GOVERNMENT OF INDIA
CENTRAL WATER COMMISSION
FLOOD FORECAST MONITORING DIRECTORATE

Outflow from Hirakud Dam in September, 2011

FLOOD FORECASTING AND WARNING NETWORK PERFORMANCE APPRAISAL REPORT 2011

NEW DELHI – 110066 **October 2012**

Chairman
Central Water Commission
Sewa Bhawan, R. K. Puram
New Delhi-110066

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 covered 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 2011 witnessed unprecedented flood events in rivers Devi, a distributary of river Mahanadi and Baitarni in Odisha. High Flood Situation was witnessed in Ganga in Uttar Pradesh and Bihar. River Ghaghra in Uttar Pradesh & Bihar, Bagmati in Bihar, Beki in Assam also witnessed High Flood Situation. The year witnessed moderate and low intensity floods in many parts of India.

During the flood season 2011, 5991 flood forecasts were issued by various units of CWC spread all over the country and 5904 forecasts i.e., 98.55% forecasts were found within permissible limit of accuracy. Out of 5991, 1143 were inflow forecasts and 4848 level forecasts. Out of 4848 level forecasts, 4795 forecasts i.e., 98.91 % of the forecasts were found within permissible limit of accuracy of ±15 cm. Similarly out of 1143 inflow forecasts, 1109 inflow forecasts i.e., 97.03% of the inflow forecasts were found within permissible limits of accuracy of ±20%.

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 helps 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 under Flood Management Organisation 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, NDMA, 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 under the guidance of Chief Engineer, FMO 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 2011 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), Shri R. Jayachandran, S.A., Shri. S. N. Biswas, S. A., Shri. Rajbir Singh, Data Entry Operator and Shri. Jameel Ahmed, PA, 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.

S. P. Kakran

(S P Kakran)
30/X/2012

New Delhi
October, 2012

CONTENTS

EXECUTIVE SUMMARY

0.1 GENERAL

During 2011, South West Monsoon, for the country as a whole, the rainfall for the season (June-September) was 101% of its long period average (LPA).Seasonal rainfall was 107% of its LPA over Northwest India, 110% of its LPA, over Central India, 100% of its LPA over south Peninsula and 86% of its LPA over Northeast (NE) India. Out of the total 36 meteorological subdivisions, 33 subdivisions constituting 92% of the total area of the country received excess/normal season rainfall and the remaining 3 subdivisions (Arunachal Pradesh, Assam & Meghalaya, and NMMT constituting 8% of the total area of the country) received deficient season rainfall. Out of 603 meteorological districts for which data are available, 453 districts (76%) received excess/normal rainfall and the remaining 150 districts (24%) received deficient/scanty rainfall during the season. Monthly rainfall over the country as a whole was 112% of LPA in June, 85% of LPA in July, 110% of LPA in August and 106% of LPA in September. Advance of Southwest monsoon over the Andaman Sea was delayed by about 10 days. The monsoon set in over Kerala on 29th May, three days before its normal date of 1st June and covered the entire country by 9th July, 6 days earlier than its normal date of 15th July. The withdrawal of monsoon from west Rajasthan was delayed and it commenced only on 23rd September. Four depressions formed during 2011 monsoon season as against the normal of 4-6 monsoon depressions per season.

0.2 Flood Situation

Unprecedented floods were witnessed two flood forecast stations in Orissa namely, Alipingal on distributary Devi of river Mahanadi and Anandpur on river Baitarni during the month of September 2011.

During the year 2011, High Flood Situation was witnessed on river Beki at Road Bridge in Assam in July. River Ganga at Kannauj, Ankinghat, Kanpur and Dalmau in Uttar Pradesh, Hathidah and Bhagalpur in Bihar, River Ghaghra at Elgin Bridge and Ayodhya, Ramganga at Bareilly in Uttar Pradesh, River Ghaghra at Gangpur Siswan in Bihar flowed in High flood situation during August. River Mahanadi at Naraj, River Devi at Alipingal and River Kusabhadra at Nimapara, River Baitarni at Anandpur flowed in High Flood Situation in September. River Bagmati at Benibad was flowing in High Flood Situation from 28th September to 2nd October.

Moderate to Low floods were witnessed in most of basins at various Flood Forecasting Stations.

0.3 Flood Forecasting Performance

During the year 2011, 5991 forecasts were issued out of which 5904 forecasts (98.55%) were found to be within the limits of accuracy. The

number of level forecasts issued during the year 2011 were 4848 out of which 4795 (98.91%) was within the limit of accuracy of +/- 0.15 m. The number of inflow forecasts issued was 1143 out of which 1109 (97.03%) 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 and No. of Divisions supporting FF Activities	25
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	866
14.	No. of exclusive rain gauge stations (ordinary/self recording)	97
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

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 2011 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

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 2011 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.

A committee is proposed to be constituted for looking into various aspects for fixing similar criteria for categorization of inflow forecast.

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 2011-12 was Rs.56.74 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 2011, 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 39 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 and data from those stations were not used for flood forecasting purposes in 2011.

1.8 DAMAGE DUE TO FLOODS/ HEAVY RAINS BETWEEN 1953 TO 2011

The damage due to floods for the entire country was estimated to be Rs.7857.892 Crore during the flood season 2011. The average annual damages to crops, houses and public utilities from the year 1953 to 2011 as reported by the States/UT's are of the order of Rs. 3612.117 Crore, the maximum annual damage being Rs.32554.775 Crore during 2009.

A comparative details showing the damages occurred during the flood season 2009 to 2011 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 2011

Sl. No.	Items	Flood damages during Year the Year			Flood Damages during 1953-2011		
		2009	2010	2011	Average	Maximum	
						Year	Damage
1	Area affected (in mha)	3.84	2.624	1.895	7.225	1978	17.5
2	Population affected (in millions)	29.537	18.297	15.973	32.430	1978	70.45
3	Damaged to Crops(area in mha)	3.592	4.994	2.718	3.789	2005	12.299
4	Damaged to crops(value in Rs. Crore)	4232.609	5887.380	1393.847	1118.807	2003	7307.23
5	Damaged to houses (in numbers)	1235628	293830	1152518	1254954	1978	3507542
6	Damaged to houses (value in Rs. Crore)	10809.795	875.952	410.475	565.649	2009	10809.795
7	Cattle lost (in number)	63383	39706	35982	96593	1979	618248
8	Human lives lost (in numbers)	1513	1582	1761	1653	1977	11316
9	Damaged to public Utilities (in Rs. Crores)	17509.353	12757.253	6053.570	1867.852	2009	17509.353
10	Total damages to crops, houses & public utilities (in Rs. Crores)	32554.775	19520.594	7857.892	3612.117	2009	32554.775

1.9 ANALYSIS OF PERFORMANCE OF FLOOD FORECASTING NETWORK

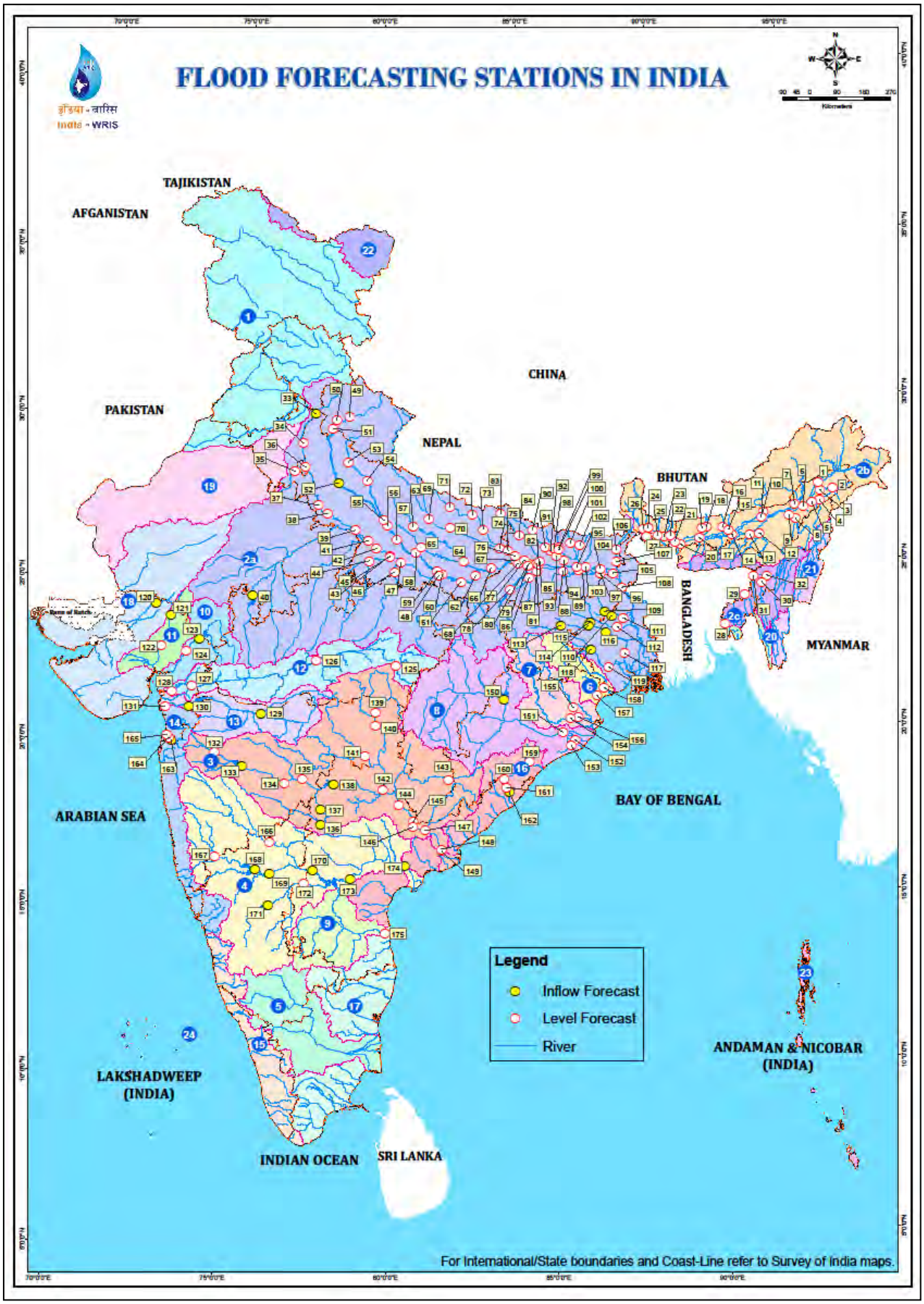
CWC carries out analysis and appraisal of the forecasting work, at the end of monsoon season. Based on this, measures for improvements, if necessary, are identified. A summary of the performance of the work carried out by the field divisions during the flood season 2011 presented in chapter-3. While 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 **Fig-1.1**


FLOOD FORECASTING STATIONS IN INDIA
इंडिया - वारिस
India - WRIS
TAJIKISTAN
AFGANISTAN
PAKISTAN
CHINA
NEPAL
BHUTAN
BANGLADESH
MYANMAR
ARABIAN SEA
BAY OF BENGAL
INDIAN OCEAN
SRI LANKA
LAKSHADWEEP (INDIA)
ANDAMAN & NICOBAR (INDIA)
Legend
Inflow Forecast
Level Forecast
River
For International/State boundaries and Coast-Line refer to Survey of India maps.

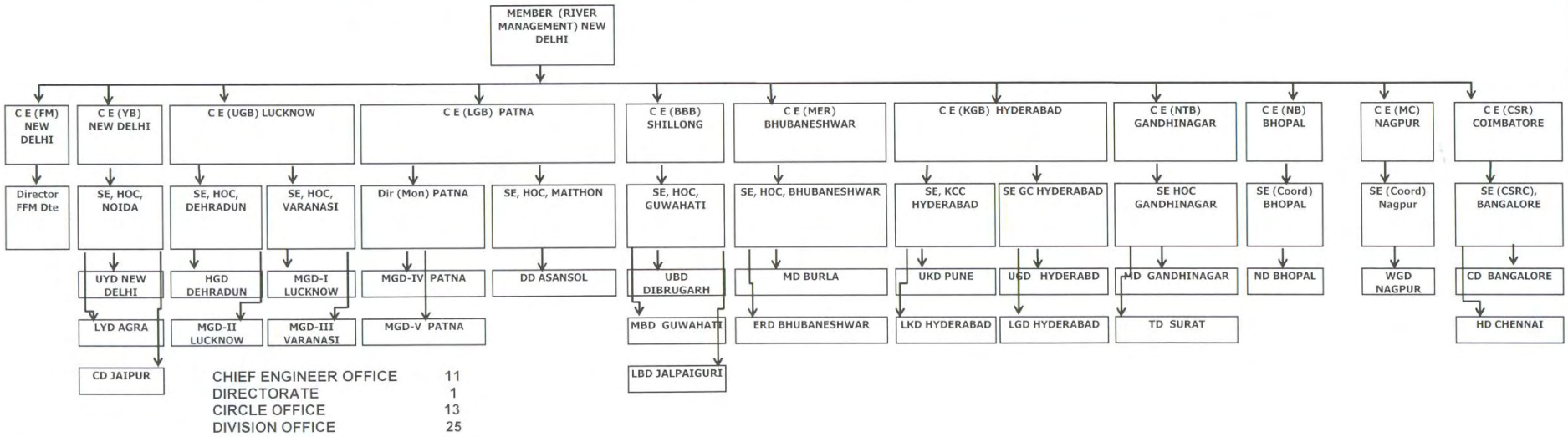
Map -1 Flood Forecasting Network in India

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 2011, the Numerical Weather Prediction 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. These were sent to different DFCRs by e-mail from the Central Flood Control Room of CWC in New Delhi for use in formulation of flood forecast for giving advisory warnings. It was agreed that the rainfall figures given in various grids will be utilised in operational flood forecasting in consultation with the concerned FMOs.

IMD has also agreed in principle to upload the daily weather summaries, QPF and rainfall figures issued by FMOs in IMD and other concerned Regional/ Meteorological Centre websites from 2012 onwards. 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.

2.1b. South-west 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 1941 to 1990 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 2011

- For the country as a whole, the rainfall for the season (June-September) was 101% of its long period average (LPA).
- Seasonal rainfall was 107% of its LPA over Northwest India, 110% of its LPA over Central India, 100% of its LPA over south Peninsula and 86% of its LPA over Northeast (NE) India.
- Out of the total 36 meteorological subdivisions, 33 subdivisions constituting 92% of the total area of the country received excess/normal season rainfall and the remaining 3 subdivisions (Arunachal Pradesh, Assam & Meghalaya, and NMMT constituting 8% of the total area of the country) received deficient seasonal rainfall.
- Out of 603 meteorological districts for which data are available, 453 districts (76%) received excess/normal rainfall and the remaining 150 districts (24%) received deficient/scanty rainfall during the season.
- Monthly rainfall over the country as a whole was 112% of LPA in June, 85% of LPA in July, 110% of LPA in August and 106% of LPA in September.
- Advance of Southwest monsoon over the Andaman Sea was delayed by about 10 days. The monsoon set in over Kerala on 29th May, three days before its normal date of 1st June and covered the entire country by 9th July, 6 days earlier than its normal date of 15th July. The withdrawal of monsoon from west Rajasthan was delayed and it commenced only on 23rd September.
- Four depressions formed during 2011 monsoon season as against the normal of 4-6 monsoon depressions per season.

2.3 ONSET OF SOUTH-WEST MONSOON SEASON 2011

This year, setting in of southwest monsoon over Andaman Sea was delayed by about 10 days. However, it set over Kerala 3 days before 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 29th May 2011.

Due to strengthening of cross-equatorial flow over Arabian Sea and the northward movement of a vortex in the form of an upper air cyclonic circulation along the trough off the west coast, monsoon further advanced rapidly and covered entire Kerala, Tamil Nadu and Goa, most parts of Karnataka and some parts of south Andhra Pradesh by 5th June. However, during 6th – 10th June, there was a short hiatus in the further advance of monsoon along the west coast. On the other hand, the eastern branch of monsoon advanced over some more parts of Bay of Bengal and north-eastern states, with a delay of nearly 5 days. Associated with the formation of a

Depression over north Bay of Bengal on 13th June, the monsoon advanced into some more parts of Arabian Sea, parts of Saurashtra and most parts of the Bay of Bengal and parts of coastal Andhra Pradesh and coastal Orissa.

Subsequently, there had been a rather steady advance during 15th – 26th June in association with the formation of a Deep Depression (16th – 22nd June) over the northwest Bay of Bengal and its gradual west-northwestward movement. This synoptic situation caused the monsoon to cover most parts of the country outside western parts of Rajasthan and north Gujarat state.

With the formation of a low pressure area over south Chhattisgarh and adjoining Telangana and the off shore trough extending from south Gujarat coast to Kerala coast during 4th-8th July, the trough at mean sea level shifted southwards and became more pronounced and made favourable conditions for further advance of monsoon. Thus, the southwest monsoon covered the entire country on 9th July, 6 days earlier than its normal date of 15th July.

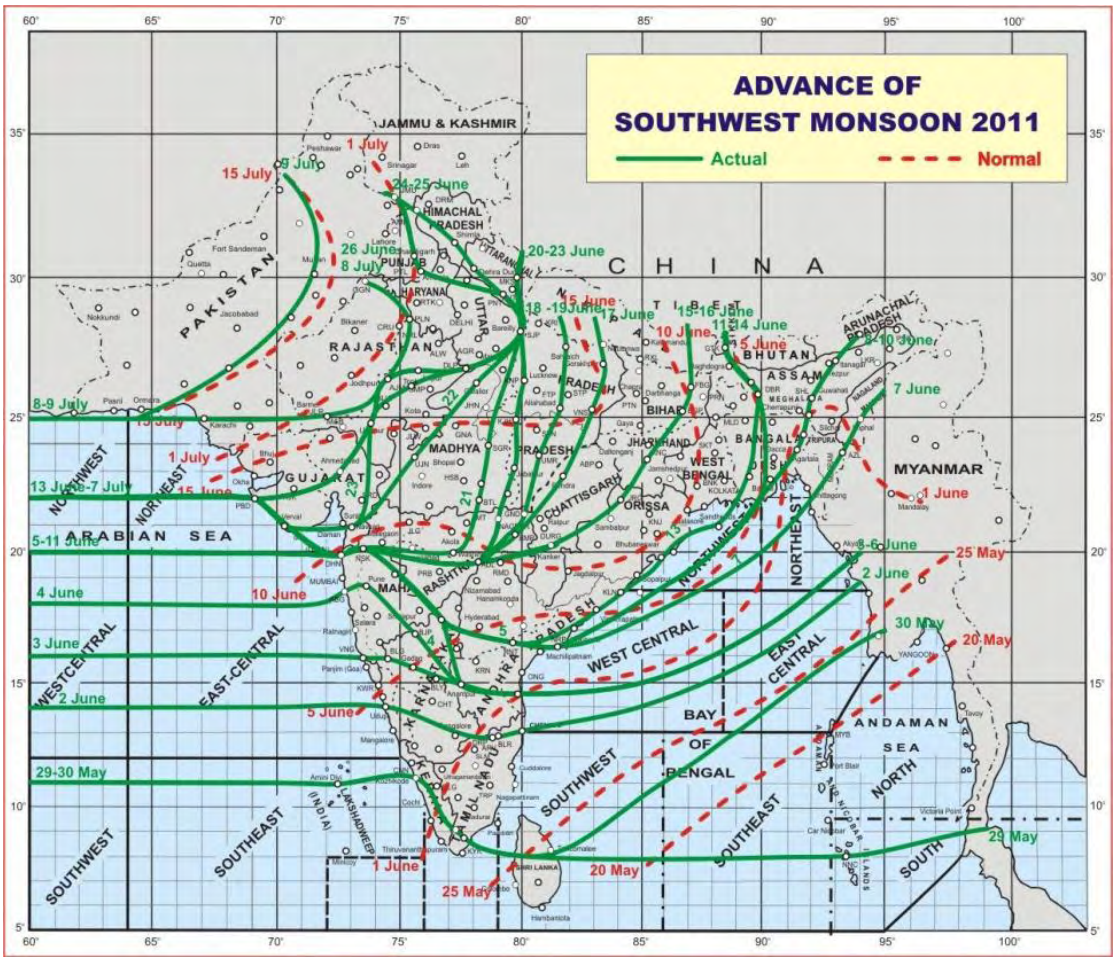


Fig – 2.1 Advance of southwest Monsoon – 2011.

2.4 CHIEF SYNOPTIC FEATURES

Strong cross equatorial flow prevailed during most parts of June. It was weak during the first fortnight of July. The cross equatorial flow maintained its strength all through the month of August and during the first half of September. Though the monsoon trough, displayed north-south oscillations, there had been active periods especially in the month of August, often in association with the low pressure systems and cyclonic circulations embedded with the monsoon trough. In such occasions, the monsoon trough extended up to mid-tropospheric levels, displaying its characteristic southward tilt with height.

Though there had been certain periods of subdued rainfall activity during the season in different spatial and temporal scales, there was no all India break monsoon condition during this year.

Four depressions formed during this season as against the normal of 4-6 monsoon depressions per season (June - September). Out of these, two Depressions (that formed on 11th June over Arabian Sea & the other during 22nd -23rd, July over Land) had a short life span. The Depression formed during 16th -23rd, June and its subsequent west northwestward movement was responsible for the advance of the monsoon over the most parts of the country. The fourth Depression formed towards the end of the season (22nd – 23rd, Sept.) weakened before moving towards northeast.

Ten low pressure areas formed during the season. The month of June and July witnessed the formation of two low pressure areas each, one over Bay (8th – 9th June & 13th -16th July) and another over land (29th-30th June) over east Uttar Pradesh and adjoining areas of north Madhya Pradesh. Another low pressure formed over south Chhattisgarh and adjoining Telangana (6th – 7th July). The two low pressure areas in the month of June dissipated in situ. The systems in July aided the monsoon to cover the entire country and were also responsible further for active monsoon conditions in the third week of July, which gave rise to widespread rainfall activity over most parts of the country outside southeast Peninsula.

The month of August was devoid of Depressions. But four low pressure areas formed during the month; two over land and one each over the Bay and the Arabian Sea. All the low pressure areas had prolonged life spans. The low pressure area (8th– 11th August.) formed over the western end of the monsoon trough over northwest Madhya Pradesh and neighbourhood and caused extremely heavy rainfall over Madhya Pradesh and Rajasthan. The well marked low pressure area 11th –17th August formed over Gangetic West Bengal and neighbourhood and interacted with the cyclonic circulation in the westerly field and caused extremely heavy rainfall over northwestern parts of India. During the third week of August though the circulation features resembled a break like situation, parts of central India received good rainfall activity due to the movement of an upper air cyclonic circulation across

central India during 18th-23rd August. A low pressure area formed on 30th August over Arabian Sea off north Gujarat coast and dissipated in situ on 4th September, because of which the western end of monsoon trough remained south of its normal position.

A Depression (22nd– 23rd September) and two low pressure areas (6th - 13th and 13th-19th) formed during the month of September. The Depression caused a second spell of flood situation over Orissa and Bihar.

The tracks of the Depressions are shown in Fig.2.2

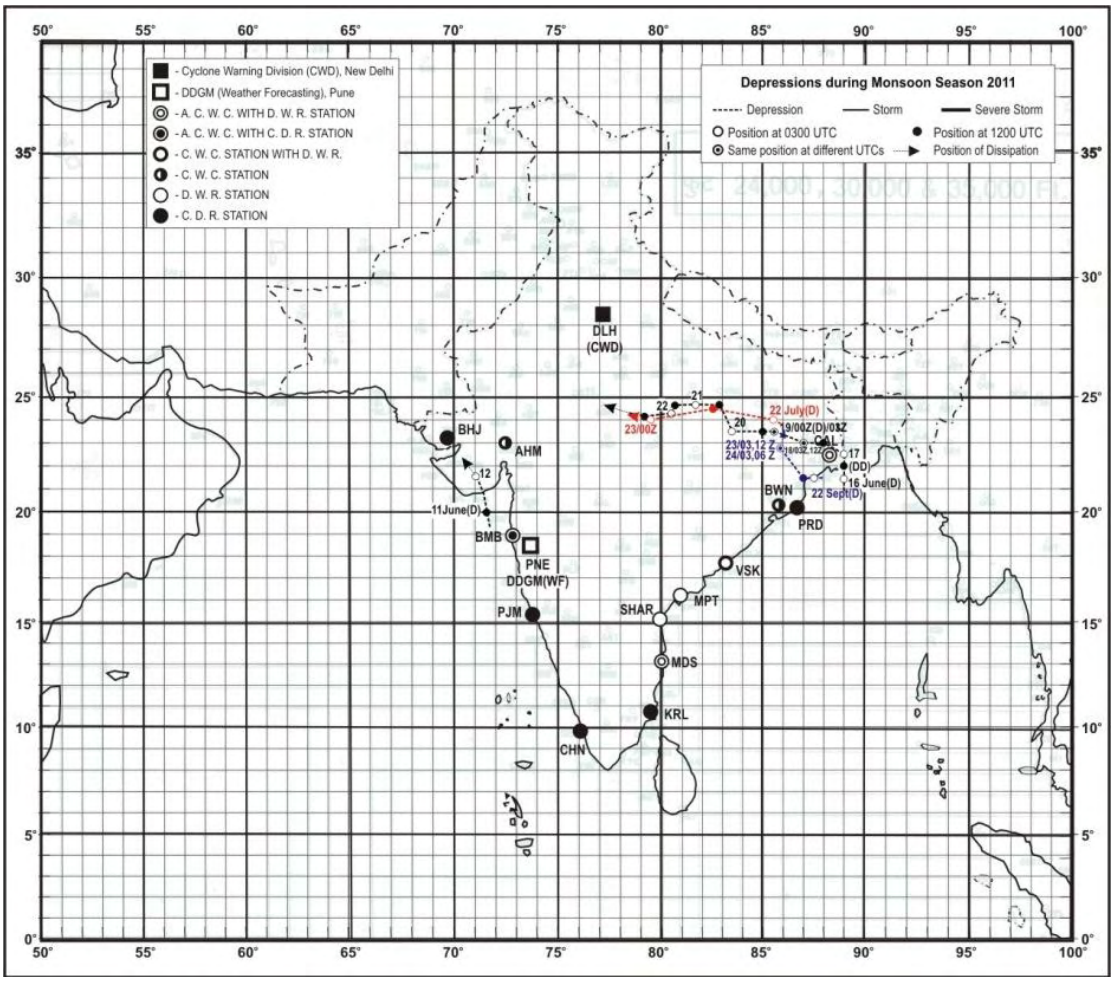


Fig.2.2 - The Tracks of the Depressions during 2011

2.5 WITHDRAWAL OF SOUTHWEST MONSOON

The withdrawal of south west monsoon from west Rajasthan started on 23rd September, with a delay of more than three weeks with respect to the normal date of withdrawal from extreme western parts of Rajasthan [1st September]. Subsequently, the monsoon withdrew from most parts of northwest India and some parts of west Uttar Pradesh on 26th September and from most parts of Uttar Pradesh, some parts of Madhya Pradesh and some more parts of Gujarat state on 28th September. On 30th September,

the monsoon further withdrew from some more parts of Uttar Pradesh and Madhya Pradesh. The subsequent withdrawal of the monsoon was delayed due to the presence of various transient synoptic scale systems including troughs and cyclonic circulations causing moisture incursion and rainfall over the region. The southwest monsoon withdrew from some more parts of central and peninsular India on 11th October and from the entire northeast and eastern parts of the country on 13th October. On 24th October, it withdrew from the entire country, including south peninsula, Bay of Bengal and Arabian Sea followed by a simultaneous commencement of northeast monsoon rains over Tamil Nadu, Kerala and adjoining areas of Andhra Pradesh and Karnataka. The isochrones of withdrawal of Southwest Monsoon is given in Figure -2.3.

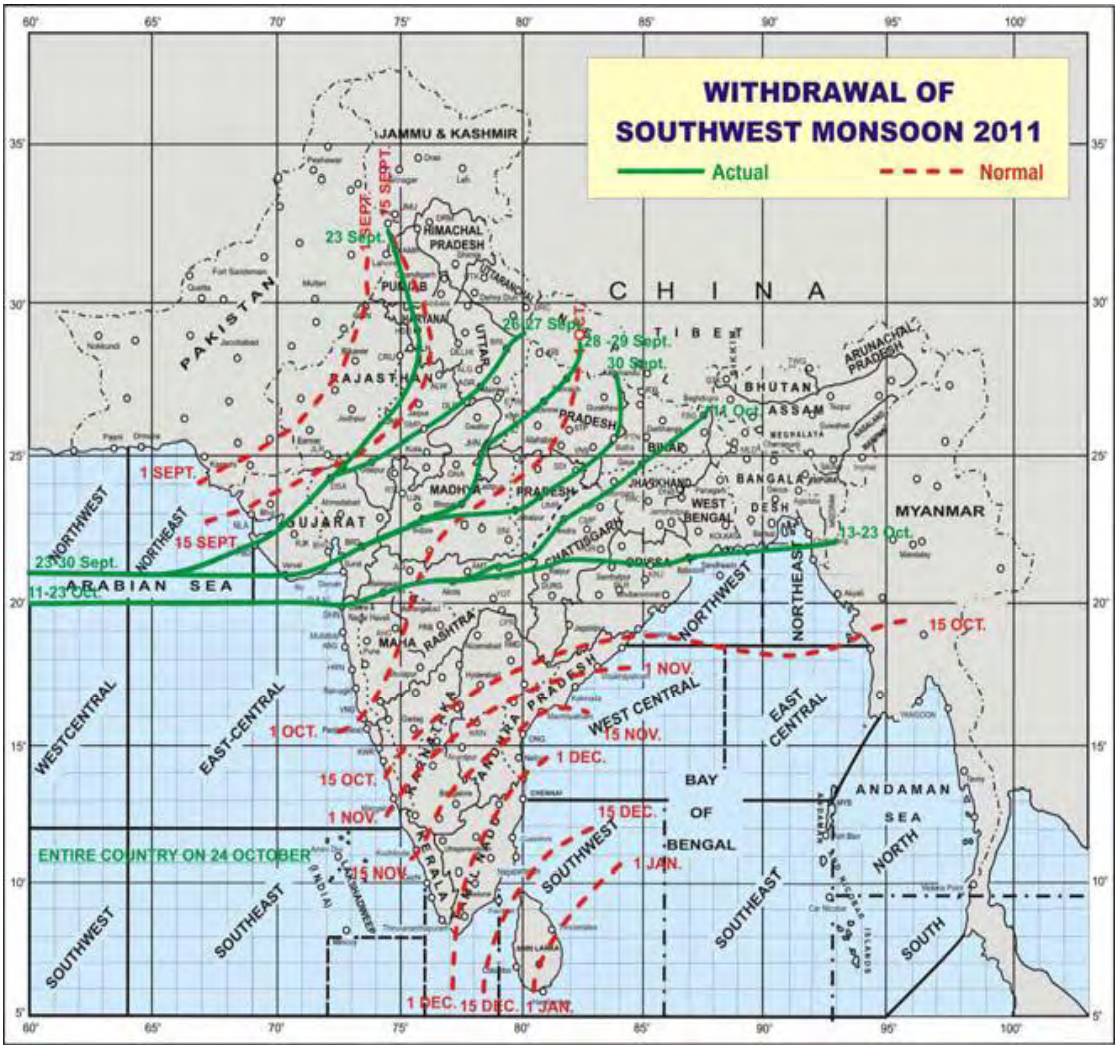


Fig. 2.3 Isochrones of withdrawal of southwest monsoon - 2011.

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

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.

(Note: Sources of this Chapter have been taken from "End of Monsoon report-2011" from web site of the India Meteorological Department 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 2011 covered various river basins and States. A total of 5991 forecast were issued during 2011. The performance of flood forecasting Divisionwise, Major Basinwise, Statewise and for the period 2000 to 2011 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 2011, analysis of the flood forecasts issued reveals that out of 5991 forecasts, 1839 forecasts (30.69% of 5991 forecast) were issued for 24 sites located on the main Brahmaputra and tributaries. Out of these, 1821 (99.02%) were found within permissible limit of accuracy.

3.4.2 Barak and Meghna Basin

During the flood season 2011, 66 forecasts (1.1% of 5991) 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 2011, 3179 forecasts (53.06% of 5991) were issued for 66 sites, out of total 87 sites located on the main Ganga and its tributaries. No forecast was issued for the remaining 21 sites. Out of these, 3154 forecasts (99.21%) were found within permissible limit of accuracy.

3.4.4 Eastern Rivers Basins including Mahanadi

During the flood season 2011, 129 forecasts (3.82% of 5991) were issued for nine sites on Eastern Rivers (excluding Mahanadi Basin) and 123 (95.35%) forecasts were found within permissible limit of accuracy. No forecasts were issued for the remaining two stations. Also 100 forecasts (1.67 % of 5991) were issued for all the four sites located on the Mahanadi river basin, of which 97 forecasts (97 %) were found within permissible limit of accuracy.

The highlight of this year is the unprecedented flood situation in Mahanadi and Baitarni Basin during September 2011. In the first fortnight of September Hirakud Dam received very heavy inflow and released huge quantum of water to downstream areas. This in turn gave rise to unprecedented floods in delta area of Mahanadi when the distributary Devi at Alipingal crossed the previous HFL on 11th September 2011. During the second fortnight of September 2011, due to very heavy rainfall in association with a depression, river Baitarni at Anandpur crossed the previous HFL on 23rd September 2011.

3.4.5 Godavari Basin

During the flood season 2011, 22 forecasts (0.37 % of 5991) were issued for 5 forecasting sites, of which 21 forecasts were found with 95.45% accuracy. No forecast were issued for the remaining 13 flood forecasting sites.

3.4.6 Krishna Basin

During the flood season 2011, 468 forecasts (7.81% of 5991) were issued for eight forecasting sites and 436 forecasts (93.16 %) were found within permissible limit of accuracy. No forecast was issued for one site in Krishna basin.

3.4.7 Southern Rivers Basin

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

3.4.8 West Flowing Rivers

During the flood season 2011, for the West-flowing Rivers which comprises of the Narmada, the Tapi etc, 188 forecasts (3.13% of 5991) were issued for 10 sites, out of fifteen sites. 186 forecasts (98.94 %) were found within permissible limit of accuracy.

The Basinwise – Riverwise flood forecasting information in India during flood season 2011 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 2011, is given in **Annex –III.** Their salient features are as under:

3.5.1 Andhra Pradesh

During the flood season 2011 out of 9 level forecasting sites and 7 inflow forecasting sites, no forecast was required at one level forecast station viz., Nellore Anicut on river North Pennar.

It is revealed that 10 level forecasts and 234 inflow forecasts were issued for 9 locations, out of which 10 level forecasts (100 %) and 218 inflow forecasts (93.16%) were found within limits respectively.

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 2011 season, 1733 forecasts were issued out of which 1719 forecasts (99.19%) were found within limit of accuracy. River Beki at Road Bridge flowed within 0.5 m of its previous HFL during the year 2011.

3.5.3 Bihar

In the state of Bihar, there were 32 level forecasting sites. Forecasts were issued for 31 sites during the year 2011. Out of 1794 forecasts issued during the flood season 2011, all the 1791 forecasts (99.83 %) were found within limit of accuracy. River Ganga at Hathidah & Bhagalpur, River Ghaghra at Gangpur Siswan and River Bagmati at Benibad flowed within 0.5 m of its previous HFL in the year 2011.

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). 1 flood forecast were issued for this station during the flood season 2011 out of which 1 (100%) were within the limits of accuracy.

3.5.5 Gujarat

There were 11 flood forecasting sites in the state of Gujarat including five inflow forecasting sites. However, forecasts were issued for eight sites. Out of 99 forecasts issued, 97 forecasts (97.98%) were found within limits of accuracy during the flood season 2011. No forecasts were issued for three 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 2011 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 2011, Out of 304 (92 level and 212 inflow) forecasts issued, 303 forecasts (99.62 %) 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 2011, out of 247 forecasts (5 level and 242 inflow) issued for 4 stations, 230 (4 level and 226 inflow) inflow (93.12%) were found within limit of accuracy.

3.5.9 Madhya Pradesh

In the state of Madhya Pradesh, there were two level forecasting sites on the river Narmada and 1 inflow forecast site at Gandhisagar on river Chambal. During the flood season 2011, forecasts were issued for 1 level and inflow sites. Out of 15 forecasts issued (8 inflow and 7 level), all 15 (100%) forecasts were found within the limit of accuracy.

3.5.10 Maharashtra

There were nine forecasting sites including two inflow forecasting sites, in the state of Maharashtra. During the flood season 2011, forecasts were issued for 1 inflow forecast station. It is seen that 82 inflow forecasts were issued for Hatnur Dam and all 82 (100%) forecasts were within limits of accuracy.

3.5.11 Odisha (Orissa)

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 2011, 227 (167 level and 60 inflow) forecasts were issued for 9 level and 1 inflow forecast stations out of which 218 (158 level and 60 inflow) (96.94%) were found within limit of accuracy. No forecasts were issued for two forecast sites. River Devi at Alipingal and River Baitarni at Anandpur crossed their previous HFL during September 2011. River Mahanadi at Naraj, River Devi at Alipingal, River Kusabhadra at Nimapara and River Baitarni at Anandpur were flowing in High Flood Situation during September 2011.

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 2011. 24 forecasts were issued out of which 18 (75 %) were within limit of accuracy.

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. During the flood season 2011, forecasts were issued for 20 stations. Out of 625 level forecasts, 616 forecasts (98.56%) were found within limit of accuracy. Further out of 78 inflow forecasts, all 78 (100 %) were found within limit of accuracy. Kannauj, Ankinghat, Kanpur and Dalmau on river Ganga, Bareilly on river Ramganga, Elgin Bridge and Ayodhya on river Ghaghra flowed in High Flood Situation during the year 2011.

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 2011, forecasts were issued for 11 sites (8 level and 3 inflow stations). Out of 365 level forecasts, 355 forecasts (97.26 %) were found within limit of accuracy. Out of 138 inflow forecasts, all 138 (100 %) forecasts were found within limit of accuracy.

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 2011.

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 2011, Out of 15 forecasts, 15 forecasts (100 %) were within limits of accuracy.

The performance of flood forecasting Stations (Divisionwise) in India during flood season 2011 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 2011, an average number of flood forecasts issued per forecasting site were 47.17. The number of forecasting sites where the performance accuracy of the issued forecasts was found above 98.55 % (National average for flood season 2011) was 96 sites (75.6 %) which includes 93 sites (73.22%) where flood forecasting stations having 100 % accurate forecast. 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 105 (82.67%).

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

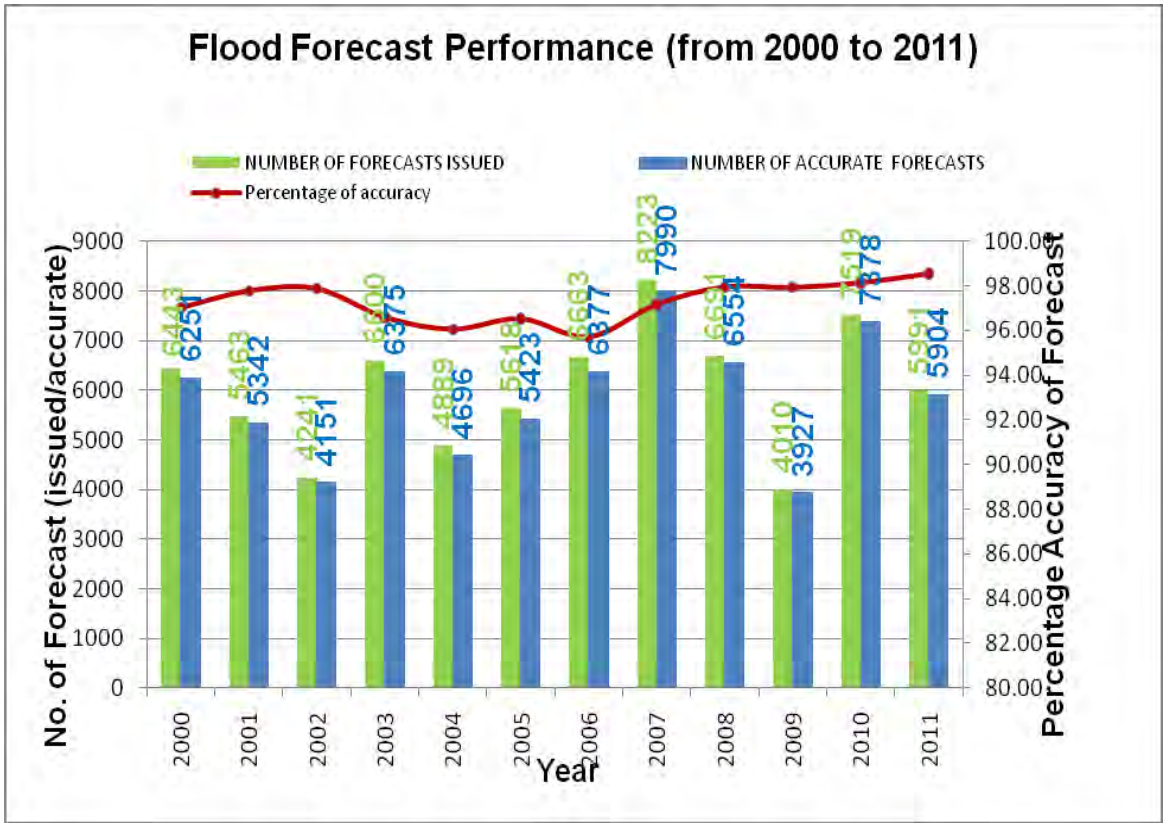


Fig -3.1 Flood Forecast Performance from 2000 to 2011

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 2011 season varies from a maximum of 100% for Barak and Meghna Rivers Basin and its tributaries to a minimum of 93.16% for the Krishna

basin. The overall accuracy performance was of the order of 98.55% for the country as a whole.

Sitewise "Forecast Performance" out of 175 operational sites in flood season 2011 is shown in **Table 3.1**.

Table 3.1 Site wise "Forecast Performance" of flood forecasting sites of CWC in Flood Season, 2011

Sl. No.	Details of sites within different range of permissible limit of accuracy (±15cm,±20%cumec)	Flood Season 2011	
		No. of Sites	% age
1	Sites with performance accuracy between 0.0 % to 25.0%	0	0%
2	Sites with performance accuracy between 25.1 % to 50.0%	1	0.78%
3	Sites with performance accuracy between 50.1 % to 75.0%	3	2.36%
4	Sites with performance accuracy between 75.1 % to 99.99%	30	23.62%
5	Sites with 100% performance accuracy i.e. where all forecasts issued were within permissible limit of accuracy	93	73.24%
6	Total sites where forecasts were issued	127	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 2011. Out of 147 level forecasting sites, water levels at sites equaled or exceeded their warning levels at 97 sites and at 67 sites, the flood level exceeded the danger levels. Unprecedented floods, exceeding previous highest flood levels (HFL), were experienced at 2 sites, and the levels were recorded within 0.5 m of their respective H.F.L at 14 more sites exclusively (total 18 on or above High Flood). All these forecasts were within prescribed limit of accuracy.

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**.** Moderate and low flood events were observed at 32 and 50 sites respectively as listed at **Annex-X to XII,** for the year. 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 2011, 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 2011, high flood events occurred at Kannauj, Ankinghat, Kanpur, Dalmau, Hathidah and Bhagalpur on main Ganga, Bareilly on river Ramganga, Elgin Bridge, Ayodhya and Gangpur Siswan on river Ghaghra and Benibad on river Bagmati all 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 2011, no stations under Brahmaputra basin witnessed Unprecedented Flood Situation. However, River Beki at Road Bridge flowed above High Flood Situation **Annex-IX** and many of the other stations

flowed in moderate and low flood situation during the season and these are shown in **Annex-XI**.

4.4 BARAK AND MEGHNA SYSTEM

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

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

4.5 EASTERN RIVERS SYSTEM

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

There are nine flood forecasting sites including one inflow forecasting site at Gotta Barrage located in the state of Andhra Pradesh. Remaining all the 8 level forecasting sites are in the state of Odisha. During the flood season 2011, flood forecasts were issued for all forecasting sites. Unprecedented Flood Situation was witnessed in one flood forecast station namely., Anandpur on river Baitarni. Details are given in **Annex-VIII**. High Flood situation was witnessed at Anandpur on river Baitarni Details are given in **Annex-IX**. The occurrence of Moderate and low floods is given in **Annex-XII**.

4.6 MAHANADI BASIN

In the Mahanadi basin, Central Water Commission has so far covered only the main stream Mahanadi under its Flood Forecasting and Warning Network setup. There were four flood forecasting sites, one being the inflow forecasting site at Hirakud Dam in Odisha. During the flood season 2011, all the sites were operational in Mahanadi River. Forecasts were issued for all operational sites, whenever level/ inflow value crossed the respective forecast criteria. Level/ inflow forecasts were issued at all the four stations in the Basin. **It is seen that "Unprecedented" was witnessed at Alipingal on river Devi during September 2011**. Details are given in **Annex-VIII.** "High" flood occurred at Naraj on river Mahanadi, Alipingal on river Devi and Nimapara on river Kusabhadra during September 2011. Details are given in

Annex-IX 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 2011. 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 2011 season no unprecedented or high flood events were recorded in this Basin. The details of low 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, 2011. 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. During the flood season 2011, no unprecedented or high flood occurred. The details of low flood events are shown in **Annex-XII**.

4.9 SOUTHERN RIVER SYSTEM

There was one forecasting site at Nellore on the Pennar River. During 2011, 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 2011, inflow forecasts were issued for all dams. Level forecasts were issued for Wanakbori on river Mahi, Mandla and

Bharuach on river Narmada and Vapi Town on river Damanganga. Details are given in **Annex-XII.**

4.11 AN OVERVIEW OF FORECAST EVENTS

The unprecedented events were experienced at 2 sites in the year 2011 in the rivers Devi, a distributary of river Mahanadi and Anandpur on river Baitarni as given under.

4.11.1. Unprecedented Flood Events

4.11.1.a Alipingal on river Devi in Odisha

The river Devi at Alipingal crossed the previous HFL during the period 1600 hours of 11th September 2011 between 07 hours and 18 hours. It attained a peak level of 13.11 m on 11th September 2011 at 1200 hours which was 6 cm above the previous HFL of 13.05 m attained on 20th September 2008. Afterwards, it fell below the unprecedented flood situation.

4.11.1.b Anandpur on river Baitarni in Odisha

The river Baitarni at Anandpur crossed the previous HFL during the period 23rd September 2011 between 01 hour and 11 hours. It attained a peak of 41.35 m at 02 hours of 23rd September 2011 which was 15 cm above the previous HFL of 41.20 m attained on 19th August 1975. Afterwards, it fell below the unprecedented flood situation.

4.11.2 High Flood Events

High flood events occurred at 14 sites namely Kannauj, Ankinghat, Kanpur, Dalmau, Hathidah and Bhagalpur on main Ganga, Bareilly on river Ramganga, Elgin Bridge, Ayodhya and Gangpur Siswan on river Ghaghra, Benibad on river Bagmati, River Beki at Road Bridge, River Mahanadi at Naraj and river Kusabhadra at Nimapara in 2011.

4.11.3 Other Events

Moderate floods were witnessed in 67 stations and Low flood events in 97 stations in various river basins. No forecasts were issued at 48 sites (46 level forecast sites and 2 inflow forecast sites) where the peak levels at these stations did not cross the warning level or the flow did not cross the warning criteria.

CHAPTER 5

RESPONSE FROM USER AGENCIES

5.1 General

Central Water Commission performs the Flood Forecasting and Warning job on flood prone interstate river basins in the country. It issues the forecast to the users such as various civil and engineering departments of the state and central governments including, railway, 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.

5.2 Appreciation letters received during flood season 2011

Abstract of some of the messages received by our field unit during the flood season 2011 are given below:

5.2.1 Engineer-in-Chief, Water Resources, Govt. of Orissa, Bhubaneswar.

Lr. no: FC-II-CWC-28/08/16594 dated 15.12.2011

"For the flood-2011 we have received the forecasts for different rivers of the State. The same has been distributed to all concerned authorities in time. I feel great to mention here the availability of such facilities in form of supply of hydrometeorological information and situation forecast etc round the clock from pioneer organisations like CWC and IMD have made it possible time and again to overcome successfully the flood exigencies in time and with better preparedness. As an active user of online data and forecast of CWC, I do express my deep thanks and gratitude to CWC organisation..."

5.2.2 Superintending Engineer, Surat Irrigation Circle, Govt. of Gujarat, Surat

Lr. No: SIC/PB.I/Flood Control/2011/T-19/WS/6744 dated 4.11.2011

"The forecast and rainfall data details received well in time and helped us in planning reservoir storage, optimizing utilization of water for various flood routing and dam safety. Due to timely availability of forecast and rainfall data gate operation can be done in time so that release of water was planned in advance in such a way that city areas are not affected in downstream of dam."

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	

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	

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			
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	

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			
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	

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			
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	

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			
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	
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/Assam	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	

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			
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/Assam	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	

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			
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	

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			
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	

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			
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	

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	

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			
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	
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 2011												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2011		No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
						Level (m)	Date/ Month/ Year	Level (m)	Date (DD/MM/YY)			
1	2	3	4	5	6	7	8	9.00	10	11	12	13
	Ganga Basin											
1	Alaknanda	Srinagar	Uttarakhand	539.00	540.00	536.85	05/09/1995	535.44	16-Aug-11	0	0	
2	Ganga	Rishikesh	Uttarakhand	339.50	340.50	341.72	05/09/1995	341.22	16-Aug-11	13	9	69.23
3	Ganga	Haridwar	Uttarakhand	293.00	294.00	296.30	19/09/2010	295.60	16-Aug-11	11	9	81.82
4	Ganga	Narora Barrage	Uttar Pradesh			180.61	23/09/2010	179.71	19-Aug-11	78	78	100.00
5	Ganga	Kannauj	Uttar Pradesh	124.97	125.97	126.78	27/09/2010	126.57	25-Aug-11	16	16	100.00
6	Ganga	Ankinghat	Uttar Pradesh	123.00	124.00	124.49	28/09/2010	124.17	24-Aug-11	25	24	96.00
7	Ganga	Kanpur	Uttar Pradesh	112.00	114.00	114.08	29/09/2010	113.75	26-Aug-11	29	29	100.00
8	Ganga	Dalmau	Uttar Pradesh	98.36	99.36	99.84	03/08/1973	99.51	28-Aug-11	13	13	100.00
9	Ganga	Phphamau	Uttar Pradesh	83.73	84.73	87.98	08/09/1978	83.24	12-Aug-11	0	0	
10	Ganga	Allahabad Chhatnag	Uttar Pradesh	83.73	84.73	88.03	08/09/1978	82.38	12-Aug-11	0	0	
11	Ganga	Mirzapur	Uttar Pradesh	76.72	77.72	80.34	09/09/1978	75.81	13-Aug-11	0	0	
12	Ganga	Varanasi	Uttar Pradesh	70.26	71.26	73.90	09/09/1978	70.30	13-Aug-11	1	1	100.00
13	Ganga	Ghazipur	Uttar Pradesh	62.11	63.11	65.22	09/09/1978	63.85	14-Aug-11	24	24	100.00
14	Ganga	Buxar	Bihar	59.32	60.32	62.09	1948	60.46	14-Aug-11	12	12	100.00
15	Ganga	Ballia	Uttar Pradesh	56.62	57.62	60.25	14/09/2003	59.43	14-Aug-11	71	70	98.59
16	Ganga	Patna Dighaghat	Bihar	49.45	50.45	52.52	23/08/1975	50.44	15-Aug-11	35	35	100.00
17	Ganga	Patna Gandhighat	Bihar	47.60	48.60	50.27	14/08/1994	49.48	15-Aug-11	76	76	100.00
18	Ganga	Hathidah	Bihar	40.76	41.76	43.15	07/08/1971	42.67	17-Aug-11	74	74	100.00
19	Ganga	Munger	Bihar	38.33	39.33	40.99	19/09/1976	39.00	17-Aug-11	26	26	100.00
20	Ganga	Bhagalpur	Bihar	32.68	33.68	34.20	17/09/2003	34.17	18-Aug-11	64	64	100.00
21	Ganga	Kahalgaon	Bihar	30.09	31.09	32.87	17/09/2003	32.22	19-Aug-11	82	82	100.00
22	Ganga	Sahibgunj	Jharkhand	26.25	27.25	30.91	1998	28.65	21-Aug-11	92	92	100.00
23	Ganga	Farakka	West Bengal	21.25	22.25	25.14	07/09/1998	23.96	20-Aug-11	176	172	97.73
24	Ramganga	Moradabad	Uttar Pradesh	189.60	190.60	192.88	21/09/2010	191.46	18-Aug-11	19	19	100.00
25	Ramganga	Bareilly	Uttar Pradesh	162.07	163.07	162.88	06/8/1978	162.40	19-Aug-11	3	3	100.00
26	Yamuna	Tajewala Weir	Haryana		323.70	328.27	03/09/1978			0	0	
27	Yamuna	Mawi	Uttar Pradesh	230.00	230.85	232.45	26/09/1988	231.56	17-Aug-11	30	28	93.33
28	Yamuna	Delhi Rly Bridge	NCT Delhi	204.00	204.83	207.49	06/09/1978	205.72	19-Aug-11	15	15	100.00
29	Yamuna	Mathura	Uttar Pradesh	164.20	165.20	169.73	08/09/1978	165.91	11-Sep-11	56	56	100.00
30	Yamuna	Agra	Uttar Pradesh	151.40	152.40	154.76	09/09/1978	150.71	22-Aug-11	0	0	
31	Yamuna	Etawa	Uttar Pradesh	120.92	121.92	126.13	11/09/1978	120.35	23-Aug-11	0	0	
32	Yamuna	Auraiya	Uttar Pradesh	112.00	113.00	118.19	25/08/1996	111.86	11-Aug-11	0	0	
33	Yamuna	Kalpi	Uttar Pradesh	107.00	108.00	112.98	25/08/1996	106.96	11-Aug-11	0	0	
34	Yamuna	Hamirpur	Uttar Pradesh	102.63	103.63	108.59	12/09/1983	102.18	11-Aug-11	0	0	
35	Yamuna	Chilaghat	Uttar Pradesh	99.00	100.00	105.16	06/09/1978	98.05	11-Aug-11	0	0	
36	Yamuna	Naini	Uttar Pradesh	83.74	84.74	87.99	08/09/1978	83.03	12-Aug-11	0	0	
37	Sahibi	Dhansa	NCT Delhi	211.44	212.44	213.58	06/08/1977	209.80	11-Sep-11	0	0	
38	Chambal	Gandhisagar Dam	Madhya Pradesh							8	8	100.00

Basinwise -Riverwise- Flood Forecasting Information in India during Flood Season 2011												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2011				
						Level (m)	Date/ Month/ Year	Level (m)	Date (DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9.00	10	11	12	13
39	Betwa	Mohana	Uttar Pradesh	121.66	122.66	133.69	11/09/1983	122.07	24-Jul-11	1	1	100.00
40	Betwa	Sahjina	Uttar Pradesh	103.54	104.54	108.67	12/09/1983	101.87	11-Aug-11	0	0	
41	Ken	Banda	Uttar Pradesh	103.00	104.00	113.29	07/0720/05	106.09	24-Jul-11	10	9	90.00
42	Gomati	Lucknow	Uttar Pradesh	108.50	109.50	110.85	10/09/1971	106.24	27-Aug-11	0	0	
43	Gomati	Jaunpur	Uttar Pradesh	73.07	74.07	77.74	22/09/1971	71.47	19-Aug-11	0	0	
44	SAI	Raibareli	Uttar Pradesh	100.00	101.00	104.81	17/09/1982	99.99	16-Aug-11	0	0	
45	Ghaghra	Elgin Bridge	Uttar Pradesh	105.07	106.07	107.56	10/10/2009	107.12	20-Aug-11	82	79	96.34
46	Ghaghra	Ayodhya	Uttar Pradesh	91.73	92.73	94.01	11/10/2009	93.92	22-Aug-11	87	86	98.85
47	Ghaghra	Turtipar	Uttar Pradesh	63.01	64.01	66.00	28/08/1998	64.56	24-Aug-11	73	73	100.00
48	Ghaghra	Darauli	Bihar	59.82	60.82	61.74	29/08/1998	60.85	25-Aug-11	60	60	100.00
49	Ghaghra	Gangpur Siswan	Bihar	56.04	57.04	58.01	18/09/1983	57.66	26-Aug-11	55	55	100.00
50	Ghaghra	Chhapra	Bihar	52.68	53.68	54.59	03/09/1982	52.74	15-Aug-11	4	4	100.00
51	Rapti	Balrampur	Uttar Pradesh	103.62	104.62	105.25	11/09/2000	103.90	25-Aug-11	9	9	100.00
52	Rapti	Bansi	Uttar Pradesh	83.90	84.90	85.82	21/08/1998	83.86	26-Aug-11	0	0	
53	Rapti	Gorakpur Birdghat	Uttar Pradesh	73.98	74.98	77.54	23/08/1998	74.14	07-Aug-11	5	5	100.00
54	Sone	Inderpuri	Bihar	107.20	108.20	108.85	23/08/1975	107.88	25-Sep-11	3	2	66.67
55	Sone	Koelwar	Bihar	54.52	55.52	58.88	20/07/1971	56.75	25-Sep-11	5	3	60.00
56	Sone	Maner	Bihar	51.00	52.00	53.79	10/09/1976	53.28	26-Sep-11	73	73	100.00
57	PunPun	Sripalpur	Bihar	49.60	50.60	53.91	18/09/1976	53.36	28-Sep-11	38	38	100.00
58	Gandak	Khadda	Uttar Pradesh	95.00	96.00	97.50	23/07/2002	96.08	02-Jul-11	71	71	100.00
59	Gandak	Chatia	Bihar	68.15	69.15	70.04	26/07/2002	67.73	04-Jul-11	0	0	
60	Gandak	Rewaghat	Bihar	53.41	54.41	55.41	17/09/1986	53.88	04-Jul-11	47	47	100.00
61	Gandak	Hazipur	Bihar	49.32	50.32	50.93	1948	50.00	26-Sep-11	17	17	100.00
62	Burhi Gandak	Lalbeghiaghat	Bihar	62.20	63.20	67.09	30/07/1975	61.73	28-Aug-11	0	0	
63	Burhi Gandak	Muzaffarpur	Bihar	51.53	52.53	54.29	15/08/1987	51.91	29-Sep-11	5	5	100.00
64	Burhi Gandak	Samastipur	Bihar	45.02	46.02	49.38	15/08/1987	46.49	01-Oct-11	18	18	100.00
65	Burhi Gandak	Rosera	Bihar	41.63	42.63	46.35	16/08/1987	42.90	01-Oct-11	16	16	100.00
66	Burhi Gandak	Khagaria	Bihar	35.58	36.58	39.22	1976	37.78	18-Aug-11	72	72	100.00
67	Bagmati	Benibad	Bihar	47.68	48.68	50.01	12/07/2004	49.68	30-Sep-11	112	112	100.00
68	Bagmati	Hayaghat	Bihar	44.72	45.72	48.96	14/08/1987	47.25	04-Oct-11	66	66	100.00
69	Adhwara Group	Kamtaul	Bihar	49.00	50.00	52.99	12/08/1987	51.48	30-Sep-11	81	81	100.00
70	Adhwara Group	Ekmighat	Bihar	45.94	46.94	49.52	12/07/2004	48.21	04-Oct-11	71	71	100.00
71	Kamla Balan	Jhanjharpur	Bihar	49.00	50.00	53.01	10/07/2004	51.43	27-Sep-11	88	88	100.00
72	Kosi	Basua	Bihar	46.75	47.75	49.17	25/08/2010	48.67	18-Aug-11	231	231	100.00
73	Kosi	Baltara	Bihar	32.85	33.85	36.40	15/08/1987	35.27	22-Aug-11	107	107	100.00
74	Kosi	Kursela	Bihar	29.00	30.00	32.04	06/09/1998	31.30	19-Aug-11	83	83	100.00
75	Mahananda	Dhengraghat	Bihar	34.65	35.65	38.09	1968	36.60	31-Jul-11	60	60	100.00
76	Mahananda	Jhawa	Bihar	30.40	31.40	33.51	14/08/1987	32.30	19-Aug-11	113	113	100.00
77	Mayurakshi	Massanjore Dam	Jharkhand		121.31	122.87	25/09/1999	119.82	05-Oct-11	7	7	100.00
78	Mayurakshi	Tilpara Barrage	West Bengal		62.79	67.05	27/09/1978	62.79	12-Oct-11	10	10	100.00
79	Mayurakshi	Narayanpur	West Bengal	26.99	27.99	29.69	27/09/1995	24.95	09-Aug-11	0	0	
80	Ajoy	Gheropara	West Bengal	38.42	39.42	43.94	27/09/1978	38.97	09-Aug-11	4	2	50.00
81	Damodar	Tenughat Dam	Jharkhand		268.83	265.56	17/09/1985	263.03	12-Aug-11	61	61	100.00
82	Damodar	Panchet Dam	Jharkhand		132.59	132.89	02/10/1959	128.63	12-Aug-11	87	87	100.00
83	Damodar	Durgapur Barrage	West Bengal		64.47	64.47	31/10/2002	64.47		81	81	100.00
84	Barakar	Maithon Dam	Jharkhand		150.88	151.79	02/10/1959	148.49	17-Aug-11	57	56	98.25
85	Mundeshwari	Harinkhola	West Bengal	11.80	12.80	14.58	29/09/1978	12.72	14-Aug-11	12	12	100.00
86	Kangsabati	Kangsabati Dam	West Bengal		134.11	134.71	02/09/1978	133.17	10-Sep-11	47	47	100.00
87	Kangsabati	Mohanpur	West Bengal	24.73	25.73	29.87	02/09/1978	25.00	19-Jun-11	1	1	100.00

Basinwise -Riverwise- Flood Forecasting Information in India during Flood Season 2011												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2011				
						Level (m)	Date/ Month/ Year	Level (m)	Date (DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9.00	10	11	12	13
	Brahmaputra Basin											
88	Brahmaputra	Dibrugrah	Assam	104.70	105.70	106.48	03/09/1998	105.53	20-Jul-11	173	173	100.00
89	Brahmaputra	Neamatighat	Assam	84.04	85.04	87.37	11/07/1991	85.90	20-Jul-11	107	107	100.00
90	Brahmaputra	Tezpur	Assam	64.23	65.23	66.59	27/08/1988	65.45	21-Jul-11	47	47	100.00
91	Brahmaputra	Guwahati	Assam	48.68	49.68	51.46	21/07/2004	49.39	22-Jul-11	28	28	100.00
92	Brahmaputra	Goalpara	Assam	35.27	36.27	37.43	31/07/1954	36.01	23-Jul-11	42	42	100.00
93	Brahmaputra	Dhubri	Assam	27.62	28.62	30.36	28/08/1988	29.02	24-Jul-11	114	114	100.00
94	Burhidihing	Naharkatia	Assam	119.40	120.40	122.69	17/06/1973	118.48	02-Jul-11	0	0	
95	Burhidihing	Khowang	Assam	101.11	102.11	103.92	25/08/1988	101.97	08-Jul-11	12	12	100.00
96	Desang	Nanglamoraghat	Assam	93.46	94.46	96.49	06/09/1998	94.97	30-Jul-11	32	31	96.88
97	Dikhow	Shivsagar	Assam	91.40	92.40	95.62	08/07/1974	92.74	24-Jul-11	63	63	100.00
98	Subansiri	Badatighat	Assam	81.53	82.53	86.84	28/06/1972	82.50	20-Jul-11	26	26	100.00
99	Dhansiri (S)	Golaghat	Assam	88.50	89.50	91.30	11/10/1986	90.27	25-Aug-11	60	59	98.33
100	Dhansiri (S)	Numaligarh	Assam	76.42	77.42	79.87	24/09/1985	79.35	25-Aug-11	233	233	100.00
101	Jiabharali	Jiabharali_NTX	Assam	76.00	77.00	78.50	26/07/2007	77.85	18-Jul-11	266	263	98.87
102	Kopilli	Kampur	Assam	59.50	60.50	61.86	16/06/1973	60.31	04-Jul-11	2	2	100.00
103	Kopilli	Dharmatul	Assam	55.00	56.00	58.09	21/07/2004	55.02	04-Jul-11	3	3	100.00
104	Puthimari	Puthimari _NHX	Assam	50.81	51.81	55.08	31/08/2008	52.22	24-Aug-11	182	173	95.05
105	Pagladiya	Pagladia_NTX	Assam	51.75	52.75	55.45	08/07/2004	52.05	23-Jul-11	4	4	100.00
106	Beki	Beki Rd Bridge	Assam	44.10	45.10	46.20	04/08/2000	45.71	20-Jul-11	2	2	100.00
107	Manas	Manas NHX	Assam	47.81	48.42	50.08	15/09/1984	47.85	15-Jul-11	173	173	100.00
108	Sankosh	Golakganj	Assam	28.94	29.94	30.95	08/09/2007	29.95	18-Aug-11	98	98	100.00
109	Raidak-I	Tufanganj	West Bengal	34.22	35.30	36.36	21/07/1993	34.61	20-Jul-11	5	4	80.00
110	Torsa	Ghughumari	West Bengal	39.80	40.41	41.46	03/08/2000	39.92	01-Jul-11	1	1	100.00
111	Jaldhaka	NH-31	West Bengal	80.00	80.90	81.33	28/08/1972	80.12	18-Sep-11	5	5	100.00
112	Jaldhaka	Mathabhanga	West Bengal	47.70	48.20	49.85	07/09/2007	47.40	01-Jul-11	0	0	
113	Tista	Domohani	West Bengal	85.65	85.95	89.30	14/10/1968	86.23	18-Sep-11	161	158	98.14
114	Tista	Mekhliganj	West Bengal	65.45	65.95	66.45	13/07/1996	65.44	19-Sep-11	0	0	
	Barak & Meghna Basins											
115	Barak	APGhat	Assam	18.83	19.83	21.84	01/08/1989	19.31	26-Aug-11	10	10	100.00
116	Katakhal	Matizuri	Assam	19.27	20.27	22.73	10/09/2007	20.41	25-Aug-11	19	19	100.00
117	Kushiyara	Karimganj	Assam	13.94	14.94	16.57	10/06/2010	15.56	26-Aug-11	37	37	100.00
118	Manu	Kailashar	Tripura	24.34	25.34	25.79	07/06/1993	24.28	07-Jun-11	0	0	
119	Gumti	Sonamura	Tripura	11.50	12.50	14.42	23/07/1993	11.16	01-Jul-11	0	0	

Basinwise -Riverwise- Flood Forecasting Information in India during Flood Season 2011												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2011				
						Level (m)	Date/ Month/ Year	Level (m)	Date (DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9.00	10	11	12	13
	Eastern Rivers (Excluding Mahanadi)											
120	Subernarekna	Rajghat	Odisha	9.45	10.36	12.69	19/06/2008	11.74	24-Sep-11	27	26	96.30
121	Burhabalang	NH_5 _Road Bridge	Odisha	7.21	8.13	9.50	12/10/1973	8.14	23-Sep-11	10	10	100.00
122	Baitarni	Anandpur	Odisha	37.44	38.36	41.20	19/08/1975	41.35	23-Sep-11	19	15	78.95
123	Baitarni	Akhuapada	Odisha	17.83	17.83	21.95	16/08/1960	20.85	23-Sep-11	14	14	100.00
124	Brahmani	Jenapur	Odisha	22.00	23.00	24.78	20/08/1975	23.88	26-Sep-11	17	17	100.00
125	Rushikuluya	Purushottampur	Odisha	15.83	16.83	19.65	04/11/1990	15.38	01-Sep-11	0	0	
126	Vamsadhara	Gunupur	Odisha	83.00	84.00	88.75	17/09/1980	82.82	01-Sep-11	0	0	
127	Vamsadhara	Kashinagar	Odisha	53.60	54.60	58.93	18/09/1980	54.80	02-Sep-11	40	39	97.50
128	Vamsadhara	Gotta Barrage	Andhra Pradesh		34.84	39.92	07/10/1999			2	2	100.00
	Mahanadi Basin											
129	Mahanadi	Hirakud Dam	Odisha		192.02	192.30	30/01/1998	192.02	29-Sep-11	60	60	100.00
130	Mahanadi	Naraj	Odisha	25.41	26.41	27.61	31/08/1982	27.55	11-Sep-11	20	19	95.00
131	Mahanadi	Alipingal Devi	Odisha	10.85	11.76	13.05	20/09/2008	13.11	11-Sep-11	10	10	100.00
132	Mahanadi	Nimapara	Odisha	9.85	10.76	11.60	31/08/1982	11.22	10-Sep-11	10	8	80.00
	Godavari Basin											
133	Godavari	Kopergaon	Maharashtra	490.90	493.68	499.17	1969	490.45	30-Aug-11	0	0	
134	Godavari	Jaikwadi Dam	Maharashtra		463.91	464.69	12/10/1990	461.70	23-Sep-11	0	0	
135	Godavari	Gangakhed	Maharashtra	374.00	375.00	377.57	1947	366.52	26-Aug-11	0	0	
136	Godavari	Nanded	Maharashtra	353.00	354.00	357.10	06/08/2006	344.50	26-Aug-11	0	0	
137	Godavari	Sriram Sagar	Andhra Pradesh		332.54	332.72	13/10/1990	332.54	30-Aug-11	14	13	92.86
138	Godavari	Kaleswaram	Andhra Pradesh	103.50	104.75	107.05	15/08/1986	101.06	09-Sep-11	0	0	
139	Godavari	Eturunagaram	Andhra Pradesh	73.29	75.79	77.66	24/08/1990	73.14	02-Sep-11	0	0	
140	Godavari	Dummagudam	Andhra Pradesh	53.00	55.00	60.25	16/08/1986	52.04	02-Sep-11	0	0	
141	Godavari	Bhadrachalam	Andhra Pradesh	45.72	48.77	55.66	16/08/1986	45.81	02-Sep-11	3	3	100.00
142	Godavari	Kunavaram	Andhra Pradesh	37.74	39.24	51.30	16/08/1986	35.98	03-Sep-11	0	0	
143	Godavari	Rajamundry	Andhra Pradesh	17.68	19.51	20.48	16/08/1986	16.08	03-Sep-11	0	0	
144	Godavari	Dowalaiswaram	Andhra Pradesh	14.25	16.08	18.36	16/08/1986	14.23	30-Jul-11	0	0	
145	Wardha	Balharsha	Maharashtra	171.50	174.00	176.00	15/08/1986	168.57	02-Sep-11	0	0	
146	Wainganga	Bhandara	Maharashtra	244.00	244.50	250.90	16/09/2005	243.98	08-Sep-11	0	0	
147	Wainganga	Pauni	Maharashtra	226.73	227.73	232.35	07/09/1994	226.55	07-Sep-11	0	0	
148	Manjira	Singur Dam	Andhra Pradesh		523.60	523.60	15/10/1999	523.60	17-Sep-11	3	3	100.00
149	Manjira	Nizamsagar Dam	Andhra Pradesh		428.24	428.24	15/10/1999	428.24	02-Sep-11	1	1	100.00
150	Indravati	Jagdalpur	Chhatisgarh	539.50	540.80	544.68	09/07/1973	539.47	02-Sep-11	1	1	100.00

Basinwise -Riverwise- Flood Forecasting Information in India during Flood Season 2011												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2011		No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
						Level (m)	Date/ Month/ Year	Level (m)	Date (DD/MM/YY)			
1	2	3	4	5	6	7	8	9.00	10	11	12	13
	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	15-Sep-11	38	34	89.47
153	Krishna	Narayanpur Dam	Karnataka		492.25	492.22	26/09/2008	492.20	16-Oct-11	71	66	92.96
154	Krishna	Priyadarshini	Andhra Pradesh		318.52	318.20	02/10/2009	318.30	15-Oct-11	81	79	97.53
155	Krishna	Srisailam Dam	Andhra Pradesh		269.75	273.25	03/10/2009	269.65	10-Sep-11	91	84	92.31
156	Krishna	Prakasham Barrage	Andhra Pradesh		18.30	21.50	07/10/1903	17.57	10-Sep-11	42	36	85.71
157	Bhima	Deongaon	Karnataka	402.00	404.50	407.34	13/08/2006	403.39	07-Sep-11	5	4	80.00
158	Tungbhadra	Tungabhadra Dam	Karnataka		497.74	497.74	05/10/1992	497.74	01-Sep-11	133	126	94.74
159	Tungbhadra	Mantralayam	Andhra Pradesh	310.00	312.00	318.77	02/10/2009	311.25	04-Sep-11	7	7	100.00
	Southern River System:											
160	Pennar	Nellore	Andhra Pradesh	15.91	17.28	18.70	30/11/1882	13.60	28-Aug-11	0	0	
	Western River Systems:											
161	Banas	Dantiwada Dam	Gujarat		182.88	186.04	01/09/1973	184.10	01-Oct-11	8	8	100.00
162	Sabarmati	Dharoi Dam	Gujarat		187.45	189.63	03/09/1990	189.59	12-Oct-11	12	11	91.67
163	Sabarmati	Ahmedabad	Gujarat	44.09	45.34	47.45	19/08/2006	43.55	13-Sep-11	0	0	
164	Mahi	Kadana Dam	Gujarat		126.19	127.74	09/09/1989	127.71	26-Sep-11	13	13	100.00
165	Mahi	Wanakbori	Gujarat	71.00	72.54	76.10	12/08/2006	72.16	12-Sep-11	5	4	80.00
166	Naramada	Mandla	Madhya Pradesh	437.20	437.80	439.41	18/08/1974	437.86	07-Sep-11	7	7	100.00
167	Naramada	Hoshangabad	Madhya Pradesh	292.83	293.83	300.90	30/08/1973	291.10	09-Sep-11	0	0	
168	Naramada	Garudeswar	Gujarat	30.48	31.09	41.65	06/09/1970	25.60	28-Aug-11	0	0	
169	Naramada	Bharuch	Gujarat	6.71	7.31	12.65	07/09/1970	7.50	28-Aug-11	4	4	100.00
170	Tapi	Hatnur Dam	Maharashtra		212.02	214.00	12/10/1989	214.00	08-Oct-11	82	82	100.00
171	Tapi	Ukai Dam	Gujarat		102.41	105.51	08/10/1990	104.34	25-Sep-11	44	44	100.00
172	Tapi	Surat	Gujarat	8.50	9.50	12.50	09/08/2006	7.10	29-Aug-11	0	0	
173	Damanganga	Madhuban Dam	Gujarat		79.86	80.60	27/09/1993	97.70	15-Oct-11	12	12	100.00
174	Damanganga	Vapi Town	Gujarat	18.20	19.20	23.76	03/08/2004	18.10	28-Aug-11	1	1	100.00
175	Damanganga	Daman	Dadra & Nagar Haveli	2.60	3.40	4.00	03/08/2004	2.00	31-Jul-11	0	0	
								Total Forecasts		***5991***	***5904***	**98.55**
								Level Forecasts		**4848**	**4795**	**98.91**
								Inflow Forecast		**1143**	**1109**	**97.03**

Statewise Flood Forecasting Information In India during Flood Season 2011

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2011		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	9.00	10	11	12	13.00
	Andhra Pradesh										
1	Vamsadhara	Gotta Barrage	FRL34.84	MWL47.4	39.92	07/10/1999			2	2	100.00
2	Godavari	Sriram Sagar	332.54		332.72	13/10/1990	332.54	30-Aug-11	14	13	92.86
3	Godavari	Kaleswaram	103.5	104.75	107.05	15/08/1986	101.06	09-Sep-11	0	0	
4	Godavari	Eturunagaram	73.29	75.79	77.66	24/08/1990	73.14	02-Sep-11	0	0	
5	Godavari	Dummagudam	53	55.00	60.25	16/08/1986	52.04	02-Sep-11	0	0	
6	Godavari	Bhadrachalam	45.72	48.77	55.66	16/08/1986	45.81	02-Sep-11	3	3	100.00
7	Godavari	Kunavaram	37.74	39.24	51.30	16/08/1986	35.98	03-Sep-11	0	0	
8	Godavari	Rajamundri	17.68	19.51	20.48	16/08/1986	16.08	03-Sep-11	0	0	
9	Godavari	Dowalaiswaram	14.25	16.08	18.36	16/08/1986	14.23	30-Jul-11	0	0	
10	Manjira	Singur Dam		523.60	523.60	15/10/1999	523.60	17-Sep-11	3	3	100.00
11	Manjira	Nizamsagar Dam		428.24	428.24	15/10/1999	428.24	02-Sep-11	1	1	100.00
12	Krishna	Priyadarshini		318.52	318.20	02/10/2009	318.30	15-Oct-11	81	79	97.53
13	Krishna	Srisailam Dam		269.75	273.25	03/10/2009	269.65	10-Sep-11	91	84	92.31
14	Krishna	Prakasham Barrage		18.30	21.50	07/10/1903	17.57	10-Sep-11	42	36	85.71
15	Tungbhadra	Mantralayam	310	312.00	318.77	02/10/2009	311.25	04-Sep-11	7	7	100.00
16	Pennar	Nellore	15.91	17.28	18.70	30/11/1882	13.60	28-Aug-11	0	0	
	Assam										
17	Brahmaputra	Dibrugrah	104.7	105.70	106.48	03/09/1998	105.53	20-Jul-11	173	173	100.00
18	Brahmaputra	Neamatighat	84.04	85.04	87.37	11/07/1991	85.90	20-Jul-11	107	107	100.00
19	Brahmaputra	Tezpur	64.23	65.23	66.59	27/08/1988	65.45	21-Jul-11	47	47	100.00
20	Brahmaputra	Guwahati	48.68	49.68	51.46	21/07/2004	49.39	22-Jul-11	28	28	100.00
21	Brahmaputra	Goalpara	35.27	36.27	37.43	31/07/1954	36.01	23-Jul-11	42	42	100.00
22	Brahmaputra	Dhubri	27.62	28.62	30.36	28/08/1988	29.02	24-Jul-11	114	114	100.00
23	Burhidihing	Naharkatia	119.4	120.40	122.69	17/06/1973	118.48	02-Jul-11	0	0	
24	Burhidihing	Khowang	101.11	102.11	103.92	25/08/1988	101.97	08-Jul-11	12	12	100.00
25	Desang	Nanglamoraghat	93.46	94.46	96.49	06/09/1998	94.97	30-Jul-11	32	31	96.88
26	Dikhow	Shivsagar	91.4	92.40	95.62	08/07/1974	92.74	24-Jul-11	63	63	100.00
27	Subansiri	Badatighat	81.53	82.53	86.84	28/06/1972	82.50	20-Jul-11	26	26	100.00
28	Dhansiri (S)	Golaghat	88.5	89.50	91.30	11/10/1986	90.27	25-Aug-11	60	59	98.33
29	Dhansiri (S)	Numaligarh	76.42	77.42	79.87	24/09/1985	79.35	25-Aug-11	233	233	100.00
30	Jiabharali	Jiabharali_NTX	76	77.00	78.50	26/07/2007	77.85	18-Jul-11	266	263	98.87
31	Kopilli	Kampur	59.5	60.50	61.86	16/06/1973	60.31	04-Jul-11	2	2	100.00
32	Kopilli	Dharmatul	55	56.00	58.09	21/07/2004	55.02	04-Jul-11	3	3	100.00
33	Puthimari	Puthimari _NHX	50.81	51.81	55.08	31/08/2008	52.22	24-Aug-11	182	173	95.05
34	Pagladiya	Pagladia_NTX	51.75	52.75	55.45	08/07/2004	52.05	23-Jul-11	4	4	100.00
35	Beki	Beki NHX	44.1	45.10	46.20	04/08/2000	45.71	20-Jul-11	2	2	100.00
36	Manas	Manas NHX	47.81	48.42	50.08	15/09/1984	47.85	15-Jul-11	173	173	100.00
37	Sankosh	Golakganj	28.94	29.94	30.95	08/09/2007	29.95	18-Aug-11	98	98	100.00
38	Barak	APGhat	18.83	19.83	21.84	01/08/1989	19.31	26-Aug-11	10	10	100.00
39	Katakhal	Matizuri	19.27	20.27	22.73	10/09/2007	20.41	25-Aug-11	19	19	100.00
40	Kushiyara	Karimganj	13.94	14.94	16.57	10/06/2010	15.56	26-Aug-11	37	37	100.00

Statewise Flood Forecasting Information In India during Flood Season 2011

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2011				
					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	9.00	10	11	12	13.00
	Bihar										
41	Ganga	Buxar	59.32	60.32	62.09	1948	60.46	14-Aug-11	12	12	100.00
42	Ganga	Patna	49.45	50.45	52.52	23/08/1975	50.44	15-Aug-11	35	35	100.00
43	Ganga	Patna Dighaghat	47.6	48.60	50.27	14/08/1994	49.48	15-Aug-11	76	76	100.00
44	Ganga	Hathidah	40.76	41.76	43.15	07/08/1971	42.67	17-Aug-11	74	74	100.00
45	Ganga	Munger	38.33	39.33	40.99	19/09/1976	39.00	17-Aug-11	26	26	100.00
46	Ganga	Bhagalpur	32.68	33.68	34.20	17/09/2003	34.17	18-Aug-11	64	64	100.00
47	Ganga	Kahalgaon	30.09	31.09	32.87	17/09/2003	32.22	19-Aug-11	82	82	100.00
48	Ghaghra	Darauli	59.82	60.82	61.74	29/08/1998	60.85	25-Aug-11	60	60	100.00
49	Ghaghra	Gangpur Siswan	56.04	57.04	58.01	18/09/1983	57.66	26-Aug-11	55	55	100.00
50	Ghaghra	Chhapra	52.68	53.68	54.59	03/09/1982	52.74	15-Aug-11	4	4	100.00
51	Sone	Inderpuri	107.2	108.20	108.85	23/08/1975	107.88	25-Sep-11	3	2	66.67
52	Sone	Koelwar	54.52	55.52	58.88	20/07/1971	56.75	25-Sep-11	5	3	60.00
53	Sone	Maner	51	52.00	53.79	10/09/1976	53.28	26-Sep-11	73	73	100.00
54	PunPun	Sripalpur	49.6	50.60	53.91	18/09/1976	53.36	28-Sep-11	38	38	100.00
55	Gandak	Chatia	68.15	69.15	70.04	26/07/2002	67.73	04-Jul-11	0	0	
56	Gandak	Rewaghat	53.41	54.41	55.41	17/09/1986	53.88	04-Jul-11	47	47	100.00
57	Gandak	Hazipur	49.32	50.32	50.93	1948	50.00	26-Sep-11	17	17	100.00
58	Burhi Gandak	Lalbeghiaghat	62.2	63.20	67.09	30/07/1975	61.73	28-Aug-11	0	0	
59	Burhi Gandak	Muzaffarpur	51.53	52.53	54.29	15/08/1987	51.91	29-Sep-11	5	5	100.00
60	Burhi Gandak	Samastipur	45.02	46.02	49.38	15/08/1987	46.49	01-Oct-11	18	18	100.00
61	Burhi Gandak	Rosera	41.63	42.63	46.35	16/08/1987	42.90	01-Oct-11	16	16	100.00
62	Burhi Gandak	Khagaria	35.58	36.58	39.22	1976	37.78	18-Aug-11	72	72	100.00
63	Bagmati	Benibad	47.68	48.68	50.01	12/07/2004	49.68	30-Sep-11	112	112	100.00
64	Bagmati	Hayaghat	44.72	45.72	48.96	14/08/1987	47.25	04-Oct-11	66	66	100.00
65	Adhwara Group	Kamtaul	49	50.00	52.99	12/08/1987	51.48	30-Sep-11	81	81	100.00
66	Adhwara Group	Ekmighat	45.94	46.94	49.52	12/07/2004	48.21	04-Oct-11	71	71	100.00
67	Kamla Balan	Jhanjharpur	49	50.00	53.01	10/07/2004	51.43	27-Sep-11	88	88	100.00
68	Kosi	Basua	46.75	47.75	49.17	25/08/2010	48.67	18-Aug-11	231	231	100.00
69	Kosi	Baltara	32.85	33.85	36.40	15/08/1987	35.27	22-Aug-11	107	107	100.00
70	Kosi	Kursela	29	30.00	32.04	06/09/1998	31.30	19-Aug-11	83	83	100.00
71	Mahananda	Dhengraghat	34.65	35.65	38.09	1968	36.60	31-Jul-11	60	60	100.00
72	Mahananda	Jhawa	30.4	31.40	33.51	14/08/1987	32.30	19-Aug-11	113	113	100.00
	Chhatisgarh										
73	Indravati	Jagdalpur	539.5	540.80	544.68	09/07/1973	539.47	02-Sep-11	1	1	100.00
	Dadra & Nagar Haveli										
74	Damanganga	Daman	2.6	3.40	4.00	03/08/2004	2.00	31-Jul-11	0	0	

Statewise Flood Forecasting Information In India during Flood Season 2011

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2011		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	9.00	10	11	12	13.00
	Gujarat										
75	Banas	Dantiwada Dam		182.88	186.04	01/09/1973	184.10	01-Oct-11	8	8	100.00
76	Sabarmati	Dharoi Dam		187.45	189.63	03/09/1990	189.59	12-Oct-11	12	11	91.67
77	Sabarmati	Ahmedabad	44.09	45.34	47.45	19/08/2006	43.55	13-Sep-11	0	0	
78	Mahi	Kadana Dam		126.19	127.74	09/09/1989	127.71	26-Sep-11	13	13	100.00
79	Mahi	Wanakbori	71	72.54	76.10	12/08/2006	72.16	12-Sep-11	5	4	80.00
80	Naramada	Garudeswar	30.48	31.09	41.65	06/09/1970	25.60	28-Aug-11	0	0	
81	Naramada	Bharuch	6.71	7.31	12.65	07/09/1970	7.50	28-Aug-11	4	4	100.00
82	Tapi	Ukai Dam		102.41	105.51	08/10/1990	104.34	25-Sep-11	44	44	100.00
83	Tapi	Surat	8.5	9.50	12.50	09/08/2006	7.10	29-Aug-11	0	0	
84	Damanganga	Madhuban Dam		79.86	80.60	27/09/1993	97.70	15-Oct-11	12	12	100.00
85	Damanganga	Vapi Town	18.2	19.20	23.76	03/08/2004	18.10	28-Aug-11	1	1	100.00
	Haryana										
86	Yamuna	Tajewala Weir		PL=323.70	328.27	03/09/1978			0	0	
	Jharkhand										
87	Ganga	Sahibgunj	26.25	27.25	30.91	1998	28.65	21-Aug-11	92	92	100.00
88	Mayurakshi	Massanjore Dam		121.31	122.87	25/09/1999	119.82	05-Oct-11	7	7	100.00
89	Damodar	Tenughat Dam		268.83	265.56	17/09/1985	263.03	12-Aug-11	61	61	100.00
90	Damodar	Panchet Dam		132.59	132.89	02/10/1959	128.63	12-Aug-11	87	87	100.00
91	Barakar	Maithon Dam		150.88	151.79	02/10/1959	148.49	17-Aug-11	57	56	98.25
	Karnataka										
92	Krishna	Alamati Dam		519.60	519.60	18/09/2002	519.60	15-Sep-11	38	34	89.47
93	Krishna	Narayanpur Dam		492.25	492.22	26/09/2008	492.20	16-Oct-11	71	66	92.96
94	Bhima	Deongaon	402	404.50	407.34	13/08/2006	403.39	07-Sep-11	5	4	80.00
95	Tungbhadra	Tungabhadra Dam		497.74	497.74	05/10/1992	497.74	01-Sep-11	133	126	94.74
	Madhya Pradesh										
96	Chambal	Gandhisagar Dam							8	8	100.00
97	Naramada	Mandla	437.2	437.80	439.41	18/08/1974	437.86	07-Sep-11	7	7	100.00
98	Naramada	Hoshangabad	292.83	293.83	300.90	30/08/1973	291.10	09-Sep-11	0	0	
	Maharashtra										
99	Godavari	Kopergaon	490.9	493.68	499.17	1969	490.45	30-Aug-11	0	0	
100	Godavari	Jaikwadi Dam		463.91	464.69	12/10/1990	461.70	23-Sep-11	0	0	
101	Godavari	Gangakhed	374	375.00	377.57	1947	366.52	26-Aug-11	0	0	
102	Godavari	Nanded	353	354.00	357.10	06/08/2006	344.50	26-Aug-11	0	0	
103	Wardha	Balharsha	171.5	174.00	176.00	15/08/1986	168.57	02-Sep-11	0	0	
104	Wainganga	Bhandara	244	244.50	250.90	16/09/2005	243.98	08-Sep-11	0	0	
105	Wainganga	Pauni	226.73	227.73	232.35	07/09/1994	226.55	07-Sep-11	0	0	
106	Krishna	Arjunward	542.07	543.29	543.69	05/08/2005			0	0	
107	Tapi	Hatnur Dam		212.02	214.00	12/10/1989	214.00	08-Oct-11	82	82	100.00
	NCT Delhi										
108	Yamuna	Delhi Rly Bridge	204	204.83	207.49	06/09/1978	205.72	19-Aug-11	15	15	100.00
109	Sahibi	Dhansa	211.44	212.44	213.58	06/08/1977	209.80	11-Sep-11	0	0	

Statewise Flood Forecasting Information In India during Flood Season 2011

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2011				
					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	9.00	10	11	12	13.00
	Odisha										
110	Subernarekna	Rajghat	9.45	10.36	12.69	19/06/2008	11.74	24-Sep-11	27	26	96.30
111	Burhabalang	NH_5 _Road Bridge	7.21	8.13	9.50	12/10/1973	8.14	23-Sep-11	10	10	100.00
112	Baitarni	Anandpur	37.44	38.36	41.20	19/08/1975	41.35	23-Sep-11	19	15	78.95
113	Baitarni	Akhuapada	17.83	17.83	21.95	16/08/1960	20.85	23-Sep-11	14	14	100.00
114	Brahmani	Jenapur	22	23.00	24.78	20/08/1975	23.88	26-Sep-11	17	17	100.00
115	Rushikuluya	Purushottampur	15.83	16.83	19.65	04/11/1990	15.38	01-Sep-11	0	0	
116	Vamsadhara	Gunupur	83	84.00	88.75	17/09/1980	82.82	01-Sep-11	0	0	
117	Vamsadhara	Kashinagar	53.6	54.60	58.93	18/09/1980	54.80	02-Sep-11	40	39	97.50
118	Mahanadi	Hirakud Dam		192.02	192.30	30/01/1998	192.02	29-Sep-11	60	60	100.00
119	Mahanadi	Naraj	25.41	26.41	27.61	31/08/1982	27.55	11-Sep-11	20	19	95.00
120	Mahanadi	Alipingal Devi	10.85	11.76	13.05	20/09/2008	13.11	11-Sep-11	10	10	100.00
121	Mahanadi	Nimapara	9.85	10.76	11.60	31/08/1982	11.22	10-Sep-11	10	8	80.00
	Tripura										
122	Manu	Kailashar	24.34	25.34	25.79	07/06/1993	24.28	07-Jun-11	0	0	
123	Gumti	Sonamura	11.5	12.50	14.42	23/07/1993	11.16	01-Jul-11	0	0	
	Uttar Pradesh										
124	Ganga	Narora Barrage		PL= 180.79 at D/S	180.61	23/09/2010	179.71	19-Aug-11	78	78	100.00
125	Ganga	Kannauj	124.97	125.97	126.78	27/09/2010	126.57	25-Aug-11	16	16	100.00
126	Ganga	Ankinghat	123	124.00	124.49	28/09/2010	124.17	24-Aug-11	25	24	96.00
127	Ganga	Kanpur	112	114.00	114.08	29/09/2010	113.75	26-Aug-11	29	29	100.00
128	Ganga	Dalmau	98.36	99.36	99.84	03/08/1973	99.51	28-Aug-11	13	13	100.00
129	Ganga	Phphamau	83.73	84.73	87.98	08/09/1978	83.24	12-Aug-11	0	0	
130	Ganga	Allahabad	83.73	84.73	88.03	08/09/1978	82.38	12-Aug-11	0	0	
131	Ganga	Mirzapur	76.72	77.72	80.34	09/09/1978	75.81	13-Aug-11	0	0	
132	Ganga	Varanasi	70.26	71.26	73.90	09/09/1978	70.30	13-Aug-11	1	1	100.00
133	Ganga	Ghazipur	62.11	63.11	65.22	09/09/1978	63.85	14-Aug-11	24	24	100.00
134	Ganga	Ballia	56.62	57.62	60.25	14/09/2003	59.43	14-Aug-11	71	70	98.59
135	Ramganga	Moradabad	189.6	190.60	192.88	21/09/2010	191.46	18-Aug-11	19	19	100.00
136	Ramganga	Bareilly	162.07	163.07	162.88	06/8/1978	162.40	19-Aug-11	3	3	100.00
137	Yamuna	Mawi	230	230.85	232.45	26/09/1988	231.56	17-Aug-11	30	28	93.33
138	Yamuna	Mathura	164.2	165.20	169.73	08/09/1978	165.91	11-Sep-11	56	56	100.00
139	Yamuna	Agra	151.4	152.40	154.76	09/09/1978	150.71	22-Aug-11	0	0	
140	Yamuna	Etawa	120.92	121.92	126.13	11/09/1978	120.35	23-Aug-11	0	0	
141	Yamuna	Auraiya	112	113.00	118.19	25/08/1996	111.86	11-Aug-11	0	0	
142	Yamuna	Kalpi	107	108.00	112.98	25/08/1996	106.96	11-Aug-11	0	0	
143	Yamuna	Hamirpur	102.63	103.63	108.59	12/09/1983	102.18	11-Aug-11	0	0	
144	Yamuna	Chilaghat	99	100.00	105.16	06/09/1978	98.05	11-Aug-11	0	0	
145	Yamuna	Naini	83.74	84.74	87.99	08/09/1978	83.03	12-Aug-11	0	0	

Statewise Flood Forecasting Information In India during Flood Season 2011

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2011				
					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	9.00	10	11	12	13.00
146	Betwa	Mohana	121.66	122.66	133.69	11/09/1983	122.07	24-Jul-11	1	1	100.00
158	Betwa	Sahjina	103.54	104.54	108.67	12/09/1983	101.87	11-Aug-11	0	0	
147	Ken	Banda	103	104.00	113.29	07/0720/05	106.09	24-Jul-11	10	9	90.00
148	Gomati	Lucknow	108.5	109.50	110.85	10/09/1971	106.24	27-Aug-11	0	0	
149	Gomati	Jaunpur	73.07	74.07	77.74	22/09/1971	71.47	19-Aug-11	0	0	
150	SAI	Raibareli	100	101.00	104.81	17/09/1982	99.99	16-Aug-11	0	0	
151	Ghaghra	Elgin Bridge	105.07	106.07	107.56	10/10/2009	107.12	20-Aug-11	82	79	96.34
152	Ghaghra	Ayodhya	91.73	92.73	94.01	11/10/2009	93.92	22-Aug-11	87	86	98.85
153	Ghaghra	Turtipar	63.01	64.01	66.00	28/08/1998	64.56	24-Aug-11	73	73	100.00
154	Rapti	Balrampur	103.62	104.62	105.25	11/09/2000	103.90	25-Aug-11	9	9	100.00
155	Rapti	Bansi	83.9	84.90	85.82	21/08/1998	83.86	26-Aug-11	0	0	
156	Rapti	Gorakpur Birdghat	73.98	74.98	77.54	23/08/1998	74.14	07-Aug-11	5	5	100.00
157	Gandak	Khadda	95	96.00	97.50	23/07/2002	96.08	02-Jul-11	71	71	100.00
	Uttarakhand										
159	Alaknanda	Srinagar	539	540.00	536.85	05/09/1995	535.44	16-Aug-11	0	0	
160	Ganga	Rishikesh	339.5	340.50	341.72	05/09/1995	341.22	16-Aug-11	13	9	69.23
161	Ganga	Haridwar	293	294.00	296.30	19/09/2010	295.60	16-Aug-11	11	9	81.82
	West Bengal										
162	Ganga	Farakka	21.25	22.25	25.14	07/09/1998	23.96	20-Aug-11	176	172	97.73
163	Mayurakshi	Tilpara Barrage		PL= 62.79	67.05	27/09/1978	62.79	12-Oct-11	10	10	100.00
164	Mayurakshi	Narayanpur	26.99	27.99	29.69	27/09/1995	24.95	09-Aug-11	0	0	
165	Ajoy	Gheropara	38.42	39.42	43.94	27/09/1978	38.97	09-Aug-11	4	2	50.00
166	Damodar	Durgapur Barrage		PL = 64.47	64.47	31/10/2002	64.47		81	81	100.00
167	Mundeshwari	Harinkhola	11.8	12.80	14.58	29/09/1978	12.72	14-Aug-11	12	12	100.00
168	Kangsabati	Kangsabati Dam		FRL=134.11	134.71	02/09/1978	133.17	10-Sep-11	47	47	100.00
169	Kangsabati	Mohanpur	24.73	25.73	29.87	02/09/1978	25.00	19-Jun-11	1	1	100.00
170	Raidak-I	Tufanganj	34.22	35.30	36.36	21/07/1993	34.61	20-Jul-11	5	4	80.00
171	Torsa	Ghughumari	39.8	40.41	41.46	03/08/2000	39.92	01-Jul-11	1	1	100.00
172	Jaldhaka	NH-31	80	80.90	81.33	28/08/1972	80.12	18-Sep-11	5	5	100.00
173	Jaldhaka	Mathabhanga	47.7	48.20	49.85	07/09/2007	47.40	01-Jul-11	0	0	
174	Tista	Domohani	85.65	85.95	89.30	14/10/1968	86.23	18-Sep-11	161	158	98.14
175	Tista	Mekhliganj	65.45	65.95	66.45	13/07/1996	65.44	19-Sep-11	0	0	
							Total Forecasts		***5991***	***5904***	**98.55**
							Level Forecasts		**4848**	**4795**	**98.91**
							Inflow Forecast		**1143**	**1109**	**97.03**

Annex IV

Performance of Flood Forecasting Stations (Divisionwise) in India during Flood Season 2011

Sl. No	Division	Level Forecasts only					Inflow Forecasts only					Total Forecast Stations				
		Stns.	F/c issued for	Total	Within Limit	Accu-racy	Stns.	F/c issued for	Total	Within Limit	Accu-racy	Stns.	F/c issued for	Total	Within Limit	Accuracy
1	Himalayan Ganga Divn, Dehradun	3	2	24	18	75.00	0	0	0	0		3	2	24	18	75.00
2	Middle Ganga Division 1, Lucknow	6	5	256	252	98.44	0	0	0	0		6	5	256	252	98.44
3	Middle Ganga Division 2, Lucknow	8	6	105	104	99.05	1	1	78	78	100.00	9	7	183	182	99.45
4	Middle Ganga Division 3, Varanasi	7	3	96	95	98.96	0	0	0	0		7	3	96	95	98.96
5	Middle Ganga Division 4, Patna	17	15	1194	1194	100.00	0	0	0	0		17	15	1194	1194	100.00
6	Middle Ganga Division 5, Patna	18	18	939	932	99.25	0	0	0	0		18	18	939	932	99.25
7	Upper Yamuna Divn, Delhi	4	3	101	99	98.02	1	0	0	0		5	3	101	99	98.02
8	Chambal Division, Jaipur	0	0	0	0		1	1	8	8		1	1	8	8	100.00
9	Lower Yamuna Divn, Agra	10	2	11	10	90.91	0	0	0	0		10	2	11	10	90.91
10	Damodar Divn, Asansol	4	3	17	15		7	7	350	349	99.71	11	10	367	364	99.18
11	Upper Brahmaputra Divn, Dibrugarh	13	12	1024	1019	99.51	0	0	0	0		13	12	1024	1019	99.51
12	Middle Brahmaputra Divn, Guwahati	9	7	322	313	97.20	0	0	0	0		9	7	322	313	97.20
13	Lower Brahmaputra Divn, Jalpaiguri	10	8	559	555	99.28	0	0	0	0		10	8	559	555	99.28
14	Eastern Rivers Divn, Bhubaneswar	11	9	167	158	94.61	1	1	2	2	100.00	12	10	169	160	94.67
15	Mahanadi Divn, Burla	0	0	0	0		1	1	60	60	100.00	1	1	60	60	100.00
16	Lower Godavari Divn, Hyderabad	14	5	4	4	100.00	4	3	18	17	94.44	18	8	22	21	95.45
17	Lower Krishna Divn, Hyderabad	4	2	12	11	91.67	6	6	456	425	93.20	10	8	468	436	93.16
18	Mahi Divn, Ahmedabad	2	1	5	4	80.00	3	3	33	32	96.97	5	4	38	36	94.74
19	Tapi Divn,Surat	5	2	5	5	100.00	3	3	138	138	100.00	8	5	143	143	100.00
20	Narmada Divn, Bhopal	2	1	7	7	100.00	0	0	0	0		2	1	7	7	
	Total	**147**	**104**	**4848**	**4795**	98.91	**28**	**26**	**1143**	**1109**	97.03	175	130	5991	5904	**98.55**

Performance of Flood Forecasting Stations (Major Basinwise) in India during Flood Season 2011

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	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Ganga and its tributaries	87	77	10	20	19	1	2743	2719	99.13	436	435	99.77	3179	3154	99.21
2	Brahamputra and its tributaries	27	27	0	3	3	0	1839	1821	99.02	0	0		1839	1821	99.02
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	2	2	0	127	121	95.28	2	2	100.00	129	123	95.35
5	Mahanadi and its tributaries	4	3	1	0	0	0	40	37	92.50	60	60	100.00	100	97	97.00
6	Godavari and its tributaries	18	14	4	13	12	1	4	4	100.00	18	17	94.44	22	21	95.45
7	Krishna and its tributaries	9	3	6	2	2	0	12	11	91.67	456	425	93.20	468	436	93.16
8	West Flowing rivers	15	9	6	5	5	0	17	16	94.12	171	170	99.42	188	186	98.94
9	Southern rivers	1	1	0	1	1	0	0	0		0	0		0	0	
	Total	175	147	28	48	46	2	4848	4795	98.91	1143	1109	97.03	5991	5904	98.55

Performance of Flood Forecasting Stations (Statewise) in India during Flood Season 2011

Sl. No	Name of the State	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	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Andhra Pradesh	16	9	7	7	7	0	10	10	100.00	234	218	93.16	244	228	93.44
2	Assam	24	24	0	1	1	0	1733	1719	99.19	0	0		1733	1719	99.19
3	Bihar	32	32	0	2	2	0	1794	1791	99.83	0	0		1794	1791	99.83
4	Chattisgarh	1	1	0	0	0	0	1	1	100.00	0	0		1	1	100.00
5	Gujarat	11	6	5	2	2	0	10	9	90.00	89	88	98.88	99	97	97.98
6	Haryana	1	0	1	1	0	1	0	0		0	0		0	0	
7	Jharkhand	5	1	4	0	0	0	92	92	100.00	212	211	99.53	304	303	99.67
8	Karnataka	4	1	3	0	0	0	5	4	80.00	242	226	93.39	247	230	93.12
9	Madhya Pradesh	3	2	1	1	1	0	7	7	100.00	8	8	100.00	15	15	100.00
10	Maharashtra	9	7	2	8	7	1	0	0		82	82	100.00	82	82	100.00
11	Odisha	12	11	1	2	2	0	167	158	94.61	60	60	100.00	227	218	96.04
12	Tripura	2	2	0	2	2	0	0	0		0	0		0	0	
13	Uttar Pradesh	35	34	1	16	16	0	625	616	98.56	78	78	100.00	703	694	98.72
14	Uttarakhand	3	3	0	1	1	0	24	18	75.00	0	0		24	18	75.00
15	West Bengal	14	11	3	3	3	0	365	355	97.26	138	138	100.00	503	493	98.01
16	NCT, DELHI	2	2	0	1	1	0	15	15	100.00	0	0		15	15	100.00
17	D,NH	1	1	0	1	1	0	0	0		0	0		0	0	
	Total	175	147	28	48	46	2	4848	4795	98.91	1143	1109	97.03	5991	5904	98.55

FLOOD FORECASTING PERFORMANCE FROM 2000 TO 2011									
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**
Average	**5023**	**4898**	**97.51**	**1006**	**966**	**96.02**	**6029**	**5864**	**97.26**

Unprecedented flood events in India under CWC FF & W Network - 2011 flood season										
Sl .No	River	Station	State	Danger level in metres	Existing Highest Flood Level (HFL)		New HFL		Duration	
					Level in metres	Date of occurrence	Level in metres	Date of occurrence	From	To
1	**Baitarni**	**Anandpur**	**Odisha**	**38.36**	**41.20**	**19/08/1975**	**41.35**	**23/09/11 02**	**23/09/11 01**	**23/09/11 05**
2	**Mahanadi**	**Alipingal Devi**	**Odisha**	**11.76**	**13.05**	**20/09/2008**	**13.11**	**11/09/11 12**	**11/09/11 07**	**11/09/11 18**

High Flood Events during Flood Season - 2011

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	**Ganga**	**Kannauj**	**Uttar Pradesh**	**Kannauj**	**125.97**	**126.78**	**27/09/2010**	**23/08/11: 04**	**26/08/11: 19**
2	**Ganga**	**Ankinghat**	**Uttar Pradesh**	**Kanpur**	**124.00**	**124.49**	**28/09/2010**	**22/08/11: 18**	**27/08/11: 13**
3	**Ganga**	**Kanpur**	**Uttar Pradesh**	**Kanpur**	**114.00**	**114.08**	**29/09/2010**	**25/08/11: 04**	**28/08/11: 18**
4	**Ganga**	**Dalmau**	**Uttar Pradesh**	**Rae-Berrily**	**99.36**	**99.84**	**03/08/1973**	**26/08/11: 00**	**30/08/11: 04**
5	**Ganga**	**Hatidah**	**Bihar**	**Patna**	**41.76**	**43.15**	**07/08/1971**	**16/08/11: 14**	**17/08/11: 20**
6	**Ganga**	**Bhagalpur**	**Bihar**	**Bhagalpur**	**33.68**	**34.20**	**17/09/2003**	**15/08/11: 03**	**23/08/11: 09**
7	**Ramganga**	**Bareilly**	**Uttar Pradesh**	**Bareilly**	**163.07**	**162.88**	**06/8/1978**	**19/08/11: 19**	**20/08/11: 14**
8	**Ghaghra**	**Elgin Bridge**	**Uttar Pradesh**	**Barabanki**	**106.07**	**107.56**	**10/10/2009**	**19/08/11: 14**	**21/08/11: 22**
9	**Ghaghra**	**Ayodhya**	**Uttar Pradesh**	**Faizabad**	**92.73**	**94.01**	**11/10/2009**	**19/08/11: 09**	**28/08/11: 19**
10	**Ghaghra**	**Gangpur Siswan**	**Bihar**	**Siwan**	**57.04**	**58.01**	**18/09/1983**	**23/08/11: 07**	**30/08/11: 12**
11	**Beki**	**Beki Rd Bridge**	**Assam**	**Barpeta**	**45.10**	**46.20**	**04/08/2000**	**20/07/11: 16**	**20/07/11: 19**
12	**Mahanadi**	**Naraj**	**Orissa**	**Cuttak**	**26.41**	**27.61**	**31/08/1982**	**10/09/11: 09**	**12/09/11: 16**
13	**Baitarni**	**Anandpur**	**Odisha**	**Anandpur**	**38.36**	**41.20**	**19/08/1975**	**22/09/11: 22**	**23/09/11: 09**
14	**Mahanadi (Devi)**	**Alipingal**	**Orissa**	**Jagatsingpur**	**11.76**	**13.05**	**20/09/2008**	**10/09/11: 19**	**12/09/11: 15**
15	**Mahanadi (Kushabhadra)**	**Nimapara**	**Orissa**	**Puri**	**10.76**	**11.60**	**31/08/1982**	**10/09/11: 19**	**12/09/11: 11**
16	**Bagmati**	**Benibad**	**Bihar**	**Muzzafarpur**	**48.68**	**50.01**	**12/07/2004**	**28/09/11: 18**	**02/10/11: 14**

High Flood Level= HFL-0.50 M

Low and Moderate flood events on main Ganga and its tributaries- 2011 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		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	Rishikesh	Ganga	Uttaranchal	339.5	340.50	341.72	05/09/1995	21/07/11: 12	21/07/11: 15	1			
								08/08/11: 12	08/08/11: 23	1			
								16/08/11: 02	19/08/11: 03	4	16/08/11: 13	17/08/11: 05	2
								19/08/11: 12	19/08/11: 13	1			
								19/08/11: 20	20/08/11: 02	1			
								27/08/11: 01	27/08/11: 01	1			
								27/08/11: 15	27/08/11: 20	1			
2	Haridwar	Ganga	Uttaranchal	293	294.00	296.30	19/09/2010	21/07/11: 13	21/07/11: 17	1			
								08/08/11: 13	10/08/11: 00	2			
								16/08/11: 02	18/08/11: 03	3	16/08/11: 07	17/08/11: 08	2
								27/08/11: 17	27/08/11: 23	1			
3	Kannauj	Ganga	Uttar Pradesh	124.97	125.97	126.78	27/09/2010	18/08/11: 06	29/09/11: 21	44	21/08/11: 16	28/08/11: 06	8
4	Ankinghat	Ganga	Uttar Pradesh	123	124.00	124.49	28/09/2010	02/08/11: 23	03/08/11: 14	2			
								17/08/11: 08	08/09/11: 03	23	22/08/11: 21	27/08/11: 12	6
								20/09/11: 19	21/09/11: 11	2			
5	Kanpur	Ganga	Uttar Pradesh	112	114.00	114.08	29/09/2010	03/08/11: 01	05/08/11: 15	4			
								14/08/11: 20	08/09/11: 00	25			
								20/09/11: 12	22/09/11: 00	3			
6	Dalmau	Ganga	Uttar Pradesh	98.36	99.36	99.84	03/08/1973	19/08/11: 18	02/09/11: 07	15	26/08/11: 02	30/08/11: 03	5
7	Varanasi	Ganga	Uttar Pradesh	70.26	71.26	73.90	09/09/1978	13/08/11: 13	14/08/11: 07	2			
8	Ghazipur	Ganga	Uttar Pradesh	62.11	63.11	65.22	09/09/1978	25/07/11: 21	29/07/11: 10	5			
								10/08/11: 14	17/08/11: 20	8	11/08/11: 19	16/08/11: 00	5
								28/08/11: 03	03/09/11: 12	7			
								10/09/11: 01	12/09/11: 12	3			
								26/09/11: 14	27/09/11: 17	2			
9	Buxar	Ganga	Bihar	59.32	60.32	62.09	1948	26/07/11: 14	29/07/11: 03	4			
								11/08/11: 03	17/08/11: 15	8	13/08/11: 10	15/08/11: 08	3
								31/08/11: 22	02/09/11: 12	3			
								27/09/11: 12	27/09/11: 23	1			
10	Ballia	Ganga	Uttar Pradesh	56.62	57.62	60.25	14/09/2003	04/07/11: 00	07/07/11: 06	4			
								24/07/11: 21	03/08/11: 06	10	26/07/11: 04	31/07/11: 01	6
								06/08/11: 03	01/10/11: 23	58	08/08/11: 11	05/09/11: 22	29
											10/09/11: 03	24/09/11: 06	15
											26/09/11: 03	30/09/11: 05	5

Low and Moderate flood events on main Ganga and its tributaries- 2011 flood season

Annex X

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
11	Dighaghat	Ganga	Bihar	49.45	50.45	52.52	23/08/1975	29/07/11: 02	29/07/11: 11	1			
								09/08/11: 10	02/09/11: 23	26			
								11/09/11: 13	13/09/11: 07	3			
								25/09/11: 14	29/09/11: 21	5			
12	Gandhighat	Ganga	Bihar	47.6	48.60	50.27	14/08/1994	04/07/11: 18	07/07/11: 11	4			
								24/07/11: 18	03/10/11: 12	72	27/07/11: 10	30/07/11: 18	4
											08/08/11: 18	04/09/11: 15	28
13	Hathidah	Ganga	Bihar	40.76	41.76	43.15	07/08/1971	05/07/11: 08	08/07/11: 07	4			
								25/07/11: 15	03/10/11: 12	71	28/07/11: 00	01/08/11: 00	5
											09/08/11: 03	04/09/11: 18	28
											12/09/11: 05	15/09/11: 00	4
											26/09/11: 09	30/09/11: 05	5
14	Munger	Ganga	Bihar	38.33	39.33	40.99	19/09/1976	12/08/11: 17	02/09/11: 10	22			
								26/09/11: 23	29/09/11: 20	4			
15	Bhagalpur	Ganga	Bihar	32.68	33.68	34.20	17/09/2003	27/07/11: 09	07/09/11: 16	43	14/08/11: 23	23/08/11: 15	10
											29/08/11: 19	31/08/11: 18	3
								12/09/11: 12	03/10/11: 02	22			
16	Kahalgaon	Ganga	Bihar	30.09	31.09	32.87	17/09/2003	05/07/11: 05	11/07/11: 07	7			
								22/07/11: 06	05/10/11: 23	77	28/07/11: 08	05/08/11: 18	9
											07/08/11: 12	07/09/11: 22	32
											13/09/11: 11	18/09/11: 15	6
											21/09/11: 07	02/10/11: 12	12
17	Sahibgunj	Ganga	Jharkhand	26.25	27.25	30.91	1998	04/07/11: 17	14/07/11: 07	11	06/07/11: 10	09/07/11: 19	4
								21/07/11: 10	10/10/11: 13	82	27/07/11: 21	08/09/11: 09	44
											13/09/11: 14	06/10/11: 21	24
18	Farakka	Ganga	West Bengal	21.25	22.25	25.14	07/09/1998	05/07/11: 16	14/07/11: 06	10			
								21/07/11: 18	08/10/11: 15	80	27/07/11: 17	09/09/11: 23	45
											13/09/11: 03	05/10/11: 20	23
19	Moradabad	Ramganga	Uttar Pradesh	189.6	190.60	192.88	21/09/2010	16/08/11: 09	03/09/11: 18	19	17/08/11: 02	20/08/11: 12	4
20	Bareilly	Ramganga	Uttar Pradesh	162.07	163.07	162.88	06/8/1978	18/08/11: 17	21/08/11: 17	4			

Low and Moderate flood events on main Ganga and its tributaries- 2011 flood season

Annex X

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
21	Mawi	Yamuna	Uttar Pradesh	230	230.85	232.45	26/09/1988	30/06/11: 08	30/06/11: 17	1			
								16/07/11: 06	17/07/11: 06	2			
								09/08/11: 10	09/08/11: 20	1			
								13/08/11: 12	27/08/11: 03	15	17/08/11: 04	19/08/11: 03	3
											21/08/11: 08	21/08/11: 16	1
								27/08/11: 18	30/08/11: 10	4	28/08/11: 06	28/08/11: 12	1
								02/09/11: 09	03/09/11: 18	2			
								10/09/11: 06	11/09/11: 18	3			
								12/09/11: 17	12/09/11: 22	1			
								16/09/11: 12	17/09/11: 12	2			
22	Delhi Rly Bridge	Yamuna	NCT Delhi	204	204.83	207.49	06/09/1978	16/07/11: 23	17/07/11: 10	1			
								17/08/11: 01	23/08/11: 04	7	17/08/11: 14	20/08/11: 00	3
											21/08/11: 12	22/08/11: 07	2
								23/08/11: 20	24/08/11: 06	1			
								24/08/11: 06	29/08/11: 14	6			
								24/08/11: 16	27/08/11: 01	3			
23	Mathura	Yamuna	Uttar Pradesh	164.2	165.20	169.73	08/09/1978	12/07/11: 21	15/07/11: 02	3			
								18/07/11: 03	21/07/11: 01	4			
								29/07/11: 01	31/07/11: 03	3			
								11/08/11: 12	23/09/11: 17	44	18/08/11: 18	25/08/11: 00	7
											26/08/11: 13	28/08/11: 12	3
											29/08/11: 23	31/08/11: 13	3
24	Mohana	Betwa	Uttar Pradesh	121.66	122.66	133.69	11/09/1983	24/07/11: 11	25/07/11: 01	2			
25	Banda	Ken	Uttar Pradesh	103	104.00	113.29	07/0720/05	23/06/11: 06	24/06/11: 21	3	23/06/11: 12	24/06/11: 17	2
								22/07/11: 18	25/07/11: 18	4			
											22/07/11: 23	25/07/11: 14	4
26	Elgin Bridge	Ghaghra	Uttar Pradesh	105.07	106.07	107.56	10/10/2009	01/07/11: 04	05/07/11: 22	6			
								07/07/11: 04	08/07/11: 23	3			
								09/07/11: 17	13/07/11: 17	5			
								15/07/11: 22	24/09/11: 22	72	17/07/11: 17	19/07/11: 13	3
											23/07/11: 12	31/08/11: 09	40
											10/09/11: 23	11/09/11: 14	2
											16/09/11: 19	18/09/11: 19	3

Low and Moderate flood events on main Ganga and its tributaries- 2011 flood season

Annex X

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
27	Ayodhya	Ghaghra	Uttar Pradesh	91.73	92.73	94.01	11/10/2009	01/07/11: 10	06/07/11: 11	6			
								07/07/11: 13	14/07/11: 23	8			
								16/07/11: 06	27/09/11: 05	74	18/07/11: 06	20/07/11: 18	4
											23/07/11: 18	04/09/11: 22	44
											11/09/11: 10	12/09/11: 20	2
											17/09/11: 04	19/09/11: 18	3
								28/09/11: 01	29/09/11: 00	2			
28	Turtipar	Ghaghra	Uttar Pradesh	63.01	64.01	66.00	28/08/1998	03/07/11: 09	06/07/11: 20	4			
								12/07/11: 11	14/07/11: 12	3			
								18/07/11: 10	08/09/11: 16	53	03/08/11: 23	09/08/11: 19	7
											19/08/11: 01	01/09/11: 06	14
								11/09/11: 23	23/09/11: 21	13			
								25/09/11: 06	26/09/11: 06	2			
29	Darauli	Ghaghra	Bihar	59.82	60.82	58.01	18/09/1983	19/07/11: 14	22/07/11: 06	4			
								25/07/11: 03	08/09/11: 06	46	24/08/11: 22	28/08/11: 18	5
								12/09/11: 02	24/09/11: 03	13			
30	Gangpur Siswan	Ghaghra	Bihar	56.04	57.04	58.01	18/09/1983	26/07/11: 08	08/09/11: 01	45	16/08/11: 16	01/09/11: 21	17
								12/09/11: 12	23/09/11: 06	12			
31	Chhapra	Ghaghra	Bihar	52.68	53.68	54.59	03/09/1982	14/08/11: 22	17/08/11: 03	3			
32	Balrampur	Rapti	Uttar Pradesh	103.62	104.62	105.25	11/09/2000	01/08/11: 17	02/08/11: 11	2			
								05/08/11: 10	07/08/11: 02	3			
								08/08/11: 01	08/08/11: 21	2			
								18/08/11: 20	19/08/11: 14	2			
								24/08/11: 17	26/08/11: 11	3			
33	Birdghat	Rapti	Uttar Pradesh	73.98	74.98	77.54	23/08/1998	07/08/11: 04	09/08/11: 16	4			
								26/08/11: 09	27/08/11: 23	3			
34	Inderpuri	Sone	Bihar	107.2	108.20	108.85	23/08/1975	10/09/11: 23	11/09/11: 18	2			
								25/09/11: 01	25/09/11: 22	2			
35	Koelwar	Sone	Bihar	54.52	55.52	58.88	20/07/1971	11/09/11: 08	12/09/11: 14	2	11/09/11: 09	12/09/11: 07	2
								25/09/11: 03	28/09/11: 00	4	25/09/11: 09	26/09/11: 18	2

Low and Moderate flood events on main Ganga and its tributaries- 2011 flood season

Annex X

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
36	Maner	Sone	Bihar	51	52.00	53.79	10/09/1976	04/07/11: 19	07/07/11: 04	3			
								24/07/11: 18	02/10/11: 05	70	26/07/11: 09	30/07/11: 18	5
											08/08/11: 17	04/09/11: 22	28
											11/09/11: 07	14/09/11: 13	4
											19/09/11: 05	22/09/11: 19	5
											25/09/11: 04	29/09/11: 21	5
37	Sripalpur	PunPun	Bihar	49.6	50.60	53.91	18/09/1976	07/08/11: 09	28/08/11: 09	22	08/08/11: 23	25/08/11: 21	18
								12/09/11: 08	12/09/11: 16	1			
								17/09/11: 08	02/10/11: 22	17	19/09/11: 13	02/10/11: 22	14
38	Khadda	Gandak	Uttar Pradesh	95	96.00	97.50	23/07/2002	25/06/11: 19	26/06/11: 10	2			
								27/06/11: 20	03/07/11: 09	7	02/07/11: 02	02/07/11: 14	2
								03/07/11: 21	07/07/11: 11	5			
								10/07/11: 02	10/07/11: 07	1			
								13/07/11: 14	14/07/11: 03	2			
								14/07/11: 14	18/07/11: 12	5			
								20/07/11: 08	25/07/11: 07	6			
								26/07/11: 01	08/08/11: 12	14			
								08/08/11: 20	09/08/11: 09	2			
								15/08/11: 21	16/08/11: 02	1			
								17/08/11: 07	19/08/11: 02	3			
								19/08/11: 19	20/08/11: 19	2			
								23/08/11: 08	24/08/11: 16	2			
								25/08/11: 21	26/08/11: 09	2			
								19/09/11: 06	20/09/11: 05	2			
39	Rewaghat	Gandak	Bihar	53.41	54.41	55.41	17/09/1986	03/07/11: 08	08/07/11: 12	6			
								22/07/11: 09	26/07/11: 15	5			
								30/07/11: 01	14/08/11: 00	16			
								16/08/11: 10	30/08/11: 18	15			
								20/09/11: 21	23/09/11: 13	4			
								26/09/11: 09	29/09/11: 07	4			
40	Hazipur	Gandak	Bihar	49.32	50.32	50.93	1948	11/08/11: 08	20/08/11: 05	10			
								26/08/11: 00	30/08/11: 18	6			
								26/09/11: 01	29/09/11: 00	4			
41	Muzaffarpur	Burhi Gandak	Bihar	51.53	52.53	54.29	15/08/1987	27/09/11: 11	03/10/11: 06	7			
42	Samastipur	Burhi Gandak	Bihar	45.02	46.02	49.38	15/08/1987	27/08/11: 16	04/09/11: 20	9			
								26/09/11: 16	06/10/11: 22	11	28/09/11: 14	04/10/11: 17	7

Low and Moderate flood events on main Ganga and its tributaries- 2011 flood season

Annex X

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
43	Rosera	Burhi Gandak	Bihar	41.63	42.63	46.35	16/08/1987	29/08/11: 14	04/09/11: 11	7			
								27/09/11: 12	06/10/11: 21	10	29/09/11: 20	04/10/11: 04	5
44	Khagaria	Burhi Gandak	Bihar	35.58	36.58	39.22	1976	07/07/11: 03	09/07/11: 01	3			
								26/07/11: 08	10/09/11: 04	47	29/07/11: 05	02/08/11: 06	5
											10/08/11: 01	06/09/11: 10	28
								11/09/11: 22	05/10/11: 20	25	13/09/11: 07	15/09/11: 21	4
											26/09/11: 12	02/10/11: 11	7
45	Benibad	Bagmati	Bihar	47.68	48.68	50.01	12/07/2004	26/06/11: 09	13/09/11: 04	80	01/07/11: 00	17/07/11: 18	18
											21/07/11: 12	26/07/11: 23	6
											28/07/11: 13	12/08/11: 09	16
											13/08/11: 15	14/08/11: 03	2
											18/08/11: 11	02/09/11: 08	16
								16/09/11: 11	16/10/11: 00	31	18/09/11: 02	11/10/11: 00	24
46	Hayaghat	Bagmati	Bihar	44.72	45.72	48.96	14/08/1987	06/07/11: 23	13/07/11: 11	8			
								24/07/11: 15	16/08/11: 08	24			
								20/08/11: 03	02/09/11: 21	15			
								22/09/11: 13	16/10/11: 00	24	28/09/11: 19	16/10/11: 00	18
47	Kamtaul	Adhwara Group	Bihar	49	50.00	52.99	12/08/1987	02/07/11: 22	19/07/11: 23	18	06/07/11: 01	07/07/11: 14	3
											08/07/11: 10	10/07/11: 21	3
								20/07/11: 10	15/08/11: 18	27	22/07/11: 12	12/08/11: 02	22
								18/08/11: 00	31/08/11: 00	14	20/08/11: 16	22/08/11: 05	3
								21/09/11: 13	16/10/11: 00	25	27/09/11: 01	12/10/11: 10	16
48	Ekmighat	Adhwara Group	Bihar	45.94	46.94	49.52	12/07/2004	06/07/11: 17	13/07/11: 16	8			
								23/07/11: 13	02/09/11: 22	42			
								22/09/11: 03	16/10/11: 00	25	29/09/11: 03	16/10/11: 00	18

Low and Moderate flood events on main Ganga and its tributaries- 2011 flood season

Annex X

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
49	Jhanjharpur	Kamla Balan	Bihar	49	50.00	53.01	10/07/2004	26/06/11: 01	27/06/11: 20	3	26/06/11: 03	26/06/11: 16	2
								01/07/11: 19	02/07/11: 20	2			
								03/07/11: 04	05/07/11: 00	3	03/07/11: 20	04/07/11: 09	2
								05/07/11: 11	07/07/11: 02	3			
								13/07/11: 21	14/07/11: 06	1			
								19/07/11: 12	23/07/11: 07	5			
								28/07/11: 10	29/07/11: 00	2			
								30/07/11: 04	31/07/11: 06	2			
								31/07/11: 11	03/08/11: 22	4	01/08/11: 01	01/08/11: 16	2
								05/08/11: 15	06/08/11: 14	2			
								17/08/11: 01	29/08/11: 15	14	17/08/11: 07	17/08/11: 15	1
											17/08/11: 18	19/08/11: 06	3
											22/08/11: 21	23/08/11: 06	1
											25/08/11: 21	26/08/11: 16	2
								07/09/11: 10	08/09/11: 07	2			
								08/09/11: 10	09/09/11: 00	2			
								15/09/11: 10	16/09/11: 00	2			
								16/09/11: 11	16/09/11: 22	1			
								17/09/11: 03	20/09/11: 00	4	18/09/11: 08	19/09/11: 01	2
								20/09/11: 11	20/09/11: 14	1			
								21/09/11: 23	23/09/11: 07	2			
								26/09/11: 07	05/10/11: 06	10	26/09/11: 20	29/09/11: 15	4
50	Basua	Kosi	Bihar	46.75	47.75	49.17	25/08/2010	20/06/11: 04	13/10/11: 00	116	27/06/11: 02	27/06/11: 14	2
											28/06/11: 17	03/07/11: 19	6
											05/07/11: 02	06/07/11: 06	2
											07/07/11: 04	07/07/11: 22	2
											11/07/11: 18	12/07/11: 04	1
											12/07/11: 20	26/07/11: 05	14
											26/07/11: 20	14/08/11: 06	19
											15/08/11: 18	22/08/11: 15	8
											23/08/11: 02	25/08/11: 13	3
											26/08/11: 00	27/08/11: 02	2
											13/09/11: 20	14/09/11: 06	1
											18/09/11: 02	22/09/11: 16	6
											26/09/11: 03	30/09/11: 21	6

Low and Moderate flood events on main Ganga and its tributaries- 2011 flood season **Annex X**

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
51	Baltara	Kosi	Bihar	32.85	33.85	36.40	15/08/1987	29/06/11: 20	15/10/11: 07	108	02/07/11: 12	04/07/11: 23	3
											11/07/11: 19	12/07/11: 18	2
											14/07/11: 04	07/09/11: 00	56
											16/07/11: 00	19/07/11: 15	5
											19/09/11: 16	07/10/11: 21	19
52	Kursela	Kosi	Bihar	29	30.00	32.04	06/09/1998	06/07/11: 00	11/07/11: 15	7			
								22/07/11: 08	06/10/11: 19	77	27/07/11: 20	06/09/11: 23	42
											14/09/11: 05	17/09/11: 08	4
											21/09/11: 12	03/10/11: 13	13
53	Dhengraghat	Mahananda	Bihar	34.65	35.65	38.09	1968	01/07/11: 05	06/08/11: 05	37	05/07/11: 12	06/07/11: 08	2
											09/07/11: 07	10/07/11: 15	2
											12/07/11: 00	13/07/11: 05	2
											17/07/11: 01	22/07/11: 23	7
											30/07/11: 13	02/08/11: 23	4
											03/08/11: 07	04/08/11: 00	2
								07/08/11: 20	08/08/11: 05	1			
								16/08/11: 21	29/08/11: 11	14	17/08/11: 03	21/08/11: 12	5
											25/08/11: 00	27/08/11: 07	3
											18/09/11: 22	24/09/11: 06	6
											19/09/11: 02	21/09/11: 11	3
								26/09/11: 07	01/10/11: 19	7			
											26/09/11: 23	29/09/11: 17	4

Low and Moderate flood events on main Ganga and its tributaries- 2011 flood season **Annex X**

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
54	Jhawa	Mahananda	Bihar	30.4	31.40	33.51	14/08/1987	02/07/11: 09	27/07/11: 14	26	18/07/11: 06	19/07/11: 10	2
											20/07/11: 04	22/07/11: 14	3
								28/07/11: 00	07/08/11: 16	12	31/07/11: 08	03/08/11: 00	4
								17/08/11: 00	30/08/11: 06	14	17/08/11: 11	21/08/11: 17	5
											25/08/11: 16	27/08/11: 22	3
								19/09/11: 11	22/09/11: 06	4			
								27/09/11: 06	02/10/11: 06	6	27/09/11: 20	29/09/11: 13	3
55	Gheropara	Ajoy	West Bengal	38.42	39.42	43.94	27/09/1978	09/08/11: 06	10/08/11: 00	2			
								11/08/11: 21	12/08/11: 05	1			
56	Harinkhola	Mundeshwari	West Bengal	11.8	12.80	14.58	29/09/1978	11/08/11: 06	16/08/11: 16	6			
								18/08/11: 16	21/08/11: 22	4			
57	Mohanpur	Kangsabati	West Bengal	24.73	25.73	29.87	02/09/1978	19/06/11: 04	19/06/11: 13	1			
								05/06/11: 20	07/06/11: 06	2			

Low and Moderate flood events on main Brahamaputra and its tributaries- 2011 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		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	Dibrugrah	Brahmaputra	Assam	104.70	105.70	106.48	03/09/1998	02/06/2011 04:00	04/06/2011 06:00	3			
								05/06/2011 20:00	07/06/2011 06:00	2			
								18/06/2011 03:00	18/06/2011 18:00	1			
								01/07/2011 05:00	12/08/2011 03:00	42			
								15/08/2011 16:00	22/08/2011 02:00	7			
								23/08/2011 14:00	23/08/2011 21:00	1			
								25/09/2011 12:00	28/09/2011 10:00	3			
2	Neamatighat	Brahmaputra	Assam	84.04	85.04	87.37	11/07/1991	26/05/2011 05:00	26/05/2011 11:00	1			
								02/06/2011 14:00	09/06/2011 03:00	7			
								13/06/2011 12:00	15/06/2011 03:00	2			
								18/06/2011 09:00	02/09/2011 04:00	76	03/07/2011 02:00	14/07/2011 00:00	11
											14/07/2011 22:00	11/08/2011 13:00	28
											16/08/2011 17:00	22/08/2011 07:00	6
								08/09/2011 08:00	11/09/2011 05:00	3			
								13/09/2011 19:00	15/09/2011 03:00	2			
								15/09/2011 13:00	16/09/2011 10:00	1			
								19/09/2011 22:00	02/10/2011 10:00	13	27/09/2011 04:00	28/09/2011 04:00	2
													1
3	Tezpur	Brahmaputra	Assam	64.23	65.23	66.59	27/08/1988	03/07/2011 22:00	11/08/2011 18:00	39	19/07/2011 23:00	23/07/2011 05:00	4
								17/08/2011 01:00	23/08/2011 12:00	7			
4	Guwahati	Brahmaputra	Assam	48.68	49.68	51.46	21/07/2004	17/07/2011 02:00	03/08/2011 15:00	18			
								06/08/2011 10:00	11/08/2011 17:00	6			
								18/08/2011 11:00	22/08/2011 06:00	4			
5	Goalpara	Brahmaputra	Assam	35.27	36.27	37.43	31/07/1954	09/07/2011 23:00	13/08/2011 10:00	35			
								18/08/2011 14:00	25/08/2011 00:00	7			
6	Dhubri	Brahmaputra	Assam	27.62	28.62	30.36	28/08/1988	05/07/2011 14:00	30/08/2011 22:00	57	19/07/2011 23:00	31/07/2011 01:00	12
											10/08/2011 04:00	11/08/2011 04:00	2
7	Khowang	Burhidihing	Assam	101.11	102.11	103.92	25/08/1988	01/07/2011 10:00	03/07/2011 23:00	3			
								04/07/2011 21:00	10/07/2011 16:00	6			
								25/08/2011 11:00	26/08/2011 11:00	2			
8	Nanglamoraghat	Desang	Assam	93.46	94.46	96.49	06/09/1998	01/07/2011 02:00	02/07/2011 00:00	1			
								05/07/2011 04:00	09/07/2011 21:00	5	06/07/2011 20:00	08/07/2011 19:00	2
													1
								15/07/2011 03:00	18/07/2011 13:00	4	16/07/2011 06:00	17/07/2011 14:00	2
													1
								28/07/2011 16:00	01/08/2011 16:00	5	29/07/2011 13:00	01/08/2011 00:00	3
								06/08/2011 10:00	09/08/2011 03:00	3			
9	Shivsagar	Dikhow	Assam	91.4	92.40	95.62	08/07/1974	21/06/2011 15:00	23/06/2011 16:00	3			
								02/07/2011 18:00	08/07/2011 00:00	6			
								15/07/2011 22:00	17/07/2011 16:00	2	16/07/2011 05:00	16/07/2011 12:00	1
								20/07/2011 05:00	21/07/2011 03:00	1			
								23/07/2011 12:00	28/07/2011 07:00	5	23/07/2011 16:00	25/07/2011 06:00	2
								28/07/2011 13:00	29/07/2011 01:00	1			
								30/07/2011 05:00	30/07/2011 12:00	1			
								06/08/2011 10:00	08/08/2011 15:00	3	07/08/2011 03:00	07/08/2011 18:00	1
								07/09/2011 18:00	09/09/2011 11:00	2			

Low and Moderate flood events on main Brahamaputra and its tributaries- 2011 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		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	Badatighat	Subansiri	Assam	81.53	82.53	86.84	28/06/1972	15/07/2011 11:00	26/07/2011 06:00	11			
								06/08/2011 01:00	07/08/2011 17:00	2			
11	Golaghat	Dhansiri (S)	Assam	88.5	89.50	91.30	11/10/1986	27/06/2011 19:00	01/07/2011 07:00	4	28/06/2011 05:00	28/06/2011 23:00	1
											29/06/2011 09:00	29/06/2011 18:00	1
								12/07/2011 07:00	12/07/2011 19:00	1			
								13/07/2011 08:00	15/07/2011 17:00	3			
								25/07/2011 06:00	25/07/2011 15:00	1			
								27/07/2011 01:00	31/07/2011 17:00	5			
								06/08/2011 15:00	17/08/2011 09:00	11	07/08/2011 23:00	09/08/2011 19:00	2
								22/08/2011 04:00	28/08/2011 02:00	6	22/08/2011 22:00	26/08/2011 10:00	4
12	Numaligarh	Dhansiri (S)	Assam	76.42	77.42	79.87	24/09/1985	12/06/2011 04:00	13/06/2011 08:00	2			
								13/06/2011 11:00	13/06/2011 17:00	1			
								14/06/2011 11:00	21/06/2011 13:00	8	15/06/2011 10:00	15/06/2011 15:00	1
								22/06/2011 11:00	07/10/2011 17:00	108	27/06/2011 20:00	02/07/2011 11:00	5
											03/07/2011 06:00	05/07/2011 07:00	3
											07/07/2011 04:00	08/07/2011 12:00	2
											12/07/2011 11:00	02/08/2011 14:00	22
											04/08/2011 07:00	20/08/2011 12:00	17
											22/08/2011 01:00	29/08/2011 16:00	8
											10/09/2011 02:00	11/09/2011 06:00	2
											16/09/2011 10:00	17/09/2011 05:00	1
13	Jiabharali_NTX	Jiabharali	Assam	76	77.00	78.50	26/07/2007	01/06/2011 03:00	09/06/2011 05:00	9	06/06/2011 05:00	06/06/2011 12:00	1
								12/06/2011 14:00	13/06/2011 02:00	1			
								17/06/2011 08:00	18/06/2011 17:00	2			
								19/06/2011 12:00	20/06/2011 01:00	1			
								23/06/2011 06:00	25/06/2011 06:00	3			
								29/06/2011 13:00	13/08/2011 17:00	46	01/07/2011 09:00	01/07/2011 10:00	1
											03/07/2011 09:00	03/07/2011 12:00	1
											04/07/2011 11:00	04/07/2011 22:00	1
											05/07/2011 05:00	05/07/2011 18:00	1
											07/07/2011 14:00	07/07/2011 18:00	1
											09/07/2011 12:00	09/07/2011 20:00	1
											10/07/2011 05:00	10/07/2011 22:00	1
											14/07/2011 04:00	21/07/2011 12:00	8
											22/07/2011 10:00	23/07/2011 12:00	2
											24/07/2011 09:00	24/07/2011 22:00	1
											25/07/2011 14:00	25/07/2011 16:00	1
											29/07/2011 10:00	30/07/2011 11:00	2
											30/07/2011 22:00	31/07/2011 16:00	1
											05/08/2011 05:00	06/08/2011 06:00	2
								15/08/2011 08:00	27/08/2011 14:00	13	16/08/2011 15:00	16/08/2011 16:00	1
											17/08/2011 04:00	18/08/2011 10:00	2
											19/08/2011 06:00	19/08/2011 10:00	1
								08/09/2011 15:00	09/09/2011 05:00	1			
								11/09/2011 09:00	11/09/2011 12:00	1			
								16/09/2011 13:00	30/09/2011 18:00	15	18/09/2011 10:00	18/09/2011 15:00	1
											26/09/2011 06:00	26/09/2011 15:00	1

Low and Moderate flood events on main Brahamaputra and its tributaries- 2011 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
14	Kampur	Kopilli	Assam	59.5	60.50	61.86	16/06/1973	03/07/2011 12:00	05/07/2011 08:00	2	04/07/2011 13:00	05/07/2011 09:00	1
15	Dharmatul	Kopilli	Assam	55	56.00	58.09	21/07/2004	04/07/2011 13:00	06/07/2011 09:00	2			
16	Puthimari _NHX	Puthimari	Assam	50.81	51.81	55.08	31/08/2008	05/06/2011 21:00	06/06/2011 13:00	1			
								21/06/2011 05:00	21/06/2011 10:00	1			
								28/06/2011 06:00	28/06/2011 16:00	1			
								29/06/2011 16:00	07/07/2011 17:00	9			
								15/07/2011 11:00	15/07/2011 17:00	1			
								16/07/2011 08:00	05/09/2011 05:00	51	23/07/2011 16:00	24/07/2011 00:00	1
											19/08/2011 13:00	19/08/2011 19:00	1
											24/08/2011 20:00	25/08/2011 09:00	1
								06/09/2011 00:00	06/10/2011 00:00	31	18/09/2011 20:00	18/09/2011 21:00	1
17	Pagladia_NTX	Pagladiya	Assam	51.75	52.75	55.45	08/07/2004	23/07/2011 11:00	24/07/2011 01:00	1			
								18/09/2011 10:00	18/09/2011 23:00	1			
18	Beki Rd Bridge	Beki	Assam	44.1	45.10	46.20	04/08/2000	19/06/2011 15:00	20/06/2011 03:00	1			1
								20/06/2011 10:00	22/06/2011 06:00	2			1
								22/06/2011 16:00	02/09/2011 23:00	73	01/07/2011 09:00	01/07/2011 14:00	1
											15/07/2011 01:00	16/07/2011 04:00	2
											18/07/2011 12:00	19/07/2011 01:00	1
											19/07/2011 11:00	22/07/2011 02:00	3
											22/07/2011 10:00	23/07/2011 02:00	1
											23/07/2011 07:00	24/07/2011 02:00	1
											24/07/2011 12:00	25/07/2011 02:00	1
											25/07/2011 13:00	26/07/2011 03:00	1
											26/07/2011 12:00	26/07/2011 20:00	1
											27/07/2011 10:00	30/07/2011 03:00	3
											30/07/2011 17:00	30/07/2011 20:00	1
											07/08/2011 11:00	08/08/2011 01:00	1
											08/08/2011 14:00	09/08/2011 01:00	1
											16/08/2011 12:00	19/08/2011 02:00	3
											19/08/2011 07:00	20/08/2011 03:00	1
								18/09/2011 07:00	29/09/2011 01:00	11			
19	Manas NHX	Manas	Assam	47.81	48.42	50.08	15/09/1984	15/07/2011 22:00	16/07/2011 05:00	1			
20	Golakganj	Sankosh	Assam	28.94	29.94	30.95	08/09/2007	01/07/2011 06:00	06/07/2011 13:00	6			
								08/07/2011 07:00	12/07/2011 15:00	5			
								15/07/2011 13:00	14/08/2011 05:00	30	21/07/2011 05:00	21/07/2011 07:00	1
								16/08/2011 06:00	23/08/2011 16:00	8	18/08/2011 02:00	18/08/2011 06:00	1
								19/09/2011 09:00	20/09/2011 17:00	2			
21	Tufanganj	Raidak-I	West Bengal	34.22	35.30	36.36	21/07/1993	19/07/2011 19:00	20/07/2011 21:00	2			
								17/08/2011 03:00	17/08/2011 19:00	1			
22	Ghughumari	Torsa	West Bengal	39.8	40.41	41.46	03/08/2000	01/07/2011 12:00	01/07/2011 18:00	1			
23	NH-31	Jaldhaka	West Bengal	80	80.90	81.33	28/08/1972	01/07/2011 07:00	01/07/2011 10:00	1			
								30/07/2011 11:00	30/07/2011 22:00	1			
								23/08/2011 06:00	23/08/2011 11:00	1			
								18/09/2011 15:00	18/09/2011 20:00	1			

Low and Moderate flood events on main Brahamaputra and its tributaries- 2011 flood season

Annex XI

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
24	Domohani	Tista	West Bengal	85.65	85.95	89.30	14/10/1968	19/06/2011 18:00	19/06/2011 23:00	1			
								20/06/2011 19:00	21/06/2011 06:00	1			
								24/06/2011 08:00	24/06/2011 23:00	1	24/06/2011 14:00	24/06/2011 14:00	1
								25/06/2011 08:00	25/06/2011 10:00	1			
								26/06/2011 06:00	26/06/2011 07:00	1			
								27/06/2011 15:00	28/06/2011 01:00	1			
								28/06/2011 11:00	03/07/2011 19:00	6	28/06/2011 14:00	28/06/2011 21:00	1
											29/06/2011 10:00	29/06/2011 20:00	1
											30/06/2011 07:00	01/07/2011 19:00	2
								04/07/2011 08:00	07/07/2011 06:00	3	04/07/2011 16:00	04/07/2011 21:00	1
											05/07/2011 18:00	06/07/2011 00:00	1
								07/07/2011 09:00	08/07/2011 22:00	2			
								10/07/2011 17:00	11/07/2011 03:00	1			
								11/07/2011 07:00	12/07/2011 00:00	1			
								12/07/2011 15:00	12/07/2011 17:00	1			
								13/07/2011 15:00	13/07/2011 21:00	1			
								14/07/2011 08:00	15/07/2011 05:00	1			
								15/07/2011 08:00	16/07/2011 04:00	1			
								17/07/2011 11:00	17/07/2011 21:00	1			
								20/07/2011 10:00	20/07/2011 23:00	1			
								23/07/2011 10:00	23/07/2011 23:00	1			
								28/07/2011 04:00	01/08/2011 16:00	5			
								29/07/2011 08:00	30/07/2011 04:00	1			
								30/07/2011 10:00	31/07/2011 14:00	2	30/07/2011 16:00	30/07/2011 19:00	1
								02/08/2011 09:00	03/08/2011 03:00	1			
								07/08/2011 10:00	07/08/2011 19:00	1			
								10/08/2011 09:00	10/08/2011 17:00	1			
								12/08/2011 12:00	12/08/2011 13:00	1			
								13/08/2011 12:00	13/08/2011 22:00	1			
								14/08/2011 07:00	15/08/2011 00:00	1			
								15/08/2011 06:00	15/08/2011 20:00	1			
								16/08/2011 02:00	27/08/2011 03:00	12	16/08/2011 07:00	16/08/2011 10:00	1
											17/08/2011 06:00	17/08/2011 16:00	1
											17/08/2011 23:00	18/08/2011 11:00	1
											19/08/2011 08:00	20/08/2011 08:00	2
											22/08/2011 11:00	23/08/2011 11:00	2
											25/08/2011 08:00	25/08/2011 12:00	1
								27/08/2011 11:00	27/08/2011 18:00	1			
								15/09/2011 19:00	16/09/2011 02:00	1			
								16/09/2011 07:00	17/09/2011 06:00	1			
								17/09/2011 10:00	17/09/2011 20:00	1			
								18/09/2011 06:00	21/09/2011 23:00	4	18/09/2011 14:00	19/09/2011 01:00	1
								22/09/2011 20:00	23/09/2011 07:00	1			
								23/09/2011 11:00	24/09/2011 01:00	1			
								24/09/2011 10:00	29/09/2011 13:00	6	25/09/2011 15:00	25/09/2011 21:00	1
											27/09/2011 04:00	27/09/2011 07:00	1
25	APGhat	Barak	Assam	18.83	19.83	21.84	01/08/1989	03/07/2011 10:00	05/07/2011 10:00	3			
26	Matizuri	Katakhal	Assam	19.27	20.27	22.73	10/09/2007	31/05/2011 22:00	02/06/2011 03:00	2			
								03/07/2011 04:00	03/07/2011 23:00	1			
								12/08/2011 18:00	13/08/2011 13:00	1			
								23/08/2011 01:00	29/08/2011 17:00	7	24/08/2011 15:00	25/08/2011 19:00	2
											28/08/2011 02:00	28/08/2011 07:00	1
27	Karimganj	Kushiyara	Assam	13.94	14.94	16.57	10/06/2010	11/08/2011 15:00	15/08/2011 00:00	4			
								16/08/2011 09:00	31/08/2011 03:00	15	18/08/2011 00:00	18/08/2011 08:00	1
											24/08/2011 18:00	29/08/2011 03:00	5

Low and Moderate flood events on various river systems (excluding Ganga and Brahmaputra basins)- 2011 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	HFL		Flood period => warning level			Flood period => danger level		
						Level in metres	Date	From	To	No. of days	From	To	No. of days
1	Subernarekna	Rajghat	Odisha	9.45	10.36	12.69	19/06/2008	19/06/11 15	21/06/11 09	2	19/06/11 20	20/06/11 11	1
								13/08/11 04	19/08/11 17	7	13/08/11 20	15/08/11 21	3
								10/09/11 13	13/09/11 06	3	10/09/11 20	12/09/11 03	2
								23/09/11 18	30/09/11 15	8	24/09/11 00	29/09/11 23	6
2	Burhabalang	NH_5 _Road B	Odisha	7.21	8.13	9.50	12/10/1973	02/09/11 11	04/09/11 12	3			
								22/09/11 14	24/09/11 16	3	23/09/11 16	23/09/11 17	1
3	Baitarni	Anandpur	Odisha	37.44	38.36	41.20	19/08/1975	06/09/11 23	07/09/11 11	1			1
								15/09/11 18	16/09/11 19	2	15/09/11 21	16/09/11 12	1
								22/09/11 07	26/09/11 00	4	22/09/11 10	24/09/11 19	3
4	Baitarni	Akhuapada	Odisha	17.83	17.83	21.95	16/08/1960				06/09/11 06	08/09/11 06	3
											16/09/11 00	17/09/11 12	2
											22/09/11 13	25/09/11 21	4
5	Brahmani	Jenapur	Odisha	22.00	23.00	24.78	20/08/1975	07/09/11 02	08/09/11 06	2			
								10/09/11 10	11/09/11 17	2			
								21/09/11 22	27/09/11 12	6	23/09/11 18	27/09/11 00	4
6	Vamsadhara	Kashinagar	Odisha	53.60	54.60	58.93	18/09/1980	17/08/11 23	18/08/11 09	1			
								27/08/11 22	28/08/11 11	1			
								30/08/11 06	04/09/11 18	6	02/09/11 03	02/09/11 13	1
								06/09/11 03	09/09/11 06	4			
7	Mahanadi	Naraj	Odisha	25.41	26.41	27.61	31/08/1982	06/09/11 01	07/09/11 05	2			
								07/09/11 18	14/09/11 05	7	09/09/11 14	13/09/11 09	4
								14/09/11 15	14/09/11 17	1			
8	Mahanadi	Alipingal Devi	Odisha	10.85	11.76	13.05	20/09/2008	09/09/11 07	13/09/11 21	5	10/09/11 04	13/09/11 11	4
9	Mahanadi	Nimapara	Odisha	9.85	10.76	11.6	31/08/1982	09/09/11 11	14/09/11 07	5	10/09/11 09	13/09/11 10	4
10	Bhadrachalam	Godavari	Andhra Pradesh	45.72	48.77	55.66	16/08/1986	02/09/11 19	03/09/11 05	1			
11	Deongaon	Bhima	Karnataka	402.00	404.50	407.34	13/08/2006	06/09/11 03	08/09/11 10	3			
12	Mantralayam	Tungbhadra	Andhra Pradesh	310.00	312.00	318.77	02/10/2009	03/09/11 13	06/09/11 02	3			
13	Wanakbori	Mahi	Gujarat	71.00	72.54	76.10	12/08/2006	29/08/11 19	31/08/11 10	2			
								12/09/11 00	13/09/11 09	2			
14	Mandla	Naramada	Madhya Pradesh	437.20	437.80	439.41	18/08/1974	07/09/11 15	08/09/11 05	1	07/09/11 19	08/09/11 00	1
15	Bharuch	Naramada	Gujarat	6.71	7.31	12.65	07/09/1970	28/08/11 10	29/08/11 11	2	28/08/11 17	28/08/11 23	1