GOVERNMENT OF INDIA
CENTRAL WATER COMMISSION
FLOOD FORECAST MONITORING DIRECTORATE

Army Men Rescuing Marooned People in Assam Flood June, 2012

FLOOD FORECASTING AND WARNING NETWORK PERFORMANCE APPRAISAL REPORT 2012

NEW DELHI – 110066 **April 2013**

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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.

The flood season 2012 witnessed no unprecedented flood events in any of the river systems in the country. High Flood Situation was witnessed at 14 stations in Rivers Brahmaputra, Jia-Bharali, Kopili, Beki and Kushiyara in Assam, River Raidak –I in West Bengal, Rivers Ghaghra and Rapti in Uttar Pradesh & River Ghaghra in Bihar. The year witnessed moderate to low intensity floods in many other parts of India. The highlight was the floods in November in association with Cyclonic Storm NILAM when flood/inflow forecast stations in Krishna, Vamsadhara and Rishikulya basin got heavy flows in association with very heavy to exceptionally heavy rainfall in association with the system.

During the year 2012, 5031 forecasts were issued out of which 4939 forecasts (98.17%) were found to be within the limits of accuracy. The number of level forecasts issued during the year 2012 were 4200 out of which 4136 (98.48%) was within the limit of accuracy of +0.15 m. The number of inflow forecasts issued was 831 out of which 803 (96.63%) were within limits of accuracy of $\pm$ 20%.

The Telemetry data have been received in all Divisions, not upto the reliable extent owing to some technical as well as natural problems which are taken into consideration for rectification and correct retrieval of data. However, few Divisions *viz;* Chambal Division (Jaipur), ERD (Bhubaneshwar), Mahanadi Division (Burla), etc. are using Telemetry data for flood forecasting purpose in Mathematical Model successfully. Other Divisions are also making attempt to use the Telemetry data

directly by developing MIKE 11 model for Flood Forecasting purposes 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. Special mention is made of Shri. V D Roy, Director, Shri. A.K. Srivastava, Deputy Director (Comm), Shri. S. Lakshminarayanan, AD (HM), Dr A P Mishra, EAD (HM), Shri J K Arora, AE (Comm), Shri R. Jayachandran, S.A., Shri. S. N. Biswas, S. A., and Shri. Ram Singh, Steno in preparing this Appraisal Report.

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.

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 **(Devender Sharma)**
April, 2013

CONTENTS

EXECUTIVE SUMMARY	0.1	General	1
	0.2	Flood Situation	1
	0.3	Flood Forecasting Performance	1
Salient features of Flood Forecasting System			2
CHAPTER- 1		**NATIONAL FLOOD FORECASTING NETWORK**	3
	1.1	Flood forecasting services	3
	1.2	Flood forecasting network in the country	3
	1.3	Classifications of various flood situations	5
	1.4	Standard Operating Procedure for Flood Forecasting & Warning	6
	1.5	Inflow Forecast	7
	1.6	Expansion of the network of flood forecasting sites	8
	1.7	Data Communication System	8
	1.7a	Wireless Communication	8
	1.7b	Telemetry	9
	1.8	Damage due to floods/ heavy rains between 1953 to 2012	9
	1.9	Analysis of performance of flood forecasting network	10
	1.10	Organisational set-up of flood forecasting network	10
CHAPTER-2		**ROLE OF IMD IN FF ACTIVITIES AND SOUTHWEST MONSOON ACTIVITIES**	16
	2.1	Role of IMD & SOUTHWEST MONSOON	16
	2.1.a	Role of IMD	16
	2.1.b	Southwest Monsoon	17
	2.2	Highlights of south-west monsoon 2012	18
	2.3	Onset of south-west monsoon 2012	18
	2.4	Chief Synoptic features	20
	2.5	Withdrawal of Southwest Monsoon	22
	2.6	A brief description of Cyclone Nilam	24
	2.7	Brief Life History of NILAM Cyclone	26
CHAPTER -3		**FLOOD FORECAST PERFORMANCE**	27
	3.1	Flood forecasting evaluation - present criteria and procedure	27
	3.2	Evaluation Criteria for stage/ inflow forecasting	27
	3.3	Flood forecasting activities	27
	3.4	Riverwise Details Of Flood Forecasting Activities & Accuracy Of Forecast	28
	3.4.1	Brahmaputra Basin	28
	3.4.2	Barak and Meghna Basin	28
	3.4.3	Ganga Basin	28
	3.4.4	Eastern rivers Basins including Mahanadi Basin	28
	3.4.5	Godavari Basin	28
	3.4.6	Krishna Basin	28
	3.4.7	Southern Rivers Basin	29
	3.4.8	West Flowing Rivers	29

	3.5	Statewise Flood forecasting performance	29
	3.5.1	Andhra Pradesh	29
	3.5.2	Assam	29
	3.5.3	Bihar	30
	3.5.4	Chhattisgarh	30
	3.5.5	Gujarat	30
	3.5.6	Haryana	30
	3.5.7	Jharkhand	30
	3.5.8	Karnataka	30
	3.5.9	Madhya Pradesh	31
	3.5.10	Maharashtra	31
	3.5.11	Odisha	31
	3.5.12	Tripura	31
	3.5.13	Uttarakhand	31
	3.5.14	Uttar Pradesh	31
	3.5.15	West Bengal	32
	3.5.16	Dadra & Nagar Haveli	32
	3.5.17	NCT of Delhi	32
	3.6	An overview of forecasting performance	32
	3.6.1	Overall Performance	33
CHAPTER-4		**RIVERWISE APPRAISAL OF FLOOD EVENTS**	35
	4.1	General	35
	4.2	Ganga Basin	35
	4.3	Brahmaputra basin	35
	4.4	Barak & Meghna System	36
	4.5	Eastern Rivers System	36
	4.6	Mahanadi Basin	36
	4.7	Godavari Basin	36
	4.8	Krishna Basin	37
	4.9	Southern Rivers System	37
	4.10	West Flowing Rivers	37
	4.11	An overview of forecast events	37
CHAPTER–5		**DIVISIONWISE STATUS ON USE OF TELEMETRY AND MATHEMATICAL MODEL**	39
	5.1	Himalayan Ganga Division, Dehradun	39
	5.2	Middle Ganga Division –I, Lucknow	39
	5.3	Middle Ganga Division –II, Lucknow	39
	5.4	Middle Ganga Division –III, Varanasi	40
	5.5	Middle Ganga Division –IV, Patna	40
	5.6	Middle Ganga Division –V, Patna	40
	5.7	Damodar Division, Asansol	40
	5.8	Upper Yamuna Division, New Delhi	40
	5.9	Lower Yamuna Division, Agra	41
	5.10	Chambal Division, Jaipur	41
	5.11	Upper Brahmaputra Division, Dibrugarh	41
	5.12	Middle Brahmaputra Division, Guwahati	42

	5.13	Lower Brahmaputra Division, Jalpaiguri	42
	5.14	Eastern Rivers Division, Bhubaneshwar	42
	5.14.1	Mike-11 for Vamsadhara Basin	43
	5.14.2	Mike-11 for Baitarni Basin	43
	5.14.3	Mike 11 for Subarnarekha Basin	43
	5.15	Mahanadi Division, Burla	43
	5.16	Narmada Division, Bhopal	43
	5.17	Tapi Division, Suart/Mahi Division, Ahmedabad	44
	5.18	Lower Godavari Division, Hyderabad	44
	5.19	Lower Krishna Division, Hyderabad	44
	5.20	Snow Hydrological Division, Shimla	44
CHAPTER 6	6.1	General	45
	6.2	Appreciation letters received during flood season 2012	45
	6.2.1	Special Relief Commission, Govt of Odisha	45
	6.2.2	Chief Engineer, Lower Mahanadi Basin, Odisha	45
	6.2.3	Engineer-in-chief (Irrigation), Government of Andhra Pradesh	46
	6.2.4	Superintending Engineer (O&M), Narayanpur Dam, Government of Karnataka	46
	6.2.5	Superintending Engineer, Surat Irrigation Circle, Surat, Government of Gujrat	46
	6.2.6	Deputy Commissioner, Surat Municipal Corporation (SMC), Suart, Gujrat	46

No	Title	Page Number
	TABLES	
Table 1.1	Yearwise positions of number of forecasting sites in CWC	4
1.2	Number of flood forecasting sites in major inter-state river systems	4
1.3	Statewise Flood Forecasting Network in CWC	5
1.4	Damages occurred during flood season 2010 to 2012	10
2.1	Date of initiation of Withdrawal of SW Monsoon from extreme West Rajasthan during recent years	24
3.1	Site wise "Forecast Performance" of flood forecasting sites of CWC in Monsoon, 2012	34
	FIGURES	
Fig. 1.1	Organisation chart of flood forecasting & warning setup of Central Water Commission	15
2.1	Advance of south-west monsoon 2012	20
2.2	Isochrones of Withdrawal of Southwest Monsoon 2012	23
2.3	Typical Kalpana Satellite and DWR, Chennai imageries of Cyclonic Storm NILAM	25
2.4	Track of Cyclonic Storm NILAM	26
3.1	Flood forecasting performance from 2000 to 2012	33
	ANNEXURES	
Annex I	Salient Features of Flood Forecasting Stations maintained by Central Water Commission	47
II	Basinwise-Riverwise Flood Forecasting information in India during flood season 2012	60
III	Statewise Flood Forecasting information in India during flood season 2012	65
IV	Performance of flood forecasting stations (Divisionwise) in India during flood season 2012	70
V	Performance of flood forecasting stations (Major basinwise) in India during flood season 2012	71
VI	Performance of flood forecasting stations (Statewise) in India During flood season 2012	72
VII	Flood forecasting performance from 1986 to 2012	73
VIII	Unprecedented flood events during flood season 2012	74
IX	High flood events during flood season 2012	75
X	Low and Moderate flood events during flood season 2012 - Ganga & its tributaries	76
XI	Low and Moderate flood events during flood season 2012 - Brahmaputra & its tributaries	79
XII	Low and Moderate flood events during flood season 2012 - Various River Systems (excluding Ganga and Brahmaputra)	85
	MAP	
Map-1	Flood Forecasting Network in India	12
	List of River Basin	13
	List of Flood Forecasting Stations	14

EXECUTIVE SUMMARY

0.1 GENERAL

During 2012, South West Monsoon, for the country as a whole, the rainfall for the season (June-September) was 92% of its long period average (LPA). Seasonal rainfall was 93% of its LPA over Northwest India, 96% of its LPA, over Central India, 90% of its LPA over south Peninsula and 89% of its LPA over Northeast (NE) India. Out of the total 36 meteorological subdivisions, 23 subdivisions constituting 67.3% of the total area of the country received excess/normal season rainfall and the remaining 13 subdivisions (32.7% of the total area of the country) received deficient seasonal rainfall. Monthly rainfall over the country as a whole was 72% of LPA in June, 87% of LPA in July, 101% of LPA in August and 111% of LPA in September. Advance of Southwest monsoon over the Andaman Sea was delayed by about 3 days. The monsoon set in over Kerala on 5th June, four days later than its normal date of 1st June and covered the entire country by 11th July, 4 days earlier than its normal date of 15th July. The withdrawal of monsoon from west Rajasthan commenced only on 24th September compared to its normal date of 1st September. Ten low pressure systems formed this year but none of them intensify into depressions as against the normal frequency of 4-6 monsoon depressions per season.

0.2 Flood Situation

During the year 2012, none of the level forecasting sites crossed the Highest Flood Level and hence no site experienced Unprecedented Flood.

High Flood Situation was witnessed at 14 sites viz., River Beki at Road Bridge, River Brahmaputra at Dibrugarh, Neamatighat, Tezpur, Goalpara and Dhubri, River Kopili at Kampur, River Kushiyara at Karimganj and River Jia-Bharali at N T Road Crossing all in Assam, River Raidak – I at Tufangunj in West Bengal, River Ghaghra at Elgin Bridge and River Rapti at Balrampur both in Uttar Pradesh, River Ghaghra at Darauli and Gangpur Siswan both in Bihar

Moderate to Low floods were witnessed in most of basins at various Flood Forecasting Stations. No forecasts were issued for 61 stations as they did not cross warning level or warning criteria.

0.3 Flood Forecasting Performance

During the year 2012, 5031 forecasts were issued out of which 4939 forecasts (98.17%) were found to be within the limits of accuracy. The number of level forecasts issued during the year 2012 were 4200 out of which 4136 (98.48%) was within the limit of accuracy of +/- 0.15 m. The number of inflow forecasts issued was 831 out of which 803 (96.63%) 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 exclusive base stations	165
13.	No. of gauge and gauge & discharge sites	878
14.	No. of exclusive rain gauge stations (ordinary/self recording)	76
15.	No. of wireless stations including Control Rooms)	544
16.	No. of Telemetry Stations installed/under installation during IX,X and XI Plans	445
17.	Maximum no. of forecasts issued in any one year Second Highest no. of forecasts issued	8566 (in 1990) 8223 (in 2007)
18.	No. of forecasts issued in flood season 2009	4010
19.	No. of forecasts issued in flood season 2010	7519
20.	No. of forecasts issued in flood season 2011	5991
21.	No. of forecasts issued in flood season 2012	5031

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 2012 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
		2012	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 2012 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	10
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 2012-13 was Rs. 1.13 Crore only including that for payment to Government of Bhutan for maintaining hydrometeorological stations in river common to India and Bhutan. 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 2012, 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 2012

The damage due to floods for the entire country was estimated to be Rs.10944.649 Crore during the flood season 2012. The average annual damages to crops, houses and public utilities from the year 1953 to 2012 as reported by the States/UT's are of the order of Rs. 3613.305 Crore, the maximum annual damage being Rs.32541.375 Crore during 2009.

A comparative details showing the details of damages occurred during the flood season 2010 to 2012 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, 2009 to 2012

Sl. No.	Items	Flood damages during Year the Year				Flood Damages during 1953-2012	
		2010	2011	2012	Average 1953-2012	Maximum	
						Year	Damage
1	Area affected (in mha)	3.32	1.81	2.142	7.289	1978	17.5
2	Population affected (in millions)	23.49	15.91	14.689	32.422	1978	70.45
3	Damaged to Crops(area in mha)	5.76	2.69	1.949	3.792	2005	12.301
4	Damaged to crops(value in Rs. Crore)	6346.96	1386.10	1534.108	1119.538	2003	7298.13
5	Damaged to houses (in numbers)	356465	1152518	174526	1255806	1978	3507542
6	Damaged to houses (value in Rs. Crore)	920.98	410.48	240.572	566.519	2009	10809.80
7	Cattle lost (in number)	40375	35982	31558	96596	1979	618248
8	Human lives lost (in numbers)	2043	1761	933	1655	1977	11316
9	Damaged to public Utilities (in Rs. Crores)	14573.95	6047.67	9169.967	1867.441	2009	17503.7
10	Total damages to crops, houses & public utilities (in Rs. Crores)	21841.90	7844.24	10944.649	3613.305	2009	32541.37

1.9 ANALYSIS OF PERFORMANCE OF FLOOD FORECASTING NETWORK

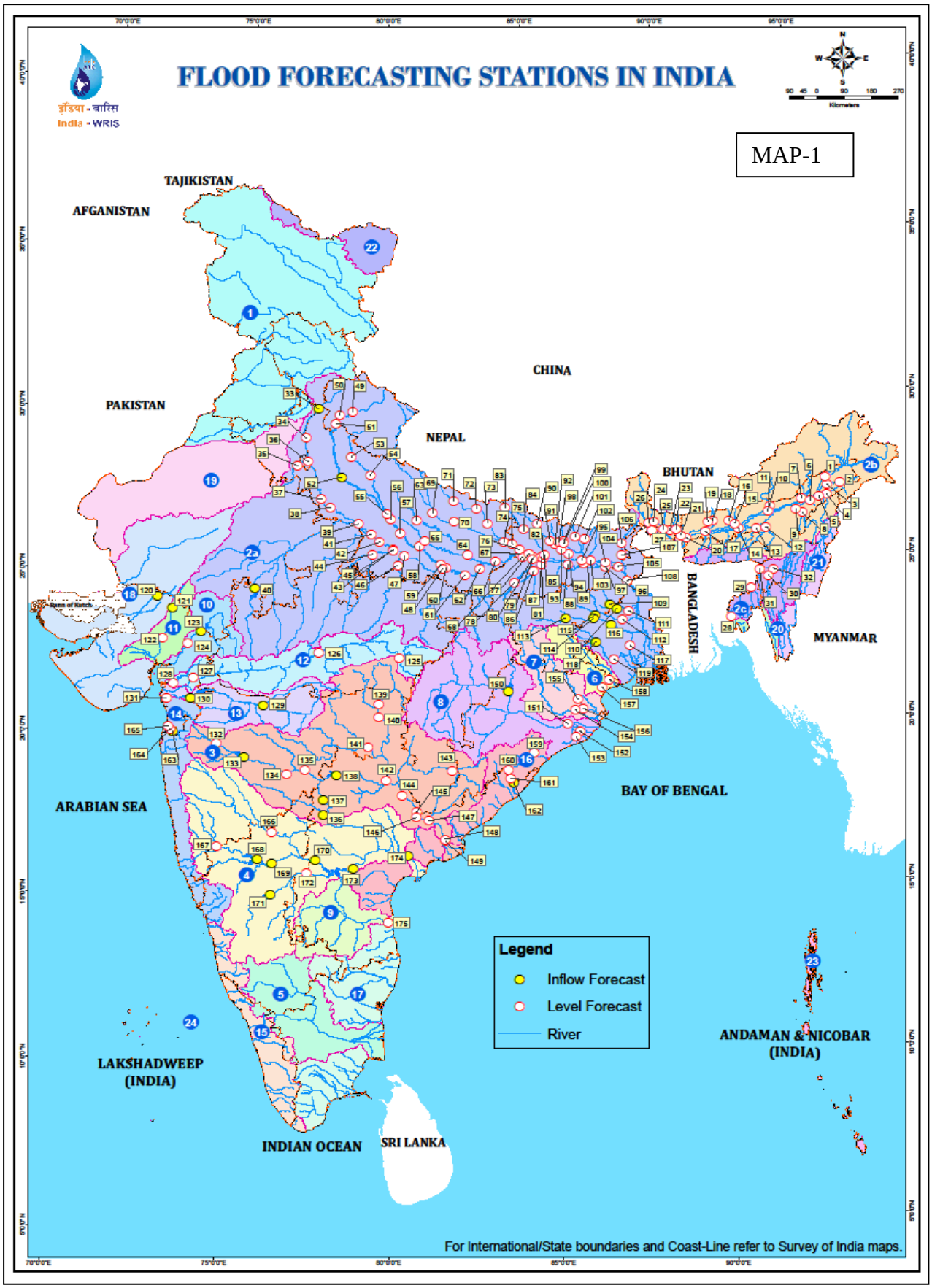
CWC carries out analysis and appraisal of the forecasting work, at the end of monsoon season. Based on this, measures for improvements, if necessary, are identified. A summary of the performance of the work carried out by the field divisions during the flood season 2012 presented in chapter-3. While 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**



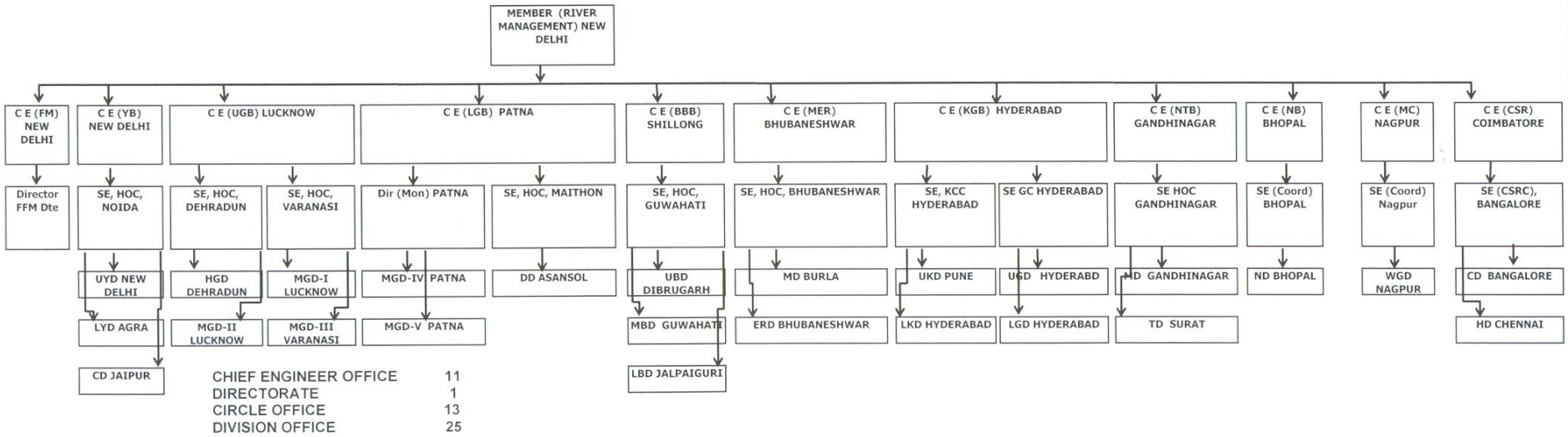
Map -1: Flood Forecasting Network in India

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	Subernarekha
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	Jhanjharpur	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	Sahjiana	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	Ghughumari	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	Mekhligunj	60	Allahabad (Chatnag)	93	Samastipur	126	Hoshangabad	159	Purushottampur		
28	Sonamura	61	Mirzapur	94	Rosera	127	Garudeshwar	160	Gunupur		
29	Kailashshar	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 2012, 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. These were used in advance flood warnings two to three days during the flood spells in Assam. The NWP Division of IMD located at New Delhi also provided three day 0.25 deg (Lat & Long) gridded rainfall figures for the entire country including various neighbouring countries to various field divisions directly by e-mail. It was agreed that the rainfall figures given in various grids will be utilised in operational flood forecasting in consultation with the concerned FMOs.

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 NILAM cyclone 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 12^{th} 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.

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 2012

- During 2012, South West Monsoon, for the country as a whole, the rainfall for the season (June-September) was 92% of its long period average (LPA).
- Seasonal rainfall was 93% of its LPA over Northwest India, 96% of its LPA, over Central India, 90% of its LPA over south Peninsula and 89% of its LPA over Northeast (NE) India.
- Out of the total 36 meteorological subdivisions, 23 subdivisions constituting 67.3% of the total area of the country received excess/normal season rainfall.
- Remaining 13 subdivisions (32.7% of the total area of the country) received deficient seasonal rainfall. Monthly rainfall over the country as a whole was 72% of LPA in June, 87% of LPA in July, 101% of LPA in August and 111% of LPA in September.
- Advance of Southwest monsoon over the Andaman Sea was delayed by about 3 days.
- The monsoon set in over Kerala on 5th June, four days later than its normal date of 1st June and covered the entire country by 11th July, 4 days earlier than its normal date of 15th July.
- The withdrawal of monsoon from west Rajasthan commenced only on 24th September compared to its normal date of 1st September.
- Ten low pressure systems formed this year but none of them intensify into depressions as against the normal frequency of 4-6 monsoon depressions per season.

2.3 ONSET OF SOUTH-WEST MONSOON SEASON 2012

This year, setting in of southwest monsoon over Andaman Sea was delayed by about 3 days due to non-conducive conditions for the development of convection over the region. However, it set over Kerala 4 days after (i.e. on 5th June) its normal date of 1st June. Monsoon set in over most parts of South Arabian Sea, Kerala, some parts of Tamil Nadu, south Bay of Bengal and South Andaman Sea on 5th June itself.

With the formation of a vortex in the form of an embedded upper layer cyclonic circulation off Karnataka coast (6-7th June) in the trough off the west coast, the monsoon covered entire Goa and some parts of Konkan on 6th June. Thus the advance of SW monsoon along the west coast of India was very rapid. Thus the advance of SW Monsoon along the west coast of India was very rapid. The monsoon also covered entire northeast India and some parts of Sub_himalayan West Bengal &Sikkim on the same day. Thereafter, there was a hiatus of 6 days, during which, the offshore trough was feeble and the vortex also became less marked. Again with the strengthening of the Arabian Sea branch of the monsoon current, the SW monsoon advanced into most parts of peninsular India including interior Maharashtra by 17th June. Also due to the formation of an upper air cyclonic circulation over the northwest Bay of Bengal & neighbourhood, the eastern branch of the monsson advanced further during the subsequent days and covered Vidharbha, West Bengal & Sikkim and Odisha on 19th June and Chattisgarh, Jharkahnd and Bihar on 21st June.

The shifting of east-west trough at sea level close to foothills of Himalayas from 25th June-3rd July caused prolonged stagnation of the Northern limit of monsson (NLM) and there was a hiatus for about 11 days from 22nd June -2nd July. A break like situation prevailed during25th-29th June. During the period of hiatus, systems in westerlies gave rainfall over the northeast India and the feeble off-shore trough prevailing off the west coast gave rise to rainfall along the west coast. Due to the sluggish advance, there was a lag of nearly 2 weeks in the advance of the SW Monsson over the west central and parts of east Uttar Pradesh for the monsson rainfall to commence. Heat wave to severe heat wave conditions prevailed over the northern plains during this period.

With the formation of upper air cyclonic circulations over northeast Bay of Bengal as well as over the Arabian Sea off Gujarat coast during the 1st week of July and a low pressure area over north Madhya Pradesh and adjoining South Uttar Pradesh and east Rajasthan during the 2nd week of July, the east west trough shifted southwards and became more pronounced and made conditions favourable for further advance of monsson. Thus there had been a rather steady advance from 3rd July and the SW monsson covered on 11th July, 4 days earlier than its normal date of 15th July.

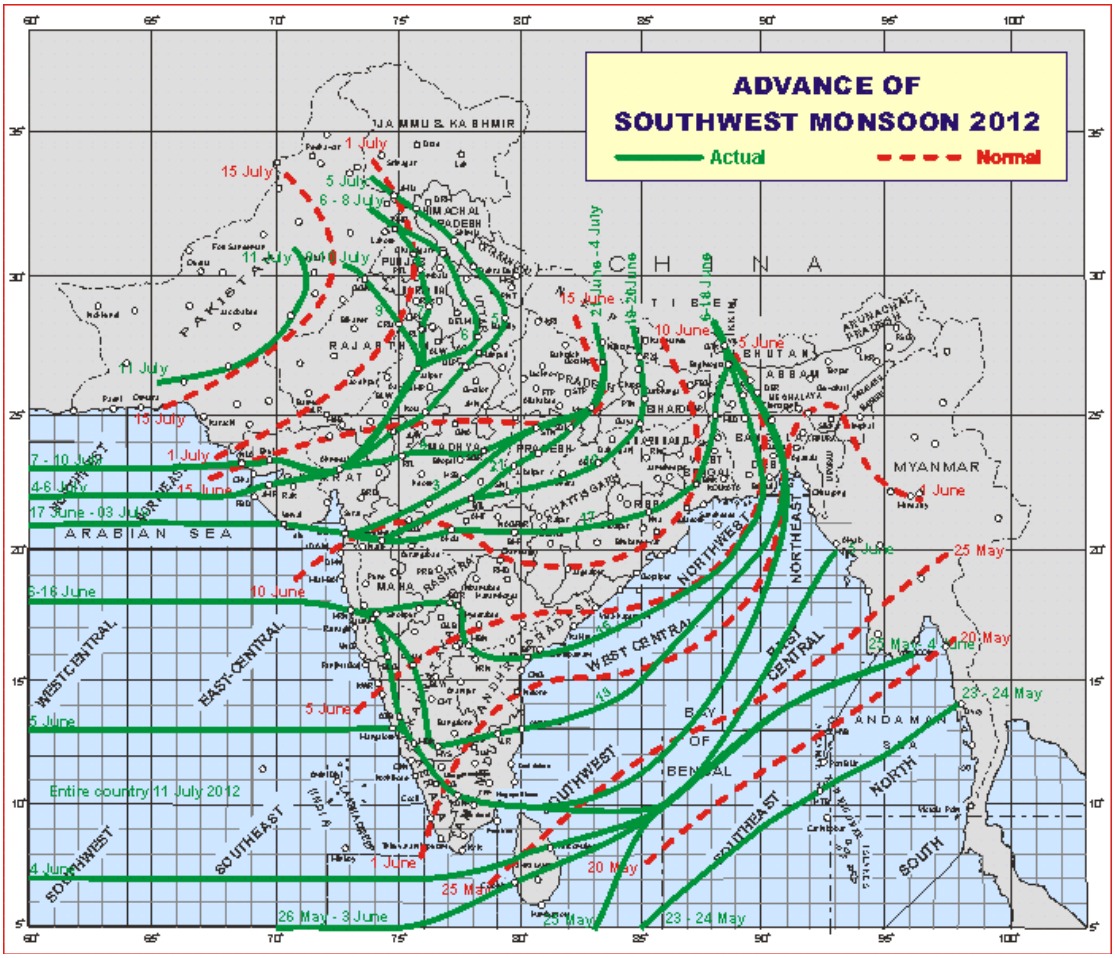


Figure – 2.1 Advance of southwest Monsoon–2012**.**

2.4 CHIEF SYNOPTIC FEATURES

The Mascarene HIGH displayed large oscillations in its position and intensity, especially during the first half of the season. The Cross Equatorial Flow (CEF) over the Arabian Sea also varied accordingly. This feature, in combination with a suppressed convection over the Arabian Sea, during major parts of June & July caused the monsoon flow pattern to remain weak during the initial half of the season.

The monsoon trough displayed rapid north-south oscillations soon after it was established in July. It then lay close to foot hills of Himalayas during 17th-19th July. The trough was generally in its near normal position and extended up to lower tropospheric levels without its characteristic southward tilt during July and August. Towards the end of August, the monsoon trough shifted southwards in association with the two low pressure systems (formed during 30th–31st August & 3rd-10th September) embedded in the monsoon trough that formed in succession over west central and adjoining northwest Bay of Bengal off north Andhra Pradesh – south Odisha coasts. The trough exhibited its characteristic southward tilt with height only during the first

week of September. With the dissipation of the low pressure areas, the monsoon trough was seen at its normal position. It then shifted northwards but remained active during the third week of September. Its interaction with mid-latitude westerlies over Western Himalayan Region resulted in active to vigorous monsoon conditions over the parts of northwest India and east & northeast India during many days of the week. The monsoon trough became less marked on 20th September.

Though there had been extended periods of subdued rainfall activity during the season in different spatial scales, rather un-organized convective activity, which is a characteristic of weak monsoon phases, contributed significantly to the seasonal rainfall. Many a times, when the circulation features indicated break like situations, rainfall distribution along the monsoon trough zone were not as per the break monsoon conditions.

Ten low pressure areas formed during the season. However, none of the low pressure areas intensified into depression (normally 4-6 monsoon depressions forms in monsoon season) as in the recent past years 2002 and 2010. Of the 10 low pressure areas formed during the season, 2 were in July, 5 were in August and 3 were in September. Five low pressure areas formed in succession during August. However, no low pressure areas formed during June. This year was the first occasion during the period 1981-2012, when no low pressure area formed during June. During July, August and September, one low pressure area each formed over land and the remaining low pressure areas formed over Bay of Bengal. No low pressure areas formed over the Arabian Sea.

The first low pressure area of the season which formed over Northeast Madhya Pradesh and adjoining south Uttar Pradesh (7th -11th July) facilitated the advance of monsoon to cover the entire country. The second low pressure area (20th-22ndJuly) formed over Bay of Bengal and was short lived. Moving in a northwesterly direction, it merged with the monsoon trough on 23rd. Under the influence of five low pressure areas that formed during successive weeks of August (3rd -9th August, 12th-14th August, 17th-22nd August, 25th-27th and 30th-31st August), the rainfall activity over the monsoon trough zone got enhanced. Towards the end of the August, the systems and their remnants caused active to vigorous monsoon conditions over major parts of the country.

A well-marked low pressure area formed over during 3rd–11th Sept. It had a long travel along the monsoon trough zone and dissipated over southeast Pakistan and adjoining southwest Rajasthan. The cyclonic circulation associated with it extended up to 7.6 km a. s. l. till 5th Sept and then up to mid tropospheric levels till 15th Sept. The low pressure area became less marked on 16th Sept. It tilted southwestwards with height. Under its influence, the monsoon continued to be active / vigorous over major parts of the country. The largely rain deprived western parts of Gujarat State also received rainfall during the first fortnight of September. With this, the

cumulative rainfall departure category of the sub-division Saurashtra & Kutch which had remained scanty since 1st June, improved significantly. Another low pressure area formed over Chhattisgarh and adjoining Odisha, but was short lived (10th Sept. evening – 12th Sept.). A well-marked low pressure area formed towards the end of the season (on 27th Sept) over west central Bay of Bengal and neighbourhood. An east west shear zone which formed with the cyclonic circulation associated with this low pressure area along with another cyclonic circulation over east central Arabian Sea off south Maharashtra coast on 28th, resulted in widespread thundershower activity on the last day of the season over the Peninsular India.

2.5 WITHDRAWAL OF SOUTHWEST MONSOON

During the third week of September, a rapid weakening of the semi-permanent features associated with monsoon circulation pattern was seen and the water vapour from western India decreased considerably.

Dry weather conditions over many parts of northwest India and Kutch area, presence of a persistent ridge over northwest India and an anti-cyclonic circulation in the lower levels over south Rajasthan and adjoining Gujarat, in lower tropospheric levels, initiated the withdrawal of southwest monsoon from 24th September.

The southwest monsoon withdrew from extreme parts of west Rajasthan on 24th September with a delay of more than 3 weeks as the normal date of withdrawal from extreme western parts of Rajasthan is 1st September. On the same day, it also withdrew from some parts of northwest India, Saurashtra & Kutch and north Arabian Sea. It further withdrew from some more parts of northwest India, Gujarat State, west Madhya Pradesh on 26 September and from most part of Uttar Pradesh, some parts of Bihar, some more parts of Madhya Pradesh and Gujarat on 8th October.

As on 17th October, the withdrawal line of southwest monsoon passed through 15°N/60°E, 15°N/70°E, Karwar, Hyderabad, Kalingapatnam and 19°N/95°E. The isochrones of withdrawal of South West Monsoon is shown in **Figure-2.2**.

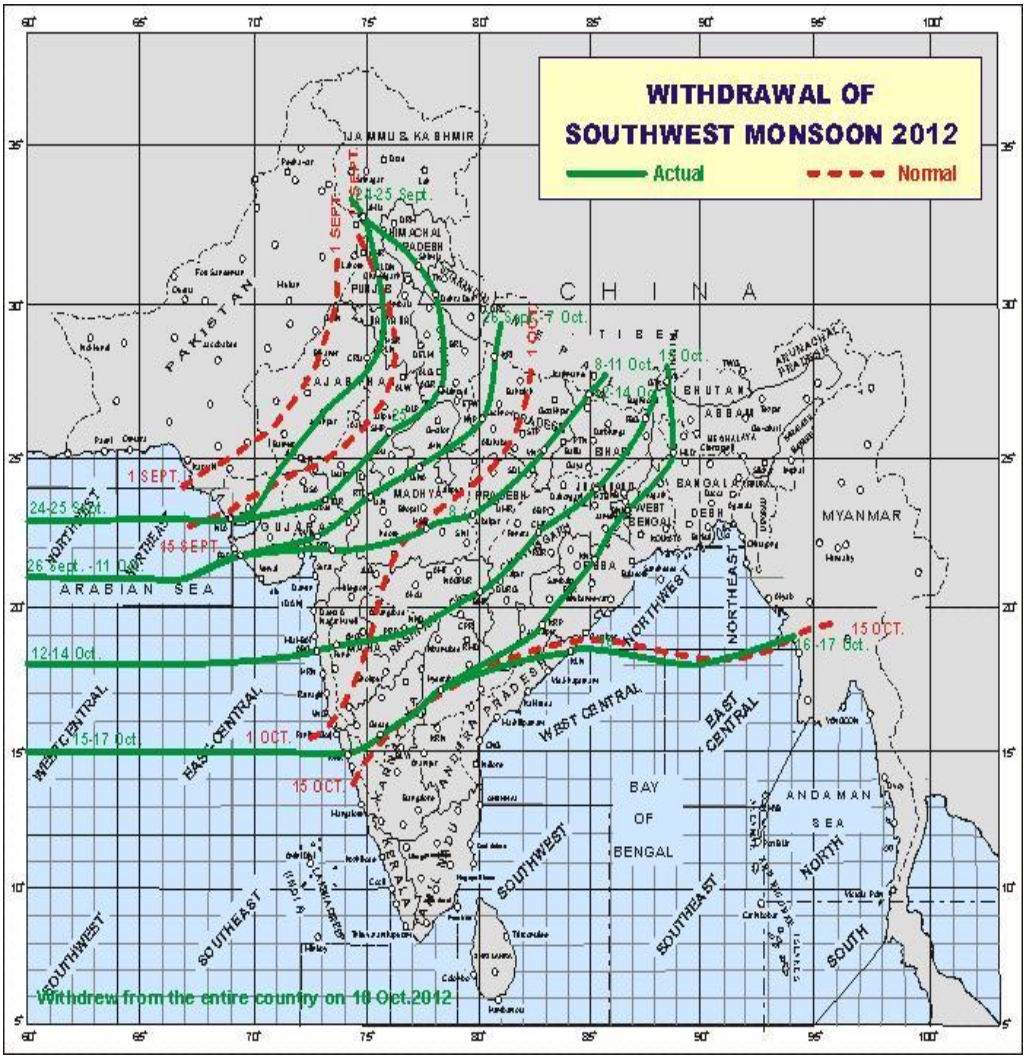


Figure 2.2 Isochrones of withdrawal of southwest monsoon - 2012

The delay in the withdrawal of southwest monsoon from west Rajasthan could be attributed to the rather extended westward tracks of the low pressure areas across the northwest India and further westwards to Pakistan during the first fortnight of September. This occurred in association with a high zonal index phase of the mid-latitude circulation pattern. Subsequently, a gradual taking over by the westerly regime occurred over the region, which led to the north and north-eastward re-curvature of the low pressure systems thereafter. The tendency of delayed withdrawal of southwest monsoon from Rajasthan is being continued since 2006. The dates of initiation of the withdrawal of the SW monsoon from extreme west Rajasthan, during recent years are tabulated in Table 2.1.

Table – 2.1: Date of Initiation of Withdrawal of SW Monsoon from extreme west Rajasthan during recent years

Year	Date of Initiation of Withdrawal of SW Monsoon from extreme west Rajasthan
2006	21st September
2007	30th September
2008	29th September
2009	25th September
2010	27th September
2011	23rd September
2012	24th September

The main causative factors for delayed withdrawal are summarized as under:

- Formation of low pressure areas over west central and northwest Bay of Bengal and adjoining areas and their movement up to Central India and adjoining Northwest India during September leading to enhanced moisture incursion over the region and presence of cyclonic circulations over northwest India.
- North-south oscillation of the western end of the axis of the monsoon trough leading to convective rainfall.
- Increased frequency of western disturbances affecting western Himalayan Region and adjoining northern plains during September.
- Interaction between monsoon easterlies and mid-tropospheric westerly troughs causing widespread rainfall over northwest India.

2.6 A BRIEF DESCRIPTION OF CYCLONE NILAM:

A cyclonic storm, NILAM crossed Tamilnadu coast near Mahabalipuram (south of Chennai) in the evening of 31st October 2012 with a sustained maximum wind speed of 70-80 knots. The salient features of this storm are as follows.

(i) It followed a unique track with many rapid changes in direction of movement. It initially moved westwards, remained practically stationary for quite some time near Sri Lanka coast and then moved north-northwestwards till landfall. It moved west-northwestwards initially over land upto south interior Karnataka and then moved northwest and northwards. The remnant low pressure area moved northeastwards

(ii) It moved very faster on the day of landfall, i.e. 31st October 2012.

(iii) Over the land surface, the cloud mass was significantly sheared to the northeast of system centre during its dissipation stage leading to rainfall activity over entire Andhra Pradesh and adjoining Odisha (iv) Maximum rainfall occurred over southwest sector of the system centre and heavy to very heavy rainfall extended upto 300 km. The Satellite imagery of NEELAM cyclone and track is shown in the following figure.

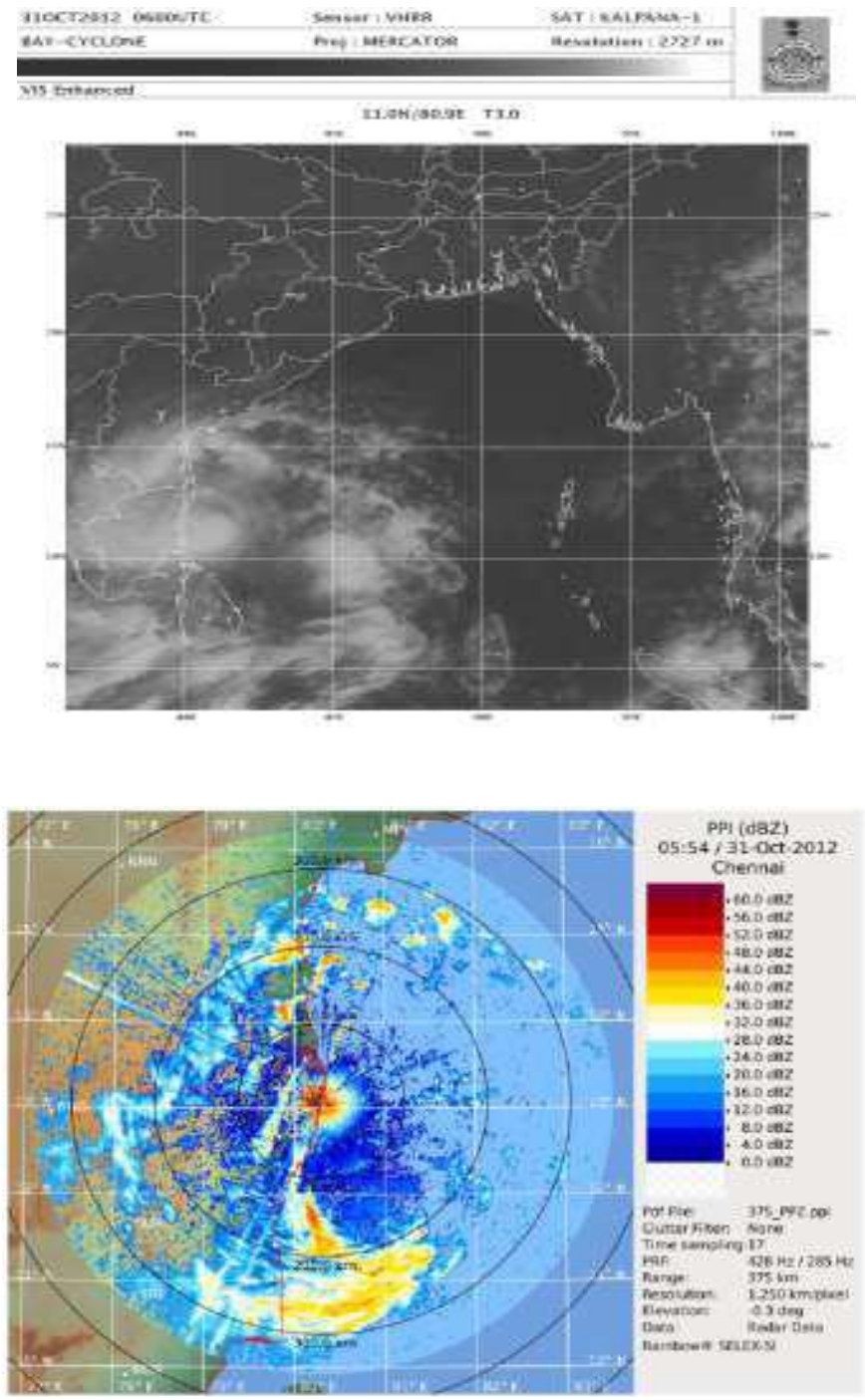


Figure 2.3 Typical Kalpana-1 Satellite and DWR, Chennai imageries of cyclonic storm NILAM at 0600 UTC of 31 Oct. 2012. (*Source: Preliminary Report on Cyclonic storm, NILAM over Bay of Bengal, (28 October- 01 November, 2012), MoES, IMD, GOI.)*

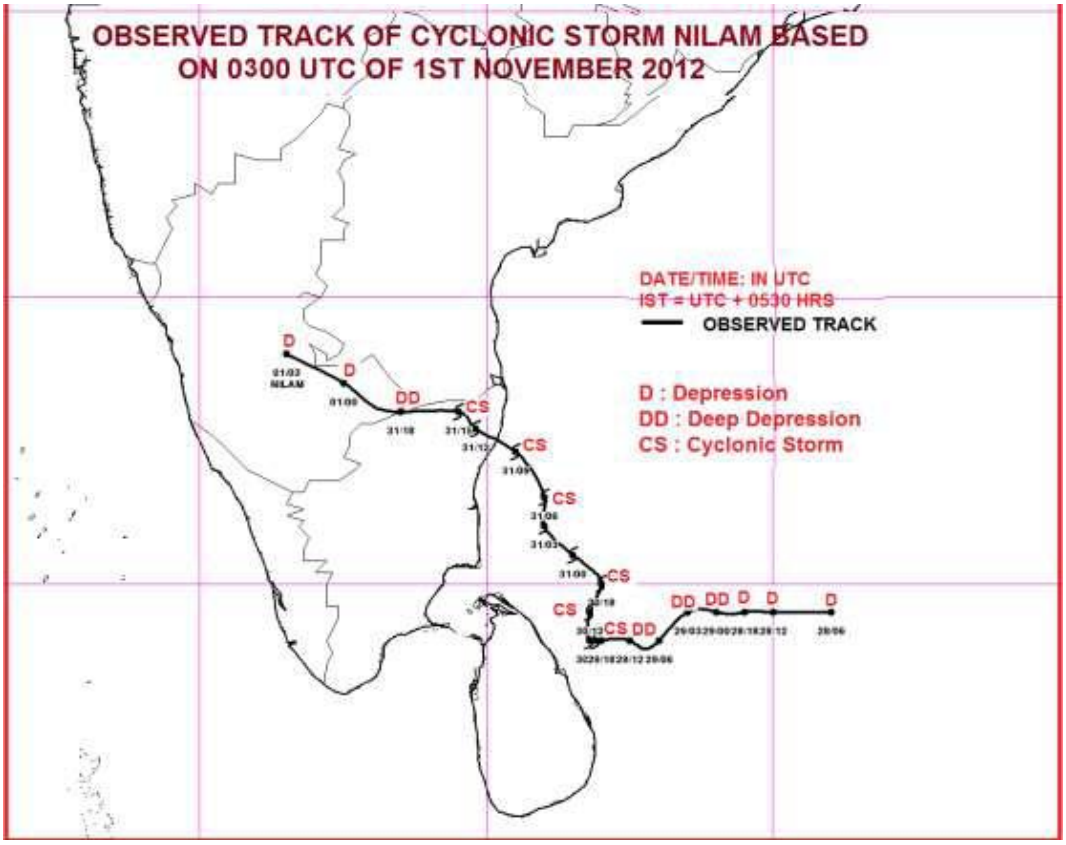


Figure 2.4 Track of cyclonic storm, NILAM over Bay of Bengal (28 Oct-01 Nov. 2012) (*Source: Preliminary Report on Cyclonic storm, NILAM over Bay of Bengal, (28 October- 01 November, 2012), MoES , IMD, GOI.)*

2.7 BRIEF LIFE HISTORY OF NILAM CYCLONE

A depression formed over southeast and adjoining southwest Bay of Bengal at 1130 hrs IST of 28th October 2012 near latitude 9.5^0N and longitude 86.0^0E. It moved westwards and intensified into a deep depression in the morning of 29th October over southwest Bay of Bengal near latitude 9.0^0N and longitude 83.0^0E, about 550 km South-Southeast of Chennai. It continued to move westwards and intensified into a Cyclonic Storm, **NILAM** in the morning of 30th October over southwest Bay of Bengal off Sri Lanka coast. The Cyclonic Storm, **NILAM** then moved northnorthwestwards, crossed north Tamilnadu coast near Mahabalipuram, south of Chennai between 1600 and 1700 hrs IST of 31st October 2012. After the landfall the cyclonic storm, Nilam moved west-northwestwards and weakened gradually into a deep depression and then into a depression over south Interior Karnataka in the morning of 01st November 2012. The typical satellite and radar imageries are shown in Fig.2.3. The track of the system is shown in Fig. 2.4.

(Note: Sources of this Chapter have been taken from "end of Monsoon report-2012" available on India Meteorological Department web site collected from time to time.)

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 2012 covered various river basins and States. A total of 5031 forecast were issued during 2012. The performance of flood forecasting Divisionwise, Major Basinwise, Statewise and for the period 2000 to 2012 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 2012, analysis of the flood forecasts issued reveals that out of 5031 forecasts, 2391 forecasts (47.52% of 5031 forecast) were issued for 26 sites located on the main Brahmaputra and tributaries. Out of these, 2357 forecasts (98.57%) were found within permissible limit of accuracy.

3.4.2 Barak and Meghna Basin

During the flood season 2012, 66 forecasts (1.31% of 5031) were issued for three sites. Out of these, 66 forecasts (100%) were found within permissible limit of accuracy.

3.4.3 Ganga Basin

During the flood season 2012, 1808 forecasts (35.94% of 5031) were issued for 58 sites, out of total 87 sites located on the main Ganga and its tributaries. No forecast was issued for the remaining 29 sites. Out of these, 1791 forecasts (99.05%) were found within permissible limit of accuracy.

3.4.4 Eastern Rivers Basins including Mahanadi

During the flood season 2012, 35 forecasts (0.69% of 5031) were issued for two sites out of nine sites on Eastern Rivers (excluding Mahanadi Basin) and 35 (100%) forecasts were found within permissible limit of accuracy. No forecasts were issued for the remaining stations. Also 85 forecasts (1.69% of 5031) were issued for two sites located on the Mahanadi river basin, of which 84 forecasts (98.82%) were found within permissible limit of accuracy.

3.4.5 Godavari Basin

During the flood season 2012, 128 forecasts (2.54% of 5031) were issued for 11 forecasting sites out of 18 sites, out of which 114 forecasts were found with 89.06% accuracy. No forecasts were issued for the remaining 7 flood forecasting sites.

3.4.6 Krishna Basin

During the flood season 2012, 199 forecasts (3.96% of 5031) were issued for six forecasting sites out of nine sites and 177 forecasts (88.94 %) were found within permissible limit of accuracy. No forecast was issued for three sites 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 2012, for the West-flowing Rivers which comprises of the Narmada, the Tapi etc, 319 forecasts (6.34% of 5031) were issued for 10 sites, out of fifteen sites. 315 forecasts (98.74 %) were found within permissible limit of accuracy.

The Basinwise – Riverwise flood forecasting information in India during flood season 2012 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 2012, 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 seven forecasting's sites out of which there were 3 inflow and 4 level sites.

It is revealed that 148 forecasts (84 level and 64 inflow) were issued out of which 129 forecasts (75 level and 54 inflow) were within limits respectively (87.16%). No forecasts were issued for 9 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 23 sites, excluding Naharkatia. It is seen that during 2012 season, 2177 forecasts were issued out of which 2167 forecasts (99.54%) were found within limit of accuracy. **Dibrugarh, Neamatighat, Tezpur, Goalpara, Dhubri on River Brahmaputra and River Beki at Road Bridge, River Jia-Bharali at N T Road Crossing, River Kopili at Kampur and River Kushiyara at Karimgunj flowed in High Flood Situation during the year 2012**.

3.5.3 Bihar

In the state of Bihar, there were 32 level forecasting sites. Forecasts were issued for 28 sites during the year 2012. Out of 905 forecasts issued during the flood season 2012, 904 forecasts (99.88%) were found within limit of accuracy. No forecasts were issued for 5 stations.

River Ghaghra at Darauli and Gangpur Siswan flowed in High Flood Situation during the year 2012.

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). 25 flood forecast were issued for this station during the flood season 2012 out of which 22 (88%) 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 nine sites. Out of 135 forecasts issued (35 level and 100 inflow), 131 forecasts (32 level and 99 inflow) (97.04%) were found within limits of accuracy during the flood season 2012. 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 2012 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.

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 2012, Out of 188 (56 level and 132 inflow) forecasts issued, 187 (56 level and 131 inflow) forecasts (99.47 %) 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, namely, Deongaon on the river Bhima, tributary of the Krishna. During the flood season 2012, out of 138 forecasts (all inflow) issued for 3 stations, 126 inflow forecasts (91.30%) were found within limit of accuracy. No forecasts were issued for 1 station.

3.5.9 Madhya Pradesh

In the state of Madhya Pradesh, there were two level forecasting sites on the river Narmada and 1 inflow forecast site at Gandhisagar on river Chambal. During the flood season 2012, forecasts were issued for 1 level and inflow sites. Out of 23 forecasts issued (9 inflow and 14 level), 21 (91.30%) (7 inflow and 14 level) forecasts were found within the limit of accuracy. No forecasts were issued for 1 station.

3.5.10 Maharashtra

There were nine forecasting sites including two inflow forecasting sites, in the state of Maharashtra. During the flood season 2012, forecasts were issued for one inflow forecast station and two level stations. Total 186 forecasts were issued (16 levels+170 inflows) during 2012 out of which 184 (14 levels+170 inflows) were in limit (98.92%). It is seen that 170 inflow forecasts were issued for Hatnur Dam and all 170 (100%) forecasts were within limits of accuracy. No forecasts were issued for 6 stations.

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 2012, 120 (53 level and 67 inflow) forecasts were issued for 3 level and 1 inflow forecast stations out of which 119 (53 level and 66 inflow) (99.17 %) were found within limit of accuracy. No forecasts were issued for 8 stations.

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. No Forecasts were issued for both the stations.

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 2012. 9 forecasts were issued out of which 7 (77.78%) were within limit of accuracy. No forecasts were issued for 1 station.

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 2012, forecasts were issued for 19 stations. Out of 473 level forecasts (413 level

and 60 inflow), 467 forecasts (408 level and 59 inflow) (98.73%) were found within limit of accuracy. Further out of 60 inflow forecasts 59 (98.33 %) were found within limit of accuracy.

Elgin Bridge on river Ghaghra, Balrampur on river Rapti flowed in High Flood Situation during the year 2012.

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 2012, forecasts were issued for 10 sites (7 level and 3 inflow stations). Out of 493 forecasts (402 level and 91inflow), 465 forecasts (374 level and 91 inflow) (94.32 %) were found within limit of accuracy. Out of 91 inflow forecasts, all 91 (100 %) forecasts were found within limit of accuracy.

River Raidak-I at Tufangunj flowed in High flood Situation during the year 2012.

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 2012.

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 2012, Out of 11 forecasts (only level), 10 forecasts (90.90%) were within limits of accuracy.

The performance of flood forecasting Stations (Divisionwise) in India during flood season 2012 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 2012, an average number of flood forecasts issued per forecasting site were 28.79. The number of forecasting sites where the performance accuracy of the issued forecasts was found to be above 98.17 % (National average for flood season 2012) was 85 sites (48.57 %) which include 79 sites (45.14 %) where flood forecasting stations having 100% accurate forecasts. The number of forecasting sites where the

performance accuracy was found greater than 96% as fixed in the Results Framework Document (RFD) of Ministry of Water Resources is 97 (55.43%).

The flood forecasting performance of the level forecasting as well as inflow forecasting sites from 2000 to 2012 is given in **Annex-VII** and from 2000 to 2012 as **Fig 3.1.**

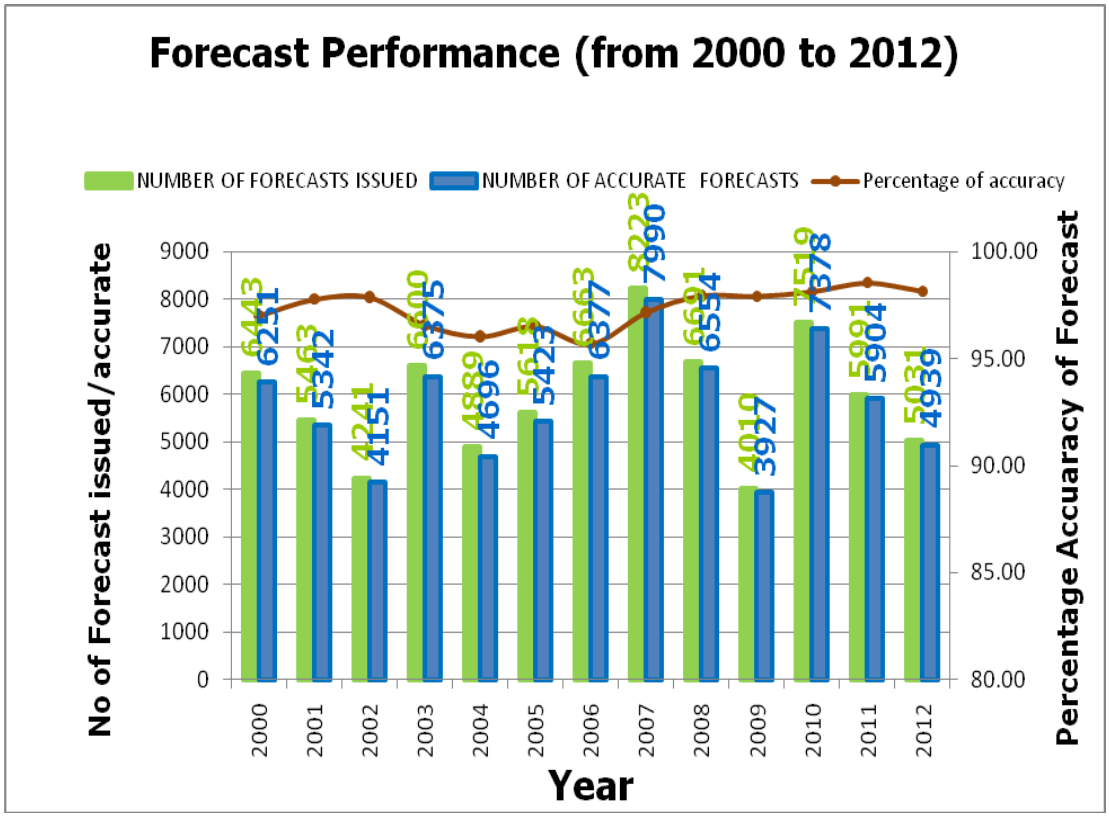


Figure-3.1 Flood Forecast Performance from 2000 to 2012

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 2012 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 2012 is shown in **Table 3.1**.

Table 3.1 Site wise "Forecast Performance" of flood forecasting sites of CWC in Flood Season, 2012

Sl. No.	Details of sites within different range of permissible limit of accuracy (±15cm,±20%cumec)	Flood Season 2012	
		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%	0	0%
3	Sites with performance accuracy between 50.1 % to 75.0%	5	4.39
4	Sites with performance accuracy between 75.1 % to 99.99%	30	26.31
5	Sites with 100% performance accuracy i.e. where all forecasts issued were within permissible limit of accuracy	79	69.30
6	Total sites where forecasts were issued	114	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 2012. Unprecedented floods, exceeding previous highest flood levels (HFL), were not observed during the year 2012. The levels were recorded within 0.5 m of their respective H.F.L at 14 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 2012**.** Moderate and low flood events were observed as listed at **Annex-X to XII,** for the year 2012. 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 2012, 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 2012, high flood events occurred at Elgin Bridge, Darauli, Gangpur Siswan on river Ghaghra, and Balrampur, on river Rapti 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 2012, no stations under Brahmaputra basin witnessed Unprecedented Flood Situation. **However, Dibrugarh, Neamatighat, Tezpur, Goalpara, Dhubri on River Brahmaputra, River Beki at Road Bridge, River Jia-Bharali at N T Road Crossing, River Kopili at Kampur and River Raidak-I at Tufangunj 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. **River Kushiyara at Karimgunj flowed in High Flood Situation during the year 2012 (Annex-IX)**. 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 2012, flood forecasts were issued for Purushottampur and Kashinagar only. 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 2012, all the sites were operational in Mahanadi River. Forecasts were issued for one inflow and one level forecast stations. Level/ inflow forecasts were issued at all the four stations in the Basin. 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 2012. 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 2012 season no unprecedented or high flood events were recorded in this Basin. 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, 2012. 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. No major flood events occurred in the three level forecasting stations in Krishna Basin.

4.9 SOUTHERN RIVER SYSTEM

There was one forecasting site at Nellore on the Pennar River. During 2012, 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 2012, inflow forecasts were issued for all dams. Level forecasts were issued for Wanakbori on river Mahi, Hoshangabad and 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 that no unprecedented flood situation was observed in any of the Flood Forecasting Site maintained by CWC and only High Flood situations was observed in 14 stations in the country.

Moreover, Cyclonic storm 'NILAM' during the end of October 2012 caused heavy rainfall in Telangana, Rayalaseema, Coastal Andhra Pradesh during the period 31st October to 5th November. As a result, many of the small streams and rivulets in various districts of cyclone affected areas in Andhra Pradesh were inundated and submergence of agriculture fields, road and rail bridges have been reported. Inflow forecasts were issued for Prakasam Barrage during the above period.

The inflow into the Tungabhadra Dam in Karnataka increased above the criteria for issue of inflow forecast and inflow forecasts were issued during first week of November 2012.

Moreover, the basins of Rishikulya and Vamsadhara which are located in South Odisha experienced incessant rains and squalls. Water levels of rivers in these basins started rising and crossed their respective warning levels. Hourly observation of water level data and three hourly observations of rainfall data were carried out, inspite of depleted staff strength. Forecasts were issued during that period. The river Rishikulya had crossed its Danger level at Purushottampur. Both the rivers remained above the respective warning levels for a period of about 24 hours.

No forecasts were issued at 61 sites (56 level forecast sites and 5 inflow forecast sites).

CHAPTER 5

DIVISIONWISE STATUS ON USE OF TELEMETRY AND MATHEMATICAL MODEL

5.1 HIMALAYAN GANGA DIVISION, DEHRADUN

There are 9 Telemetry stations viz. Rishikesh, Haridwar, Uttarkasi, Tehri, Srinagar, Rudrprayag, Joshimath, Marora and Nandkeshri on the rivers Ganga, Bhagirathi, Alaknanda, Nayar and Pinder with most of the sites having sensor as Water Level and Rainfall. Mathematical Model is yet to be developed.

5.2 MIDDLE GANGA DIVISION–I, LUCKNOW

Under the jurisdiction of MGD-1, Lucknow 11 Nos Telemetry stations have been installed during 11^{th} plan and the process of installation of 06 Nos. Telemetry station is under progress during 12^{th} plan.

The stations name include Elgin bridge, Ayodhya, Turtipar, Balrampur, Bansi, Birdghat, BK ghat, Shardanagar, Kakardhari, Colnelganj, and Gaighat on the rivers/tributaries Ghaghara, Rapti, Sharda, Rapti, Saryu and Saryu Babai with most of the stations having Rainfall and Water level parameters.

Another 06 Nos new Telemetry stations such as Banbasa, Paliakalan, Basti, Regauli, Jaulgeebi and Tawaghat are proposed under 12^{th} Plan.

The data from above 11 stations were received in the modeling center from June to October 2012 which does not match with the manually observed data. Matter has been taken up with respective agencies for corrective measures. Mathematical Model is yet to be developed.

5.3 MIDDLE GANGA DIVISION–II, LUCKNOW

There are 15 Telemetry stations under this Division which include Garhmukteshwar, Narora, Fathegarh, Kannauj, Ankinghat, Kanpur, Dalmau, Kalagarh, Moradabad, Bareilly, Dabri, Neemsar, Bhatpurwaghat, Lucknow, Rai-bareilly on river Ganga, Ramganga, Gomti and Sai respectively. Most of the sites have water level and rainfall parameter. In addition, 04 new Telemetry stations are proposed under this Division during 2012-13 at Bani, Bhikiasen, Rampur and Kachalabridge.

The data of established Telemetry stations are received in the modeling center during 2012 which do not match with manually observed data. Matter has been taken up with respective agencies for corrective measures. Mathematical Model is yet to be developed.

5.4 MIDDLE GANGA DIVISION –III, CWC, VARANASI

Ten sites have been installed under the jurisdiction of Middle Ganga Division –III, CWC, Varanasi. Out of these 10, 1 site is not reporting at all and at other sites data verification is being done to ascertain the accuracy and reliability of data. No mathematical model has been developed for this division.

5.5 MIDDLE GANGA DIVISION –IV, CWC, PATNA

Eight sites have been proposed to be installed under XI Plan and the process of installation is going on at some of the sites and the work is likely to be completed before the end of February 2013. No mathematical model has been developed for this division.

5.6 MIDDLE GANGA DIVISION –V, CWC, PATNA

Six sites have been proposed to be installed under XI Plan and the process of installation is likely to be completed by February 2013. No mathematical model has been developed for this division.

5.7 DAMODAR DIVISION –IV, CWC, ASANSOL

Twenty Telemetry stations were installed under X Plan and another four has been installed under XI Plan. Due to theft and security related issues only about 12 sites are working and the data are being compared for accuracy and reliability. MIKE 11 model for flood forecasting is yet to be developed.

5.8 UPPER YAMUNA DIVISION, NEW DELHI

There are 14 telemetry sites under the jurisdiction of UYD, New Delhi set up on the rivers Yamuna, Giri, Tons, Hindon and Pabar. The sensors are Water Level and Rainfall with Evaporation, Air Temperature, Wind Speed, Wind Direction, Relative Humidity and Solar Radiation. The telemetry system was established during 2007 monsoon season. The modeling center was also setup at Divisional HQ, New Delhi which started receiving real time data from all 14 sites. During monsoon season 2012, the telemetry data has been received and used for formulation of flood forecasts.

Mathematical Model MIKE 11, established in year 2007 was used for formulation of flood forecast of river Yamuna at Mawi and Delhi Railway Bridge site till 2009. The software for flood forecasting at Mathura site is under trial stage.

5.9 LOWER YAMUNA DIVISION, AGRA

There are sixteen Telemetry stations on the rivers Ken, Chambal, Sindh and Dhasen installed under Lower Yamuna Division**,** Agra**.** One station has been installed under X plan and 15 stations have been installed under XI Plan. Five more stations are proposed under XII Plan for which procurement action is being taken. Mathematical Model developed for Agra and Etawah using MIKE 11 is under trial stage.

5.10 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.

Presently there are 20 number of Telemetry sites in the basin on the Rivers namely Chambal, Shipra, Chotikalisindh, Siwana and Retam. Also other 10 Telemetry stations are under proposal in Chambal, Banas, Parwati and Kalisindh Rivers. These sites contain sensors for Water level, rainfall, Wind direction, Wind speed and Solar Radiation but 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 2012, 9 forecasts were issued for Gandhisagar Dam using Telemetry system and Mathematical Model, out of which 8 forecasts were within the limit with accuracy 89%.

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).

5.11 UPPER BRAHMAPUTRA DIVISION, CWC, DIBRUGARH

Twenty one stations were installed under X Plan and 3 stations were installed under XI Plan. Due to theft and security related issues only 1 station installed under X Plan is working. The three stations installed under XI Plan

are also not reporting accurate data due to non-construction of permanent bubbler termination point. The modelling centre server installed under X Plan was also down and is being attended by the concerned vendor. No mathematical model has been developed for this division.

5.12 MIDDLE BRAHMAPUTRA DIVISION, CWC, GUWAHATI

The modelling centre was installed under X Plan and 6 sites have been installed under XI Plan. As the modelling centre server is not working, no data is being received at Guwahati. The vendor is attending to complaints. A mathematical model for the reach Bhomraguri to Guwahati is being developed in consultation with FCA Directorate and is likely to be calibrated shortly after getting some more cross section data. Once the model is calibrated, then the model can be run on real-time basis.

5.13 LOWER BRAHMAPUTRA DIVISION, JALPAIGURI

Under 11th Plan five (5) Telemetry stations have been installed under the jurisdiction of Lower Brahmaputra Division, Jalpaiguri namely Barabisa on river Raidak-II, Sankosh LRP & Golokganj on Sankosh, Dhubri on Brahmaputra and Mathanguri on Beki with observed parameters as Water Level and Rainfall. Mathematical Model is yet to be developed.

5.14 EASTERN RIVER DIVISION, BHUBANESWAR

There are 39 Telemetry stations under Eastern River Division, Bhubaneswar on the Rivers Subarnarekha, Burhabalang, Baitarni, Brahmani, Rishikulya, Vamsadhara, Mahanadi with most of the stations observing the parameters as Water Level and Rainfall except some stations observing Evaporation, Pressure, RH, Wind direction, Wind Speed in addition to Water Level and Rainfall.

Telemetry data are used in flood forecasting calculations using MIKE 11 and NWSRFS. Rainfall and water level data of sites in Mahanadi basin are exported in MIKE 11 format and also in standard Hydrometeorological Exchange Format (SHEF) to run simulation files in MIKE 11 and also to run NWSRFS.

For the entire monsoon of 2012, forecasts for sites Naraj on Mahanadi, 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 have been encouraging. Especially when the precipitation in the basin was significant, the difference between actual and forecasted value matched very closely. More cross sections of the rivers are being incorporated to enhance the accuracy of the forecast. Model for Jenapur, Rengali (Inflow Forecast) on Brahmani and Rajghat on Subarnrekha are in trial stage. Presently Rengali is not part of existing network. This will be included during 12th Plan.

5.14.1 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.

5.14.2 MIKE 11 FOR BAITARNI BASIN

MIKE 11 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. If more cross sections are made available, Anandpur forecasts can be issued from the results of MIKE-11 with full confidence and within reasonable accuracy.

5.14.2 MIKE 11 FOR SUBARNAREKHA BASIN

During 2012, a humble beginning was made by incorporating Subarnarekha basin in MIKE-11. The work of calibration of the basin was completed using past data and trial run was done daily using real time data during monsoon 2012. The results are encouraging. To increase the effectiveness of the programme, cross sectional data along the river is required to be incorporated in the Hydrodynamic model.

5.15 MAHANADI DIVISION, CWC, Burla

36 stations were installed under IX Plan and X Plan and 2 stations have been installed under XI Plan. Two stations installed under XI Plan were down due to security related issues. The other stations are reporting data which are being verified for accuracy and reliability.

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.

5.16 NARMADA DIVISION, BHOPAL

There is no telemetry station installed under Narmada basin till date. Six numbers of telemetry stations are proposed to be installed under XII plan and action is being taken for installing the same. Mathematical Model is yet to be developed.

5.17 TAPI DIVISION AND MAHI DIVISION (NARMADA & TAPI BASIN ORGANISATION)

Under XI Plan 76 telemetry stations were installed and data from these stations are received at modelling centres at Gandhinagar, Surat and Bhusaval. The data are being verified for accuracy and reliability. Mathematical model is under development for inflow to Hatnur Dam.

5.18 LOWER GODAVARI DIVISION (GODAVARI CIRCLE, HYDERABAD)

Under the X Plan 63 Telemetry stations have already been installed and data from these stations were received on real time basis under Godavari Basin. Real–Time data from Telemetry is also additionally being used for flood forecasting purpose from the year 2008. MIKE 11 model is being developed for Bhadrachalam & Jiakwadi Dam in consultation with CWC HQ and its performance will be tried during 2013 monsoon season.

5.19 LOWER KRISHNA DIVISION (KRISHNA AND PENNAR BASINS/KRISHNA AND COORDINATION CIRCLE)

A total of 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 36 stations have been received on real time basis during the year 2012 and effectively used in flood forecast formulation and six (six) telemetry stations at Huvinahedgi, T. Ramapuram, Mantralayam, Krishna Agraharam, Bawapuram and Pondugala got submerged in the unprecedented flood of the year 2009. All the telemetry stations except Pondugala were functioning during 2012 flood season. 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 2013.

5.20 SNOW HYDROLOGY DIVISION, SHIMLA (SUTLEJ BASIN)

Four sites have been installed in Sutlej basin and the data is being received at the modelling centre at Shimla. The data are being verified for accuracy and reliability.

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, defence, 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 2012

Abstract of some of the messages received by our field unit during the flood season 2012 are given below:

6.2.1 The Special Relief Commissioner, Ex-Officio Additional Secretary to Government, Revenue & Disaster Management Department, Government of Odisha, Bhubaneswar.

Lr. no: 3497/SR dated 26.12.2012

"The flood forecasts of major rivers issued by CWC during monsoon play an important role in effective management of floods. The gauge readings reflected in forecasts helps the Government administration to track the flood situation and keep the district administration in alert to meet any eventuality."

6.2.2 Chief Engineer, Lower Mahanadi and Basin manager, Government of Odisha Bhubaneswar

Lr. No: FC-II-CWC-28/10/2013, Dt 18/12/2012

"I feel great to mention that the availability of such facilities in form of supply of hydrometeorological information and situation forecast etc. (round the clock) from pioneer organizations like CWC & IMD have made it possible time and again to overcome successfully the flood exigencies in time and with better preparedness. As an active user if online data and forecast of CWC, I do express my deep thanks and gratitude to the CWC organization."

6.2.3 Engineer in Chief, Irrigation, Government of Andhra Pradesh, Hyderabad-500 082 Lr. No NA

"The information furnished by Central Water Commission, Lower Krishna Division, Hyderabad for monsoon 2012 in respect of inflow forecast and flood level forecast in Krishna Basin has been very useful in monitoring the floods and water resources of the various reservoirs and also very helpful during review meetings of high level coordination committee on flood management being held by Principal Secretary to Government and Commissioner for disaster management during flood seasons. The forecast issued by Central Water Commission for major reservoirs (**i.e Tungabhadra Jurala Project, Srisailam, Nagarjuna Sagar Project and Prakasam Barrage of Krishna Basin)** is helpful in monitoring and planning the water releases for the irrigation. The same may be continued in future with further developments, if any.

6.2.4 Superintending Engineer, KBJNL O&M Circle NO 1, Government of Karnataka

"The inflow forecast issued by the Central Water Commission is very useful to regulate the flood and safe monitoring of Narayanpur Dam."

6.2.5 Superintending Engineer, Surat Irrigation Circle-Surat, Government of Gujrat, Letter No. SIC/PB-1/Flood Warning-2012/Message/Monsoon-2012/F-19/65, dtd 02-01-2013

Floof Forecast, rainfall data for Upper Tapi Basin and advisory warning recived from CWC, Tapi Division, well in time helped this office to convey the flood related messages timelt to all the concerned Authoriies of Surat City and nearby area and release of flood water was planned according to advisory warning in advance so that least low lying city area was affected with flood water for shorter period in downstream of Ukai Dam.

6.2.6 Deputy Commissioner, Surat Municipal Corporation, Surat, Letter No. DC/Out/32, dtd 03-01-2013

"I happy to put on record that Tapi Divison of Central Water Commission at surat is rendering good services during monsoon period of 2012-13. Timely and speedily communication and transmitting of messages during emergency time has helped a lot to SMC."

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	

Annex-I

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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	

Annex-I

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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	

Annex-I

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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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											(m)	Year			
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	

Annex-I

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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	

Annex-I

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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	

Annex-I

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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	

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			
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	

Annex-I

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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

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											(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 2012												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2012				
						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	Uttaranchal	539.00	540.00	536.85	05/09/1995	535.50	04/Aug/12 06	0	0	
2	Ganga	Rishikesh	Uttaranchal	339.50	340.50	341.72	05/09/1995	339.95	04/Aug/12 11	4	4	100.00
3	Ganga	Haridwar	Uttaranchal	293.00	294.00	296.30	19/09/2010	294.30	04/Aug/12 11	5	3	60.00
4	Ganga	Narora Barrage	Uttar Pradesh			180.61	23/09/2010	179.6	08/Aug/12 16	60	59	98.33
5	Ganga	Kannauj	Uttar Pradesh	124.97	125.97	126.78	27/09/2010	125.15	23/Sep/12 05	4	4	100.00
6	Ganga	Ankinghat	Uttar Pradesh	123.00	124.00	124.49	28/09/2010	123.38	23/Sep/12 13	6	6	100.00
7	Ganga	Kanpur	Uttar Pradesh	113.00	114.00	114.08	29/09/2010	112.465	23/Sep/12 16	7	7	100.00
8	Ganga	Dalmau	Uttar Pradesh	98.36	99.36	99.84	03/08/1973	98.44	23/Sep/12 17	2	2	100.00
9	Ganga	Phphamau	Uttar Pradesh	83.73	84.73	87.98	08/09/1978	80.48	27/Aug/12 09	0	0	
10	Ganga	Allahabad Chhatnag	Uttar Pradesh	83.73	84.73	88.03	08/09/1978	79.55	26/Aug/12 13	0	0	
11	Ganga	Mirzapur	Uttar Pradesh	76.72	77.72	80.34	09/09/1978	73.58	16/Sep/12 18	0	0	
12	Ganga	Varanasi	Uttar Pradesh	70.26	71.26	73.90	09/09/1978	68.17	16/Sep/12 23	0	0	
13	Ganga	Ghazipur	Uttar Pradesh	62.11	63.11	65.22	09/09/1978	62.39	18/Sep/12 01	2	2	100.00
14	Ganga	Buxar	Bihar	59.32	60.32	62.09	1948	59.35	18/Sep/12 08	2	2	100.00
15	Ganga	Ballia	Uttar Pradesh	56.62	57.62	60.25	14/09/2003	58.44	19/Sep/12 17	32	32	100.00
16	Ganga	Patna Dighaghat	Bihar	49.45	50.45	52.52	23/08/1975	50.15	21/Sep/12 17	9	9	100.00
17	Ganga	Patna Gandhighat	Bihar	47.60	48.60	50.27	14/08/1994	49.27	21/Sep/12 11	46	46	100.00
18	Ganga	Hathidah	Bihar	40.76	41.76	43.15	07/08/1971	42.21	22/Sep/12 06	38	38	100.00
19	Ganga	Munger	Bihar	38.33	39.33	40.99	19/09/1976	38.71	23/Sep/12 10	6	6	100.00
20	Ganga	Bhagalpur	Bihar	32.68	33.68	34.20	17/09/2003	33.69	23/Sep/12 18	11	11	100.00
21	Ganga	Kahalgaon	Bihar	30.09	31.09	32.87	17/09/2003	31.64	23/Sep/12 21	47	47	100.00
22	Ganga	Sahibgunj	Jharkhand	26.25	27.25	30.91	1998	28.21	25/Sep/12 05	56	56	100.00
23	Ganga	Farakka	West Bengal	21.25	22.25	25.14	07/09/1998	23.35	24/Sep/12 15	122	118	96.72
24	Ramganga	Moradabad	Uttar Pradesh	189.60	190.60	192.88	21/09/2010	189.8	18/Aug/12 19	2	2	100.00
25	Ramganga	Bareilly	Uttar Pradesh	162.70	163.70	162.88	06/8/1978	160.33	06/Aug/12 18	0	0	
26	Yamuna	Tajewala Weir	Haryana			328.27	03/09/1978	334.50	04/Aug/12 00	0	0	
27	Yamuna	Mawi	Uttar Pradesh	230.00	230.85	232.45	26/09/1988	230.42	05/Aug/12 00	13	13	100.00
28	Yamuna	Delhi Rly Bridge	NCT Delhi	204.00	204.83	207.49	06/09/1978	204.70	29/Aug/12 00	11	10	91.00
29	Yamuna	Mathura	Uttar Pradesh	164.20	165.20	169.73	08/09/1978	165.02	30/Aug/12 00	20	20	100.00
30	Yamuna	Agra	Uttar Pradesh	151.40	152.40	154.76	09/09/1978	150.13	31/Aug/12 08	0	0	
31	Yamuna	Etawa	Uttar Pradesh	120.92	121.92	126.13	11/09/1978	119.50	01/Sep/12 12	0	0	
32	Yamuna	Auraiya	Uttar Pradesh	112.00	113.00	118.19	25/08/1996	107.56	25/Aug/12 12	0	0	
33	Yamuna	Kalpi	Uttar Pradesh	107.00	108.00	112.98	25/08/1996	102.66	25/Aug/12 12	0	0	
34	Yamuna	Hamirpur	Uttar Pradesh	102.63	103.63	108.59	12/09/1983	98.10	25/Aug/12 11	0	0	
35	Yamuna	Chilaghat	Uttar Pradesh	99.00	100.00	105.16	06/09/1978	94.42	25/Aug/12 12	0	0	
36	Yamuna	Naini	Uttar Pradesh	83.74	84.74	87.99	08/09/1978	80.12	26/Aug/12 15	0	0	
37	Sahibi	Dhansa	NCT Delhi	211.44	212.44	213.58	06/08/1977	209.95	06/Sep/12 00	0	0	
38	Chambal	Gandhisagar Dam	Madhya Pradesh	399.99				398.53	05/Oct/12 08	9	7	77.78
39	Betwa	Mohana	Uttar Pradesh	121.66	122.66	133.69	11/09/1983	118.91	23/Aug/12 12	0	0	
40	Betwa	Sahjina	Uttar Pradesh	103.54	104.54	108.67	12/09/1983	98.27	24/Aug/12 10	0	0	
41	Ken	Banda	Uttar Pradesh	103.00	104.00	113.29	07/0720/05	102.70	23/Aug/12 15	0	0	

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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	106.13	14/Sep/12 04	0	0	
43	Gomati	Jaunpur	Uttar Pradesh	73.07	74.07	77.74	22/09/1971	71.29	19/Sep/12 02	0	0	
44	SAI	Raibareli	Uttar Pradesh	100.00	101.00	104.81	17/09/1982	100.654	20/Sep/12 01	7	6	85.71
45	Ghaghra	Elgin Bridge	Uttar Pradesh	105.07	106.07	107.56	10/10/2009	107.206	18/Sep/12 23	72	71	98.61
46	Ghaghra	Ayodhya	Uttar Pradesh	91.73	92.73	94.01	11/10/2009	93.350	21/Sep/12 07	68	68	100.00
47	Ghaghra	Turtipar	Uttar Pradesh	63.01	64.01	66.00	28/08/1998	64.820	22/Sep/12 01	67	66	98.51
48	Ghaghra	Darauli	Bihar	59.82	60.82	61.74	29/08/1998	61.535	22/Sep/12 07	64	64	100.00
49	Ghaghra	Gangpur Siswan	Bihar	56.04	57.04	58.01	18/09/1983	57.580	22/Sep/12 01	42	42	100.00
50	Ghaghra	Chhapra	Bihar	52.68	53.68	54.59	03/09/1982	53.370	20/Sep/12 00	8	8	100.00
51	Rapti	Balrampur	Uttar Pradesh	103.62	104.62	105.25	11/09/2000	104.895	07/Aug/12 04	30	29	96.67
52	Rapti	Bansi	Uttar Pradesh	83.90	84.90	85.82	21/08/1998	84.495	10/Aug/12 15	26	25	96.15
53	Rapti	Gorakpur Birdghat	Uttar Pradesh	73.98	74.98	77.54	23/08/1998	74.780	21/Sep/12 18	16	16	100.00
54	Sone	Inderpuri	Bihar	107.20	108.20	108.85	23/08/1975	106.00	16/Sep/12 08	0	0	
55	Sone	Koelwar	Bihar	54.52	55.52	58.88	20/07/1971	53.38	17/Sep/12 08	0	0	
56	Sone	Maner	Bihar	51.00	52.00	53.79	10/09/1976	52.22	21/Sep/12 07	19	19	100.00
57	PunPun	Sripalpur	Bihar	49.60	50.60	53.91	18/09/1976	52.47	19/Sep/12 10	31	30	96.77
58	Gandak	Khadda	Uttar Pradesh	95.00	96.00	97.50	23/07/2002	95.85	18/Sep/12 14	39	39	100.00
59	Gandak	Chatia	Bihar	68.15	69.15	70.04	26/07/2002	67.28	20/Sep/12 23	0	0	
60	Gandak	Rewaghat	Bihar	53.41	54.41	55.41	17/09/1986	54.20	21/Sep/12 19	11	11	100.00
61	Gandak	Hazipur	Bihar	49.32	50.32	50.93	1948	49.93	21/Sep/12 16	8	8	100.00
62	Burhi Gandak	Lalbeghiaghat	Bihar	62.20	63.20	67.09	30/07/1975	62.13	21/Sep/12 07	0	0	
63	Burhi Gandak	Muzaffarpur	Bihar	51.53	52.53	54.29	15/08/1987	51.18	22/Sep/12 21	0	0	
64	Burhi Gandak	Samastipur	Bihar	45.02	46.02	49.38	15/08/1987	45.25	24/Sep/12 16	5	5	100.00
65	Burhi Gandak	Rosera	Bihar	41.63	42.63	46.35	16/08/1987	42.41	25/Sep/12 09	8	8	100.00
66	Burhi Gandak	Khagaria	Bihar	35.58	36.58	39.22	1976	37.55	23/Sep/12 09	35	35	100.00
67	Bagmati	Benibad	Bihar	47.68	48.68	50.01	12/07/2004	49.34	16/Sep/12 09	67	67	100.00
68	Bagmati	Hayaghat	Bihar	44.72	45.72	48.96	14/08/1987	45.65	22/Sep/12 06	9	9	100.00
69	Adhwara Group	Kamtaul	Bihar	49.00	50.00	52.99	12/08/1987	50.56	20/Sep/12 18	25	25	100.00
70	Adhwara Group	Ekmighat	Bihar	45.94	46.94	49.52	12/07/2004	46.52	22/Sep/12 13	10	10	100.00
71	Kamla Balan	Jhanjharpur	Bihar	49.00	50.00	53.01	10/07/2004	50.90	16/Jul/12 07	30	30	100.00
72	Kosi	Basua	Bihar	46.75	47.75	49.17	25/08/2010	48.37	26/Jul/12 14	186	186	100.00
73	Kosi	Baltara	Bihar	32.85	33.85	36.40	15/08/1987	34.17	05/Sep/12 06	74	74	100.00
74	Kosi	Kursela	Bihar	29.00	30.00	32.04	06/09/1998	30.78	24/Sep/12 14	50	50	100.00
75	Mahananda	Dhengraghat	Bihar	34.65	35.65	38.09	1968	36.65	17/Jul/12 05	27	27	100.00
76	Mahananda	Jhawa	Bihar	30.40	31.40	33.51	14/08/1987	32.16	20/Jul/12 21	37	37	100.00
77	Mayurakshi	Massanjore Dam	Jharkhand	121.31		122.87	25/09/1999	116.159	26/Sep/12 12	3	3	100.00
78	Mayurakshi	Tilpara Barrage	West Bengal	62.79		67.05	27/09/1978	62.728	30/Sep/12 17	4	4	100.00
79	Mayurakshi	Narayanpur	West Bengal	26.99	27.99	29.69	27/09/1995	24.30	15/Sep/12 10	0	0	
80	Ajoy	Gheropara	West Bengal	38.42	39.42	43.94	27/09/1978	37.92	18/Aug/12 05	0	0	
81	Damodar	Tenughat Dam	Jharkhand	268.83		265.56	17/09/1985	262.10	15/Aug/12 02	42	42	100.00
82	Damodar	Panchet Dam	Jharkhand	132.59		132.89	02/10/1959	127.81	12/Sep/12 12	56	56	100.00
83	Damodar	Durgapur Barrage	West Bengal	64.47		64.47	31/10/2002	64.47		47	47	100.00
84	Barakar	Maithon Dam	Jharkhand	150.88		151.79	02/10/1959	147.41	23/Sep/12 00	31	30	96.80
85	Mundeshwari	Harinkhola	West Bengal	11.80	12.80	14.58	29/09/1978	11.77	18/Aug/12 14	0	0	
86	Kangsabati	Kangsabati Dam	West Bengal	134.11		134.71	02/09/1978	132.48	10/Sep/12 16	40	40	100.00
87	Kangsabati	Mohanpur	West Bengal	24.73	25.73	29.87	02/09/1978	21.82	07/Sep/12 18	0	0	

Basinwise -Riverwise- Flood Forecasting Information in India during Flood Season 2012												
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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	103.24	104.24	106.48	03/09/1998	106.34	25/Jun/12 19	178	178	100.00
89	Brahmaputra	Neamatighat	Assam	84.04	85.04	87.37	11/07/1991	87.25	26/Jun/12 16	139	139	100.00
90	Brahmaputra	Tezpur	Assam	64.23	65.23	66.59	27/08/1988	66.13	28/Jun/12 14	67	67	100.00
91	Brahmaputra	Guwahati	Assam	48.68	49.68	51.46	21/07/2004	50.75	26/Sep/12 09	67	67	100.00
92	Brahmaputra	Goalpara	Assam	35.27	36.27	37.43	31/07/1954	37.08	30/Jun/12 09	69	69	100.00
93	Brahmaputra	Dhubri	Assam	27.62	28.62	30.36	28/08/1988	29.92	30/Jun/12 14	224	224	100.00
94	Burhidihing	Naharkatia	Assam	119.40	120.40	122.69	17/06/1973	118.98	25/Jun/12 10	0	0	
95	Burhidihing	Khowang	Assam	101.11	102.11	103.92	25/08/1988	103.05	20/Jul/12 20	57	57	100.00
96	Desang	Nanglamoraghat	Assam	93.46	94.46	96.49	06/09/1998	95.74	03/Aug/12 17	74	74	100.00
97	Dikhow	Shivsagar	Assam	91.40	92.40	95.62	08/07/1974	94.01	30/Jul/12 01	76	76	100.00
98	Subansiri	Badatighat	Assam	81.53	82.53	86.84	28/06/1972	82.92	25/Sep/12 02	23	23	100.00
99	Dhansiri (S)	Golaghat	Assam	88.50	89.50	91.30	11/10/1986	89.62	30/Aug/12 12	15	15	100.00
100	Dhansiri (S)	Numaligarh	Assam	76.42	77.42	79.87	24/09/1985	78.39	31/Aug/12 00	229	229	100.00
101	Jiabharali	Jiabharali_NTX	Assam	76.00	77.00	78.50	26/07/2007	78.05	15/Jul/12 12	377	370	98.14
102	Kopilli	Kampur	Assam	59.50	60.50	61.86	16/06/1973	61.59	28/Jun/12 17	14	14	100.00
103	Kopilli	Dharmatul	Assam	55.00	56.00	58.09	21/07/2004	56.13	30/Jun/12 04	47	47	100.00
104	Puthimari	Puthimari _NHX	Assam	50.81	51.81	55.08	31/08/2008	53.75	26/Jun/12 21	56	55	98.21
105	Pagladiya	Pagladia_NTX	Assam	51.75	52.75	55.45	08/07/2004	53.56	27/Jun/12 16	38	38	100.00
106	Beki	Beki NHX	Assam	44.10	45.10	46.20	04/08/2000	45.97	26/Jun/12 17	202	202	100.00
107	Manas	Manas NHX	Assam	47.81	48.42	50.08	15/09/1984	49.20	15/Jun/12 13	64	64	100.00
108	Sankosh	Golakganj	Assam	28.94	29.94	30.95	08/09/2007	30.10	20/Jul/12 04	95	93	97.89
109	Raidak-I	Tufanganj	West Bengal	34.22	35.30	36.36	21/07/1993	35.89	27/Jun/12 23	37	26	70.27
110	Torsa	Ghughumari	West Bengal	39.80	40.41	41.46	03/08/2000	40.26	16/Jul/12 16	41	40	97.56
111	Jaldhaka	NH-31	West Bengal	80.00	80.90	81.33	28/08/1972	80.45	15/Jul/12 10	34	31	91.18
112	Jaldhaka	Mathabhanga	West Bengal	47.70	48.20	49.85	07/09/2007	48.05	15/Jul/12 15	7	5	71.43
113	Tista	Domohani	West Bengal	85.65	85.95	89.30	14/10/1968	86.32	15/Jul/12 13	154	148	96.10
114	Tista	Mekhliganj	West Bengal	65.45	65.95	66.45	13/07/1996	65.66	16/Jul/12 13	7	6	85.71
	Barak & Meghna Basins											
115	Barak	APGhat	Assam	18.83	19.83	21.84	01/08/1989	21.11	28/Jun/12 16	12	12	100.00
116	Katakhal	Matizuri	Assam	19.27	20.27	22.73	10/09/2007	21.97	28/Jun/12 03	24	24	100.00
117	Kushiyara	Karimganj	Assam	13.94	14.94	16.57	10/06/2010	16.10	29/Jun/12 01	30	30	100.00
118	Manu	Kailashar	Tripura	24.34	25.34	25.79	07/06/1993	24.10	17/Jun/12 05	0	0	
119	Gumti	Sonamura	Tripura	11.50	12.50	14.42	23/07/1993	11.07	25/Jun/12 17	0	0	
	Eastern Rivers (Excluding Mahanadi)											
120	Subernarekna	Rajghat	Orissa	9.45	10.36	12.69	19/06/2008	9.32	06/Aug/12 19	0	0	
121	Burhabalang	NH_5 _Road Bridge	Orissa	7.21	8.13	9.50	12/10/1973	6.30	10/Sep/12 16	0	0	
122	Baitarni	Anandpur	Orissa	37.44	38.36	41.35	23/09/2011	36.90	12/Aug/12 18	0	0	
123	Baitarni	Akhuapada	Orissa		17.83	21.95	16/08/1960	17.67	12/Aug/12 23	0	0	
124	Brahmani	Jenapur	Orissa	22.00	23.00	24.78	20/08/1975	21.14	20/Aug/12 19	0	0	
125	Rushikuluya	Purushottampur	Orissa	15.83	16.83	19.65	04/11/1990	16.86	03/Nov/12 16	2	2	100.00
126	Vamsadhara	Gunupur	Orissa	83.00	84.00	88.75	17/09/1980	82.95	03/Aug/12 10	0	0	
127	Vamsadhara	Kashinagar	Orissa	53.60	54.60	58.93	18/09/1980	54.94	03/Aug/12 10	33	33	100.00
128	Vamsadhara	Gotta Barrage	Andhra Pradesh	34.84	34.84	39.92	07/10/1999			0	0	

Basinwise -Riverwise- Flood Forecasting Information in India during Flood Season 2012												
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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
	Mahanadi Basin											
129	Mahanadi	Hirakud Dam	Orissa	192.02		192.30	30/01/1998	192.03	09/Oct/12 13	67	66	98.50
130	Mahanadi	Naraj	Orissa	25.41	26.41	27.61	31/08/1982	26.02	19/Aug/12 07	18	18	100.00
131	Mahanadi	Alipingal Devi	Orissa	10.85	11.76	13.11	11/09/2011	6.80	08/Aug/12 05	0	0	
132	Mahanadi	Nimapara	Orissa	9.85	10.76	11.60	31/08/1982	8.51	08/Aug/12 02	0	0	
	Godavari Basin											
133	Godavari	Kopergaon	Maharashtra	490.90	493.68	499.17	1969	489.15	12-Sep-12 07	0	0	
134	Godavari	Jaikwadi Dam	Maharashtra	463.91		464.69	12/10/1990	456.78	30-Jun-12 18	0	0	
135	Godavari	Gangakhed	Maharashtra	374.00	375.00	377.57	1947	367.80	03-Sep-12 22	0	0	
136	Godavari	Nanded	Maharashtra	353.00	354.00	357.10	06/08/2006	344.70	04-Sep-12 18	0	0	
137	Godavari	Sriram Sagar	Andhra Pradesh	332.54		332.72	13/10/1990	329.34	14-Oct-12 04	3	3	100.00
138	Godavari	Kaleswaram	Andhra Pradesh	103.50	104.75	107.05	15/08/1986	102.07	08-Sep-12 09	0	0	
139	Godavari	Eturunagaram	Andhra Pradesh	73.29	75.79	77.66	24/08/1990	73.56	22-Aug-12 05	16	12	75.00
140	Godavari	Dummagudam	Andhra Pradesh	53.00	55.00	60.25	16/08/1986	52.87	22-Aug-12 03	0	0	
141	Godavari	Bhadrachalam	Andhra Pradesh	45.72	48.77	55.66	16/08/1986	46.76	22-Aug-12 05	45	40	88.89
142	Godavari	Kunavaram	Andhra Pradesh	37.74	39.24	51.30	16/08/1986	37.22	22-Aug-12 21	0	0	
143	Godavari	Rajamundri	Andhra Pradesh	17.68	19.51	20.48	16/08/1986	16.63	23-Aug-12 06	0	0	
144	Godavari	Dowalaiswaram	Andhra Pradesh	14.25	16.08	18.36	16/08/1986	14.63	23-Aug-12 05	23	23	100.00
145	Wardha	Balharsha	Maharashtra	171.50	174.00	176.00	15/08/1986	171.45	07-Sep-12 00	0	0	
146	Wainganga	Bhandara	Maharashtra	244.00	244.50	250.90	16/09/2005	244.37	06-Sep-12 10	4	4	100.00
147	Wainganga	Pauni	Maharashtra	226.73	227.73	232.35	07/09/1994	228.15	06-Sep-12 19	12	10	83.33
148	Manjira	Singur Dam	Andhra Pradesh	523.60		523.60	15/10/1999	519.28	15-Oct-12 05	0	0	
149	Manjira	Nizamsagar Dam	Andhra Pradesh	428.24		428.24	15/10/1999	424.39	11-Oct-12 05	0	0	
150	Indravati	Jagdalpur	Chhatisgarh	539.50	540.80	544.68	09/07/1973	540.99	06-Aug-12 17	25	22	88.00
	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	01-Sep-12 00	29	26	89.66
153	Krishna	Narayanpur Dam	Karnataka	492.25		492.22	26/09/2008	492.21	03-Sep-12 00	23	22	95.65
154	Krishna	Priyadarshini	Andhra Pradesh	318.52		318.20	02/10/2009	318.50	09-Oct-12 00	27	25	92.59
155	Krishna	Srisailam Dam	Andhra Pradesh	269.75		273.25	03/10/2009	265.53	17-Sep-12 00	25	21	84.00
156	Krishna	Prakasham Barrage	Andhra Pradesh	18.30		21.50	07/10/1903	17.42	30-Jun-12 00	9	5	55.56
157	Bhima	Deongaon	Karnataka	402.00	404.50	407.34	13/08/2006	397.25	08-Oct-12 00	0	0	
158	Tungbhadra	Tungabhadra Dam	Karnataka	497.74		497.74	05/10/1992	497.74	03-Sep-12 00	86	78	90.70
159	Tungbhadra	Mantralayam	Andhra Pradesh	310.00	312.00	318.77	02/10/2009	309.77	05-Sep-12 00	0	0	
	Southern River System:											
160	Pennar	Nellore	Andhra Pradesh	15.91	17.28	18.70	30/11/1882	8.23	16/Jul/12 11	0	0	
	Western River Systems:											
161	Banas	Dantiwada Dam	Gujarat	182.88	185.06	186.04	01/09/1973	178.29	04/Oct/12 08	2	2	100.00
162	Sabarmati	Dharoi Dam	Gujarat	187.45	192.25	189.63	03/09/1990	189.25	07/Oct/12 08	7	7	100.00
163	Sabarmati	Ahmedabad	Gujarat	44.09	45.34	47.45	19/08/2006	42.10	08/Sep/12 13	0	0	
164	Mahi	Kadana Dam	Gujarat	126.19	127.71	127.74	09/09/1989	127.71	23/Sep/12 22	15	15	100.00
165	Mahi	Wanakbori	Gujarat	71.00	72.54	76.10	12/08/2006	73.96	06/Sep/12 18	21	19	90.48
166	Naramada	Mandla	Madhya Pradesh	437.20	437.80	439.41	18/08/1974	435.97	14/Aug/12 12	0	0	
167	Naramada	Hoshangabad	Madhya Pradesh	292.83	293.83	300.90	30/08/1973	295.55	07/Aug/12 19	14	14	100.00
168	Naramada	Garudeswar	Gujarat	30.48	31.09	41.65	06/09/1970	29.79	09/Aug/12 06	0	0	
169	Naramada	Bharuch	Gujarat	6.71	7.31	12.65	07/09/1970	9.20	07/Sep/12 11	13	12	92.30
170	Tapi	Hatnur Dam	Maharashtra	212.00	214.00	214.00	12/10/1989	214.00	05/Oct/12 07	170	170	100.00

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						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12	13.00
171	Tapi	Ukai Dam	Gujarat	102.41	105.16	105.51	08/10/1990	104.31	26/Sep/12 09	73	72	98.63
172	Tapi	Surat	Gujarat	8.50	9.50	12.50	09/08/2006	8.65	08/Sep/12 02	1	1	100.00
173	Damanganga	Madhuban Dam	Gujarat	79.86	82.40	80.60	27/09/1993	80.05	11/Oct/12 16	3	3	100.00
174	Damanganga	Vapi Town	Gujarat	18.20	19.20	23.76	03/08/2004	16.45	11/Sep/12 15	0	0	
175	Damanganga	Daman	Dadra & Nagar Haveli	2.60	3.40	4.00	03/08/2004	2.00	11/Sep/12 06	0	0	
								Total Forecasts		***5031***	***4939***	**98.17**
								Level Forecasts		**4200**	**4136**	**98.48**
								Inflow Forecast		**831**	**803**	**96.63**

Statewise Flood Forecasting Information In India during Flood Season 2012

Sl. No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2012				
					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	5	6	7	8	9	10	11	12	13
	Andhra Pradesh										
1	Vamsadhara	Gotta Barrage	FRL34.84	MWL47.4	39.92	07/10/1999			0	0	
2	Godavari	Sriram Sagar	FRL332.54		332.72	13/10/1990	329.34	14/Oct/12 04	3	3	100
3	Godavari	Kaleswaram	103.50	104.75	107.05	15/08/1986	102.07	08/Sep/12 09	0	0	
4	Godavari	Eturunagaram	73.29	75.79	77.66	24/08/1990	73.56	22/Aug/12 05	16	12	75.00
5	Godavari	Dummagudam	53.00	55.00	60.25	16/08/1986	52.87	22/Aug/12 03	0	0	
6	Godavari	Bhadrachalam	45.72	48.77	55.66	16/08/1986	46.76	22/Aug/12 05	45	40	88.89
7	Godavari	Kunavaram	37.74	39.24	51.30	16/08/1986	37.22	22/Aug/12 21	0	0	
8	Godavari	Rajamundri	17.68	19.51	20.48	16/08/1986	16.63	23/Aug/12 06	0	0	
9	Godavari	Dowalaiswaram	14.25	16.08	18.36	16/08/1986	14.63	23/Aug/12 05	23	23	100
10	Manjira	Singur Dam	523.60	FRL=523.60	523.60	15/10/1999	519.28	15/Oct/12 05	0	0	
11	Manjira	Nizamsagar Dam	428.24	FRL=428.24	428.24	15/10/1999	424.39	11/Oct/12 05	0	0	
12	Krishna	Priyadarshini	318.52	FRL=318.52	318.20	02/10/2009	318.50	09/Oct/12 00	27	25	92.59
13	Krishna	Srisailam Dam	269.75	FRL=269.75	273.25	03/10/2009	265.53	17/Sep/12 00	25	21	84.00
14	Krishna	Prakasham Barrage	18.30	FRL=18.30	21.50	07/10/1903	17.42	30/Jun/12 00	9	5	55.56
15	Tungbhadra	Mantralayam	310.00	312.00	318.77	02/10/2009	309.77	05/Sep/12 00	0	0	
16	Pennar	Nellore	15.91	17.28	18.70	30/11/1882	8.23	16/Jul/12 11	0	0	
	Assam										
17	Brahmaputra	Dibrugrah	103.24	104.24	106.48	03/09/1998	106.34	25/Jun/12 19	178	178	100
18	Brahmaputra	Neamatighat	84.04	85.04	87.37	11/07/1991	87.25	26/Jun/12 16	139	139	100
19	Brahmaputra	Tezpur	64.23	65.23	66.59	27/08/1988	66.13	28/Jun/12 14	67	67	100
20	Brahmaputra	Guwahati	48.68	49.68	51.46	21/07/2004	50.75	26/Sep/12 09	67	67	100
21	Brahmaputra	Goalpara	35.27	36.27	37.43	31/07/1954	37.08	30/Jun/12 09	69	69	100
22	Brahmaputra	Dhubri	27.62	28.62	30.36	28/08/1988	29.92	30/Jun/12 14	224	224	100
23	Burhidihing	Naharkatia	119.40	120.40	122.69	17/06/1973	118.98	25/Jun/12 10	0	0	
24	Burhidihing	Khowang	101.11	102.11	103.92	25/08/1988	103.05	20/Jul/12 20	57	57	100
25	Desang	Nanglamoraghat	93.46	94.46	96.49	06/09/1998	95.74	03/Aug/12 17	74	74	100
26	Dikhow	Shivsagar	91.40	92.40	95.62	08/07/1974	94.01	30/Jul/12 01	76	76	100
27	Subansiri	Badatighat	81.53	82.53	86.84	28/06/1972	82.92	25/Sep/12 02	23	23	100
28	Dhansiri (S)	Golaghat	88.50	89.50	91.30	11/10/1986	89.62	30/Aug/12 12	15	15	100
29	Dhansiri (S)	Numaligarh	76.42	77.42	79.87	24/09/1985	78.39	31/Aug/12 00	229	229	100
30	Jiabharali	Jiabharali_NTX	76.00	77.00	78.50	26/07/2007	78.05	15/Jul/12 12	377	370	98.14
31	Kopilli	Kampur	59.50	60.50	61.86	16/06/1973	61.59	28/Jun/12 17	14	14	100
32	Kopilli	Dharmatul	55.00	56.00	58.09	21/07/2004	56.13	30/Jun/12 04	47	47	100
33	Puthimari	Puthimari _NHX	50.81	51.81	55.08	31/08/2008	53.75	26/Jun/12 21	56	55	98.21
34	Pagladiya	Pagladia_NTX	51.75	52.75	55.45	08/07/2004	53.56	27/Jun/12 16	38	38	100
35	Beki	Beki NHX	44.10	45.10	46.20	04/08/2000	45.97	26/Jun/12 17	202	202	100
36	Manas	Manas NHX	47.81	48.42	50.08	15/09/1984	49.20	15/Jun/12 13	64	64	100
37	Sankosh	Golakganj	28.94	29.94	30.95	08/09/2007	30.10	20/Jul/12 04	95	93	97.89
38	Barak	APGhat	18.83	19.83	21.84	01/08/1989	21.11	28/Jun/12 16	12	12	100
39	Katakhal	Matizuri	19.27	20.27	22.73	10/09/2007	21.97	28/Jun/12 03	24	24	100
40	Kushiyara	Karimganj	13.94	14.94	16.57	10/06/2010	16.10	29/Jun/12 01	30	30	100

Statewise Flood Forecasting Information In India during Flood Season 2012

Sl. No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2012		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	5	6	7	8	9	10	11	12	13
	Bihar										
41	Ganga	Buxar	59.32	60.32	62.09	1948	59.35	18/Sep/12 08	2	2	100
42	Ganga	Patna Gandhighat	49.45	50.45	52.52	23/08/1975	50.15	21/Sep/12 17	9	9	100
43	Ganga	Patna Dighaghat	47.60	48.60	50.27	14/08/1994	49.27	21/Sep/12 11	46	46	100
44	Ganga	Hathidah	40.76	41.76	43.15	07/08/1971	42.21	22/Sep/12 06	38	38	100
45	Ganga	Munger	38.33	39.33	40.99	19/09/1976	38.71	23/Sep/12 10	6	6	100
46	Ganga	Bhagalpur	32.68	33.68	34.20	17/09/2003	33.69	23/Sep/12 18	11	11	100
47	Ganga	Kahalgaon	30.09	31.09	32.87	17/09/2003	31.64	23/Sep/12 21	47	47	100
48	Ghaghra	Darauli	59.82	60.82	61.74	29/08/1998	61.535	22/Sep/12 07	64	64	100
49	Ghaghra	Gangpur Siswan	56.04	57.04	58.01	18/09/1983	57.580	22/Sep/12 01	42	42	100
50	Ghaghra	Chhapra	52.68	53.68	54.59	03/09/1982	53.370	20/Sep/12 00	8	8	100
51	Sone	Inderpuri	107.20	108.20	108.85	23/08/1975	106.00	16/Sep/12 08	0	0	
52	Sone	Koelwar	54.52	55.52	58.88	20/07/1971	53.38	17/Sep/12 08	0	0	
53	Sone	Maner	51.00	52.00	53.79	10/09/1976	52.22	21/Sep/12 07	19	19	100
54	PunPun	Sripalpur	49.60	50.60	53.91	18/09/1976	52.47	19/Sep/12 10	31	30	96.77
55	Gandak	Chatia	68.15	69.15	70.04	26/07/2002	67.28	20/Sep/12 23	0	0	
56	Gandak	Rewaghat	53.41	54.41	55.41	17/09/1986	54.20	21/Sep/12 19	11	11	100
57	Gandak	Hazipur	49.32	50.32	50.93	1948	49.93	21/Sep/12 16	8	8	100
58	Burhi Gandak	Lalbeghiaghat	62.20	63.20	67.09	30/07/1975	62.13	21/Sep/12 07	0	0	
59	Burhi Gandak	Muzaffarpur	51.53	52.53	54.29	15/08/1987	51.18	22/Sep/12 21	0	0	
60	Burhi Gandak	Samastipur	45.02	46.02	49.38	15/08/1987	45.25	24/Sep/12 16	5	5	100
61	Burhi Gandak	Rosera	41.63	42.63	46.35	16/08/1987	42.41	25/Sep/12 09	8	8	100
62	Burhi Gandak	Khagaria	35.58	36.58	39.22	1976	37.55	23/Sep/12 09	35	35	100
63	Bagmati	Benibad	47.68	48.68	50.01	12/07/2004	49.34	16/Sep/12 09	67	67	100
64	Bagmati	Hayaghat	44.72	45.72	48.96	14/08/1987	45.65	22/Sep/12 06	9	9	100
65	Adhwara Group	Kamtaul	49.00	50.00	52.99	12/08/1987	50.56	20/Sep/12 18	25	25	100
66	Adhwara Group	Ekmighat	45.94	46.94	49.52	12/07/2004	46.52	22/Sep/12 13	10	10	100
67	Kamla Balan	Jhanjharpur	49.00	50.00	53.01	10/07/2004	50.90	16/Jul/12 07	30	30	100
68	Kosi	Basua	46.75	47.75	49.17	25/08/2010	48.37	26/Jul/12 14	186	186	100
69	Kosi	Baltara	32.85	33.85	36.40	15/08/1987	34.17	05/Sep/12 06	74	74	100
70	Kosi	Kursela	29.00	30.00	32.04	06/09/1998	30.78	24/Sep/12 14	50	50	100
71	Mahananda	Dhengraghat	34.65	35.65	38.09	1968	36.65	17/Jul/12 05	27	27	100
72	Mahananda	Jhawa	30.40	31.40	33.51	14/08/1987	32.16	20/Jul/12 21	37	37	100
	Chhatisgarh										
73	Indravati	Jagdalpur	539.50	540.80	544.68	09/07/1973	540.99	06/Aug/12 17	25	22	88.00
	Dadra & Nagar Haveli										
74	Damanganga	Daman	2.60	3.40	4.00	03/08/2004	2.00	11/Sep/12 06	0	0	
	Gujarat										
75	Banas	Dantiwada Dam	182.88	185.06	186.04	01/09/1973	178.29	04/Oct/12 08	2	2	100
76	Sabarmati	Dharoi Dam	187.45	192.25	189.63	03/09/1990	189.25	07/Oct/12 08	7	7	100
77	Sabarmati	Ahmedabad	44.09	45.34	47.45	19/08/2006	42.10	08/Sep/12 13	0	0	
78	Mahi	Kadana Dam	126.19	127.71	127.74	09/09/1989	127.71	23/Sep/12 22	15	15	100
79	Mahi	Wanakbori	71.00	72.54	76.10	12/08/2006	73.96	06/Sep/12 18	21	19	90.48
80	Naramada	Garudeswar	30.48	31.09	41.65	06/09/1970	29.79	09/Aug/12 06	0	0	
81	Naramada	Bharuch	6.71	7.31	12.65	07/09/1970	9.20	07/Sep/12 11	13	12	92.31
82	Tapi	Ukai Dam	102.41	105.16	105.51	08/10/1990	104.31	26/Sep/12 09	73	72	98.63
83	Tapi	Surat	8.50	9.50	12.50	09/08/2006	8.65	08/Sep/12 02	1	1	100
84	Damanganga	Madhuban Dam	79.86	82.40	80.60	27/09/1993	80.05	11/Oct/12 16	3	3	100
85	Damanganga	Vapi Town	18.20	19.20	23.76	03/08/2004	16.45	11/Sep/12 15	0	0	

Statewise Flood Forecasting Information In India during Flood Season 2012

Sl. No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2012		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	5	6	7	8	9	10	11	12	13
	Haryana										
86	Yamuna	Tajewala Weir	PL=323.70		328.27	03/09/1978	334.50	04/Aug/12 00	0	0	
	Jharkhand										
87	Ganga	Sahibgunj	26.25	27.25	30.91	1998	28.21	25/Sep/12 05	56	56	100
88	Mayurakshi	Massanjore Dam	FRL = 121.31		122.87	25/09/1999	116.159	26/Sep/12 12	3	3	100
89	Damodar	Tenughat Dam	FRL = 268.83		265.56	17/09/1985	262.10	15/Aug/12 02	42	42	100
90	Damodar	Panchet Dam	FRL = 132.59		132.89	02/10/1959	127.81	12/Sep/12 12	56	56	100
91	Barakar	Maithon Dam	FRL= 150.88		151.79	02/10/1959	147.41	23/Sep/12 00	31	30	96.80
	Karnataka										
92	Krishna	Alamati Dam	FRL=519.60		519.60	18/09/2002	519.60	01-Sep-12 00	29	26	89.66
93	Krishna	Narayanpur Dam	FRL=492.25		492.22	26/09/2008	492.21	03-Sep-12 00	23	22	95.65
94	Bhima	Deongaon	402.00	404.50	407.34	13/08/2006	397.25	08-Oct-12 00	0	0	
95	Tungbhadra	Tungabhadra Dam	FRL=497.74		497.74	05/10/1992	497.74	03-Sep-12 00	86	78	90.70
	Madhya Pradesh										
96	Chambal	Gandhisagar Dam	FRL+399.99				398.53	05/Oct/12 08	9	7	77.78
97	Naramada	Mandla	437.20	437.80	439.41	18/08/1974	435.97	14/Aug/12 12	0	0	
98	Naramada	Hoshangabad	292.83	293.83	300.90	30/08/1973	295.55	07/Aug/12 19	14	14	100
	Maharashtra										
99	Godavari	Kopergaon	490.90	493.68	499.17	1969	489.15	12-Sep-12 07	0	0	
100	Godavari	Jaikwadi Dam	FRL=463.91		464.69	12/10/1990	456.78	30-Jun-12 18	0	0	
101	Godavari	Gangakhed	374.00	375.00	377.57	1947	367.80	03-Sep-12 22	0	0	
102	Godavari	Nanded	353.00	354.00	357.10	06/08/2006	344.70	04-Sep-12 18	0	0	
103	Wardha	Balharsha	171.50	174.00	176.00	15/08/1986	171.45	07-Sep-12 00	0	0	
104	Wainganga	Bhandara	244.00	244.50	250.90	16/09/2005	244.37	06-Sep-12 10	4	4	100
105	Wainganga	Pauni	226.73	227.73	232.35	07/09/1994	228.15	06-Sep-12 19	12	10	83.33
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	214.00	05/Oct/12 07	170	170	100
	NCT Delhi										
108	Yamuna	Delhi Rly Bridge	204.00	204.83	207.49	06/09/1978	204.70	29/Aug/12 00	11	10	90.91
109	Sahibi	Dhansa	211.44	212.44	213.58	06/08/1977	209.95	06/Sep/12 00	0	0	0
	Odisha										
110	Subernarekna	Rajghat	9.45	10.36	12.69	19/06/2008	9.32	06/Aug/12 19	0	0	
111	Burhabalang	NH_5 _Road Bridge	7.21	8.13	9.50	12/10/1973	6.30	10/Sep/12 16	0	0	
112	Baitarni	Anandpur	37.44	38.36	41.35	23/09/2011	36.90	12/Aug/12 18	0	0	
113	Baitarni	Akhuapada	17.83	17.83	21.95	16/08/1960	17.67	12/Aug/12 23	0	0	
114	Brahmani	Jenapur	22.00	23.00	24.78	20/08/1975	21.14	20/Aug/12 19	0	0	
115	Rushikuluya	Purushottampur	15.83	16.83	19.65	04/11/1990	16.86	03/Nov/12 16	2	2	100
116	Vamsadhara	Gunupur	83.00	84.00	88.75	17/09/1980	82.95	03/Aug/12 10	0	0	
117	Vamsadhara	Kashinagar	53.60	54.60	58.93	18/09/1980	54.94	03/Aug/12 10	33	33	100
118	Mahanadi	Hirakud Dam	FRL=192.02		192.30	30/01/1998	192.03	09/Oct/12 13	67	66	98.50
119	Mahanadi	Naraj	25.41	26.41	27.61	31/08/1982	26.02	19/Aug/12 07	18	18	100
120	Mahanadi	Alipingal Devi	10.85	11.76	13.11	11/09/2011	6.80	08/Aug/12 05	0	0	
121	Mahanadi	Nimapara	9.85	10.76	11.60	31/08/1982	8.51	08/Aug/12 02	0	0	
	Tripura										
122	Manu	Kailashar	24.34	25.34	25.79	07/06/1993	24.10	17/Jun/12 05	0	0	
123	Gumti	Sonamura	11.50	12.50	14.42	23/07/1993	11.07	25/Jun/12 17	0	0	

Statewise Flood Forecasting Information In India during Flood Season 2012

Sl. No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2012		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	5	6	7	8	9	10	11	12	13
	Uttar Pradesh										
124	Ganga	Narora Barrage	PL= 180.79 at D/S		180.61	23/09/2010	179.6	08/Aug/12 16	60	59	98.33
125	Ganga	Kannauj	124.97	125.97	126.78	27/09/2010	125.15	23/Sep/12 05	4	4	100
126	Ganga	Ankinghat	123.00	124.00	124.49	28/09/2010	123.38	23/Sep/12 13	6	6	100
127	Ganga	Kanpur	113.00	114.00	114.08	29/09/2010	112.465	23/Sep/12 16	7	7	100
128	Ganga	Dalmau	98.36	99.36	99.84	03/08/1973	98.44	23/Sep/12 17	2	2	100
129	Ganga	Phphamau	83.73	84.73	87.98	08/09/1978	80.48	27/Aug/12 09	0	0	
130	Ganga	Allahabad	83.73	84.73	88.03	08/09/1978	79.55	26/Aug/12 13	0	0	
131	Ganga	Mirzapur	76.72	77.72	80.34	09/09/1978	73.58	16/Sep/12 18	0	0	
132	Ganga	Varanasi	70.26	71.26	73.90	09/09/1978	68.17	16/Sep/12 23	0	0	
133	Ganga	Ghazipur	62.11	63.11	65.22	09/09/1978	62.39	18/Sep/12 01	2	2	100
134	Ganga	Ballia	56.62	57.62	60.25	14/09/2003	58.44	19/Sep/12 17	32	32	100
135	Ramganga	Moradabad	189.60	190.60	192.88	21/09/2010	189.8	18/Aug/12 19	2	2	100
136	Ramganga	Bareilly	162.70	163.70	162.88	06/8/1978	160.33	06/Aug/12 18	0	0	
137	Yamuna	Mawi	230.00	230.85	232.45	26/09/1988	230.42	05/Aug/12 00	13	13	100
138	Yamuna	Mathura	164.20	165.20	169.73	08/09/1978	165.02	30/Aug/12 00	20	20	100
139	Yamuna	Agra	151.40	152.40	154.76	09/09/1978	150.13	31/Aug/12 08	0	0	
140	Yamuna	Etawa	120.92	121.92	126.13	11/09/1978	119.50	01/Sep/12 12	0	0	
141	Yamuna	Auraiya	112.00	113.00	118.19	25/08/1996	107.56	25/Aug/12 12	0	0	
142	Yamuna	Kalpi	107.00	108.00	112.98	25/08/1996	102.66	25/Aug/12 12	0	0	
143	Yamuna	Hamirpur	102.63	103.63	108.59	12/09/1983	98.10	25/Aug/12 11	0	0	
144	Yamuna	Chilaghat	99.00	100.00	105.16	06/09/1978	94.42	25/Aug/12 12	0	0	
145	Yamuna	Naini	83.74	84.74	87.99	08/09/1978	80.12	26/Aug/12 15	0	0	
146	Betwa	Mohana	121.66	122.66	133.69	11/09/1983	118.91	23/Aug/12 12	0	0	
147	Betwa	Sahjina	103.54	104.54	108.67	12/09/1983	98.27	24/Aug/12 10	0	0	
148	Ken	Banda	103.00	104.00	113.29	07/0720/05	102.70	23/Aug/12 15	0	0	
149	Gomati	Lucknow	108.50	109.50	110.85	10/09/1971	106.13	14/Sep/12 04	0	0	
150	Gomati	Jaunpur	73.07	74.07	77.74	22/09/1971	71.29	19/Sep/12 02	0	0	
151	SAI	Raibareli	100.00	101.00	104.81	17/09/1982	100.654	20/Sep/12 01	7	6	85.71
152	Ghaghra	Elgin Bridge	105.07	106.07	107.56	10/10/2009	107.206	18/Sep/12 23	72	71	98.61
153	Ghaghra	Ayodhya	91.73	92.73	94.01	11/10/2009	93.350	21/Sep/12 07	68	68	100
154	Ghaghra	Turtipar	63.01	64.01	66.00	28/08/1998	64.820	22/Sep/12 01	67	66	98.51
155	Rapti	Balrampur	103.62	104.62	105.25	11/09/2000	104.895	07/Aug/12 04	30	29	96.67
156	Rapti	Bansi	83.90	84.90	85.82	21/08/1998	84.495	10/Aug/12 15	26	25	96.15
157	Rapti	Gorakpur Birdghat	73.98	74.98	77.54	23/08/1998	74.780	21/Sep/12 18	16	16	100
158	Gandak	Khadda	95.00	96.00	97.50	23/07/2002	95.85	18/Sep/12 14	39	39	100
	Uttarakhand										
159	Alaknanda	Srinagar	539.00	540.00	536.85	05/09/1995	535.50	04/Aug/12 06	0	0	
160	Ganga	Rishikesh	339.50	340.50	341.72	05/09/1995	339.95	04/Aug/12 11	4	4	100
161	Ganga	Haridwar	293.00	294.00	296.30	19/09/2010	294.30	04/Aug/12 11	5	3	60
	West Bengal										
162	Ganga	Farakka	21.25	22.25	25.14	07/09/1998	23.35	24/Sep/12 15	122	118	96.72
163	Mayurakshi	Tilpara Barrage	PL= 62.79		67.05	27/09/1978	62.728	30/Sep/12 17	4	4	100
164	Mayurakshi	Narayanpur	26.99	27.99	29.69	27/09/1995	24.30	15/Sep/12 10	0	0	
165	Ajoy	Gheropara	38.42	39.42	43.94	27/09/1978	37.92	18/Aug/12 05	0	0	
166	Damodar	Durgapur Barrage	PL = 64.47		64.47	31/10/2002	64.47		47	47	100
167	Mundeshwari	Harinkhola	11.80	12.80	14.58	29/09/1978	11.77	18/Aug/12 14	0	0	
168	Kangsabati	Kangsabati Dam	FRL=134.11		134.71	02/09/1978	132.48	10/Sep/12 16	40	40	100
169	Kangsabati	Mohanpur	24.73	25.73	29.87	02/09/1978	21.82	07/Sep/12 18	0	0	
170	Raidak-I	Tufanganj	34.22	35.30	36.36	21/07/1993	35.89	27/Jun/12 23	37	26	70.27

Statewise Flood Forecasting Information In India during Flood Season 2012

Sl. No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2012				
					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	5	6	7	8	9	10	11	12	13
171	Torsa	Ghughumari	39.80	40.41	41.46	03/08/2000	40.26	16/Jul/12 16	41	40	97.56
172	Jaldhaka	NH-31	80.00	80.90	81.33	28/08/1972	80.45	15/Jul/12 10	34	31	91.18
173	Jaldhaka	Mathabhanga	47.70	48.20	49.85	07/09/2007	48.05	15/Jul/12 15	7	5	71.43
174	Tista	Domohani	85.65	85.95	89.30	14/10/1968	86.32	15/Jul/12 13	154	148	96.10
175	Tista	Mekhliganj	65.45	65.95	66.45	13/07/1996	65.66	16/Jul/12 13	7	6	85.71
							Total Forecasts		***5031***	***4939***	**98.17**
							Level Forecasts		**4200**	**4136**	**98.48**
							Inflow Forecast		**831**	**803**	**96.63**

Performance of Flood Forecasting Stations (Divisionwise) in India during Flood Season 2012

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	9	7	77.78	0	0	0	0		3	2	9	7	77.78
2	Middle Ganga Division 1, Lucknow	6	6	279	275	98.57	0	0	0	0		6	6	279	275	98.57
3	Middle Ganga Division 2, Lucknow	8	6	28	27	96.43	1	1	60	59	98.33	9	7	88	86	97.73
4	Middle Ganga Division 3, Varanasi	7	2	34	34	100.00	0	0	0	0		7	2	34	34	100.00
5	Middle Ganga Division 4, Patna	17	14	602	602	100.00	0	0	0	0		17	14	602	602	100.00
6	Middle Ganga Division 5, Patna	18	16	520	515	99.00	0	0	0	0		18	16	520	515	99.04
7	Upper Yamuna Divn, Delhi	4	3	44	43	97.73	1	0	0	0		5	3	44	43	97.73
8	Chambal Division, Jaipur	0	0	0	0		1	1	9	7	77.78	1	1	9	7	77.78
9	Lower Yamuna Divn, Agra	10	0	0	0		0	0	0	0		10	0	0	0	
10	Damodar Divn, Asansol	4	0	0	0		7	7	223	222	99.55	11	7	223	222	99.55
11	Upper Brahmaputra Divn, Dibrugarh	13	12	1296	1289	99.46	0	0	0	0		13	12	1296	1289	99.46
12	Middle Brahmaputra Divn, Guwahati	9	7	296	295	99.66	0	0	0	0		9	7	296	295	99.66
13	Lower Brahmaputra Divn, Jalpaiguri	10	10	865	839	96.99	0	0	0	0		10	10	865	839	96.99
14	Eastern Rivers Divn, Bhubaneswar	11	2	53	53	100.00	1	0	0	0		12	2	53	53	100.00
15	Mahanadi Divn, Burla	0	0				1	1	67	66	98.50	1	1	67	66	98.51
16	Lower Godavari Divn, Hyderabad	14	6	125	111	88.80	4	1	3	3	100.00	18	7	128	114	89.06
17	Lower Krishna Divn, Hyderabad	4	0	0	0	0.00	6	6	199	177	88.94	10	6	199	177	88.94
18	Mahi Divn, Ahmedabad	2	1	21	19	90.48	3	3	24	24	100.00	5	4	45	43	95.56
19	Tapi Divn,Surat	5	2	14	13	92.86	3	3	246	245	99.59	8	5	260	258	99.23
20	Narmada Divn, Bhopal	2	14	14	14	100.00	0	0	0	0		2	14	14	14	100.00
Total		**147**	**103**	**4200**	**4136**	**98.48**	**28**	**23**	**831**	**803**	**96.63**	**175**	**126**	**5031**	**4939**	**98.17**

Performance of Flood Forecasting Stations (Major Basinwise) in India during Flood Season 2012

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	29	28	1	1516	1503	99.14	292	288	98.63	1808	1791	99.06
2	Brahamputra and its tributaries	27	27	0	1	1	0	2391	2357	98.58	0	0		2391	2357	98.58
3	Barak and its tributaries	5	5	0	2	2	0	66	66	100.00	0	0		66	66	100.00
4	Eastern Rivers	9	8	1	7	6	1	35	35	100.00	0	0		35	35	100.00
5	Mahanadi and its tributaries	4	3	1	2	2	0	18	18	100.00	67	66	98.51	85	84	98.82
6	Godavari and its tributaries	18	14	4	11	8	3	125	111	88.80	3	3	100.00	128	114	89.06
7	Krishna and its tributaries	9	3	6	3	3	0	0	0	-	199	177	88.94	199	177	88.94
8	West Flowing rivers	15	9	6	5	5	0	49	46	93.88	270	269	99.63	319	315	98.75
9	Southern rivers	1	1	0	1	1	0	0	0	-	0	0	0	0	0	
Total		**175**	**147**	**28**	**61**	**56**	**5**	**4200**	**4136**	**98.48**	**831**	**803**	**96.63**	**5031**	**4939**	**98.17**

Annex VI

Performance of Flood Forecasting Stations (Statewise) in India during Flood Season 2012

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	9	6	3	84	75	89.29	64	54	84.38	148	129	87.16
2	Assam	24	24	0	1	1	0	2177	2167	99.54				2177	2167	99.54
3	Bihar	32	32	0	5	5	0	905	904	99.89				905	904	99.89
4	Chattisgarh	1	1	0	0	0	0	25	22	88.00				25	22	88.00
5	Gujarat	11	6	5	3	3	0	35	32	91.43	100	99	99.00	135	131	97.04
6	Karnataka	4	1	3	1	1	0	0	0		138	126	91.30	138	126	91.30
7	Maharashtra	9	7	2	6	5	1	16	14	87.50	170	170	100.00	186	184	98.92
8	Madhya Pradesh	3	2	1	1	1	0	14	14	100.00	9	7	77.78	23	21	91.30
9	Odisha	12	11	1	8	8	0	53	53	100.00	67	66	98.51	120	119	99.17
10	Tripura	2	2	0	2	2	0	0	0					0	0	
11	Uttar Pradesh	35	34	1	17	17	0	413	408	98.79	60	59	98.33	473	467	98.73
12	Uttarakhand	3	3	0	1	1	0	9	7	77.78	0	0		9	7	77.78
13	West Bengal	14	11	3	4	4	0	402	374	93.03	91	91	100.00	493	465	94.32
14	NCT, DELHI	2	2	0	1	1	0	11	10	91.00	0	0		11	10	91.00
15	D,NH	1	1	0	1	1	0	0	0					0	0	
16	Haryana	1	0	1	1	0	1				0	0		0	0	
17	Jharkhand	5	1	4	0	0	0	56	56	100.00	132	131	99.24	188	187	99.47
Total		**175**	**147**	**28**	**61**	**56**	**5**	**4200**	**4136**	**98.48**	**831**	**803**	**96.63**	**5031**	**4939**	**98.17**

FLOOD FORECASTING PERFORMANCE FROM 2000 TO 2012

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
Average	4960	4840	97.58	992	953	96.07	5952	5793	97.33

Unprecedented flood events in India under CWC FF & W Network - 2012 flood season													
Sl .No	River	Station	State	Danger level in metres	Highest Flood Level (HFL)		Existing HFL		Duration		New HFL		
					Level in metres	Date of occurrence	Level in metres	Date of occurrence	From	To	Level	From	To
1													
2													
3													

No Station flowed in Unprecedented Flood Situation during 2012

High Flood Events during Flood Season - 2012

Annex IX

Sl.No	River	Station	State	District	Danger level in metres	Existing HFL		Duration of High Flood	
						Level in metres	Date of occurrence	From	To
1	Brahmaputra	Dibrugarh	Assam	Dibrugarh	105.70	106.48	3-4/09/1998	25/06/12:04	27/06/12:17
								21/09/12:04	22/09/12:02
2	Brahmaputra	Neamatighat	Assam	Jorhat	85.04	87.37	07/11/1991	25/06/12:21	27/06/12:22
3	Brahmaputra	Tezpur	Assam	Sonitpur	65.23	66.59	27/08/1988	27/06/12:20	28/06/12:22
4	Brahmaputra	Goalpara	Assam	Goalpara	36.27	37.43	31/07/1954	29/06/12 :01	30/06/12 : 24
								01/07/12 :01	01/07/12 :06
5	Brahmaputra	Dhubri	Assam	Dhubri	28.62	30.36	28/08/1988	29/06/12: 15	01/07/12: 12
6	Kopili	Kampur	Assam	Nogaon	60.5	61.86	16/06/1973	27/06/12:12	29/06/12:12
7	Jiabharali	Nt. Rd. X-ing	Assam	Sonitpur	77.00	78.50	26/07/2007	15/07/12:11	15/07/12:15
8	Kushiyara	Karimganj	Assam	Karimganj	14.94	16.57	10/06/2010	28/06/12 : 23	29/06/12 : 08
								01/07/12 :01	01/07/12 :01
9	Raidak-I	Tufanganj	W. Bengal	Coochbehar	35.30	36.36	21/07/1993	27/06/12: 23	28/06/12: 03
10	Beki	Beki Rd. Bridge	Assam	Barpeta	45.10	46.20	04/08/2000	26/06/12: 11	26/06/12: 23
								25/07/12: 14	25/07/12: 22
11	Ghaghra	Elginbridge	Uttar Pradesh	Barabanki	106.07	107.56	10/10/2009	17/09/12: 13	22/09/12: 00
12	Rapti	Balrampur	Uttar Pradesh	Balrampur	104.62	105.25	11/09/2000	06/08/12: 00	08/08/12: 13
13	Ghagra	Darauli	Bihar	Siwan	60.82	61.74	29/08/1998	18/09/12: 18	25/09/12: 18
14	Ghaghra	Gangpur Siswan	Bihar	Siwan	57.04	58.01	18/09/1983	20/09/12: 19	24/09/12: 05

High Flood Level= HFL-0.50 M

Low and Moderate flood events on main Ganga and its tributaries- 2012 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2012		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	Ganga	Rishikesh	Uttarakhand	339.50	340.50	339.95	04/08/12: 11	04/08/12: 07	04/08/12: 23	1			
2	Ganga	Haridwar	Uttarakhand	293.00	294.00	294.30	04/08/12: 11	04/08/12: 07	04/08/12: 19	1	04/08/12: 09	04/08/12: 13	1
3	Ganga	Kannauj	Uttar Pradesh	124.97	125.97	125.15	23/09/12: 05	21/09/12: 14	24/09/12: 10	4			
4	Ganga	Ankinghat	Uttar Pradesh	123.00	124.00	123.38	23/09/12: 13	20/09/12: 18	25/09/12: 19	6			
5	Ganga	Kanpur	Uttar Pradesh	113.00	114.00	112.47	23/09/12: 16	01/09/12: 00	02/09/12: 22	2			
								21/09/12: 03	26/09/12: 06	6			
6	Ganga	Dalmau	Uttar Pradesh	98.36	99.36	98.44	23/09/12: 17	22/09/12: 23	25/09/12: 05	4			
7	Ganga	Ghazipur	Uttar Pradesh	62.11	63.11	62.39	18/09/12: 01	16/09/12: 23	19/09/12: 09	4			
8	Ganga	Ballia	Uttar Pradesh	56.62	57.62	58.44	19/09/12: 17	12/08/12 : 03	20/08/12 : 06	09	28/08/12 : 08	30/08/12 : 05	3
								26/08/12 : 13	07/09/12 : 04	13	16/09/12 : 20	23/09/12 : 06	8
								16/09/12 : 06	27/09/12 : 03	12			
9	Ganga	Buxar	Bihar	59.32	60.32	59.35	18/09/12: 06	18/09/12: 02	18/09/12: 19	1			
10	Ganga	Dighaghat	Bihar	49.45	50.45	50.15	21/09/12: 17	17/09/12: 06	25/09/12: 11	9			
11	Ganga	Gandhighat	Bihar	47.60	48.60	49.27	21/09/12: 11	06/08/12: 05	21/08/12: 11	16	17/09/12: 09	25/09/12: 06	9
								24/08/12: 22	10/09/12: 01	18			
								15/09/12: 23	29/09/12: 12	15			
12	Ganga	Hatidah	Bihar	40.76	41.76	42.21	22/09/12: 06	07/08/12: 18	20/08/12: 10	14	18/09/12: 20	25/09/12: 13	8
								27/08/12: 11	06/09/12: 16	11			
								07/09/12: 12	08/09/12: 04	2			
								16/09/12: 22	29/09/12: 13	14			
13	Ganga	Munger	Bihar	38.33	39.33	38.71	23/09/12: 10	20/09/12: 09	25/09/12: 19	6			
14	Ganga	Bhagalpur	Bihar	32.68	33.68	33.69	23/09/12: 18	18/09/12: 14	29/09/12: 04	12	23/09/12: 12	24/09/12: 11	2
15	Ganga	Colgong/Kahalgaon	Bihar	30.09	31.09	31.64	23/09/12: 21	07/08/12: 11	23/08/12: 18	17	19/09/12: 11	27/09/12: 23	9
								27/08/12: 02	11/09/12: 00	15			
								17/09/12: 05	02/10/12: 07	16			
16	Ganga	Sahebganj	Jharkhand	26.25	27.25	28.21	25/09/12: 05	06/08/12: 14	12/09/12: 11	38	18/09/12: 09	30/09/12: 23	13
								16/09/12: 15	03/10/12: 22	18			
17	Ganga	Farakka	West Bengal	21.25	22.25	23.35	24/09/12: 15	01/08/12: 19	03/08/12: 00	2	10/08/12: 00	20/08/12: 14	12
								05/08/12: 05	03/10/12: 15	60	30/08/12: 03	08/09/12: 01	10
											18/09/12: 10	01/10/12: 02	14
18	Ramganga	Moradabad	Uttar Pradesh	189.60	190.60	189.80	18/08/12: 19	05/08/12: 08	06/08/12: 12	2			
19	Sai	Raebareli	Uttar Pradesh	100.00	101.00	100.65	20/09/12: 01	16/09/12: 18	23/09/12: 08	8			
20	Yamuna	Mawi	Uttar Pradesh	230.00	230.85	230.42	05/08/12: 12	05/08/12: 07	06/08/12: 00	1			
								23/08/12: 05	23/08/12: 14	1			
								26/08/12: 04	30/08/12: 19	5			
								04/09/12: 03	04/09/12: 10	1			
21	Yamuna	Delhi Rly. Bridge	Delhi	204.00	204.83	204.70	29/08/12: 02	26/08/12: 18	31/08/12: 01	5			
22	Yamuna	Mathura	Uttar Pradesh	164.20	165.20	165.02	31/08/12: 00	08/08/12: 01	08/08/12: 06	1			
								24/08/12: 17	08/09/12: 08	16			
								08/09/12: 16	09/09/12: 10	1			
								09/09/12: 15	10/09/12: 02	1			
								10/09/12: 11	11/09/12: 06	1			
								22/09/12: 10	23/09/12: 08	2			

Low and Moderate flood events on main Ganga and its tributaries- 2012 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2012		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
23	Ghaghra	Elginbridge	Uttar Pradesh	105.07	106.07	107.206	18/09/12: 23	07/07/12: 22	08/07/12: 09	2	31/07/12: 08	10/08/12: 02	11
								21/07/12: 18	24/07/12: 08	4	10/08/12: 15	13/08/12: 00	3
								26/07/12: 03	01/10/12: 22	68	21/08/12: 20	28/08/12: 15	8
											30/08/12: 18	01/09/12: 14	3
											03/09/12: 13	05/09/12: 00	2
											05/09/12: 16	08/09/12: 10	4
											14/09/12: 13	26/09/12: 02	13
24	Ghaghra	Ayodhya	Uttar Pradesh	91.73	92.73	93.35	21/09/12: 07	24/07/12: 11	24/07/12: 13	1	02/08/12: 22	10/08/12: 01	9
								26/07/12: 20	02/10/12: 04	69	22/08/12: 14	27/08/12: 09	6
											16/09/12: 22	25/09/12: 18	10
25	Ghaghra	Turtipar	Uttar Pradesh	63.01	64.01	64.82	22/09/12: 01	28/07/12: 12	03/10/12: 07	68	04/08/12: 23	11/08/12: 02	8
											24/08/12: 04	29/08/12: 20	6
											17/09/12: 08	27/09/12: 01	11
26	Rapti	Balrampur	Uttar Pradesh	103.62	104.62	104.895	07/08/12: 04	20/07/12: 22	21/07/12: 15	2	05/08/12: 06	08/08/12: 19	4
								26/07/12: 15	27/07/12: 23	2	24/08/12: 09	26/08/12: 00	2
								04/08/12: 00	11/08/12: 21	9			
								23/08/12: 02	29/08/12: 06	7			
								31/08/12: 04	06/09/12: 19	7			
								17/09/12: 19	22/09/12: 10	6			
27	Rapti	Bansi	Uttar Pradesh	83.90	84.90	84.495	10/08/12: 15	05/08/12: 14	12/08/12: 11	8			
								25/08/12: 07	30/08/12: 17	6			
								01/09/12: 14	07/09/12: 03	7			
								18/09/12: 13	23/09/12: 23	6			
28	Rapti	Birdghat	Uttar Pradesh	73.98	74.98	74.78	21/09/12: 18	05/08/12: 10	13/08/12: 14	9			
								18/09/12: 23	26/09/12: 05	9			
29	Ghaghra	Darauli	Bihar	59.82	60.82	61.54	22/09/12: 07	28/07/12: 22	30/09/12: 11	65	24/08/12: 10	28/08/12: 18	5
											17/09/12: 16	27/09/12: 02	11
30	Ghaghra	Gangpur Siswan	Bihar	56.04	57.04	57.58	22/09/12: 01	05/08/12: 04	16/08/12: 10	12	19/09/12: 02	27/09/12: 17	9
								18/08/12: 06	19/08/12: 07	2			
								24/08/12: 01	04/09/12: 22	12			
								06/09/12: 04	09/09/12: 15	4			
								17/09/12: 01	30/09/12: 06	14			
31	Ghaghra	Chapra	Bihar	52.68	53.68	53.37	20/09/12: 00	17/09/12: 14	25/09/12: 01	9	18/09/12: 20	22/09/12: 19	5
32	Sone	Maner	Bihar	51.00	52.00	52.22	21/09/12: 07	27/08/12: 14	04/09/12: 18	9			
								16/09/12: 18	27/09/12: 03	12			
33	Punpun	Sripalpur	Bihar	49.60	50.60	52.47	19/09/12: 10	06/08/12: 17	26/08/12: 14	22	10/08/12: 18	13/08/12: 05	4
								27/08/12: 12	29/08/12: 09	3	17/08/12: 09	22/08/12: 19	6
								16/09/12: 01	24/09/12: 09	9	16/09/12: 19	22/09/12: 23	7
34	Gandak	Khadda	Uttar Pradesh	95.00	96.00	95.85	18/09/12: 14	27/06/12: 21	27/06/12: 04	2			
								05/07/12: 22	06/07/12: 22	2			
								06/07/12: 10	09/07/12: 06	3			
								12/07/12: 21	15/07/12: 05	4			
								18/07/12: 23	20/07/12: 22	3			
								24/07/12: 23	27/07/12: 07	4			
								30/07/12: 17	31/07/12: 02	2			
								03/08/12: 05	05/08/12: 17	3			
								09/08/12: 10	10/08/12: 21	2			
								20/08/12: 19	21/08/12: 08	2			
								23/08/12: 04	24/08/12: 06	2			
								26/08/12: 13	27/08/12: 04	2			
								28/08/12: 15	29/08/12: 06	2			
								30/08/12: 21	31/08/12: 09	2			
								16/09/12: 14	20/09/12: 08	5			

Low and Moderate flood events on main Ganga and its tributaries- 2012 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2012		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	Gandak	Rewaghat	Bihar	53.41	54.41	54.20	21/09/12: 19	05/08/12: 23	09/08/12: 15	5			
								17/09/12: 10	23/09/12: 23	7			
36	Gandak	Hazipur	Bihar	49.32	50.32	49.93	21/09/12: 16	17/09/12: 10	24/09/12: 23	7			
37	Burhi Gandak	Samastipur	Bihar	45.02	46.02	45.25	24/09/12: 16	22/09/12: 09	27/09/12: 03	6			
38	Burhi Gandak	Rusera	Bihar	41.63	42.63	42.41	25/09/12: 08	21/09/12: 03	28/09/12: 04	8			
39	Burhi Gandak	Khagria	Bihar	35.58	36.58	37.55	23/09/12: 09	08/08/12: 12	20/08/12: 21	13	18/09/12: 21	22/09/12: 00	4
								28/08/12: 07	07/09/12: 04	11	22/09/12: 01	28/09/12: 16	7
								17/09/12: 19	30/09/12: 22	14			
40	Bagmati	Benibad	Bihar	47.68	48.68	49.34	16/09/12: 09	16/07/12: 12	02/08/12: 04	18	16/07/12: 22	25/07/12: 04	10
								03/08/12: 12	19/08/12: 18	17	26/07/12: 12	27/07/12: 23	2
								20/08/12: 23	22/08/12: 04	3	04/08/12: 07	08/08/12: 10	5
								23/08/12: 13	26/08/12: 01	4	28/08/12: 13	29/08/12: 03	2
								26/08/12: 20	09/09/12: 07	14	02/09/12: 03	06/09/12: 12	5
								12/09/12: 07	30/09/12: 05	19	14/09/12: 19	24/09/12: 14	11
41	Bagmati	Hayaghat	Bihar	44.72	45.72	45.65	22/09/12: 06	18/09/12: 01	26/09/12: 20	9			
42	Adhwara Group	Kamtaul	Bihar	49.00	50.00	50.56	20/09/12: 18	17/07/12: 03	19/07/12: 10	3	05/08/12: 20	06/08/12: 08	2
								19/07/12: 17	24/07/12: 13	5	15/09/12: 19	24/09/12: 00	10
								05/08/12: 01	09/08/12: 01	5			
								15/09/12: 11	28/09/12: 08	14			
43	Adhwara Group	Ekmighat	Bihar	45.94	46.94	46.52	22/09/12: 13	18/09/12: 08	27/09/12: 21	10			
44	Kamala Balan	Jhanjharpur	Bihar	49.00	50.00	50.90	16/07/12: 07	21/06/12: 21	22/06/12: 11	2	15/07/12: 18	17/07/12: 02	3
								25/06/12: 06	25/06/12: 16	1	17/07/12: 14	17/07/12: 17	1
								25/06/12: 22	26/06/12: 16	1	18/07/12: 16	18/07/12: 18	1
								27/06/12: 03	27/06/12: 15	1	19/07/12: 19	20/07/12: 02	2
								28/06/12: 18	29/06/12: 14	2	20/09/12: 12	21/09/12: 03	1
								13/07/12: 11	13/07/12: 17	1			
								15/07/12: 14	21/07/12: 15	7			
								04/08/12: 11	04/08/12: 23	1			
								27/08/12: 19	28/08/12: 07	2			
								02/09/12: 12	03/09/12: 17	2			
								14/09/12: 20	15/09/12: 07	2			
								19/09/12: 13	21/09/12: 11	3			
								21/09/12: 20	24/09/12: 07	3			
								25/09/12: 22	26/09/12: 05	2			
45	Kosi	Basua	Bihar	46.75	47.75	48.37	26/07/12: 04	25/06/12: 13	30/06/12: 02	6	13/07/12: 06	31/07/12: 22	19
								04/07/12: 13	01/10/12: 06	90	04/08/12: 09	05/08/12: 18	2
											21/08/12: 16	22/08/12: 00	1
											29/08/12: 13	31/08/12: 19	3
											01/09/12: 18	05/09/12: 06	5
											14/09/12: 08	23/09/12: 20	10
46	Kosi	Baltara	Bihar	33.85	34.85	34.17	05/09/12: 06	20/07/12: 05	01/08/12: 00	12	22/07/12: 01	22/07/12: 08	1
								01/08/12: 01	01/10/12: 22	62	27/07/12: 05	28/07/12: 05	2
											05/08/12: 16	06/08/12: 14	2
											04/09/12: 02	06/09/12: 15	3
											16/09/12: 10	21/09/12: 00	5
47	Kosi	Kursela	Bihar	29.00	30.00	30.78	24/09/12: 14	07/08/12: 04	17/09/12: 07	36	19/09/12: 01	29/09/12: 02	11
								16/09/12: 12	01/10/12: 16	16			
48	Mahanada	Dhengraghat	Bihar	34.65	35.65	36.65	17/07/12: 05	07/07/12: 22	09/07/12: 15	3	16/07/12: 00	22/07/12: 15	8
								11/07/12: 23	27/07/12: 14	17	25/07/12: 00	26/07/12: 01	3
								15/09/12: 02	24/09/12: 00	10	16/09/12: 04	19/09/12: 20	4
49	Mahanada	Jhawa	Bihar	30.40	31.40	32.16	20/07/12: 21	14/07/12: 04	27/07/12: 19	14	16/07/12: 12	22/07/12: 21	7
								16/09/12: 11	21/09/12: 00	5	25/07/12: 01	26/07/12: 05	2

Low and Moderate flood events on main Brahamaputra and its tributaries- 2012 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2012		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
1	Brahmaputra	Dibrugarh	Assam	104.70	105.70	105.02	17/05/12:09	16/05/12:04	18/05/12:06	3	24/06/12:18	28/06/12:11	5
						106.34	25/06/12:19	02/06/12:09	08/06/12:10	7	16/07/12:17	18/07/12:14	3
						105.79	17/07/12:18	16/06/12:11	18/06/12:12	3	20/09/12:05	24/09/12:21	5
						106.10	21/09/12:14	21/06/12:23	10/08/12:09	51			
								12/08/12:06	12/08/12:09	1			
								21/08/12:18	27/08/12:02	7			
								01/09/12:02	04/09/12:14	4			
								13/09/12:10	13/09/12:24	1			
								16/09/12:21	27/09/12:17	12			
								03/10/12:16	07/10/12:17	5			
								12/10/12:12	14/10/12:02	3			
									Total	**97**		Total	**13**
2	Brahmaputra	Neamatighat	Assam	84.04	85.04	85.14	18/05/12:05	16/05/12:17	20/05/12:01	5	17/05/12:19	18/05/12:14	2
						86.02	06/06/12:02	02/06/12:08	10/09/12:07	101	04/06/12:15	08/06/12:05	5
						87.25	26/06/12:21	13/09/12:02	15/10/12:24	3	18/06/12:03	18/06/12:21	1
						86.24	18/07/12:13				22/06/12:13	07/08/12:18	47
						86.84	21/09/12:21				22/08/12:18	27/08/12:15	6
											01/09/12:17	05/09/12:04	5
											14/09/12:08	15/09/12:03	2
											17/09/12:18	29/09/12:02	13
											04/10/12:03	08/10/12:17	5
											13/10/12:23	14/10/12:01	2
									Total	**109**		Total	**88**
3	Brahmaputra	Tezpur	Assam	64.23	65.23	64.87	06/06/12:24	05/06/12:20	08/06/12:24	4	26/06/12:02	30/06/12:09	5
						66.13	28/06/12:14	23/06/12:12	02/07/12:08	10	21/09/12:13	27/09/12:12	7
						65.97	25/09/12:04	06/07/12:12	02/08/12:02	28			
								05/08/12:02	06/08/12:07	2			
								24/08/12:07	28/08/12:02	5			
								03/09/12:03	05/09/12:13	3			
								18/09/12:23	30/09/12:01	13			
								05/10/12:07	09/10/12:09	5			
									Total	**70**		Total	**12**
4	Brahmaputra	Guwahati (D.C.Court)	Assam	48.68	49.68	50.75	26/09/12 : 09	07/06/12 :18	08/06/12 :10	2	27/06/12 : 04	02/07/12 :02	6
								25/06/12 : 09	03/07/12 :17	9	18/07/12 :15	21/07/12 : 24	4
								07/07/12 : 09	09/08/12 : 02	34	22/09/12 : 03	28/09/12 : 14	7
								25/08/12 : 05	29/08/12 :07	5			
								04/09/12 :06	06/09/12 :03	3			
								20/09/12 :03	01/10/12 :11	12			
								06/10/12 :09	09/10/12 :14	4			
									Total	69		Total	17

Low and Moderate flood events on main Brahamaputra and its tributaries- 2012 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2012		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
5	Brahmaputra	Goalpara	Assam	35.27	36.27	37.08	30/06/12 : 09	09/06/12 : 03	09/06/12: 11	1	27/06/12 : 03	02/07/12 : 15	6
								25/06/12 : 01	09/08/12 : 24	46	19/07/12 : 03	22/07/12 : 16	4
								26/08/12 : 16	29/08/12 : 18	4	24/09/12 : 03	28/09/12 : 23	5
								20/09/12 : 23	02/10/12 : 20	13			
								07/10/12 : 11	10/10/12 : 15	4			
									Total	68		Total	15
6	Brahmaputra	Dhubri	Assam	27.62	28.62	29.92	30.06.12 (1400)	07.06.12	12.06.12	6	26.06.12	05.08.12	41
								15.06.12	16.08.12	63	21.09.12	03.10.12	13
								24.08.12	09.09.12	17			
								16.09.12	14.10.12	29			
									Total	115		Total	**54**
7	Buridehing	Chenimari	Assam	101.11	102.11	102.93	28/06/12:13	24/06/12:23	01/07/12:01	8	25/06/12:14	29/06/12:23	5
						103.05	20/07/12:20	04/07/12:21	05/07/12:20	2	17/07/12:24	22/07/12:16	6
						102.29	23/09/12:19	06/07/12:21	09/07/12:02	4	25/07/12:11	27/07/12:18	3
								10/07/12:22	11/07/12:21	2	28/07/12:14	31/07/12:24	4
								12/07/12:07	05/08/12:09	25	15/09/12:12	15/09/12:24	1
								21/08/12:19	25/08/12:04	5	21/09/12:18	24/09/12:10	4
								14/09/12:09	26/09/12:06	13			
								05/10/12:23	7/10/12:07	3			
									Total	**62**		Total	**23**
8	Subansiri	Badatighat	Assam	81.53	82.53	82.03	26/06/12:03	26/06/12:05	29/06/12:03	4	23/09/12:01	26/09/12:10	4
						82.92	25/09/12:02	20/09/12:13	28/09/12:11	9			
						81.23	07/10/12:18						
									Total	**13**		Total	**4**
9	Dikhow	Sivasagar	Assam	91.4	92.4	93.04	26/06/12:15	22/06/12:18	28/06/12:04	7	23/06/12:03	24/06/12:11	2
						94.01	20/07/12:01	09/07/12:11	11/07/12:22	3	27/07/12:17	04/08/12:16	9
						91.93	14/09/12:09	15/07/12:16	16/07/12:11	2			
								19/07/12:15	21/07/12:03	3			
								25/07/12:06	26/07/12:07	2			
								27/07/12:09	05/08/12:08	10			
								08/08/12:16	09/08/12:17	2			
								14/09/12:02	16/09/12:19	3			
									Total	**32**		Total	**11**

Low and Moderate flood events on main Brahamaputra and its tributaries- 2012 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2012		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
10	Desang	Nanglamoraghat	Assam	93.46	94.46	94.03	27/06/12:11	24/06/12:19	28/06/12:13	5	19/07/12:13	22/07/12:19	4
						95.74	03/08/12:17	11/07/12:05	12/07/12:09	2	23/07/12:03	05/08/12:15	14
						94.08	15/09/12:04	15/07/12:22	06/08/12:09	23			
								09/08/12:01	10/08/12:05	5			
								10/08/12:23	13/08/12:15				
								20/08/12:10	23/08/12:14	4			
								14/09/12:10	16/09/12:06	3			
									Total	**42**		Total	**18**
11	Dhansiri(S)	Golaghat	Assam	88.50	89.50	88.28	28/06/12:01	29/07/12:01	30/07/12:15	2	30/08/12:05	30/08/12:17	1
						88.82	29/07/12:09	20/08/12:23	21/08/12:05	2			
						89.62	30/08/12:12	28/08/12:23	31/08/12:17	4			
						88.48	13/10/12:19	03/09/12:24	04/09/12:17	2			
								13/09/12:23	14/09/12:07	2			
									Total	**12**		Total	**1**
12	Dhansiri(S)	Numaligarh	Assam	76.42	77.42	78.20	28/06/12:07	23/06/12:03	15/10/12:24	115	23/06/12:13	24/06/12:11	2
						78.27	29/07/12:23				26/06/12:07	29/06/12:18	4
						78.39	30/08/12:24				28/07/12:08	06/08/12:03	10
						77.86	06/10/12:24				10/08/12:23	11/08/12:16	2
											15/08/12:05	16/08/12:01	2
											20/08/12:19	21/08/12:15	2
											27/08/12:06	27/08/12:20	1
											29/08/12:01	02/09/12:13	5
											03/09/12:17	06/09/12:16	4
											13/09/12:16	19/09/12:03	7
											20/09/12:06	20/09/12:23	1
											21/09/12:04	26/09/12:12	6
											06/10/12:06	08/10/12:07	3
											10/10/12:16	15/10/12:06	6
									Total	**115**		Total	**55**
13	Kopili	Kampur	Assam	59.50	60.50	61.59	28/06/12:17	26/06/12:14	02/07/12:03	7	26/06/12:23	30/06/12:02	5
						60.90	17/07/12:06	16/07/12:03	19/07/12:08	4	16/07/12:13	17/07/12:23	2
						60.40	07/10/12:07	06/10/12:07	08/10/12:16	3			
									Total	**14**		Total	**7**
14	Kopili	Dharamtul	Assam	55.00	56.00	56.13	30/06/12:04	27/06/12:01	06/07/12:04	10	29/06/12:13	02/07/12:15	4
						55.63	19/07/12:22	16/07/12:19	25/07/12:03	10			
						55.23	26/09/12:18	25/09/12:18	28/09/12:11	4			
								07/10/12:20	08/10/12:17	2			
								11/10/12:19	13/10/12:03	3			
									Total	**29**		Total	**4**

Low and Moderate flood events on main Brahamaputra and its tributaries- 2012 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2012		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
15	Jiabharali	NT.Rd.X-ing	Assam	76.00	77.00	76.60	17/05/12:10	15/05/12:14	16/05/12:04	2	22/06/12:13	22/06/12:21	1
						77.76	26/06/12:12	16/05/12:07	17/05/12:01	2	23/06/12:03	23/06/12:20	6
						78.05	15/07/12:12	17/05/12:07	17/05/12:21		23/06/12:22	28/06/12:24	
						77.68	24/08/12:12	31/05/12:15	01/06/12:01	10	04/07/12:10	05/07/12:17	2
						77.92	24/09/12:09	01/06/12:15	09/06/12:03		06/07/12:04	07/07/12:18	2
								11/06/12:13	20/06/12:06	64	08/07/12:11	08/07/12:14	1
								20/06/12:16	21/06/12:02		09/07/12:10	09/07/12:15	1
								21/06/12:07	13/08/12:08		11/07/12:06	20/07/12:10	10
								16/08/12:15	16/08/12:24	1	21/07/12:07	21/07/12:18	1
								20/08/12:16	07/09/12:19	19	22/07/12:05	22/07/12:06	1
								11/09/12:11	15/10/12:02	35	24/07/12:05	26/07/12:22	3
											29/07/12:09	30/07/12:07	2
											02/08/12:09	02/08/12:14	1
											03/08/12:06	03/08/12:08	1
											08/08/12:16	08/08/12:24	1
											21/08/12:06	25/08/12:19	5
											27/08/12:10	27/08/12:24	1
											01/09/12:03	02/09/12:08	2
											13/09/12:03	16/09/12:21	4
											17/09/12:07	26/09/12:05	10
											01/10/12:08	01/10/12:15	1
											06/10/12:03	06/10/12:18	1
									Total	**133**		Total	**57**
16	Puthimari	N.H.Rd.Xing	Assam	50.81	51.81	53.75	26/06/12 : 21	03/06/12 : 11	09/06/12 : 16	7	03/06/12 : 18	04/06/12 : 06	2
								12/06/12 : 18	01/07/12 :04	20	12/06/12 : 21	13/06/12 : 04	2
								13/07/12 : 08	14/07/12 : 04	2	14/06/12 : 08	17/06/12 : 19	4
								16/07/12 : 02	17/07/12 : 17	2	24/06/12 : 24	28/06/12 : 20	5
									Total	31			13
17	Pagladiya	N.T.Rd.Xing	Assam	51.75	52.75	53.56	27/06/12 : 16	03/06/12 :18	04/06/12 : 08	2	26/06/12 :13	28/06/12 : 23	3
								13/06/12 : 06	17/06/12 : 11	5	21/09/12 : 10	21/09/12 : 22	1
								26/06/12 : 03	30/06/12 : 14	5			
								15/07/12 : 14	18/07/12 : 03	4			
								20/09/12 :13	24/09/12 : 02	5			
								02/10/12 : 13	03/10/12 : 05	2			
									Total	23		Total	4
18	Beki	Beki Rd. Bridge	Assam	44.10	45.10	45.97	26.06.12 (1700)	03.06.12	06.06.12	4	18.06.12	18.06.12	1
								13.06.12	13.08.12	62	23.06.12	28.06.12	6
								16.08.12	17.08.12	2	06.07.12	06.07.12	1
								20.08.12	08.09.12	20	12.07.12	29.07.12	18
								12.09.12	28.09.12	17	14.09.12	17.09.12	4
											20.09.12	21.09.12	2
									Total	**105**		Total	**32**
19	Manas	Manas NH- Crossing	Assam	47.81	48.42	49.20	15.06.12 (1300)	14.06.12	17.06.12	4	14.06.12	16.06.12	3
								25.06.12	28.06.12	4	26.06.12	28.06.12	3
								16.07.12	22.07.12	7	16.07.12	17.07.12	2
								20.09.12	24.09.12	**5**	19.07.12	20.07.12	**2**
											21.09.12	24.09.12	4
									Total	**20**		Total	**14**

Low and Moderate flood events on main Brahamaputra and its tributaries- 2012 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2012		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
20	Sankosh	Golokganj	Assam	28.94	29.94	30.10	20.07.12 (0400)	17.06.12	19.06.12	3	16.07.12	17.07.12	2
								25.06.12	01.07.12	**7**	19.07.12	20.07.12	2
								05.07.12	08.07.12	4	26.07.12	26.07.12	1
								11.07.12	02.08.12	23			
								04.08.12	06.08.12	3			
								10.08.12	10.08.12	1			
								15.09.12	25.09.12	11			
									Total	**52**		Total	**5**
21	Barak	A.P.Ghat	Assam	18.83	19.83	21.11	28/06/12 : 16	04/06/12 : 20	06/06/12 : 17	3	26/06/12 : 22	29/06/12 : 23	4
								26/06/12 : 12	30/06/12 : 15	5			
									Total	8		Total	4
22	Katakhal	Matizuri	Assam	19.27	20.27	21.97	28/06/12 : 03	04/06/12 :14	07/06/12 :03	4	26/06/12 : 15	30.06/12 : 01	5
								19/06/12 : 23	21/06/12 : 01	3			
								26/06/12 : 05	30/06/12 : 20	5			
								27/08/12 : 20	28/08/12 :24	2			
								12/10/12 : 16	14/10/12 : 10	3			
									Total	17		Total	5
23	Kushiyara	Karimganj	Assam	13.94	14.94	16.10	29/06/12 : 01	04/06/12 : 19	07/06/12 : 19	4	26/06/12 :24	01/07/12 :05	6
								26/06/12 : 09	03/07/12 : 08	8			
								16/09/12 : 23	19/09/12 : 15	4			
								13/10/12 : 16	14/10/12 : 17	2			
									Total	18		Total	6
24	Teesta	Domohani	W.B.	85.65	85.95	86.32	15.07.12 (1300)	16.06.12	19.06.12	4	17.06.12	18.06.12	2
								21.06.12	29.06.12	9	23.06.12	23.06.12	1
								01.07.12	01.07.12	1	26.06.12	26.06.12	1
								03.07.12	25.07.12	23	10.07.12	10.07.12	1
								27.07.12	27.07.12	1	12.07.12	17.07.12	6
								29.07.12	29.07.12	1	19.07.12	19.07.12	1
								03.08.12	07.08.12	5	06.08.12	06.08.12	1
								09.08.12	09.08.12	1	29.08.12	29.08.12	1
								12.08.12	13.08.12	2	31.08.12	02.09.12	3
								17.08.12	18.08.12	2	12.09.12	12.09.12	1
								20.08.12	22.08.12	3	14.09.12	16.09.12	3
								24.08.12	24.08.12	1			
								26.08.12	26.08.12	1			
								28.08.12	04.09.12	8			
								06.09.12	06.09.12	1			
								12.09.12	17.09.12	6			
								26.09.12	26.09.12	1			
								02.10.12	03.10.12	2			
									Total	**72**		Total	**21**

Low and Moderate flood events on main Brahamaputra and its tributaries- 2012 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2012		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
25	Teesta	Mekhliganj	W.B.	65.45	65.95	65.66	16.07.12 (1300)	15.07.12	16.07.12	2			
								19.07.12	19.07.12	1			
									Total	**3**			
26	Jaldhaka	N H 31	W.B.	80.00	80.90	80.45	15.07.12 (1000)	16.06.12	17.06.12	2			
								25.06.12	27.06.12	3			
								10.07.12	10.07.12	1			
								12.07.12	19.07.12	8			
								12.09.12	12.09.12	1			
								15.09.12	15.09.12	1			
									Total	**16**			
27	Jaldhaka	Mathabhanga	W.B.	47.70	48.20	48.05	15.07.12 (1500)	17.06.12	17.06.12	1			
								15.07.12	16.07.12	2			
								19.07.12	20.07.12	2			
									Total	**5**			
28	Torsa	Ghughumari	W. B.	39.80	40.41	40.26	16.07.12 (1600)	16.06.12	18.06.12	**3**			
								25.06.12	28.06.12	4			
								05.07.12	07.07.12	3			
								11.07.12	11.07.12	1			
								15.07.12	17.07.12	3			
								19.07.12	19.07.12	1			
								15.09.12	22.09.12	8			
									Total	**23**			
29	Radak-I	Tufanganj	W. B.	34.22	35.30	35.89	27.06.12 (2300)	14.06.12	19.06.12	6	26.06.12	28.06.12	3
								26.06.12	29.06.12	4	12.07.12	12.07.12	1
								06.07.12	07.07.12	2			
								11.07.12	13.07.12	3			
								16.07.12	21.07.12	6			
								19.09.12	20.09.12	2			
									Total	**23**		Total	**4**

Low and Moderate flood events on various river systems (excluding Ganga and Brahmaputra basins)- 2012 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2012		Flood period => warning level			Flood period => danger level		
						Level in metres	Time	From	To	No. of days	From	To	No. of days
1	Mahi	Wanakbori	Gujarat	69.80	72.54	73.96	06-Sep-12	13/08/12: 22	15/08/12: 13	2			
								06/09/12: 07	10/09/12: 01	4	06/09/2012 15:00	07/09/2012 22:00	2
								12/09/12: 00	13/09/12: 08	2			
								09/08/12: 02	10/08/12: 17	2	09/08/12: 06	10/08/12: 07	2
2	Narmada	Bharuch	Gujarat	6.71	7.32	9.20	07/09/12 11	14/08/12: 13	15/08/12: 01	2			
								15/08/12: 01	15/08/12: 01	1			
								24/08/12: 10	24/08/12: 12	1			
								06/09/12: 21	08/09/12: 00	2	06/09/12: 22	08/09/12: 00	2
								08/09/12: 01	09/09/12: 05	2	08/09/12: 01	08/09/12: 18	1
3	Tapi	Surat	Gujarat	8.50	9.50	8.65	08/09/12 02	07/09/12: 21	08/09/12: 02	1			
4	Narmada	Hoshangabad	Madhya pradesh	292.83	293.83	295.55	07/08/2012 19	06/08/12: 11	08/08/12: 05	2	06/08/12: 15	08/08/12: 03	2
5	Mahanadi	Naraj	Odisha	25.41	26.41	26.02	19/08/2012 07:00	05/08/2012 07:00	05/08/2012 19:00	1			
								06/08/2012 05:00	09/08/2012 22:00	4			
								18/08/2012 10:00	21/08/2012 12:00	4			
								09/09/2012 08:00	10/09/2012 07:00	2			
6	Rishikulya	Purushottampur	Odisha	15.835	16.835	16.86	03/11/2012 16:00	03/11/2012 06:00	04/11/2012 09:00	2	03/11/2012 16:00	03/11/2012 17:00	1
7	Vamsadhara	Kashinagar	Odisha	53.6	54.6	54.94	03/08/2012 13:00	03/08/2012 11:00	04/08/2012 10:00	2			
								05/08/2012 12:00	06/08/2012 21:00	2			
								19/08/2012 06:00	20/08/2012 04:00	2			
								22/08/2012 06:00	22/08/2012 12:00	1			
								30/08/2012 22:00	31/08/2012 02:00	2			
								09/09/2012 22:00	11/09/2012 10:00	3			
								21/09/2012 21:00	22/09/2012 08:00	2			
								23/09/2012 04:00	24/09/2012 21:00	2			
								13/10/2012 12:00	14/10/2012 09:00	2			
								07/11/2012 15:00	08/11/2012 11:00	2			
8	Wainganga	Bhandara	Maharashtra	244.00	244.50	244.37	06/09/2012 10	06/09/2012	06/09/2012	1			
9	Wainganga	Pauni	Maharashtra	226.73	227.73	228.15	06/09/2012 19	06/09/2012	07/09/2012	2	06/09/2012	07/09/2012	2
10	Indravati	Jagdalpur	Chattisgarh	539.50	540.80	540.99	06/08/2012 17	05/08/2012	07/08/2012	3	06/08/2012	07/08/2012	2
								05/09/2012	06/09/2012	2			
11	Godavari	Eturunagaram	Andhra Pradesh	73.29 - I 74.29 - II	75.79	73.56	22/08/2012 05	21/08/2012	22/08/2012	2			
								06/09/2012	06/09/2012	1			
12	Godavari	Bhadrachalam	Andhra Pradesh	45.72 - I 47.24 - II	48.77	46.76	22/08/2012 05	21/08/2012	23/08/2012	3			
								06/09/2012	09/09/2012	4			
13	Godavari	Dowlaiswaram	Andhra Pradesh	14.25 - I 14.86 - II	16.08	14.63	23/08/2012 05	05/08/2012	07/08/2012	3			