.0, Jamshedpur: 98.2, Maithon Dam: 91.6, Ghatsila: 82.4

West Bengal: Kangsabati Dam: 73.4, Narayanpur: 56.0

Bihar: Rosera: 138.4, Hayaghat: 136.4, Munger: 130.2, Kahalgaon: 120.8, Kursela: 118.0, Bhagalpur: 111.8, Benibad: 109.4, Samastipur: 107.6, Basua: 103.2,

Sikandarpur: 102.4, Khagaria: 102.0, Kamtaul: 101.8, Jhanjarpur: 96.4, Hatidah: 90.2, Rewaghat: 90.2, Patna: 78.0.

Uttar Pradesh: Ballia 84.0, Ghazipur: 76.2, Turtipar: 53.0, Allahabad: 50.0.

15th October

West Bengal: Jalpaiguri: 114.8, Mathabanga: 88.4, Narayanpur: 69.0, Gheropara: 62.4.

Bihar: Kursela: 238.4, Jhawa: 202.6, Bhagalpur: 136.3, Kahalgaon: 119.4, Basua: 68.0, Buxar: 56.0, Sripalpur: 51.8.

Uttar Pradesh: Ballia: 75.4, Regoli: 70.4, Mukleshpur: 64.6, Trimohanighat: 60.0, Khadda 59.6, Uska Bazar: 50.6.

16th October

Uttar Pradesh: Trimohanighat: 70.0, Uska Bazar: 64.4.

Statewise Flood Situation in association with "Phailin"

Odisha

In anticipation of rainfall due to cyclone, the Chandil dam started releasing water from 10th October in the order of 1000 to 1300 cumec to bring down the reservoir level from 181 m to 179 m on 13th October. Due to heavy to very heavy rainfall due to cyclone, the reservoir level again rose to 181.60 m on 16th morning which was brought down to 181 m by 17th October. Due to releases from Chandil Dam in the range of 1300 cumec and contributions from intervening catchment including Kharkai, a tributary of river Subarnarekha joining downstream of Chandil Dam, the discharge from Galudih Barrage was around 7,000 cumec which combining with the very heavy rainfall in the downstream areas created flooding in West Medhinipur district of West Bengal between 14th and 18th October 2013and a High Flood Situation at Rajghat in Balasore District of Odisha on river Subarnarekha. **The river flowed in High Flood Situation from 16 hrs of 14th October 2011 to 12 hours of 15th October 2013. The peak level attained was 12.42 m from 0100 hrs to 0500 hrs on 15th October 2013**. The water level fell below warning level on 17th October.

The river Burhabalang at NH-5 flowed in High Flood Situation from 01 hrs to 15 hrs of 14th October and attained a peak of 9.24 m between 08 hrs and 09 hrs on 14th October 2013. Thereafter it fell below warning level on 15th October.

River Water level flowed in Moderate to Low flood situation in Baitarni, Mahanadi, Rishikulya and Vamsadhara rivers in Odisha.

On information regarding formation of cyclone, the Hirakud Dam authorities on Mahanadi in Odisha started releasing water to create a flood cushion. The reservoir level was brought down from 192.02 to around 189.40 m by the time of heavy to very heavy rainfall in its catchment. Then the releases were stopped and the reservoir again got filled up due to incoming floods without substantial release.

A total of 66 flood forecasts were issued during the above period in Odisha.

Andhra Pradesh

River Vamsadhara at Gotta Barrage received inflows of about 1000 cumec on 14th October 2013. Two inflow forecasts were issued during this period.

Jharkhand

Due to very heavy rain in its catchment areas, Tenughat, Panchet and Maithon Dam received very heavy inflows on 14th and 15th October. Maximum combined outflow of around 1,10,000 cusec was released from Panchet and Maithon Dam causing flooding of low to moderate category in West Bengal. The outflows were reduced gradually with reduction in rainfall.

Due to very severe cyclonic storm "Phailin", the river Ganga at Sahibganj flowed in Low Flood Situation between 16th to 18th October.

28 flood forecasts were issued during this period for the state of Jharkhand

West Bengal

Due to combined release of 1,10,000 cusec from upstream Damodar reservoirs, and rainfall in its catchment, Durgapur Barrage received the inflows of the order of 1, 40,000 cusec and it created a moderate to low flood in Mundeswari river at Harinkhola.

River Ajoy at Gheropara also flowed in low flood situation on 15th October and then fell below Warning Level.

Due to rainfall and releases from Kangsabati Dam, the river Kangsabati at Mohanpur flowed in Moderate Flood Situation on 15th October and then fell below warning level.

Due to very severe cyclonic storm "Phailin", the river Ganga Farakka flowed in Low Flood Situation between 16th to 18th October.

River Tista at Domohani Road Bridge flowed in low flood situation on 16th October and then fell below warning level.

All other rivers are flowing below Warning Level.

36 flood forecasts were issued for West Bengal during the above period.

Bihar

Due to very heavy rain in the catchment areas the river Punpun at Sripalpur flowed in moderate flood situation from 15th October to 18th October.

River Bagmati at Benibad flowed in Moderate flood Situation from 15th to 18th October.

River Kosi at Basua flowed in low flood situation between 15th and 17th October.

River Kamlabalan at Jhanjarpur also flowed in Low flood situation during the above period.

All other rivers in Bihar are flowing below Warning Level.

20 nos flood forecasts were issued for Bihar during the above period.

Uttar Pradesh

River Ganga at Narora Barrage received inflows of the order of 20000 cusec during the above period.

Remaining all level forecast stations remained below warning level.

10 nos flood forecasts were issued for Uttar Pradesh during this period.