FLOOD FORECASTING AND WARNING NETWORK PERFORMANCE APPRAISAL 2009

Outflow from N S Dam on 5.10.2009

GOVERNMENT OF INDIA
CENTRAL WATER COMMISSION
FLOOD FORECAST MONITORING DIRECTORATE

NEW DELHI – 110066

January 2011

PREFACE

Central Water Commission had made a small beginning in Flood Forecasting & Warning service in India in November 1958 with one forecasting station at Delhi, the national capital, on the river Yamuna. Today, its network of Flood Forecasting and Warning Stations has gradually extended over the years and covers almost all the major inter-state flood prone river basins throughout the country.

The stations comprised of 175 Flood Forecasting Stations including 28 inflow forecast stations during the year 2009, 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 touch the warning level at the flood forecasting stations.

The flood season 2009 witnessed unprecedented flood events in Krishna and Ghagra (Ganga) basins. As observed by CWC during the first and second week of October 2009, the river Krishna witnessed "Unprecedented" flood at P D Jurala Project and Srisailam Dam (both inflow forecast stations). River Tungabhadra, tributary of Krishna also witnessed unprecedented flood at Mantralayam (level forecast station) in Andhra Pradesh. Unprecedented flood situation was also witnessed at Elgin Bridge and at Ayodhya on river Ghagra in Uttar Pradesh during October 2009. The year witnessed moderate intensity floods in some parts of India.

During the flood season 2009, in all, 4010 flood forecasts were issued and 3927 forecasts i.e., 97.93% forecasts were found within permissible limit of accuracy. Out of 4010, 667 were inflow forecasts and 3343 were level forecasts. Out of 3343 level forecasts, 3298 forecasts i.e., 98.65 % of the forecasts were found within permissible limit of accuracy of ± 15 cm. Similarly out of 667 inflow forecasts, 629 inflow forecasts i.e., 94.30 % 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 in the field offices.

Flood Forecast Monitoring (FFM) Directorate plays an important role in compiling the information received from various field offices and issues daily

bulletins which are sent to various offices of the MOWR, MHA, Railway Board, Transport Ministry and Ministry of Agriculture. I wish to place on record my deep appreciations of the efforts put in by the officers and staff of FFM Directorate in carrying out the work with utmost devotion & dedication in bringing out this report. The staff of this Directorate, along with other supporting staff from other Directorates attached to this Directorate during flood duties in the flood season of 2009 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 during 15th May to 31st October in general and the period of unprecedented floods especially for formulating & issuing three hourly special flood bulletins in particular. Special mention is to be made of Shri C Lal, Director, Shri. V D Roy, Director, Shri. A K Srivastava, Deputy Director (Comm), Shri S Venkataraman, AD (HM), Shri. S. Lakshminarayanan, EAD (HM), Shri. Krishna Kumar EAD (HM), Shri R. Jayachandran SA, Shri. S.N. Biswas SA, Shri Munna Lal SA, Shri. Rajbir Singh Data Entry Operator, Shri. Jameel Ahmed, Steno-Gr-II in preparing this Appraisal Report.

I am hopeful that the momentum gained in improving performance, innovations in evaluation, modernization as well as computerization, year after year, will be further accelerated to achieve greater accuracy of each and every forecast especially in high and unprecedented flood situations.

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

New Delhi
January, 2011

MEMBER (RM)

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Cover Photo: Outflow from Nagarjunasagar Dam on 5-10-2009
(Picture Courtesy: http://whatslatest.com/blog/?tag=krishna-river-floods)

EXECUTIVE SUMMARY

0.1 GENERAL

The Flood Forecasting and Warning Network of the Central Water Commission comprised of 147 level forecasting and 28 inflow forecasting sites during the flood season 2009 (from 15th May to 31st October every year). There were 175 flood forecasting sites and all of them were operational i.e. hydrological and hydro-meteorological data were duly observed and collected. However, no forecasts were issued for 68 flood forecasting sites, as they did not cross the respective warning levels in the flood season 2009.

During the flood season 2009, in all, 4010 flood forecasts were issued and 3927 forecasts i.e., 97.93% forecasts were found within permissible limit of accuracy. Out of 4010, 667 were inflow forecasts and 3343 level forecasts. Out of 3343 level forecasts, 3298 forecasts i.e., 98.65 % of the forecasts were found within permissible limit of accuracy of ±15 cm. Similarly out of 667 inflow forecasts, 629 inflow forecasts i.e., 94.30 % of the inflow forecasts were found within permissible limits of accuracy of ±20%.

0.2 Flood Forecasting Performance

The "Flood Forecasting and Warning" activities are being performed by the twenty field divisions of the Central Water Commission. These Divisions report to respective SE's/ CE's in the field which functions under the overall supervision of the Member (River Management), CWC. These divisions have a dedicated team of Hydrologists and Hydro-meteorologists who are observing, collecting and analyzing the data and formulating the forecasts of incoming floods in the rivers flowing through the fifteen flood prone states, Union Territory of Dadra & Nagar Haveli and NCT of Delhi.

0.2.1 River basinwise

During the flood season 2009, maximum number of flood forecasting sites i.e. 87 out of 175 or 49.7 percent of the total forecasting sites were located in the Ganga basin. Similarly, there were 27 forecasting sites located in the Brahmaputra basin which is 15.6 percent of the total sites. In the Godavari basin, there were 18 forecasting sites i.e. 10.4 percent of the total sites. 15 sites i.e. 8.7 percent of the total sites were in the west flowing rivers. The remaining river systems covered under flood forecasting network with single digit site.

The analysis of forecast data reveals that the maximum numbers of flood forecasts (1806) were issued for the Brahmaputra River and its tributaries. Out of which, 99.67% forecasts were found within permissible limit of accuracy. This

is as per normal situation every year as floods occur more frequently in Brahmaputra River and its tributaries. Next highest numbers of forecasts i.e. 1408 forecasts were issued for the Ganga and its tributaries with an accuracy of 97.66 percent. The minimum numbers i.e. 7 forecasts were issued for Godavari basin, whereas no forecast were issued for Southern Rivers (Pennar).

0.2.2 Statewise

The analysis of Statewise forecasts data of the flood season 2009 reveals that although maximum number of flood forecasting sites, i.e. 35 sites of the total forecasting sites were located in the state of Uttar Pradesh, yet the maximum number of flood forecasts were issued for the state of Assam where only 24 flood forecasting sites are located. On rivers in the state of Assam, 1757 forecasts (43.82 percent of total forecasts) were issued, out of which 1753 (99.8%) forecasts were found within permissible limit of accuracy. Next highest numbers of forecasts i.e. 775 forecasts (19.32%) were issued in the rivers of the state of Bihar, out of which 770 forecasts (99.4%) were found within permissible limit of accuracy.

0.2.3 Divisionwise

During the flood season 2009, the analysis of forecasts data of the flood season reveals that the maximum number of forecasts i.e. 915 forecasts were issued by the Upper Brahmaputra Division, Dibrugarh, out of which, 914 forecasts (i.e. 99.9 %) were found within permissible limit of accuracy. The minimum numbers of forecasts i.e. only 1 forecasts were issued by the Himalayan Ganga Division, Dehradun. However that forecast was not within the permissible limit of accuracy i.e. with 0 percent performance accuracy. However, no forecast was issued to Gandhisagar Dam in Chambal Division, Jaipur. Forecasts issued by the Lower Yamuna Division, Agra were also found to be 100% accurate.

At 72 sites in 10 states, all the forecasts issued during the flood season 2009 were within permissible limit of accuracy (100% accuracy) as shown in the table given below:

Sl. No	State	No. of sites	Sl. No	State	No. of sites
1	Andhra Pradesh	1	7	Orissa	7
2	Assam	21	8	Uttar Pradesh	5
3	Bihar	19	9	Tripura	1
4	Gujarat	3	10	West Bengal	10
5	Jharkhand	4			
6	Maharashtra	1			

At 68 forecast stations, there was no necessity to issue forecasts, as the water levels at these stations did not cross respective warning levels.

0.3 Data Communication System

There is network of wireless stations for near real-time communication of hydrological and hydro-meteorological data between various base & forecasting sites and their subdivisions; and divisions (including Control Stations). The flood forecasts are being formulated in the divisional offices (sub divisional offices in a few cases) and disseminated by these wireless stations to the users and also from the divisions to the head quarters of the Central Water Commission at Sewa Bhawan, R.K. Puram, New Delhi where "Flood Forecast Monitoring Directorate" is monitoring the flood forecast and flood situations at the National level.

In addition, there were 223 telemetry stations monitoring real time hourly water levels, 15 minutes as well as 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 satellite, the data from remote stations for further transmission to the respective modelling centre through VSAT.

The telephone, fax and internet in particular were found more useful in receiving the vital flood forecasts and hourly river data on short notice as the wirelesses work on pre-fixed timetables only.

0.4 Forecasts Performance Accuracy- Criteria

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.

0.5 Flood Forecast Monitoring at the CWC's Headquarter

The field units of the Central Water Commission located in various flood affected states is responsible for issuing real time daily flood forecasts of the various forecasting sites to the users. The "Flood Forecast Monitoring Directorate (FFM)" in CWC headquarters is responsible for monitoring the All India flood situation as well as daily flood forecasts and warnings issued by the field divisions every day. The FFM Directorate issues daily flood situation summary (also called as daily flood bulletin) comprising level and inflow forecasts alongwith complete analyzed data of each flood forecasting site showing degree of flood situation in terms of water level in respect of "Level Forecasting Sites" and discharge/ volume in case of "Inflow Forecasting Sites". In case of unprecedented and high flood situations, three-hourly flood situations / levels of the concerned sites are also being collected through telephone / fax/ wireless/e-mail and subsequently special "Red" or "Orange" colored bulletins on latest flood situations are being issued by the FFM Directorate. The bulletins in case of unprecedented and high flood situations are issued to various senior officers in Central Water Commission, Ministry of Water Resources including the Hon'ble Minister for Water resources and the Hon'ble Minister of State for Water Resources as well as to various concerned senior officers in Ministries such as Ministry of Home Affairs, National Disaster Management Authority (NDMA), Ministry of Agriculture, India Meteorological Department (IMD), Ministry of Railways, National Remote Sensing Centre (NRSC), Hyderabad and United Nations Development Programme local office at New Delhi.

The special **"Red"** or **"Orange"** colored bulletins are being issued for drawing prompt attention of the concerned authorities towards the severe flood situations prevailing at that time in any part of the country. The FFM Directorate has issued 154 Nos. daily bulletins besides 31 numbers of **"Orange"** and 23 numbers of **"Red"** bulletins during the flood season 2009.

0.6 Response of User Agencies

The issuing of the "Flood Forecasts & Warnings" and the "Flood Protection & Flood Hazard Mitigation" jobs are being done by two different agencies, namely, the Central Water Commission and the various civil and engineering authorities of the state governments, respectively. The later one is the user of the flood forecast & warning issued by the first one.

Although, there are always regular interactions between CWC's "Flood Forecasters" and the "Flood Hazard Mitigation Authorities", yet very few agencies give their response on the usefulness of the flood forecast issued by CWC. They have opined in general that the correct and timely flood forecasts and warnings

of Central Water Commission were found extremely useful to them in flood loss mitigation, flood protection and reservoirs' operation etc. During 2009, appreciations from Orissa and Bihar have been received.

0.7 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	9
6.	No. of Superintending Engineer's offices including one Flood Forecast Monitoring Directorate at CWC headquarter	12
7.	No. of present Flood Forecasting Divisions	20
8.	No. of Control Room/Sub-Divisions engaged in flood forecasting work under above divisions	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	350 (approx)
13.	No. of gauge and gauge & discharge sites	1000 (approx)
14.	No. of rain gauge stations (ordinary/self recording)	500 (approx)
15.	No. of real time data stations –(wireless stations including Control Stations)	568
16.	Maximum no. of forecasts issued in any one year Second Highest no. of forecasts issued	8566 (in 1990) 8223 (in 2007)
17.	Average no. of forecasts being issued every years	6000
18.	No. of forecasts issued in flood season 2007	8223
19.	No. of forecasts issued in flood season 2008	6691
20.	No. of forecasts issued in flood season 2009	4010

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 2009 in the network of Central Water Commission are shown in the **Table 1.1** given below:

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	2009	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 2009 is shown in **Map-1.** The number of flood forecasting sites on each of the nine major inter-state river systems, which constitutes 71 river sub-basins in the country, are given in the **Table 1.2**.

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

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

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

Table 1.3 Statewise Flood Forecasting Network in CWC

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

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

1.3 CLASSIFICATIONS OF VARIOUS FLOOD SITUATIONS

The Central Water Commission has categorized various flood situations, for monitoring the floods in the country though its flood forecasting network, into the following four different categories, depending upon the severity of floods i.e. based on floods magnitudes.

(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 **even if it is equal to or below danger / warning level**. 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 surpasses 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.

From flood season 2006, as per Standard Operating procedure (SOP) directives 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), the categorization of alerts is given below:

Specific hazards have different categories of alerts as indicated below. For the purpose of dissemination of alerts of PMO/ Cabinet Secretariat, a uniform system has been devised by categorizing each type of alert in stages- Yellow, Orange and Red. For floods they are: (Referred as Flood- Central Water Commission)

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) **even if it is equal to or below danger / warning level**	Orange
I	Unprecedented Flood (Water Level equal and above Highest Flood Level-HFL) **even if it is equal to or below danger / warning level**	Red

The above criteria are applicable so far only to level forecasts and not to inflow forecasts. But in view of the unprecedented floods in Krishna, it is high time that similar criteria are fixed for inflow forecasts too. The categorization of inflow shall be done taking into account the total live storage of the reservoir and the largest designed flood discharging capacity and the likely affect 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 likely to cause damages/ difficulties in the downstream areas. 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 of changing the existing criteria for stage forecast and fixing new criteria for inflow forecast taking into account the experiences gained in the past four years after SOP has come into operation.

1.4 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 expansion of the network with a view to cover additional flood prone areas is 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 list of real – time data station using Wireless and Telemetry in CWC during the flood season 2009 is shown as **Annex-I**. The details of all the sites basin-wise as well as Statewise during the flood season 2009, is shown at **Annex-II** and **Annex-III** respectively.

1.5 DAMAGE DUE TO FLOODS/ HEAVY RAINS BETWEEN 1953 TO 2009

The damage due to floods for the entire country were estimated to be Rs.1399.275 Crore (tentative) during the flood season 2009. The average annual damages to crops, houses and public utilities from the year 1953 to 2009 as reported by the States/UT's are of the order of Rs. 1824.207 Crore (tentative), the maximum annual damage being Rs.8864.544 Crore during 2000.

A comparative details showing the details of damages occurred during the flood season 2007 to 2009 on different accounts, based on the reports (tentative), received from the revenue authorities of the state governments is given in the **Table 1.4**. (Figures given for all the three years are tentative- Source: FMP Directorate- CWC)

Table 1.4: Damages occurred during flood season, 2007 to 2009

Sl. No.	Items	Flood damages during Year the Year			Flood Damages during 1953-2009		
		2007	2008	2009	Average	Maximum	
						Year	Damage
1	Area affected (in mha)	3.549	0.000	0.000	7.246	1978	17.500
2	Population affected (in millions)	41.462	19.213	11.372	32.361	1978	70.45
3	Damaged to Crops(area in mha)	6.309	1.783	1.006	3.680	2005	15.18
4	Damaged to crops(value in Rs. Crore)	1336.315	679.284	438.35	699.908	2000	4246.622
5	Damaged to houses (in numbers)	1686135	914251	933490	1213226	1978	3507542
6	Damaged to houses (value in Rs. Crore)	1011.967	441.105	129.07	280	1995	1307.894
7	Cattle lost (in number)	70650	17214	38578	90764	1979	618248
8	Human lives lost (in numbers)	2439	2143	1326	1620	1977	11316
9	Damaged to public Utilities (in Rs. Crores)	1591.616	1188.016	831.857	816.403	2001	5604.46
10	Total damages to crops, houses & public utilities (in Rs. Crores)	3939.898	2214.405	1399.275	1824.207	2000	8864.54

1.6 CALAMITY RELIEF FUND

The earlier system of providing flood relief as central assistance to states has been dispensed with as per recommendations of the Ninth Finance Commission. In its place the Commission has recommended a scheme, which is qualitatively different in the sense that specific amount has been allocated to each state under "Calamity Relief Fund" and the states are expected to look after themselves in any situation created by natural calamities. The central government contributes 75 percent of the amount and the state governments contribute balance 25 percent out of its own resources.

1.7 PLAN OUTLAY FOR FLOOD FORECASTING NETWORK

Plan outlay for the "Flood Forecasting Network of CWC" is available under the plan scheme "Establishment and Modernisation of Flood Forecasting Network in India including inflow forecasts" under the head "Flood Control and Drainage". The outlay of the scheme for the Tenth Plan Period 2002-2007 is Rs.65.00 Crore (Rs.51 Crore under "Establishment and Modernisation of Flood Forecasting Network in India including inflow forecasts", and Rs.14.00 Crore under "Strengthening and Modernisation of FF and HO network in Brahmaputra and Barak Basin"). The actual expenditure incurred during the year 2005-06, 2006-07 and 2007-08 were Rs. 9.6 Crore, Rs.12.07 Crore and Rs.10.57 Crore respectively. The aforesaid Plan scheme has been renamed in XI Plan (2007-12) as "Flood Forecasting" with the Plan outlay of Rs.130 Crore. The expenditure incurred during 2008-09 is Rs. 13.997 Crore. The expenditure incurred for the year 2009-10 was Rs. 17.619 Crore.

1.8 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 2009 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.

1.9 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. Eleven Circle Offices and twenty Divisions in its field formations

carry out flood forecasting activities. In the headquarters One Chief Engineer (Flood Management) and a Directorate coordinate and monitor the Flood Forecasting activities. 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**

CHAPTER – 2

SOUTHWEST MONSOON ACTIVITIES

2.1 GENERAL

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 the following 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

2.2 HIGHLIGHTS OF SOUTH-WEST MONSOON 2009

For the country as a whole, the rainfall for the season (June-September) was 78% of its long period average (LPA).

Seasonal rainfall was 65% of its LPA over Northwest India, 80% of its LPA over Central India, 94% of its LPA over south Peninsula and 77 % of its LPA over Northeast (NE) India.

Monthly rainfall was 53% of LPA in June, 96% of LPA in July, 73% of LPA in August and 80% of LPA in September.

The monsoon set in over Kerala on 23rd May, one week before its normal date of 1st June. During 8-20 June, there was hiatus in the advance of the monsoon. However, later the monsoon advanced rapidly and covered the entire country by 3rd July, compared to its normal date of 15th July. As in the previous two years, the withdrawal of monsoon from west Rajasthan was delayed and it commenced only on 25th September compared to its normal date of 1st September.

Out of 511 meteorological districts for which data are available, 217 districts (42) % of the meteorological districts received excess/normal rainfall and the remaining 294 districts (58%) received deficient/scanty rainfall during the season.

2.3 ONSET OF SOUTH-WEST MONSOON SEASON 2009

Climatologically, the southwest monsoon has an onset phase from end of May to end of June and a withdrawal phase from the first week of September continuing up to the middle of October. The **Fig. 2.1 and Fig.2.2** show the "Normal dates on Onset and Withdrawal" of southwest monsoon in India, respectively. The intervening months of July and August are the months of peak monsoon activity. However, the rainfall over various parts of the country occurs in association with the movement of low-pressure systems. The monsoon rainfall thus has its active and weak phases. Also the paths traversed by the low-pressure systems determine the spatial rainfall pattern.

During phases of the weak monsoon activity mentioned above, the monsoon trough of low pressure, which normally runs across the northern parts of the country, shifts to the foothills of the Himalayas. This produced heavy rainfall and led to floods in Bihar, West Bengal and northeastern states.

Southwest monsoon advanced over parts of southeast Bay, most parts of Andaman Sea and Bay Islands on 20 May, 2009, its normal date. The monsoon set in over Kerala on 23rd May, one week prior to the normal date. Subsequent to the onset over Kerala, a Severe Cyclonic Storm (Aila) formed over the Bay of Bengal. In association with it the advance of monsoon over

the northeastern states including West Bengal & Sikkim occurred earlier than normal. Thereafter, the cross equatorial flow became weak. After a hiatus of about a week, monsoon further advanced along the west coast and advanced up to around 17°N latitude on 7th June. A prolonged hiatus in the further advance of monsoon occurred during 8th – 20th June, which may be mainly attributed to the weak cross equatorial flow and non formation of low pressure systems over the Bay of Bengal. Severe heat wave conditions prevailed over many parts of northwest, central and adjoining eastern parts during this period.

Associated with the formation of a Depression over the Arabian Sea during 23rd – 24th June, Southwest monsoon advanced as a weak current over some more parts of peninsular India and parts of central India during 21st – 27th June. Subsequent monsoon advance was very rapid and by 30th June, most parts of the country, outside parts of west Rajasthan was covered by the monsoon current. Monsoon covered entire country on 3rd July, about 12 days earlier than its normal date of 15th July, when the interaction between monsoon flow and mid-latitude westerlies resulted in copious rainfall over Rajasthan. The advance of south west monsoon 2009 is enclosed as **Fig.2.3**.

2.4 SYNOPTIC FEATURES ASSOCIATED WITH THE MONSOON 2009

The north-south surface pressure gradient across the country was mostly weak throughout the season. The monsoon trough was also very shallow and during many occasions was situated to north of its normal position. During 30-31 July and 13-19 September, the trough was close to the foothills of Himalayas. The cross equatorial flow was weaker than normal during major part of the season except for a brief period from last week of June to third week of July. Due to these anomalous features, the activity of monsoon low pressure systems (lows and depressions) during this year was very much subdued compared to previous years. Only 4 depressions (2 each formed over the Arabian Sea and the Bay of Bengal) and 5 low pressure areas formed during the season. The life duration of most of these systems over land was short and therefore did not help in persistent rainfall activity.

During June, two depressions and a low pressure area were formed. A low pressure area formed over the northwest Bay of Bengal and neighbourhood on 4th June 2009. It dissipated over the northeast Bay of Bengal by 7th June and did not contribute much to the monsoon activity. However, the depressions caused very heavy rainfall along the west coast and Saurashtra & Kutch. One depression formed over the east central Arabian Sea, moved northwards along the west coast and weakened after crossing the south Gujarat coast during 23-24 June. Subsequently the remnant of this system re-emerged over the northeast Arabian Sea and after concentrating again into a depression moved northwards over the land during 25 – 26 June and weakened over Kutch and neighborhood.

During July, the synoptic activity was near normal. Two low pressure areas and a deep depression formed during the month. One of the low pressure areas (13-16 July) and the deep depression (20-21 July) formed over northwest Bay of Bengal, moved west northwestwards along the monsoon trough zone and caused normal to excess rainfall along west coast and over central parts of the country.

In August, only one low pressure area formed. This system (25-29 August) which formed over northwest Bay of Bengal and adjoining coastal Orissa moved west northwestwards and contributed to excess rainfall over the central and peninsular India especially over Gujarat and Rajasthan.

In September, one deep depression and one low pressure area formed. The deep depression which formed over the northwest Bay of Bengal off Orissa coast (5 -7 September) initially moved northwestwards and then west northwestwards resulting in active monsoon conditions all along the west coast and central India. The interaction of the remnant of this system with trough in upper air westerlies also caused good rainfall activity over north India. Towards the end of the season, a well marked low pressure area formed over the west central Bay of Bengal and persisted during 28-30 September. This continued to persist till 5th October 2009 with initial west northwesterly movement upto West Madhya Pradesh and northeasterly movement to Uttar Pradesh till 7th October 2009 before weakening.

Fig.2.4 shows the tracks of depressions and deep depressions formed over Indian seas during the season.

2.5 RAINFALL DISTRIBUTION IN INDIA DURING THE MONSOON SEASON (2009)

The southwest monsoon season (June to September) rainfall for the country as a whole and the four broad geographical regions are as follows

Table 2.1 Southwest monsoon rainfall (June to September) for the country as a whole and four broad homogenous regions

Region	Actual (mm)	Long Period Average (LPA) (mm)	Actual % of LPA	Coefficient Of Variation (CV) % of LPA
All-India	698.1	892.2	78	10
Northwest(NW) India	394.6	611.6	65	19
Central India	795.0	993.9	80	14
South peninsula	682.4	722.6	94	15
Northeast (NE) India	1098.1	1427.3	77	8

The season rainfall is classified as normal when the actual rainfall is within LPA ± CV. The CV for season rainfall over various regions is given in the table above. Similarly season rainfall is classified as deficient when the actual rainfall is less than (LPA – CV) and as excess when the actual rainfall is more than (LPA+CV). Accordingly the 2009 season rainfall over the country as a whole was deficient (78% of LPA), and was the lowest recorded rainfall in recent decade. Similarly season rainfalls over NW India (65% of LPA), Central India (80% of LPA), and NE India (77% of LPA) were also deficient and that over South Peninsula (94% of LPA) was normal.

The sub-divisionwise season rainfall is shown in Fig.3. The rainfall recorded over 22 out of 36 subdivisions was deficient. Out of the remaining 14 subdivisions, only 3 subdivisions (Saurashtra & Kutch, North Interior Karnataka and South Interior Karnataka) recorded excess rainfall and remaining 11 subdivisions recorded normal rainfall. Out of 511 meteorological districts for which data are available, 217 districts (42) % of the meteorological districts received excess/normal rainfall and the remaining 294 districts (58%) received deficient/scanty rainfall during the season.

The monthly monsoon rainfall over the country as a whole during all the months was below the respective LPA. However, the rainfall during July (96% of LPA) was within the normal limit. Monsoon rainfall over the country as a whole was 53% of LPA during June, 73% of LPA in August and 80% of LPA during September.

In June, large rainfall deficiency was observed over most parts of the country due to prolonged hiatus in the monsoon advance over central and northern parts of the country. During July, rainfall over most of the subdivisions along the foothills of Himalayas and few in the eastern side of the Peninsula were highly deficient. The rainfall over most of the subdivisions along the monsoon trough zone region and along west coast was normal/excess due to the strengthening of monsoon over these regions in association with the passage of fast moving synoptic scale systems from Bay region along the monsoon trough zone. In August rainfall over most of the subdivisions along the west coast and that over NW India & neighboring central India were highly deficient. In September the rainfall over all subdivisions from south Peninsula & neighboring central India and that over few subdivisions from north was normal or excess. Rainfall over other subdivisions was deficient or scanty.

2.6 WITHDRAWAL OF MONSOON SEASON 2009

Like last two years, this year also there was delay in the withdrawal of southwest monsoon due to rainfall activity over north India in associated with the mid latitude westerly activities. The withdrawal of SW Monsoon from west Rajasthan started only on 25th September (a delay of more than 3 weeks). The normal date of withdrawal to start from extreme western parts of

Rajasthan is 1st September. Subsequently, it withdrew from most parts of the northwestern states and from the northern parts of Gujarat on 28th September.

(Note: Sources of this Chapter have been taken from "end of Monsoon report-2009" 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 2009 covered various river basins and States. A total of 4010 forecast were issued during 2009. The performance of flood forecasting (Basinwise and Riverwise), Statewise, Divisionwise and for the period 1986 to 2009 are given from **Annex-II to VI.**

3.4 RIVERWISE DETAILS OF FLOOD FORECASTING ACTIVITES & ACCURACY OF FORECAST

3.4.1 Brahmaputra Basin

During the flood season 2009, analysis of the flood forecasts issued reveals that out of 4010 forecasts, 1806 forecasts (45.03% of 4010 forecast) were issued for 24 sites located on the main Brahmaputra and tributaries. Out of these, 1800 (99.67%) were found within permissible limit of accuracy.

3.4.2 Barak and Meghna Basin

During the flood season 2009, 89 forecasts (2.22% of 4010) were issued for five sites. Out of these, 89 forecasts (100 %) forecasts were found within permissible limit of accuracy

3.4.3 Ganga Basin

During the flood season 2009, 1399 forecasts (34.88% of 4010) were issued for 49 sites, out of total 87 sites located on the main Ganga and its tributaries. No forecast was issued for the remaining 38 sites. Out of these, 1366 forecasts (97.64%) were found within permissible limit of accuracy.

3.4.4 Eastern Rivers Basins including Mahanadi

During the flood season 2009, 128 forecasts (3.19% of 4010) were issued for all nine sites and 121 (94.5%) forecasts were found within permissible limit of accuracy. Also 72 forecasts (1.79 % of 4010) were issued for four sites located on the Mahanadi river basin, of which 70 forecasts (97.22 %) were found within permissible limit of accuracy.

3.4.5 Godavari Basin

During the flood season 2009, 7 forecasts (0.17 % of 4010) were issued for all forecasting sites, of which 6 forecasts were found with 85.7 percent accuracy.

3.4.6 Krishna Basin

During the flood season 2009, 439 forecasts (10.95% of 4010) were issued for eight forecasting sites and 408 forecasts (92.9 %) were found within permissible limit of accuracy.

The highlight of this year is the unprecedented flood situation in Tungabhadra sub –basin as well as in the reservoirs in Middle Krishna sub – basin. The river Tungabhadra at Mantralayam crossed the previous HFL on

the night of 1st October 2010 and attained a peak level of 318.77 m on 2nd October 2010. This peak level was 2.97m above the previously recorded HFL of 315.80 m attained in November 1992. T Ramapuram, the base station of this forecast station also crossed the previous HFL. Due to combined effect of rainfall and upstream releases, the P D Jurala Project and Srisailam project on river Krishna received their highest ever inflow on record. The inflow into Srisailam project was much higher than the design capacity of the dam due to which the reservoir level rose menacingly and attained a peak level of 273.25 m compared to Full reservoir level of 269.75m. Base Stations such as Huvinahedgi, Deosugur, Krishna Agraharam, on river Krishna and Bawapuram on river Tungabhadra also attained their respective HFLs.

3.4.7 West Flowing Rivers

During the flood season 2009, for the West-flowing Rivers which comprises of the Narmada, the Tapi etc, 60 forecasts (1.5% of 4010) were issued for sites, out of fifteen sites. Here, 57 forecasts (95 %) were found within permissible limit of accuracy.

The Basinwise – Riverwise flood forecasting information in India during flood season 2009 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 2009, is given in **Annex –III.** Their salient features are as under:

3.5.1 Andhra Pradesh

During the flood season 2009 out of 9 level forecasting sites and 7 inflow forecasting sites, no forecast was required on 8 level forecast station viz., Kaleswaram, Eturunagaram, Dummagudem, Bhadrachalam, Kunavaram, Rajahmundry, Dowlaiswaram on river Godavari and Nellore Anicut on river North Pennar and 3 inflow forecast stations viz., Sriramsagar on river Godavari, Singur and Nizamsagar on river Manjira.

The river Tungabhadra at level forecast station at Mantralayam recorded Unprecedented flood and attained a new HFL of 318.77 m. This was 2.97 m above its previously recorded HFL of 315.80 m attained in November 1992.

The river Krishna at inflow forecast station at Priyadarshini Jurala Project and Srisailam Dam recorded the highest on record average daily inflow on 3rd October 2010 as well as the Maximum Water Level ever recorded after completion of the Project.

It is revealed that 17 level forecasts and 208 inflow forecasts, out of which 16 forecasts (94.12 %) and 193 forecasts (92.79%) 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 2009 season, 1753 forecasts out of 1757 forecasts (99.77 %) were found within limit of accuracy. River Desang at Nanglamoraghat flowed within 0.5 m of its previous HFL during the year 2009.

3.5.3 Bihar

In the state of Bihar, there were 32 level forecasting sites. Out of these 32 sites, forecasts were issued in 24 sites during the year 2009. Out of 775 forecasts during the flood season 2009, 770 forecasts (99.35 %) were found within limit of accuracy. River Kosi at Basua and river Bagmati at Benibad flowed within 0.5 m of its previous HFL in the year 2009.

3.5.4 Chhattisgarh

In the state of Chhattisgarh there was only one level flood forecasting site (i.e. Jagdalpur) on the Indravathi river (a tributary of the Godavari River). No forecast was issued for this station during the flood season 2009.

3.5.5 Gujarat

There were 11 flood forecasting sites in the state of Gujarat including five inflow forecasting sites. However, the forecasts were issued for only three inflow forecasting sites. Out of 18 forecasts issued, 18 forecasts (100%) were found within limits of accuracy during the flood season 2009.

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 2009 also. Instead data from an upstream site, namely, Hathni Kund Barrage were collected. Consequently, the analysis of the forecasts data did not explain / reveal any flood situations in the state.

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 2009, Out of 91 inflow forecasts, 86 inflow forecasts (94.5 %) and all 34 level forecasts (100 %) were found within limit of accuracy.

3.5.8 Karnataka

There were four flood forecasting sites in the state of Karnataka which includes three inflow forecasting sites and one level forecasting site, namely, Deongaon on the river Bhima, tributary of the Krishna. During the flood season 2009, out of 216 inflow forecasts issued for 3 stations as well as 8 level forecasts, 202 inflow (93.5%) and 7 level forecast (87.5%) respectively 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 2009, 11 level forecasts were issued for Hoshangabad out of which 10 (90.91%) were within limits of accuracy.

3.5.10 Maharashtra

There were eight forecasting sites including two inflow forecasting sites, in the state of Maharashtra. During the flood season 2009, forecasts were issued for two level forecasting sites viz., Bhandara and Pauni. Inflow forecasts were issued for 1 inflow forecast station out of the two. It is seen that out of 7 level forecasts, 6 level forecasts (85.71 %) were found within limit of accuracy. 31 inflow forecasts were issued for Hatnur Dam and 29 (93.55%) were within limits of accuracy.

3.5.11 Orissa

In the state of Orissa, 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 2009, 132 level forecasts (94.29 %) out of 140 level forecasts were found within limit of accuracy. For inflow forecasting site 49 forecasts (98%) out of 50 forecasts were found within limit of accuracy.

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. Forecasts were issued for only Sonamura. During the flood season 2009, 1 forecast was issued to Sonamura which was within limit of accuracy (100 %).

3.5.13 Uttarakhand (formerly called Uttaranchal)

There were three level forecasting sites in the state of Uttaranchal, namely, Srinagar on the Alaknanda, Rishikesh and Haridwar on the main river

Ganga. Forecasts were issued for only Haridwar in 2009. 1 forecast was issued to Haridwar but that was not within limit of accuracy (0 %).

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 2009, forecasts were issued for 23 stations. Out of 359 level forecasts, 340 forecasts (94.71%) were found within limit of accuracy. Further out of 4 inflow forecasts, 3 (75 %) were found within limit of accuracy. River Ghagra at Elgin Bridge and Ayodhya attained their respective new HFL during October 2009.

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 2009, forecasts were issued for 12 sites (9 level and three inflow stations). Out of 228 level forecasts, 225 forecasts (98.68 %) were found within limit of accuracy. Out of 49 inflow forecasts, 49 (100 %) were found within limit of accuracy. River Mayurakshi at Harinkhola flowed within 0.5 m of its previous HFL.

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 2009.

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 2009, Out of 5 forecasts, 4 forecasts (80 %) were within limits of accuracy.

The performance of flood forecasting Stations (Divisionwise) in India during flood season 2009 is given in **Annex-IV.**

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

3.6 AN OVERVIEW OF FLOOD FORECASTING PERFORMANCE

During the flood season 2009, an average number of flood forecasts issued per forecasting site were 37.48. The number of forecasting sites where the performance accuracy of the issued forecasts was found above 97.93 % (National average for flood season 2009) was 80 sites (74.75 %) which includes 72 stations (67.29 %) flood forecasting stations having 100 % accurate forecast.

The flood forecasting performance of the level forecasting as well as inflow forecasting sites from 1986 to 2009 is given in **Annex-VII and Fig 3.1 and Fig 3.2.**

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 2009 season varies from a maximum of 100% for Barak Basin and its tributaries to a minimum of 85.7% for the Godavari basin. The overall accuracy performance was of the order of 97.83% for the country as a whole.

There was one site namely Haridwar on river Ganga where one forecast was issued but was beyond the prescribed limit of accuracy during the flood season 2009. Sitewise "Forecast Performance" out of 175 operational sites in flood season 2009 is shown in **Table 3.1**.

Table 3.1 Site wise "Forecast Performance" of flood forecasting sites of CWC in Flood Season, 2009

Sl. No.	Details of sites within different range of permissible limit of accuracy (±15cm,±20%cumec)	Flood Season 2009	
		No. of Sites	% age
1	Sites with performance accuracy between 0.0 % to 25.0%	1	0.93
2	Sites with performance accuracy between 25.1 % to 50.0%	0	Nil
3	Sites with performance accuracy between 50.1 % to 75.0%	3	2.80%
4	Sites with performance accuracy between 75.1 % to 99.99%	31	28.98%
5	Sites with 100% performance accuracy i.e. where all forecasts issued were within permissible limit of accuracy	72	67.29%
6	Total sites where forecasts were issued	107	

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 2009. Out of 147 level forecasting sites, water levels at sites (excluding Kanpur), equaled or exceeded their warning levels at 80 sites and at 44 sites, the flood level exceeded the danger levels. Unprecedented floods, exceeding previous highest flood levels (HFL), were experienced at 5 sites, and the levels were recorded within 0.5 m of their respective H.F.L at 8 more sites exclusively (total 13 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 2009, 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 2009, the unprecedented flood occurred at Elgin Bridge and Ayodhya on Ghagra, a major tributary of Ganga. Refer **Annex-VIII.** High flood events occurred at Elgin Bridge and Ayodhya on Ghaghra, Benibad on Bagmati, Basua on Kosi Harinkhola on Mayurakshi 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 2009. The details are shown below.

During the flood season 2009, no unprecedented flood situation was witnessed. However, Nanglamoraghat on river Desang was flowing in 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. Forecasts were issued for 4 sites during the flood season 2009, excluding Kailashahar. The occurrence of Moderate and 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 Orissa. During the flood season 2009, flood forecasts were issued for all forecasting sites. There was no Unprecedented and High Flood situation. The occurrence of Moderate and low floods is given in **Annex-XII**.

4.6 FLOOD EVENTS IN THE 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 Orissa. During the flood season 2009, 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 the no "Unprecedented" flood occurred. However, the moderate and low flood events observed are given in **Annex -XII**.

4.7 FLOOD EVENTS IN THE 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 2009. 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 2009 season no unprecedented or high flood events were recorded in this Basin. The details of moderate and low events are shown in **Annex-XII**.

4.8 FLOOD EVENTS IN 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, 2009. 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 2009, the unprecedented flood occurred at Mantralayam on Tungabhadra, a major tributary of Krishna. Refer **Annex-VIII.** The inflow forecast station at P D Jurala and Srisailam Dam on river Krishna recorded their heaviest inflow and as the inflows were beyond the discharge capacity of the gates, the reservoir level at Srisailam crossed the MWL and a new MWL of 273.25 m was recorded on 3rd October 2009. The details of moderate and low events are shown in **Annex-XII**.

4.9 FLOOD EVENTS IN WEST FLOWING RIVERS

The important west flowing rivers include the Banas, the Sabarmati, the Mahi, the Narmada, the Tapi, and the Damanganga rivers. 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 2009, only inflow forecasts were issued at Hatnur Dam and Ukai Dam on river Tapi and at Madhuban dam on Damanganga.

During the flood season, 2009, there were no major flood events in West flowing river system.

4.10 FLOOD EVENTS IN SOUTHERN RIVER SYSTEM

There was one forecasting site at Nellore on the Pennar River. During 2009, no forecast was necessary, as the river did not cross warning level.

4.11 AN OVERVIEW OF FORECAST EVENTS

The unprecedented events were experienced at 3 sites in the year 2009 in the rivers Tungabhadra and Ghaghra, and "High" flood events occurred at 7 sites. No forecasts were issued at 68 sites (60 level forecast sites and 8 inflow forecast sites)

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 2009

Abstract of some of the messages received by our field unit during the flood season 2009 are given below:

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

Lr. no: FC-II-CWC-28/08/ dated 30.10.2009

"For the flood-2009 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 District Magistrate & Collector, Balasore, Orissa.

Lr. no: FC-II-CWC-28/08/ dated 30.10.2009

"Hourly messages on the water level in different rivers during flood/ heavy rain by the CWC is very much essential. It gives us a graphic picture on the flow of water which is beneficial for taking precautionary measures."

5.2.3 Chief Engineer, Water Resources Department, Siwan. (Bihar)

"The daily water level and forecasting bulletins during the period 15th June to 31st October 2009 are regularly received in this office, which is quite appreciable. These bulletins are useful to us. Thank you very much for the same."

Fig 1.1

ORGANISATIONAL CHART OF FLOOD FORECASTING & WARNING SET UP OF CENTRAL WATER COMMISSION

CHIEF ENGINEER OFFICE	9
DIRECTORATE	1
CIRCLE OFFICE	11
DIVISION OFFICE	20

Fig 2.1

भारत मौसम विज्ञान विभाग
INDIA METEOROLOGICAL DEPARTMENT

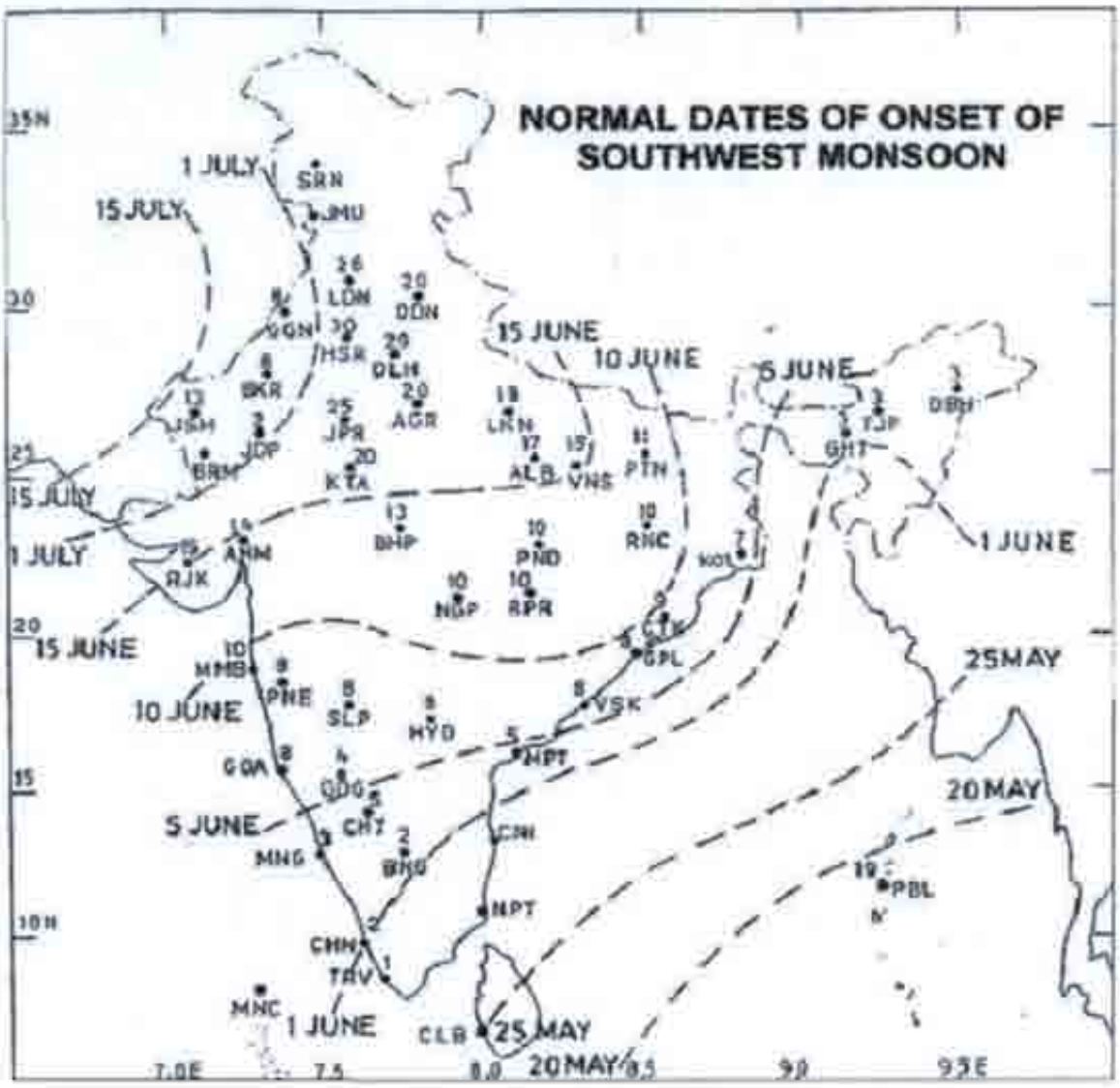


Fig 2.2

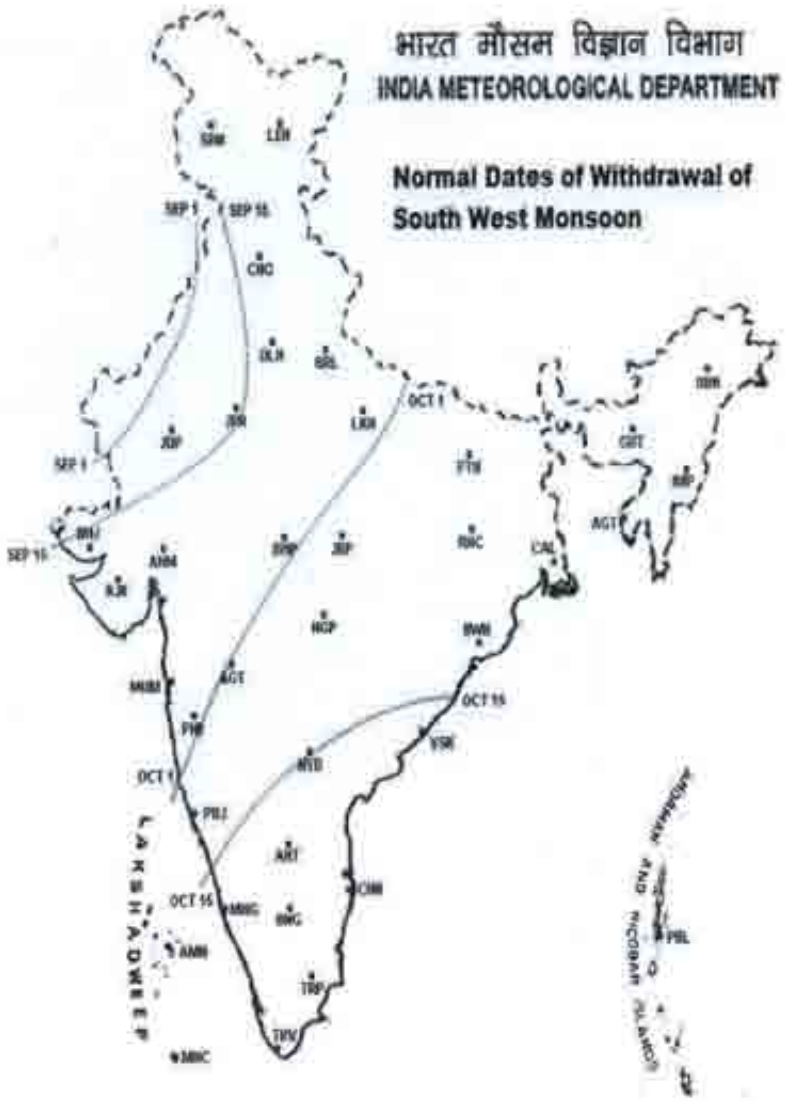

भारत मौसम विज्ञान विभाग
INDIA METEOROLOGICAL DEPARTMENT
Normal Dates of Withdrawal of
South West Monsoon
SEP 1
SEP 15
OCT 1
OCT 15
LAKSHADWEEP
ANDAMAN AND NICOBAR ISLANDS

Fig 2.3

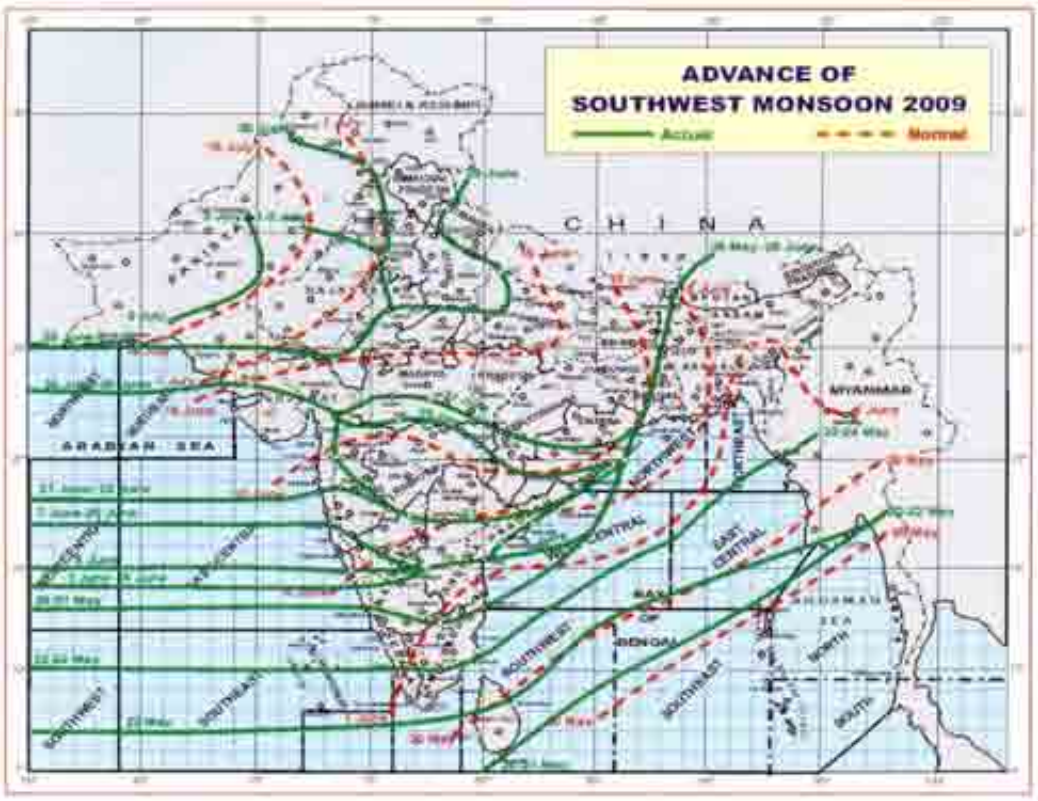

ADVANCE OF
SOUTHWEST MONSOON 2009
Actual
Normal
C H I N A
MYANMAR
ARABIAN SEA
BAY OF BENGAL
SOUTHWEST
SOUTHEAST
NORTHWEST
NORTHEAST
EAST CENTRAL
SOUTH

Fig 2.4

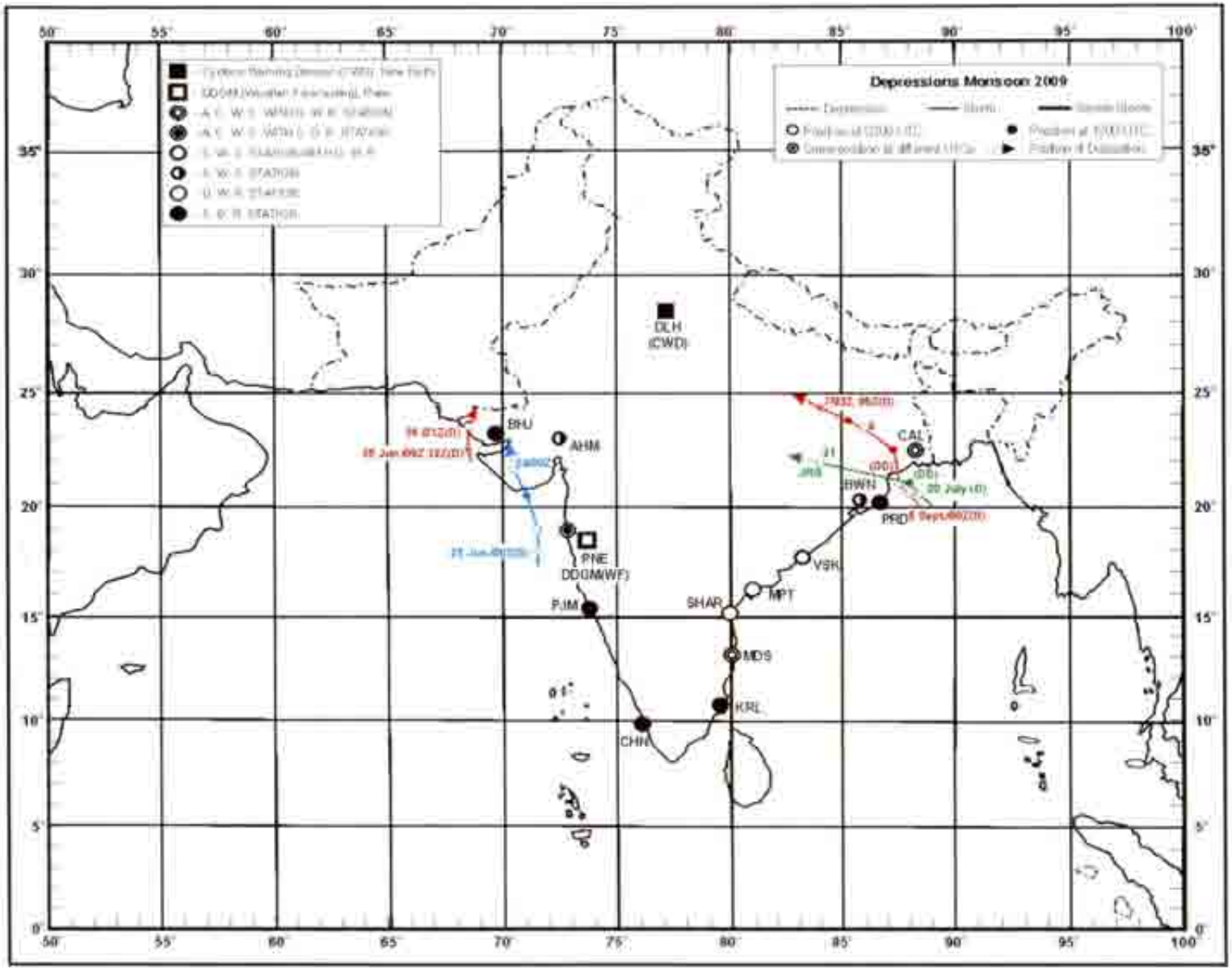
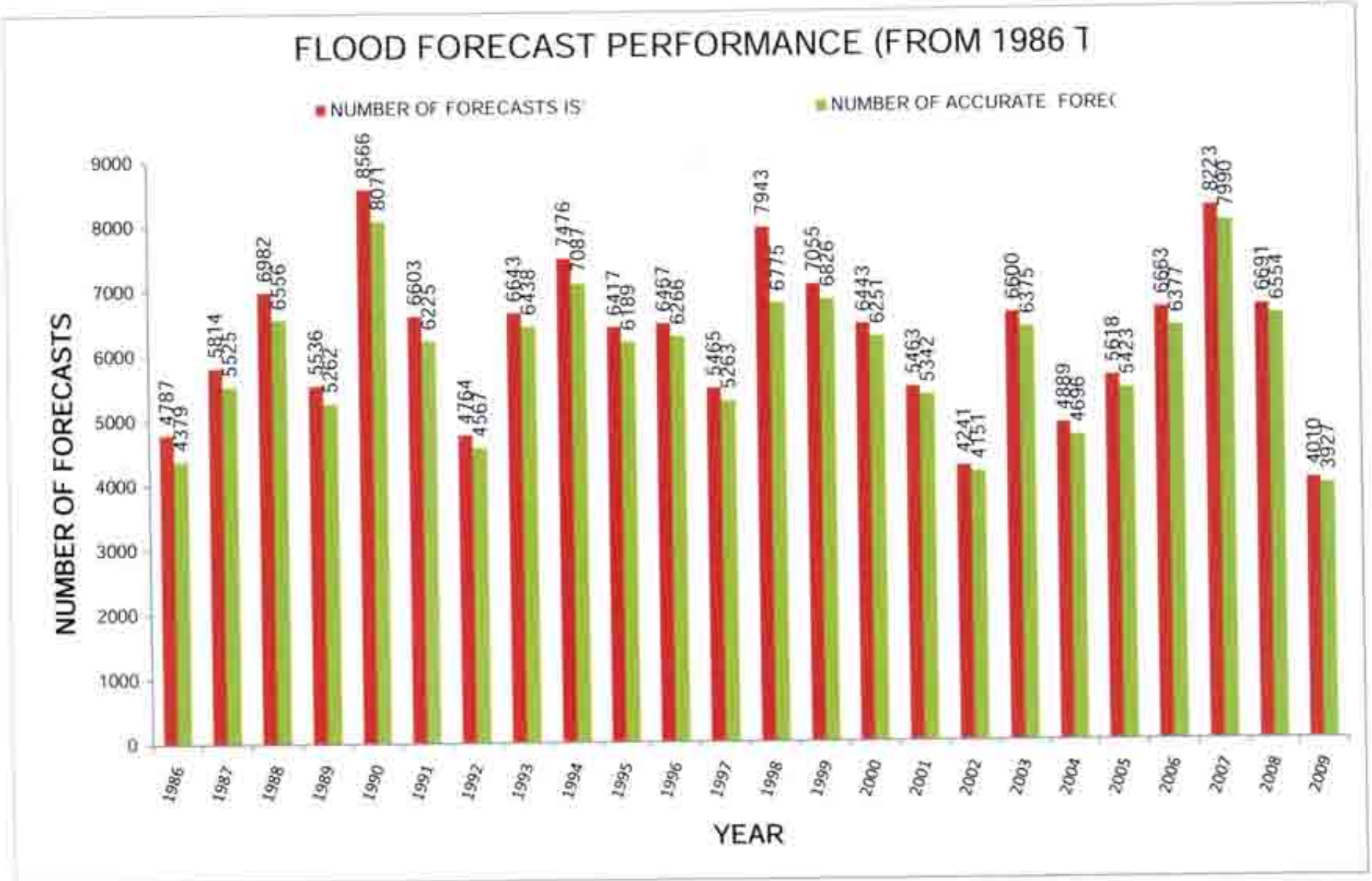

Depressions Monsoon 2009
DLH
(CWD)
BHU
AHM
PNE
DDGM(WF)
PJM
CHN
SHAR
MPT
VSK
MDS
KRL
CAL
BBSR
PRD

Fig 3.1


FLOOD FORECAST PERFORMANCE (FROM 1986 T
NUMBER OF FORECASTS IS
NUMBER OF ACCURATE FOREC
NUMBER OF FORECASTS
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4000
5000
6000
7000
8000
9000
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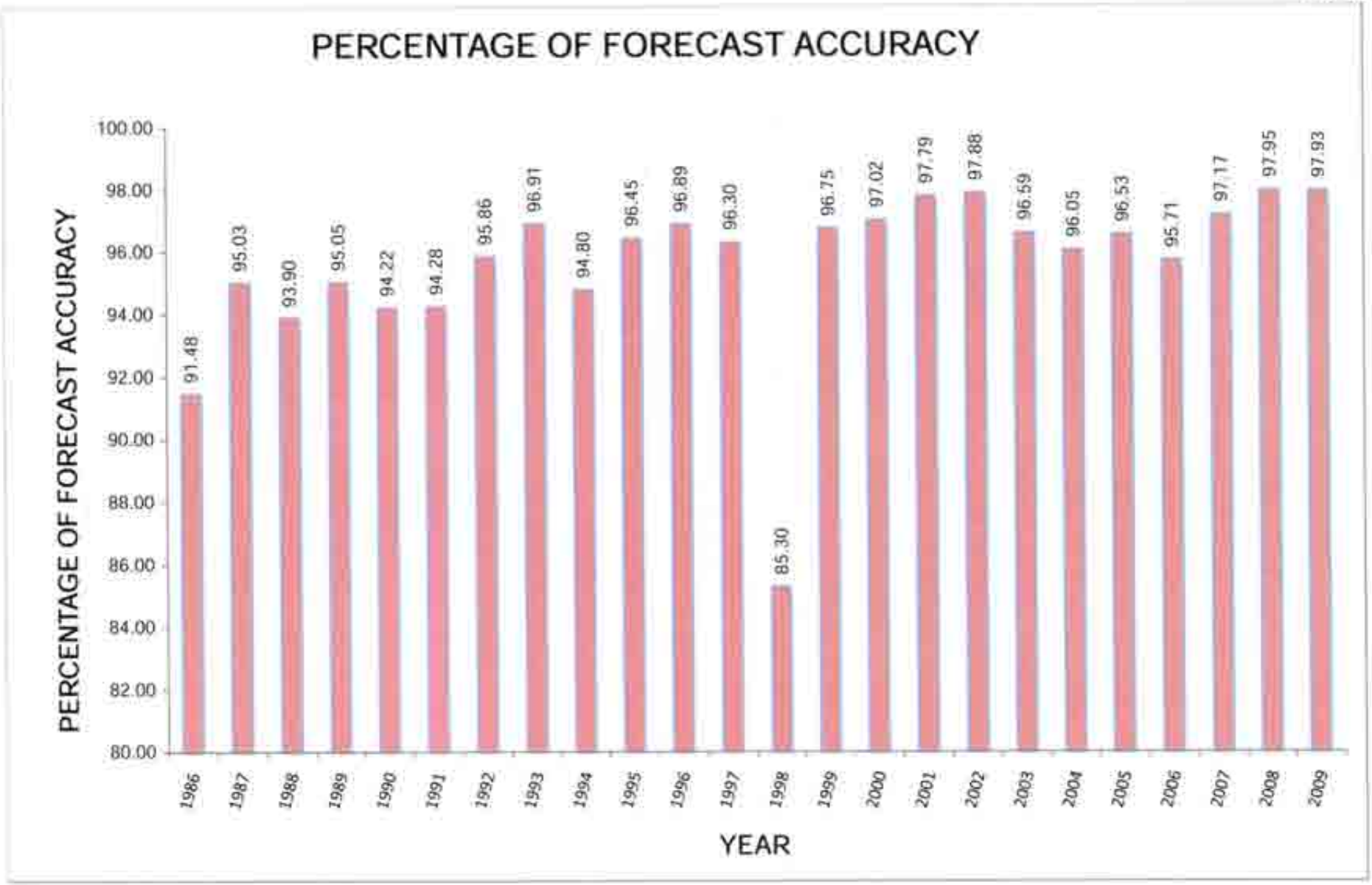
1987 5814 5525
1988 6982 6556
1989 5536 5262
1990 8566 8071
1991 6603 6225
1992 4764 4567
1993 6643 6438
1994 7476 7087
1995 6417 6189
1996 6467 6266
1997 5465 5263
1998 7943 6775
1999 7055 6826
2000 6443 6251
2001 5463 5342
2002 4241 4151
2003 6600 6375
2004 4889 4696
2005 5618 5423
2006 6563 6377
2007 8223 7990
2008 6691 6554
2009 4010 3927

Fig 3.2


PERCENTAGE OF FORECAST ACCURACY
PERCENTAGE OF FORECAST ACCURACY
100.00
98.00
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92.00
90.00
88.00
86.00
84.00
82.00
80.00
91.48
95.03
93.90
95.05
94.22
94.28
95.86
96.91
94.80
96.45
96.89
96.30
85.30
96.75
97.02
97.79
97.88
96.59
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96.53
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2006
2007
2008
2009
YEAR

Annex I

List of Real time data stations and Wireless Control Stations (Wireless stations in CWC) in 2009 season.

(a) North -east Region: Stations under Brahmaputra, Barak, Meghna and Tista and their tributaries (102 nos) Page-1

Sl.No.	Division	Real Time station	TM	Sl.No	Division	Real Time station	TM	Sl.No.	Division	Real Time station	TM
1	UBD Dibrugarh	Badatighat		36	MBD Guwahati	Goalpara		71	LBD Jalpaiguri	Ghish	
2	UBD Dibrugarh	Bhalukpong (#)		37	MBD Guwahati	Guwahati_Circle (*)		72	LBD Jalpaiguri	Chel	
3	UBD Dibrugarh	Bihubar		38	MBD Guwahati	Guwahati_DC (#)		73	LBD Jalpaiguri	Neora	
4	UBD Dibrugarh	Bokajan		39	MBD Guwahati	Guwahati_Div (*)		74	LBD Jalpaiguri	Dhubri	
5	UBD Dibrugarh	Chenimari (Khowang)		40	MBD Guwahati	Guwahati_Pandu		75	LBD Jalpaiguri	Diana	
6	UBD Dibrugarh	Chouldhowaghat		41	MBD Guwahati	Chowki		76	LBD Jalpaiguri	Domohani	
7	UBD Dibrugarh	Desangpani		42	MBD Guwahati	ORF		77	LBD Jalpaiguri	Gazaldoba	
8	UBD Dibrugarh	Dharamtul		43	MBD Guwahati	Melabazar		78	LBD Jalpaiguri	Ghugumari	
9	UBD Dibrugarh	Dholla Bazar		44	MBD Guwahati	N.T.Rd.Xing (Pag)		79	LBD Jalpaiguri	Golokganj	
10	UBD Dibrugarh	Dibrugarh_Div (*)		45	MBD Guwahati	Nalbari (*)		80	LBD Jalpaiguri	Hashimara	
11	UBD Dibrugarh	Dibrugarh_Sub div (*)	*	46	MBD Guwahati	Suklai		81	LBD Jalpaiguri	Jalpaiguri Div. CR(*)	
12	UBD Dibrugarh	Dilighat		47	MBD Guwahati	NH Rd.Xing (Put)		82	LBD Jalpaiguri	Kahnitar	
13	UBD Dibrugarh	Gelabil		48	MBD Guwahati	Amarpur		83	LBD Jalpaiguri	Kokrajhar	
14	UBD Dibrugarh	Golaghat		49	MBD Guwahati	Amraghat		84	LBD Jalpaiguri	Majithar	
15	UBD Dibrugarh	Itanagar (Naharlagan) (*)		50	MBD Guwahati	Annapurnaghat		85	LBD Jalpaiguri	Mathabhanga	
16	UBD Dibrugarh	Jorhat (*)		51	MBD Guwahati	Badarpurghat		86	LBD Jalpaiguri	Mathanguri	
17	UBD Dibrugarh	Kabu Basti_Kambang	T	52	MBD Guwahati	Chotabekra		87	LBD Jalpaiguri	Mekhliganj	
18	UBD Dibrugarh	Kampur		53	MBD Guwahati	Dholai		88	LBD Jalpaiguri	Murti	
19	UBD Dibrugarh	Kheronighat		54	MBD Guwahati	Gharmura		89	LBD Jalpaiguri	N.H.31_Jaldhaka	
20	UBD Dibrugarh	KM65-Yingkiang	T	55	MBD Guwahati	Karimganj		90	LBD Jalpaiguri	Nagrakata	
21	UBD Dibrugarh	Margherita		56	MBD Guwahati	Lakhipur		91	LBD Jalpaiguri	NH Rd.Xing_Ale	
22	UBD Dibrugarh	Miao		57	MBD Guwahati	Manughat		92	LBD Jalpaiguri	NH Rd.Xing (Manas)	
23	UBD Dibrugarh	Motipur (#)		58	MBD Guwahati	Matizuri		93	LBD Jalpaiguri	Panbari	
24	UBD Dibrugarh	Seppa		59	MBD Guwahati	Silchar (*)		94	LBD Jalpaiguri	Rangpo	
25	UBD Dibrugarh	N.T.Rd.Xing_Jiabharali		60	MBD Guwahati	Kailashahar		95	LBD Jalpaiguri	Sankalan	
26	UBD Dibrugarh	Nagaon (*)		61	MBD Guwahati	Sonamura		96	LBD Jalpaiguri	Sankosh LRP	
27	UBD Dibrugarh	Naharkatia		62	LBD Jalpaiguri	Bahalpur		97	LBD Jalpaiguri	Saralpara	
28	UBD Dibrugarh	Namsai		63	LBD Jalpaiguri	Barabisha		98	LBD Jalpaiguri	Sevoke	
29	UBD Dibrugarh	Nanglamoraghat		64	LBD Jalpaiguri	Barpeta Road (*)		99	LBD Jalpaiguri	Siliguri (*)	
30	UBD Dibrugarh	Neamatighat		65	LBD Jalpaiguri	Beki Road Bridge		100	LBD Jalpaiguri	Singlabazar	
31	UBD Dibrugarh	Numaligarh		66	LBD Jalpaiguri	Champasarai (sili)		101	LBD Jalpaiguri	Tistabazar	
32	UBD Dibrugarh	Passighat	T	67	LBD Jalpaiguri	Chepan (Raidak-1)		102	LBD Jalpaiguri	Tufanganj	
33	UBD Dibrugarh	Sivasagar		68	LBD Jalpaiguri	Cooch behar					
34	UBD Dibrugarh	Tezpur		69	LBD Jalpaiguri	CoronationBridge					
35	UBD Dibrugarh	Tezu		70	LBD Jalpaiguri	Lish ($$)					

Note: (#) Data through Telephone/ Spl.Messenger/ Temporary Wirelss

($$) Communication temporarily suspended.

T Telemetry

* Divisional/Sub - Division Control Room

(b) Ganga Basin: Stations under Ganga and its various tributaries (205 nos) Page-2

Sl.No.	Division	Real Time station	TM	Sl.No.	Division	Real Time station	TM	Sl.No.	Division	Real Time station	TM
1	HGDivn DHRN	Dehradun Div CR(*)		36	MGD1 Lucknow	Gonda (*)		71	MGD5 Patna	Farakka	
2	HGDivn DHRN	Deoprayag_Ganga		37	MGD1 Lucknow	Gorakhpur_Birdghat (*)		72	MGD5 Patna	Gangpur Siswan	
3	HGDivn DHRN	Haridwar		38	MGD1 Lucknow	Haldwani (S/D) (*)		73	MGD5 Patna	Gaya	
4	HGDivn DHRN	Joshimath		39	MGD1 Lucknow	Kakardhari		74	MGD5 Patna	Hathidah	
5	HGDivn DHRN	Karnaprayag _Alak		40	MGD1 Lucknow	Kakarhi		75	MGD5 Patna	Hazipur	
6	HGDivn DHRN	Marora		41	MGD1 Lucknow	Katerniaghat		76	MGD5 Patna	Inderpuri	
7	HGDivn DHRN	Rrishikesh		42	MGD1 Lucknow	Lucknow_MGD-1Div (*)		77	MGD5 Patna	Japla	
8	HGDivn DHRN	Rudraprayag_DS		43	MGD1 Lucknow	Mukhlishpur		78	MGD5 Patna	Kahalgaon	
9	HGDivn DHRN	Srinagar		44	MGD1 Lucknow	Paliakalan		79	MGD5 Patna	Kinjer	
10	HGDivn DHRN	Tehri (Zero Point)		45	MGD1 Lucknow	Regauli		80	MGD5 Patna	Koelwar	
11	HGDivn DHRN	Uttarkashi		46	MGD1 Lucknow	Tawaghat		81	MGD5 Patna	Lalganj	
12	MGD2 Lucknow	Ankinghat		47	MGD1 Lucknow	Trimohanighat		82	MGD5 Patna	Maner	
13	MGD2 Lucknow	Bani		48	MGD1 Lucknow	Turtipar		83	MGD5 Patna	Munger	
14	MGD2 Lucknow	Bareily S/D (*)		49	MGD1 Lucknow	Uskabazar		84	MGD5 Patna	Palmerganj	
15	MGD2 Lucknow	Bhatpurvaghat		50	MGD3 Varanasi	Ballia		85	MGD5 Patna	Patna_Divn 5 (*)	
16	MGD2 Lucknow	Dabri		51	MGD3 Varanasi	Chhatnag-Allbd (S/D)(*)		86	MGD5 Patna	Gandhighat	
17	MGD2 Lucknow	Dalmau		52	MGD3 Varanasi	Chopan		87	MGD5 Patna	Rewaghat	
18	MGD2 Lucknow	Fatthegarh		53	MGD3 Varanasi	Gazipur		88	MGD5 Patna	Sahibganj	
19	MGD2 Lucknow	Kannauj		54	MGD3 Varanasi	Jaunpur		89	MGD5 Patna	Sripalpur	
20	MGD2 Lucknow	Kanpur		55	MGD3 Varanasi	Karrah		90	MGD4 Patna	Ahirwalia	
21	MGD2 Lucknow	Kanpur_SD (*)		56	MGD3 Varanasi	Kuldah Bridge		91	MGD4 Patna	Balan (H/W)	
22	MGD2 Lucknow	Lucknow (MGD-2) Div (*)		57	MGD3 Varanasi	Mirzapur		92	MGD4 Patna	Battara	
23	MGD2 Lucknow	Moradabad S/D (*)		58	MGD3 Varanasi	Phaphamau (#)		93	MGD4 Patna	Basua	
24	MGD2 Lucknow	Narora Barrage		59	MGD3 Varanasi	Sitamarhi		94	MGD4 Patna	Begusarai (*)	
25	MGD2 Lucknow	Neemsar		60	MGD3 Varanasi	Sultanpur		95	MGD4 Patna	Benibad	
26	MGD2 Lucknow	Rae Bareily		61	MGD3 Varanasi	Azamgarh		96	MGD4 Patna	Birpur	
27	MGD2 Lucknow	Shardanagar		62	MGD3 Varanasi	Varanasi (Circle) (*)		97	MGD4 Patna	Chanpatia	
28	MGD1 Lucknow	Ayodhya		63	MGD3 Varanasi	Varanasi (Divn) (*)		98	MGD4 Patna	Chargharia	
29	MGD1 Lucknow	Balrampur		64	MGD3 Varanasi	Rewa (S/D) (*)		99	MGD4 Patna	Chatia	
30	MGD1 Lucknow	Banbasa		65	MGD5 Patna	Bhagalpur (*)		100	MGD4 Patna	Darbhanga (*)	
31	MGD1 Lucknow	Bansi		66	MGD5 Patna	Buxar		101	MGD4 Patna	Dhengraghat	
32	MGD1 Lucknow	Basti		67	MGD5 Patna	Chappra (*)		102	MGD4 Patna	Ekmighat	
33	MGD1 Lucknow	Bhinga		68	MGD5 Patna	Daltonganj		103	MGD4 Patna	Galgalia	
34	MGD1 Lucknow	Chanderdeepghat		69	MGD5 Patna	Darauli		104	MGD4 Patna	Hayaghat	
35	MGD1 Lucknow	Elgin Bridge		70	MGD5 Patna	Dehri on Sone (*)		105	MGD4 Patna	Jainagar	

Annex I

(b) Ganga Basin: Stations under Ganga and its various tributaries (205 nos) Page-3

Sl.No.	Division	Real Time station	TM	Sl.No.	Division	Real Time station	TM	Sl.No.	Division	Real Time station	TM
106	MGD4 Patna	Jhanjharpur		141	DD Asansol	Kushkami		176	UYD DELHI	Mohna	T
107	MGD4 Patna	Jhawa		142	DD Asansol	Lalgarh		177	UYD DELHI	Naugaon	T
108	MGD4 Patna	Kamtaul		143	DD Asansol	Maharo		178	UYD DELHI	New Delh (*)	
109	MGD4 Patna	Khadda		144	DD Asansol	Maithon Dam (*)	T	179	UYD DELHI	Paonta	T
110	MGD4 Patna	Khagaria		145	DD Asansol	Massanjore Dam		180	UYD DELHI	Tajewala	
111	MGD4 Patna	Kursela		146	DD Asansol	Midnapur (*)		181	UYD DELHI	Tuini_Tons	T
112	MGD4 Patna	Lalbegiaghat		147	DD Asansol	Nandadih	T	182	UYD DELHI	Yashwant nagar	T
113	MGD4 Patna	Muzaffarpur (Sikandarpur) (*)		148	DD Asansol	Narayanpur		183	LYD AGRA	Agra (*)	
114	MGD4 Patna	Patna- Divn 4 (*)		149	DD Asansol	Panchet dam	T	184	LYD AGRA	Agra_PoyiaGhat	T
115	MGD4 Patna	Purnea (*)		150	DD Asansol	Phulberia		185	LYD AGRA	Auriya	
116	MGD4 Patna	Runisaidpur		151	DD Asansol	Purihansha		186	LYD AGRA	Banda	
117	MGD4 Patna	Russera		152	DD Asansol	Putki	T	187	LYD AGRA	Chillaghat	
118	MGD4 Patna	Samsatipur		153	DD Asansol	Ramgarh	T	188	LYD AGRA	Dholpur	
119	MGD4 Patna	Saulighat		154	DD Asansol	Sikatia		189	LYD AGRA	Etawah	
120	MGD4 Patna	Sonebarsha		155	DD Asansol	Simulia		190	LYD AGRA	Garrauli	
121	MGD4 Patna	Taibpur		156	DD Asansol	Suiri (*)		191	LYD AGRA	Hamirpur	
122	MGD4 Patna	Triveni		157	DD Asansol	Tantloi		192	LYD AGRA	Jhansi (*)	
123	MGD4 Patna	Dheng Bridge		158	DD Asansol	Tenughat Dam	T	193	LYD AGRA	Kairnaha	
124	MGD4 Patna	Araria		159	DD Asansol	Tilaiya dam	T	194	LYD AGRA	Kalpi	
125	DD Asansol	Asansol (*)	T	160	DD Asansol	Tilpara Barrage		195	LYD AGRA	Madla (*)	
126	DD Asansol	Bankura (*)		161	DD Asansol	Tusuma		196	LYD AGRA	Mohana	
127	DD Asansol	Barkisuriya	T	162	DD Asansol	Mohanpur		197	LYD AGRA	Sahijina	
128	DD Asansol	Bhowrah		163	UYD DELHI	Baghpat	T	198	LYD AGRA	Naini_Allahabad	
129	DD Asansol	D.P.Ghat		164	UYD DELHI	Dadri		199	CD Jaipur	Baranwada	
130	DD Asansol	Durgapur Barr	T	165	UYD DELHI	Dehradun (*)		200	CD Jaipur	Barod	
131	DD Asansol	Gheropara		166	UYD DELHI	Delhi Rly.Bridge	T	201	CD Jaipur	Jaipur (*)	
132	DD Asansol	Harinkhola	T	167	UYD DELHI	Dhansa Regulator		202	CD Jaipur	Khatoli	
133	DD Asansol	Hendegir	T	168	UYD DELHI	Haripur	T	203	CD Jaipur	Kota Barrage (*)	
134	DD Asansol	Jamtara		169	UYD DELHI	Hathihari (Bausari)	T	204	CD Jaipur	Mandesal	
135	DD Asansol	Kangsabati dam		170	UYD DELHI	Jataon barrage		205	CD Jaipur	Pali	
136	DD Asansol	Kharidwar		171	UYD DELHI	Kalanaur	T				
137	DD Asansol	Khusiary		172	UYD DELHI	Karnal					
138	DD Asansol	Kolkata (Salt Lake) (*)		173	UYD DELHI	Masani					
139	DD Asansol	Kolkata (Writer's Building)		174	UYD DELHI	Mathura	T				
140	DD Asansol	Konar Dam		175	UYD DELHI	Maw	T				

Note: (#) Data through Telephone/ Spl.Messenger/ Temporary Wirelss
($$) Communication temporarily suspended.
T Telemetry
* Divisional/Sub - Division Control Room

Annex I

(C) Peninsular Region Basins (other than Ganga and Brahmaputra Basins) (275 Nos) Page-4											
Sl.No	Division	Real Time station	TM	Sl.No	Division	Real Time station	TM	Sl.No	Division	Real Time station	TM
1	MD Burla	Andhiyakore	T	36	ERD Bbsr	Tikarapara	T	71	ERD Bbsr	Talcher	
2	MD Burla	Baikunthpur	T	37	ERD Bbsr	Akhuapada		72	ERD Bbsr	Thakurmunda	
3	MD Burla	Bamnidhi	T	38	ERD Bbsr	Altuma		73	ERD Bbsr	Jarsikela	
4	MD Burla	Bango Dam	T	39	ERD Bbsr	Padmavati	T	74	ERD Bbsr	Gomlai	
5	MD Burla	Basantpur	T	40	ERD Bbsr	Khandapara	T	75	ERD Bbsr	Mohana	
6	MD Burla	Burla_HirakudDam	T	41	ERD Bbsr	Arampur	T	76	ERD Bbsr	Panposh	
7	MD Burla	Dharamjaygarh	T	42	ERD Bbsr	Indupur		77	ERD Bbsr	Purushottampur	
8	MD Burla	Ghatora	T	43	ERD Bbsr	Rourkela (*)		78	ERD Bbsr	Rajghat	
9	MD Burla	Kantamal	T	44	ERD Bbsr	Balasore (*)		79	ERD Bbsr	Rengali	
10	MD Burla	Kelo_Raigarh	T	45	ERD Bbsr	Berhampur (*)		80	ERD Bbsr	Sorada	
11	MD Burla	Kesinga	T	46	ERD Bbsr	Pubansa		81	ERD Bbsr	Swampatna	
12	MD Burla	Khairmal	T	47	ERD Bbsr	Karas		82	UGD Hyderabad	Aurangabad (*)	
13	MD Burla	Korba	T	48	ERD Bbsr	Marshagai		83	UGD Hyderabad	Bhainsa	T
14	MD Burla	Kurubhata	T	49	ERD Bbsr	Anandpur		84	UGD Hyderabad	Degloor	T
15	MD Burla	Mahupali	T	50	ERD Bbsr	Balimundali		85	UGD Hyderabad	Dhalegaon	T
16	MD Burla	Manedragarh	T	51	ERD Bbsr	Baripada		86	UGD Hyderabad	Dharna Dam (#)	
17	MD Burla	Paramanpur	T	52	ERD Bbsr	Bhubaneswar (*)		87	UGD Hyderabad	Gangakhed	T
18	MD Burla	Pendra road	T	53	ERD Bbsr	Champua		88	UGD Hyderabad	Gangapur dam (#)	
19	MD Burla	Baronda		54	ERD Bbsr	Adityapur		89	UGD Hyderabad	Hyderabad_UGD (*)	
20	MD Burla	Rampur		55	ERD Bbsr	Chandrapur		90	UGD Hyderabad	Jaikwadi dam	
21	MD Burla	Jamdar pali	T	56	ERD Bbsr	Fekoghat		91	UGD Hyderabad	Karanja dam (#)	
22	MD Burla	Deogaon	T	57	ERD Bbsr	Ghatsila		92	UGD Hyderabad	Kopergaon	T
23	MD Burla	Phulbani	T	58	ERD Bbsr	Gotta Barrage		93	UGD Hyderabad	Lasur	
24	MD Burla	Raipur (*)	T	59	ERD Bbsr	Govindpur-NH5 Rd		94	UGD Hyderabad	Mancherial	T
25	MD Burla	Rajim	T	60	ERD Bbsr	Gudari		95	UGD Hyderabad	Manjlegaon	
26	MD Burla	Salebhata	T	61	ERD Bbsr	Gunupur		96	UGD Hyderabad	Mula Dam	
27	MD Burla	Sankara	T	62	ERD Bbsr	Jamshedpur		97	UGD Hyderabad	Nanded (*)	T
28	MD Burla	Seorinarayan	T	63	ERD Bbsr	Jamsolaghat		98	UGD Hyderabad	Nasik	T
29	MD Burla	Simga	T	64	ERD Bbsr	Jenapur Exp.way		99	UGD Hyderabad	Nizamabad (*)	T
30	MD Burla	Sundergarh	T	65	ERD Bbsr	Jeypure		100	UGD Hyderabad	Nizamsagar Dam	
31	MD Burla	Surajgarh	T	66	ERD Bbsr	Kashinagar		101	UGD Hyderabad	NMD Weir	T
32	MD Burla	Thettatatnger	T	67	ERD Bbsr	Keonjhar		102	UGD Hyderabad	Pachegaon	T
33	ERD Bbsr	Naraj (Barrage)	T	68	ERD Bbsr	Kutraguda		103	UGD Hyderabad	Palkhed Dam	
34	ERD Bbsr	Nimapara	T	69	ERD Bbsr	Madhabarida		104	UGD Hyderabad	Purna	T
35	ERD Bbsr	Alinpingal	T	70	ERD Bbsr	Mahendragarh		105	UGD Hyderabad	Saigaon	T

Annex I

Sl.No	Division	Real Time station	TM	Sl.No	Division	Real Time station	TM	Sl.No	Division	Real Time station	TM
106	UGD Hyderabad	Sangareddy barr.		141	LGD Hyderabad	Nowrangpur	T	176	UKD Pune	Cholachguda	T
107	UGD Hyderabad	Siddeshwar Weir		142	LGD Hyderabad	Pathagudem	T	177	UKD Pune	Gokak	T
108	UGD Hyderabad	Singur Dam		143	LGD Hyderabad	Perur	T	178	UKD Pune	Kurundwad	T
109	UGD Hyderabad	Zari (Moregaon)	T	144	LGD Hyderabad	Polavaram	T	179	UKD Pune	Takli	T
110	WD Nagpur	Ashti	T	145	LGD Hyderabad	Rajahmundry	T	180	UKD Pune	Wadakbal	T
111	WD Nagpur	Balaghat		146	LGD Hyderabad	Sangam	T	181	UKD Pune	UKD_Pune (*)	
112	WD Nagpur	Balharsha_Bamni	T	147	LGD Hyderabad	Sardaput	T	182	ND Bhopal	Bargi dam	
113	WD Nagpur	Bhandara	T	148	LGD Hyderabad	Sukma	T	183	ND Bhopal	Barmanghat	
114	WD Nagpur	Bhatpalli	T	149	LKD Hyderabad	AlmattiDam		184	ND Bhopal	Dindori	
115	WD Nagpur	Chandrapur (*)		150	LKD Hyderabad	DeongaonBridge	T	185	ND Bhopal	Hoshangabod (*)	
116	WD Nagpur	Ghugus	T	151	LKD Hyderabad	Deosugur	T	186	ND Bhopal	Jabalpur	
117	WD Nagpur	Hivra	T	152	LKD Hyderabad	Harlahalli	T	187	ND Bhopal	Mandla	
118	WD Nagpur	K.R.Bridge	T	153	LKD Hyderabad	Honnali	T	188	ND Bhopal	Manot	
119	WD Nagpur	Nagpur (*)		154	LKD Hyderabad	Huvinhedgi	T	189	ND Bhopal	Mawai	
120	WD Nagpur	Nandgaon	T	155	LKD Hyderabad	Hyderabad_LKD (*)		190	ND Bhopal	Mohgaon	
121	WD Nagpur	P.G.Bridge	T	156	LKD Hyderabad	K.Agraharam	T	191	ND Bhopal	Mukki	
122	WD Nagpur	Pauni	T	157	LKD Hyderabad	Kurnool (*)		192	ND Bhopal	Pachhmarhi	
123	WD Nagpur	Rajegaon	T	158	LKD Hyderabad	Madhira	T	193	ND Bhopal	Rajghat_Narmada	
124	WD Nagpur	Ramakona	T	159	LKD Hyderabad	Mantralayam	T	194	ND Bhopal	Tawa Dam	
125	WD Nagpur	Sitakesa_Chikli	T	160	LKD Hyderabad	Marol	T	195	TD Surat	Barwani	
126	WD Nagpur	Sriramasagar		161	LKD Hyderabad	NarayanpurDam		196	TD Surat	Bharuch	
127	WD Nagpur	Tekra	T	162	LKD Hyderabad	NSDam		197	TD Surat	Bhusawal (*)	
128	LGD Hyderabad	Bhadrachalam (*)	T	163	LKD Hyderabad	Oollenur (Bennur Bar)	T	198	TD Surat	Bodeli	
129	LGD Hyderabad	Chindnar	T	164	LKD Hyderabad	PaleruBridge	T	199	TD Surat	Burhanpur	
130	LGD Hyderabad	Dowlaiswaram (#)	T	165	LKD Hyderabad	PDJurala Project		200	TD Surat	Chikhalda	
131	LGD Hyderabad	Dummagudem	T	166	LKD Hyderabad	Polampalli	T	201	TD Surat	Dahigaon	
132	LGD Hyderabad	Eturunagaram	T	167	LKD Hyderabad	PrakasamBarrage (#)		202	TD Surat	Daman	
133	LGD Hyderabad	Hyderabad_LGD (*)		168	LKD Hyderabad	Sedalga (#)	T	203	TD Surat	Dedtalai	
134	LGD Hyderabad	Jagdalpur (*)	T	169	LKD Hyderabad	Shimoga	T	204	TD Surat	Dhandore	
135	LGD Hyderabad	Kaleswaram	T	170	LKD Hyderabad	Srisailam Project		205	TD Surat	Garudeshwar	
136	LGD Hyderabad	Kolda	T	171	LKD Hyderabad	T.Ramapuram	T	206	TD Surat	Ghala	
137	LGD Hyderabad	Konta	T	172	LKD Hyderabad	TBDam		207	TD Surat	Gidhade	
138	LGD Hyderabad	Kosagumda	T	173	LKD Hyderabad	Vijayawada (*)		208	TD Surat	Girna dam	
139	LGD Hyderabad	Kunavaram	T	174	LKD Hyderabad	Wadenapalli	T	209	TD Surat	Gopalkheda	
140	LGD Hyderabad	Tumnar (Nelesnar)	T	175	LKD Hyderabad	Yadgir	T	210	TD Surat	Harsul	

Annex I

Sl.No	Division	Real Time station	TM	Sl.No	Division	Real Time station	TM	Sl.No	Division	Real Time station	TM
211	TD Surat	Hathnur Dam		241	Mahi D Ahmd	Gandinagar DIV CR(*)		271	HD Chennai	Kadapa Sub Div (*)	
212	TD Surat	Kakrapar		242	Mahi D Ahmd	Ghanod		272	HD Chennai	Nandipally	
213	TD Surat	Lakhpuri		243	Mahi D Ahmd	Hamav Weir		273	HD Chennai	NelloreAnicut	
214	TD Surat	Mohkheda		244	Mahi D Ahmd	Hathamati Weir		274	HD Chennai	NelloreCWC	
215	TD Surat	Morane (Dhulia)		245	Mahi D Ahmd	Himmat Nagar		275	HD Chennai	Somasila Project	
216	TD Surat	Mortakka		246	Mahi D Ahmd	Jotasan			Division	Stns	Total:
217	TD Surat	Nanipalsan		247	Mahi D Ahmd	Kadana Dam		1	UBD,Dibrugarh	35	
218	TD Surat	Rajpipla		248	Mahi D Ahmd	Khanpur		2	MBD,Guwahati	26	
219	TD Surat	Sarangkheda		249	Mahi D Ahmd	Kheda		3	LBD,Jalpaiguri	41	102
220	TD Surat	Savkheda		250	Mahi D Ahmd	Kheroj		4	HGDiv, Dehradun	11	
221	TD Surat	Silvassa		251	Mahi D Ahmd	Lowara		5	MGD1,Lucknow	22	
222	TD Surat	Solachar (*)		252	Mahi D Ahmd	Mahi Bajaj Sagar Dam		6	MGD2,Lucknow	16	
223	TD Surat	Surat		253	Mahi D Ahmd	Mataji		7	MGD3, Varanasi	15	
224	TD Surat	Ukai Dam		254	Mahi D Ahmd	Mount Abu (seas)		8	MGD4, Patna	25	
225	TD Surat	Vapi		255	Mahi D Ahmd	Nadiad		9	MGD5, Patna	35	
226	TD Surat	Yerli		256	Mahi D Ahmd	Paderdibadi		10	DD,Asansol	38	
227	TDSurat	Teska		257	Mahi D Ahmd	Palanpur (*)		11	UYD,Delhi	20	
228	TD Surat	Ozarkheda		258	Mahi D Ahmd	Panam Dam		12	LYD,Agra	16	
229	TDSurat	Madhuban Dam		259	Mahi D Ahmd	Ratanpur		13	CD, Jaipur	7	205
230	Mahi D Ahmd	Abu Road		260	Mahi D Ahmd	Rerska Weir		14	MD, Burla	32	
231	Mahi D Ahmd	Ambaji (seas)		261	Mahi D Ahmd	Saroty		15	ERD,BBSR	49	
232	Mahi D Ahmd	Anas (Phase 2)		262	Mahi D Ahmd	Sei Dam		16	UGD,Hyderabad	28	
233	Mahi D Ahmd	Bakudar (sipu Dam)		263	Mahi D Ahmd	Amba Dam		17	WD,Nagpur	18	
234	Mahi D Ahmd	Chakaliya		264	Mahi D Ahmd	Subash Bridge		18	LGD,Hyderabad	21	
235	Mahi D Ahmd	Chitrasani		265	Mahi D Ahmd	Swaroopganj		19	LKD,Hyderabad	27	
236	Mahi D Ahmd	Dantiwada dam		266	Mahi D Ahmd	Vautha		20	UKD,Pune	6	
237	Mahi D Ahmd	Deesa		267	Mahi D Ahmd	Wanakbori Weir		21	ND,Bhopal	13	
238	Mahi D Ahmd	Derol Bridge		268	Mahi D Ahmd	Watrak Dam		22	TD,Surat	35	
239	Mahi D Ahmd	Dhariawad		269	HD Chennai	Annamayya Proj		23	MD,Ahmedabad	39	
240	Mahi D Ahmd	Dharoi Dam		270	HD Chennai	Chennur		24	HD, Chennai	7	275
									Grand Total:	582	582

Zone:	Total:
(a)	102
(b)	205
(C)	275
Grand Total:	582

Note: (#) Data through Telephone/ Spl.Messenger/ Temporary Wirelss
($$) Communication temporarily suspended.
(T) CWC Telemetry station existing

Annex I

List of Telemtory stations under CWC where no real time net work (Wireless) exist.

Sl.No	Division	Real Time station	TM
1	UBD Dibrugarh	Tuting	T
2	UBD Dibrugarh	Ningguing	T
3	UBD Dibrugarh	Karkoo	T
4	UBD Dibrugarh	Gette	T
5	UBD Dibrugarh	Yao	T
6	UBD Dibrugarh	Rigga	T
7	UBD Dibrugarh	Dalbung	T
8	UBD Dibrugarh	Ghasing	T
9	UBD Dibrugarh	Bamdo	T
10	UBD Dibrugarh	Rotung	T
11	UBD Dibrugarh	Kane	T
12	UBD Dibrugarh	Buchi	T
13	UBD Dibrugarh	Tilmukh	T
14	UBD Dibrugarh	Dhemaji	T
15	UBD Dibrugarh	Jiadholmukh	T
16	UBD Dibrugarh	Abaypur	T
17	UBD Dibrugarh	Bordolonoi	T
18	UBD Dibrugarh	Basudevthan	T
19	DD Asansol	Palganj	T
20	DD Asansol	Giridhi	T
21	DD Asansol	Jamua	T
22	DD Asansol	Churi	T
23	DD Asansol	Chandrapura	T
24	DD Asansol	Pupunki	T
25	DD Asansol	Jamalpur	T
26	UYD DELHI	Galeta	T
27	UYD DELHI	Tuini (Pabar)	T
28	MD Burla	Jondhra	T
29	MD Burla	Ravinshankar Sagar Dam	T
30	MD Burla	Dhudhwa	T
31	MD Burla	Morumsili	T
32	MD Burla	Sarangpal	T
33	MD Burla	Burla (Control)	T
34	ERD Bbsr	Gopalpur	T
35	UGD Hyderabad	Yelli	T

Sl.No	Division	Real Time station	TM
36	UGD Hyderabad	G.R.Bridge	T
37	UGD Hyderabad	Betmogra	T
38	WD Nagpur	Keotari	T
39	WD Nagpur	Bhishnur	T
40	WD Nagpur	Selebirdi	T
41	WD Nagpur	Kumhari	T
42	WD Nagpur	Medapalli	T
43	LGD Hyderabad	Murthahandi	T
44	LGD Hyderabad	Wyragarh	T
45	LGD Hyderabad	Somanapally	T
46	LGD Hyderabad	Cheeitbeda	T
47	LGD Hyderabad	Medadapalli	T
48	LGD Hyderabad	Injaram	T
49	LGD Hyderabad	Potteru	T
50	LGD Hyderabad	Amabal	T
51	UKD Hyderabad	Mudhol	T
52	UKD Hyderabad	Talikol	T
53	UKD Hyderabad	Malkhed	T
54	UKD Hyderabad	Sholapur	T
55	UKD Hyderabad	Pandegaon	
56	UKD Hyderabad	Navalgund	
57	UKD Hyderabad	Narsingpur	T
58	UKD Hyderabad	Boriomerga	T
59	LKD Hyderabad	Khustagi	T
60	LKD Hyderabad	Hagari Bommanahalli	T
61	LKD Hyderabad	Jewangi	T
62	LKD Hyderabad	Bawapuram	T
63	LKD Hyderabad	Kollsagar	T
64	LKD Hyderabad	Keesra	T
65	LKD Hyderabad	Pondugala	T
66	LKD Hyderabad	Damaracherla	T
67	CD Bengaluru	Bytadahalli	T
68	CD Bengaluru	Bhupasamudram	T
69	CD Bengaluru	A.K.Bridge	T

Sl.No	Divn	Telemetry Stns
	Eastern Rivers & Mahandai Basins:	44
1	**MD, Burla**	37
2	**ERD,BBSR**	7
	Godavari Basin:	63
3	**UGD Hyderabad**	17
4	**LGD Hyderabad**	27
5	**WD Nagpur**	19
	Krishna Basin:	41
6	**UKD Pune**	13
7	**LKD Hyderabad**	21
8	**CD, Bangaluru**	7
	Brahmaputra Basin:	21
9	**UBD Dibrugarh**	21
	Ganga Basin	56
10	**DD Asansol**	20
11	**UYD DELHI**	14
12	**LYD AGRA**	1
13	**CD, Jaipur**	21
	Grand Total:	225
	Master Control: (less)	2
	Field stations:	227

Basin wise Telemetry & Wireless availablity	
Godavari Basin:	63
Krishna Basin:	41
Brahmaputra Basin:	21
Eastern Rivers	7
Mahanadi Basin	37
Ganga Basin	56
	225

Basinwise -Riverwise- Flood Forecasting Information in India during Flood Season 2009.												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2009		No.of Forecasts issued	No.of Forecasts within limits	Percentage of accuracy
						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	4	5	6	7	8	9	10	11	12	13
	Ganga Basin											
1	Alaknanda	Srinagar	Uttaranchal	539.00	540.00	536.85	05/09/1995	534.35	11-Sep-09 01	0	0	
2	Ganga	Rishikesh	Uttaranchal	339.50	340.50	341.72	03/09/1978	339.02	11-Sep-09 04	0	0	
3	Ganga	Haridwar	Uttaranchal	293.00	294.00	296.23	02/09/1978	293.15	11-Sep-09 05	1	0	0
4	Ganga	Narora Barrage	Uttar Pradesh			180.18	06/09/1978	179.16	29-Jul-09 06	4	3	75
5	Ganga	Kannauj	Uttar Pradesh	124.97	125.97	126.24	29/08/1998	124.48	15-Sep-09 19	0	0	
6	Ganga	Ankinghat	Uttar Pradesh	123.00	124.00	124.31	09/09/1978	122.62	15-Sep-09 14	0	0	
7	Ganga	Kanpur	Uttar Pradesh	113.00	114.00	113.47	02/09/1967	111.98	16-Sep-09 09	0	0	
8	Ganga	Dalmau	Uttar Pradesh	98.36	99.36	99.84	03/08/1973	97.85	17-Sep-09 01	0	0	
9	Ganga	Phphamau	Uttar Pradesh	83.73	84.73	87.98	08/09/1978	78.77	17-Aug-09 21	0	0	
10	Ganga	Allahabad Chhatnag	Uttar Pradesh	83.73	84.73	88.03	08/09/1978	77.53	14-Sep-09 00	0	0	
11	Ganga	Mirzapur	Uttar Pradesh	76.72	77.72	80.34	09/09/1978	70.52	14-Sep-09 17	0	0	
12	Ganga	Varanasi	Uttar Pradesh	70.26	71.26	73.90	09/09/1978	65.31	15-Sep-09 02	0	0	
13	Ganga	Ghazipur	Uttar Pradesh	62.11	63.11	65.22	09/09/1978	59.29	15-Sep-09 21	0	0	
14	Ganga	Buxar	Bihar	59.32	60.32	62.09	1948	56.58	16-Sep-09 06	0	0	
15	Ganga	Ballia	Uttar Pradesh	56.62	57.62	60.25	14/09/2003	55.89	16-Sep-09 14	0	0	
16	Ganga	Patna Dighaghat	Bihar	49.45	50.45	52.52	23/08/1975	48.67	15-Oct-09 13	0	0	
17	Ganga	Patna Gandhighat	Bihar	47.60	48.60	50.27	14/08/1994	47.57	25-Aug-09 17	2	2	100
18	Ganga	Hathidah	Bihar	40.76	41.76	43.15	07/08/1971	40.91	26-Aug-09 13	7	7	100
19	Ganga	Munger	Bihar	38.33	39.33	40.99	19/09/1976	37.05	27-Aug-09 16	0	0	
20	Ganga	Bhagalpur	Bihar	32.68	33.68	34.20	17/09/2003	32.18	27-Aug-09 08	0	0	
21	Ganga	Kahalgaon	Bihar	30.09	31.09	32.87	17/09/2003	30.59	27-Aug-09 04	13	13	100
22	Ganga	Sahibgunj	Jharkhand	26.25	27.25	30.91	1998	27.19	28-Aug-09 05	34	34	100
23	Ganga	Farakka	West Bengal	21.25	22.25	25.14	07/09/1998	22.58	27-Aug-09 10	82	81	98.78
24	Ramganga	Moradabad	Uttar Pradesh	189.60	190.60	192.68	03/09/1978	189.95	13-Sep-09 17	5	5	100
25	Ramganga	Bareilly	Uttar Pradesh	162.70	163.70	162.88	06/08/1978	161.12	19-Aug-09 19	0	0	
26	Yamuna	Tajewala Weir	Haryana			328.27	03/09/1978	335.80	11-Sep-09 02	0	0	
27	Yamuna	Mawi	Uttar Pradesh	230.00	230.85	232.45	26/09/1988	230.95	12-Sep-09 21	4	4	100
28	Yamuna	Delhi Rly Bridge	NCT Delhi	204.00	204.83	207.49	06/09/1978	205.33	15-Sep-09 03	5	4	80
29	Yamuna	Mathura	Uttar Pradesh	164.20	165.20	169.73	08/09/1978	165.15	16-Sep-09 23	8	8	100
30	Yamuna	Agra	Uttar Pradesh	151.40	152.40	154.76	09/09/1978	149.98	17-Sep-09 18	0	0	
31	Yamuna	Etawa	Uttar Pradesh	120.92	121.92	126.13	11/09/1978	119.00	18-Sep-09 18	0	0	
32	Yamuna	Auraiya	Uttar Pradesh	112.00	113.00	118.19	25/08/1996	104.68	27-Jul-09 08	0	0	
33	Yamuna	Kalpi	Uttar Pradesh	107.00	108.00	112.98	25/08/1996	99.53	28-Jul-09 03	0	0	
34	Yamuna	Hamirpur	Uttar Pradesh	102.63	103.63	108.59	12/09/1983	93.46	28-Jul-09 18	0	0	
35	Yamuna	Chilaghat	Uttar Pradesh	99.00	100.00	105.16	06/09/1978	92.56	13-Sep-09 01	0	0	
36	Yamuna	Naini	Uttar Pradesh	83.74	84.74	87.99	08/09/1978	78.22	13-Sep-09 22	0	0	

Annex II

Basinwise -Riverwise- Flood Forecasting Information in India during Flood Season 2009.												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2009		No.of Forecasts issued	No.of Forecasts within limits	Percentage of accuracy
						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	4	5	6	7	8	9	10	11	12	13
37	Sahibi	Dhansa	NCT Delhi	211.44	212.44	213.58	06/08/1977	210.50	14-Sep-09 08	0	0	
38	Chambal	Gandhisagar Dam	Madhya Pradesh							0	0	
39	Betwa	Mohana	Uttar Pradesh	121.66	122.66	133.35	11/09/1983	114.95	12-Sep-09 02	0	0	
40	Betwa	Sahjina	Uttar Pradesh	103.54	104.54	108.67	12/09/1983	83.98	12-Sep-09 23	0	0	
41	Ken	Banda	Uttar Pradesh	103.00	104.00	113.29	07-07-2005	105.50	12-Sep-09 11	5	5	100.00
42	Gomati	Lucknow	Uttar Pradesh	108.50	109.50	110.85	11-09-1971	106.47	16-Oct-09 00	0	0	
43	Gomati	Jaunpur	Uttar Pradesh	73.07	74.07	77.74	22/09/1971	70.55	10-Oct-09 10	0	0	
44	SAI	Raibareli	Uttar Pradesh	100.00	101.00	104.81	17/09/1982	98.97	18-Sep-09 15	0	0	
45	Ghaghra	Elgin Bridge	Uttar Pradesh	105.07	106.07	107.48	23/09/2008	107.56	10-Oct-09 06	69	60	86.96
46	Ghaghra	Ayodhya	Uttar Pradesh	91.73	92.73	93.84	24/09/2008	94.01	11-Oct-09 11	79	75	94.94
47	Ghaghra	Turtipar	Uttar Pradesh	63.01	64.01	66.00	28/08/1998	64.71	13-Oct-09 15	58	57	98.28
48	Ghaghra	Darauli	Bihar	59.82	60.82	61.74	29/08/1998	60.82	14-Oct-09 12	22	22	100.00
49	Ghaghra	Gangpur Siswan	Bihar	56.04	57.04	58.01	18/09/1983	57.25	25-Aug-09 19	21	21	100.00
50	Ghaghra	Chhapra	Bihar	52.68	53.68	54.59	03/09/1982	51.23	16-Sep-09 20	0	0	
51	Rapti	Balrampur	Uttar Pradesh	103.62	104.62	105.25	11/09/2000	104.64	21-Aug-09 18	26	26	100.00
52	Rapti	Bansi	Uttar Pradesh	83.90	84.90	85.82	21/08/1998	84.87	25-Aug-09 12	22	21	95.45
53	Rapti	Gorakpur Birdghat	Uttar Pradesh	73.98	74.98	77.54	23/08/1998	76.00	22-Aug-09 06	39	37	94.87
54	Sone	Inderpuri	Bihar	107.20	108.20	108.85	23/08/1975	105.80	08-Sep-09 12	0	0	
55	Sone	Koelwar	Bihar	54.52	55.52	58.88	20/07/1971	53.66	10-Sep-09 23	0	0	
56	Sone	Maner	Bihar	51.00	52.00	53.79	10/09/1976	51.15	25-Aug-09 18	4	4	100.00
57	PunPun	Sripalpur	Bihar	49.60	50.60	53.91	18/09/1976	52.99	13-Sep-09 07	13	13	100.00
58	Gandak	Khadda	Uttar Pradesh	95.00	96.00	97.50	23/07/2002	95.84	18-Aug-09 21	44	42	95.45
59	Gandak	Chatia	Bihar	68.15	69.15	70.04	26/07/2002	68.31	20-Aug-09 18	2	2	100.00
60	Gandak	Rewaghat	Bihar	53.41	54.41	55.41	17/09/1985	53.53	21-Aug-09 07	6	6	100.00
61	Gandak	Hazipur	Bihar	49.32	50.32	50.93	1948	48.08	26-Aug-09 18	0	0	
62	Burhi Gandak	Lalbeghiaghat	Bihar	62.20	63.20	67.09	30/07/1975	62.76	24-Aug-09 06	5	5	100.00
63	Burhi Gandak	Muzaffarpur	Bihar	51.53	52.53	54.29	15/08/1987	51.77	25-Aug-09 06	6	6	100.00
64	Burhi Gandak	Samastipur	Bihar	45.02	46.02	49.38	15/08/1987	45.76	28-Aug-09 02	15	15	100.00
65	Burhi Gandak	Rosera	Bihar	41.63	42.63	46.35	16/08/1987	42.70	28-Aug-09 07	19	19	100.00
66	Burhi Gandak	Khagaria	Bihar	35.58	36.58	39.22	1976	36.20	28-Aug-09 05	11	11	100.00
67	Bagmati	Benibad	Bihar	47.68	48.68	50.01	12/07/2004	49.72	09-Jul-09 22	68	67	98.53
68	Bagmati	Hayaghat	Bihar	44.72	45.72	48.96	14/08/1987	46.77	26-Aug-09 09	39	38	97.44
69	Adhwara Group	Kamtaul	Bihar	49.00	50.00	52.99	12/08/1987	50.95	21-Aug-09 06	36	36	100.00
70	Adhwara Group	Ekmighat	Bihar	45.94	46.94	49.52	12/07/2004	47.72	26-Aug-09 01	42	42	100.00
71	Kamla Balan	Jhanjharpur	Bihar	49.00	50.00	53.01	10/07/2004	51.83	21-Aug-09 00	60	59	98.33
72	Kosi	Basua	Bihar	46.75	47.75	48.87	11/07/2004	48.85	18-Aug-09 10	166	166	100.00
73	Kosi	Baltara	Bihar	32.85	33.85	36.40	15/08/1987	35.36	27-Aug-09 18	79	79	100.00
74	Kosi	Kursela	Bihar	29.00	30.00	32.04	06/09/1998	29.85	27-Aug-09 03	19	19	100.00

Annex II

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Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2009		No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	4	5	6	7	8	9	10	11	12	13
75	Mahananda	Dhengraghat	Bihar	34.65	35.65	38.09	1968	36.78	21-Aug-09 09	42	41	97.62
76	Mahananda	Jhawa	Bihar	30.40	31.40	33.51	14/08/1987	32.02	21-Aug-09 23	78	77	98.72
77	Mayurakshi	Massanjore Dam	Jharkhand	121.31		122.87	25/09/1999	119.31	09-Oct-09 22	5	5	100.00
78	Mayurakshi	Tilpara Barrage	West Bengal	62.79		67.05	27/09/1978	62.79	06-Oct-09 12	4	4	100.00
79	Mayurakshi	Narayanpur	West Bengal	26.99	27.99	29.69	27/09/1995	25.17	10-Sep-09 16	0	0	
80	Ajoy	Gheropara	West Bengal	38.42	39.42	43.94	27/09/1978	40.15	07-Sep-09 14	2	2	100.00
81	Damodar	Tenughat Dam	Jharkhand	268.83		265.58	17/09/1985	263.33	07-Sep-09 19	20	20	100.00
82	Damodar	Panchet Dam	Jharkhand	132.59		132.89	02/10/1959	131.57	07-Sep-09 23	40	40	100.00
83	Damodar	Durgapur Barrage	West Bengal	64.47		64.47	31/10/2002	64.47		28	28	100.00
84	Barakar	Maithon Dam	Jharkhand	150.88		151.79	02/10/1959	151.36	07-Sep-09 16	26	21	80.77
85	Mundeshwari	Harinkhola	West Bengal	11.80	12.80	14.58	29/09/1978	14.43	08-Sep-09 21	6	6	100.00
86	Kangsabati	Kangsabati Dam	West Bengal	134.11		134.71	02/09/1978	133.33	07-Sep-09 13	17	17	100.00
87	Kangsabati	Mohanpur	West Bengal	24.73	25.73	29.87	02/09/1978	24.18	09-Sep-09 08	0	0	
	Brahmaputra Basin											
88	Brahmaputra	Dibrugrah	Assam	103.24	104.24	106.48	03/09/1998	105.53	01-Jul-09 07	307	307	100.00
89	Brahmaputra	Neamatighat	Assam	84.04	85.04	87.37	11/07/1991	85.56	02-Jul-09 09	71	71	100.00
90	Brahmaputra	Tezpur	Assam	64.23	65.23	66.59	27/08/1988	65.25	24-Aug-09 07	40	40	100.00
91	Brahmaputra	Guwahati	Assam	48.68	49.68	51.46	21/07/2004	48.94	24-Aug-09 01	8	8	100.00
92	Brahmaputra	Goalpara	Assam	35.27	36.27	37.43	31/07/1954	35.74	26-Aug-09 01	19	19	100.00
93	Brahmaputra	Dhubri	Assam	27.62	28.62	30.36	28/08/1988	28.99	22-Aug-09 06	103	103	100.00
94	Burhidihing	Naharkatia	Assam	119.40	120.40	122.69	17/06/1973	118.12	17-Aug-09 09	0	0	
95	Burhidihing	Khowang	Assam	101.11	102.11	103.92	25/08/1988	102.49	23-Aug-09 02	22	22	100.00
96	Desang	Nanglamoraghat	Assam	93.46	94.46	96.49	06/09/1998	96.04	11-Jul-09 21	64	64	100.00
97	Dikhow	Shivsagar	Assam	91.40	92.40	95.62	08/07/1974	94.14	11-Jul-09 08	46	46	100.00
98	Subansiri	Badatighat	Assam	81.53	82.53	86.84	28/06/1972	82.10	24-Aug-09 10	48	48	100.00
99	Dhansiri (S)	Golaghat	Assam	88.50	89.50	91.30	11/10/1986	88.90	26-Sep-09 00	9	9	100.00
100	Dhansiri (S)	Numaligarh	Assam	76.42	77.42	79.87	24/09/1985	77.80	25-Aug-09 12	106	106	100.00
101	Jiabharali	Jiabharali_NTX	Assam	76.00	77.00	78.50	26/07/2007	77.56	29-Jul-09 18	194	193	99.48
102	Kopilli	Kampur	Assam	59.50	60.50	61.86	16/06/1973	61.08	11-Oct-09 06	3	3	100.00
103	Kopilli	Dharmatul	Assam	55.00	56.00	58.09	21/07/2004	55.17	11-Oct-09 19	5	5	100.00
104	Puthimari	Puthimari_NHX	Assam	50.81	51.81	55.08	31/08/2008	52.82	03-Jul-09 19	228	225	98.68
105	Pagladiya	Pagladia_NTX	Assam	51.75	52.75	55.45	08/07/2004	52.78	02-Jul-09 19	20	20	100.00
106	Beki	Beki NHX	Assam	44.10	45.10	46.20	04/08/2000	45.38	20-Aug-09 00	292	292	100.00
107	Manas	Manas NHX	Assam	47.81	48.42	50.08	15/09/1984	48.08	17-Aug-09 11	5	5	100.00
108	Sankosh	Golakganj	Assam	28.94	29.94	30.95	08/09/2007	30.24	20-Aug-09 23	78	78	100.00
109	Raidak-I	Tufanganj	West Bengal	34.22	35.30	36.36	21/07/1993	34.65	06-Jul-09 07	7	7	100.00
110	Torsa	Ghughuman	West Bengal	39.80	40.41	41.46	03/08/2000	40.40	20-Aug-09 21	38	36	94.74
111	Jaldhaka	NH-31	West Bengal	80.00	80.90	81.33	28/08/1972	80.49	08-Oct-09 05	11	11	100.00

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						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	4	5	6	7	8	9	10	11	12	13
112	Jaldhaka	Mathabhanga	West Bengal	47.70	48.20	49.85	07/09/2007	48.18	20-Aug-09 17	2	2	100.00
113	Tista	Domohani	West Bengal	85.65	85.95	89.30	04/10/1968	85.45	20-Aug-09 11	56	56	100.00
114	Tista	Mekhliganj	West Bengal	65.45	65.95	66.45	13/07/1996	66.10	20-Aug-09 13	24	24	100.00
	Barak & Meghna Basins											
115	Barak	APGhat	Assam	18.83	19.83	21.84	01/08/1989	19.48	02-Aug-09 12	16	16	100.00
116	Katakhal	Matizuri	Assam	19.27	20.27	22.73	10/09/2007	19.74	28-Aug-09 17	10	10	100.00
117	Kushiyara	Karimganj	Assam	13.94	14.94	16.55	09/09/2007	15.96	22-Aug-09 17	63	63	100.00
118	Manu	Kailashar	Tripura	24.34	25.34	25.79	07/06/1993	24.37	01-Jul-09 21	0	0	
119	Gumti	Sonamura	Tripura	11.50	12.50	14.42	23/07/1993	11.64	02-Jul-09 06	1	1	100.00
	Eastern Rivers (Excluding Mahanadi)											
120	Subernarekna	Rajghat	Orissa	9.45	10.36	12.69	19/06/2008	11.17	09-Sep-09 12	7	7	100.00
121	Burhabalang	NH_5_Road Bridge	Orissa	7.21	8.13	9.50	12/10/1973	8.30	02-Oct-09 23	4	3	75.00
122	Baitarni	Anandpur	Orissa	37.44	38.36	41.20	19/08/1975	37.67	21-Jul-09 13	2	2	100.00
123	Baitarni	Akhuapada	Orissa		17.83	21.95	16/08/1960	18.00	03-Oct-09 10	7	7	100.00
124	Brahmani	Jenapur	Orissa	22.00	23.00	24.78	20/08/1975	22.50	22-Jul-09 09	2	2	100.00
125	Rushikuluya	Purushottampur	Orissa	15.83	16.83	19.65	04/11/1990	17.30	20-Jul-09 05	8	8	100.00
126	Vamsadhara	Gunupur	Orissa	83.00	84.00	88.75	17/09/1980	84.00	19-Jul-09 16	7	6	85.71
127	Vamsadhara	Kashinagar	Orissa	53.60	54.60	58.93	18/09/1980	55.65	19-Jul-09 19	81	76	93.83
128	Vamsadhara	Gotta Barrage	Andhra Pradesh	34.84	34.84	39.92	07/10/1999	38.12	25-Jul-09 22	10	10	100.00
	Mahanadi Basin											
129	Mahanadi	Hirakud Dam	Orissa	192.02		192.30	30/01/1998			50	49	98.00
130	Mahanadi	Naraj	Orissa	25.41	26.41	27.61	31/08/1982	26.11	21-Jul-09 14	17	16	94.12
131	Mahanadi	Alipingal Devi	Orissa	10.85	11.76	13.05	20/09/2008	10.86	21-Jul-09 14	1	1	100.00
132	Mahanadi	Nimapara	Orissa	9.85	10.76	11.60	31/08/1982	10.04	21-Jul-09 19	4	4	100.00
	Godavari Basin											
133	Godavari	Kopergaon	Maharashtra	490.90	493.68	499.17	1969	489.75	25-Jul-09 05	0	0	
134	Godavari	Jaikwadi Dam	Maharashtra	463.91		464.69	12/10/1990	458.47	06-Oct-09 12	0	0	
135	Godavari	Gangakhed	Maharashtra	374.00	375.00	377.57	1947	366.56	26-Aug-09 07	0	0	
136	Godavari	Nanded	Maharashtra	353.00	354.00	357.10	06/08/2006	344.52	06-Oct-09 17	0	0	
137	Godavari	Sriram Sagar	Andhra Pradesh	332.54		332.72	13/10/1990	326.17	08-Oct-09 16	0	0	
138	Godavari	Kaleswaram	Andhra Pradesh	103.50	104.75	107.05	15-08-1986	99.08	25-Jul-09 12	0	0	
139	Godavari	Eturunagaram	Andhra Pradesh	73.29	75.79	77.66	24-08-1990	70.47	29-Aug-09 04	0	0	
140	Godavari	Dummagudam	Andhra Pradesh	53.00	55.00	60.25	16/08/1986	49.09	28-Aug-09 21	0	0	
141	Godavari	Bhadrachalam	Andhra Pradesh	45.72	48.77	55.66	16/08/1986	42.06	29-Aug-09 00	0	0	
142	Godavari	Kunavaram	Andhra Pradesh	37.74	39.24	51.30	16/08/1986	30.32	29-Aug-09 09	0	0	
143	Godavari	Rajamundri	Andhra Pradesh	17.68	19.51	20.48	16/08/1986	14.50	29-Aug-09 07	0	0	
144	Godavari	Dowlaiswaram	Andhra Pradesh	14.25	16.08	18.36	16-08-1986	14.14	14-Jul-09 12	0	0	
145	Wardha	Balharsha	Maharashtra	171.50	174.00	176.00	15-08-1986	161.47	04-Sep-09 06	0	0	

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						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percentage of accuracy
1	2	3	4	5	6	7	8	9	10	11	12	13
146	Wainganga	Bhandara	Maharashtra	244.00	244.50	250.90	16-09-2005	244.05	23-Jul-09 14	3	3	100.00
147	Wainganga	Pauni	Maharashtra	226.73	227.73	232.35	07/09/1994	226.73	23-Jul-09 17	4	3	75.00
148	Manjira	Singur Dam	Andhra Pradesh	523.60		523.60	15-10-1999	520.15	12-Oct-09 06	0	0	
149	Manjira	Nizamsagar Dam	Andhra Pradesh	428.24		428.24	15-10-1999	421.90	11-Sep-09 15	0	0	
150	Indravati	Jagdalpur	Chhatisgarh	539.50	540.80	544.68	09-07-1973	536.80	26-Aug-09 22	0	0	
	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	24-Aug-09 15	41	36	87.80
153	Krishna	Narayanpur Dam	Karnataka	492.25		492.22	26-09-2008	492.21	22-Sep-09 09	34	30	88.24
154	Krishna	Priyadarshini	Andhra Pradesh	318.52		316.50	21/10/1993	318.20	02-Oct-09 15	73	69	94.52
155	Krishna	Srisailam Dam	Andhra Pradesh	269.75		269.93	13/10/1990	273.25	03-Oct-09 11	95	87	91.58
156	Krishna	Prakasham Barrage	Andhra Pradesh	18.30		21.50	07-10-1903	20.45	06-Oct-09 00	30	27	90.00
157	Bhima	Deongaon	Karnataka	402.00	404.50	407.34	13/08/2006	404.22	01-Oct-09 18	8	7	87.50
158	Tungbhadra	Tungabhadra Dam	Karnataka	497.74		497.74	05/10/1992	497.74	08-Aug-09 06	141	136	96.45
159	Tungbhadra	Mantralayam	Andhra Pradesh	310.00	312.00	315.80	19/11/1992	318.77	02-Oct-09 22	17	16	94.12
	Southern River System:											
160	Pennar	Nellore	Andhra Pradesh	15.91	17.28	18.70	30/11/1882	14.57	10-Nov-09 06	0	0	
	Western River Systems:											
161	Banas	Dantiwada Dam	Gujarat	182.88	185.06	186.04	01/09/1973	165.32	30-Jul-09 04	0	0	
162	Sabarmati	Dharoi Dam	Gujarat	187.45	192.25	189.63	03/09/1990	183.14	18-Sep-09 08	5	5	100.00
163	Sabarmati	Ahmedabad	Gujarat	44.09	45.34	47.45	19-08-2006	41.98	20-Sep-09 20	0	0	
164	Mahi	Kadana Dam	Gujarat	126.19	127.71	127.74	09/09/1989	125.99	15-Sep-09 13	0	0	
165	Mahi	Wanakbori	Gujarat	71.00	72.54	76.10	12-08-2006	67.97	29-Aug-09 15	0	0	
166	Naramada	Mandla	Madhya Pradesh	437.20	437.80	439.41	18/08/1974	434.54	09-Sep-10 12	0	0	
167	Naramada	Hoshangabad	Madhya Pradesh	292.83	293.83	300.90	30/08/1973	296.70	10-Sep-09 04	11	10	90.91
168	Naramada	Garudeswar	Gujarat	30.48	31.09	41.65	06/09/1970	24.00	12-Sep-09 20	0	0	
169	Naramada	Bharuch	Gujarat	6.71	7.31	12.65	07-09-1970	6.10	13-Sep-09 12	0	0	
170	Tapi	Hatnur Dam	Maharashtra	212.00	214.00	214.00	12/10/1989	214.00	27-Sep-09 06	31	29	93.55
171	Tapi	Ukai Dam	Gujarat	102.41	105.16	105.51	06/10/1990	99.58	17-Sep-09 06	5	5	100.00
172	Tapi	Surat	Gujarat	8.50	9.50	12.50	09-08-2006	5.10	23-Jul-09 16	0	0	
173	Damanganga	Madhuban Dam	Gujarat	79.86	82.40	80.60	27/09/1993	79.75	15-Oct-09 18	8	8	100.00
174	Damanganga	Vapi Town	Gujarat	18.20	19.20	23.76	03-08-2004	17.30	22-Jul-09 23	0	0	
175	Damanganga	Daman	Dadra & Nagar Haveli	2.60	3.40	4.00	03/08/2004	2.30	24-Jul-09 16	0	0	
								Total Forecasts		***4010***	***3927***	**97.93**
								Level Forecasts		**3343**	**3298**	**98.65**
								Inflow Forecast		**667**	**629**	**94.30**

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					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	5	6	7	8	9	10	11	12	13
	Andhra Pradesh										
1	Vamsadhara	Gotta Barrage	FRL34.84	MWL47.4	39.92	07/10/1999	38.12	25-07-2009	10	10	100
2	Godavari	Sriram Sagar	332.54		332.72	13/10/1990	326.17	08-10-2009	0	0	
3	Godavari	Kaleswaram	103.50	104.75	107.05	15-08-1986	99.08	25-07-2009	0	0	
4	Godavari	Eturunagaram	73.29	75.79	77.66	24-08-1990	70.47	29-08-2009	0	0	
5	Godavari	Dummagudam	53.00	55.00	60.25	16/08/1986	49.09	28-08-2009	0	0	
6	Godavari	Bhadrachalam	45.72	48.77	55.66	16/08/1986	42.06	29-08-2009	0	0	
7	Godavari	Kunavaram	37.74	39.24	51.30	16/08/1986	30.32	29-08-2009	0	0	
8	Godavari	Rajamundri	17.68	19.51	20.48	16/08/1986	14.50	29-08-2009	0	0	
9	Godavari	Dowalaiswaram	14.25	16.08	18.36	16/08/1986	14.14	14-07-2009	0	0	
10	Manjira	Singur Dam	523.60	FRL=523.60	523.60	15-10-1999	520.15	12-10-2009	0	0	
11	Manjira	Nizamsagar Dam	428.24	FRL=428.24	428.24	15-10-1999	421.90	11-09-2009	0	0	
12	Krishna	Priyadarshini	318.52	FRL=318.52	316.50	21/10/1993	318.20	02-10-2009	73	69	94.52
13	Krishna	Srisailam Dam	269.75	FRL=269.75	269.93	13/10/1990	273.25	03-10-2009	95	87	91.58
14	Krishna	Prakasham Barrage	18.30	FRL=18.30	21.50	07-10-1903	20.45	06-10-2009	30	27	90
15	Tungbhadra	Mantralayam	310.00	312.00	315.80	19/11/1992	318.77	02-10-2009	17	16	94.12
16	Pennar	Nellore	15.91	17.28	18.70	30/11/1882	14.57	10-11-2009	0	0	
	Assam										
17	Brahmaputra	Dibrugrah	103.24	104.24	106.48	03/09/1998	105.53	01-07-2009	307	307	100
18	Brahmaputra	Neamatighat	84.04	85.04	87.37	11/07/1991	85.56	02-07-2009	71	71	100
19	Brahmaputra	Tezpur	64.23	65.23	66.59	27/08/1988	65.25	24-08-2009	40	40	100
20	Brahmaputra	Guwahati	48.68	49.68	51.46	21/07/2004	48.94	24-08-2009	8	8	100
21	Brahmaputra	Goalpara	35.27	36.27	37.43	31/07/1954	35.74	26-08-2009	19	19	100
22	Brahmaputra	Dhubri	27.62	28.62	30.36	28/08/1988	28.99	22-08-2009	103	103	100
23	Burhidihing	Naharkatia	119.40	120.40	122.69	17/06/1973	118.12	17-08-2009	0	0	
24	Burhidihing	Khowang	101.11	102.11	103.92	25/08/1988	102.49	23-08-2009	22	22	100
25	Desang	Nanglamoraghat	93.46	94.46	96.49	06/09/1998	96.04	11-07-2009	64	64	100
26	Dikhow	Shivsagar	91.40	92.40	95.62	08/07/1974	94.14	11-07-2009	46	46	100
27	Subansiri	Badatighat	81.53	82.53	86.84	28/06/1972	82.10	24-08-2009	48	48	100
28	Dhansiri (S)	Golaghat	88.50	89.50	91.30	11/10/1986	88.90	26-09-2009	9	9	100
29	Dhansiri (S)	Numaligarh	76.42	77.42	79.87	24/09/1985	77.80	25-08-2009	106	106	100
30	Jiabharali	Jiabharali_NTX	76.00	77.00	78.50	26/07/2007	77.56	29-07-2009	194	193	99.48
31	Kopili	Kampur	59.50	60.50	61.86	16/06/1973	61.08	11-10-2009	3	3	100

Annex III

Statewise Flood Forecasting Information In India during Flood Season 2009

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2009		No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	5	6	7	8	9	10	11	12	13
32	Kopilli	Dharmatul	55.00	56.00	58.09	21/07/2004	55.17	11-10-2009	5	5	100
33	Puthimari	Puthimari NHX	50.81	51.81	55.08	31-08-2008	52.82	03-07-2009	228	225	98.68
34	Pagladiya	Pagladia NTX	51.75	52.75	55.45	08/07/2004	52.78	02-07-2009	20	20	100
35	Beki	Beki NHX	44.10	45.10	46.20	04/08/2000	45.38	20-08-2009	292	292	100
36	Manas	Manas NHX	47.81	48.42	50.08	15/09/1984	48.08	17-08-2009	5	5	100
37	Sankosh	Golakganj	28.94	29.94	30.95	08/09/2007	30.24	20-08-2009	78	78	100
38	Barak	APGhat	18.83	19.83	21.84	01/08/1989	19.48	02-08-2009	16	16	100
39	Katakhal	Matizuri	19.27	20.27	22.73	10/09/2007	19.74	28-08-2009	10	10	100
40	Kushiyara	Karimganj	13.94	14.94	16.55	09/09/2007	15.96	22-08-2009	63	63	100
	Bihar										
41	Ganga	Buxar	59.32	60.32	62.09	1948	56.58	16-09-2009	0	0	
42	Ganga	Patna Gandhighat	49.45	50.45	52.52	23/08/1975	48.67	15-10-2009	0	0	
43	Ganga	Patna Dighaghat	47.60	48.60	50.27	14/08/1994	47.57	25-08-2009	2	2	100
44	Ganga	Hathidah	40.76	41.76	43.15	07/08/1971	40.91	26-08-2009	7	7	100
45	Ganga	Munger	38.33	39.33	40.99	19/09/1976	37.05	27-08-2009	0	0	
46	Ganga	Bhagalpur	32.68	33.68	34.20	17/09/2003	32.18	27-08-2009	0	0	
47	Ganga	Kahalgaon	30.09	31.09	32.87	17/09/2003	30.59	27-08-2009	13	13	100
48	Ghaghra	Darauli	59.82	60.82	61.74	29/08/1998	60.82	14-10-2009	22	22	100
49	Ghaghra	Gangpur Siswan	56.04	57.04	58.01	18/09/1983	57.25	25-08-2009	21	21	100
50	Ghaghra	Chhapra	52.68	53.68	54.59	03/09/1982	51.23	16-09-2009	0	0	
51	Sone	Inderpuri	107.20	108.20	108.85	23/08/1975	105.80	08-09-2009	0	0	
52	Sone	Koelwar	54.52	55.52	58.88	20/07/1971	53.66	10-09-2009	0	0	
53	Sone	Maner	51.00	52.00	53.79	10/09/1976	51.15	25-08-2009	4	4	100
54	PunPun	Sripalpur	49.60	50.60	53.91	18/09/1976	52.99	13-09-2009	13	13	100
55	Gandak	Chatia	68.15	69.15	70.04	26/07/2002	68.31	20-08-2009	2	2	100
56	Gandak	Rewaghat	53.41	54.41	55.41	17/09/1986	53.53	21-08-2009	6	6	100
57	Gandak	Hazipur	49.32	50.32	50.93	1948	48.08	26-08-2009	0	0	
58	Burhi Gandak	Lalbeghiaghat	62.20	63.20	67.09	30/07/1975	62.76	24-08-2009	5	5	100
59	Burhi Gandak	Muzaffarpur	51.53	52.53	54.29	15/08/1987	51.77	25-08-2009	6	6	100
60	Burhi Gandak	Samastipur	45.02	46.02	49.38	15/08/1987	45.76	28-08-2009	15	15	100
61	Burhi Gandak	Rosera	41.63	42.63	46.35	16/08/1987	42.70	28-08-2009	19	19	100
62	Burhi Gandak	Khagaria	35.58	36.58	39.22	1976	36.20	28-08-2009	11	11	100
63	Bagmati	Benibad	47.68	48.68	50.01	12/07/2004	49.72	09-07-2009	68	67	98.53
64	Bagmati	Hayaghat	44.72	45.72	48.96	14/08/1987	46.77	26-08-2009	39	38	97.44

Annex III

Statewise Flood Forecasting Information in India during Flood Season 2009

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2009		No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	5	6	7	8	9	10	11	12	13
65	Adhwara Group	Kamtaul	49.00	50.00	52.99	12/08/1987	50.95	21-08-2009	36	36	100
66	Adhwara Group	Ekmighat	45.94	46.94	49.52	12/07/2004	47.72	26-08-2009	42	42	100
67	Kamla Balan	Jhanjharpur	49.00	50.00	53.01	10/07/2004	51.83	21-08-2009	60	59	98.33
68	Kosi	Basua	46.75	47.75	48.87	11/07/2004	48.85	18-08-2009	166	166	100
69	Kosi	Baltara	32.85	33.85	36.40	15/08/1987	35.36	27-08-2009	79	79	100
70	Kosi	Kursela	29.00	30.00	32.04	06/09/1998	29.85	27-08-2009	19	19	100
71	Mahananda	Dhengraghat	34.65	35.65	38.09	1968	36.78	21-08-2009	42	41	97.62
72	Mahananda	Jhawa	30.40	31.40	33.51	14/08/1987	32.02	21-08-2009	78	77	98.72
	Chhatisgarh										
73	Indravati	Jagdalpur	539.50	540.80	544.68	09-07-1973	538.80	26-08-2009	0	0	
	Dadra & Nagar Haveli										
74	Damanganga	Daman	2.60	3.40	4.00	03/08/2004	2.30	24-07-2009	0	0	
	Gujarat										
75	Banas	Dantiwada Dam	182.88	185.06	186.04	01/09/1973	165.32	30-07-2009	0	0	
76	Sabarmati	Dharoi Dam	187.45	192.25	189.63	03/09/1990	183.14	18-09-2009	5	5	100
77	Sabarmati	Ahmedabad	44.09	45.34	47.45	19-08-2006	41.98	20-09-2009	0	0	
78	Mahi	Kadana Dam	126.19	127.71	127.74	09/09/1989	125.99	15-09-2009	0	0	
79	Mahi	Wanakbori	71.00	72.54	76.10	12-08-2006	67.97	29-08-2009	0	0	
80	Naramada	Garudeswar	30.48	31.09	41.65	06/09/1970	24.00	12-09-2009	0	0	
81	Naramada	Bharuch	6.71	7.31	12.65	07/09/1970	6.10	13-09-2009	0	0	
82	Tapi	Ukai Dam	102.41	105.16	105.51	08/10/1990	99.58	17-09-2009	5	5	100
83	Tapi	Surat	8.50	9.50	12.50	09-08-2006	5.10	23-07-2009	0	0	
84	Damanganga	Madhuban Dam	79.86	82.40	80.60	27/09/1993	79.75	15-10-2009	8	8	100
85	Damanganga	Vapi Town	18.20	19.20	23.76	03-08-2004	17.30	22-07-2009	0	0	
	Haryana										
86	Yamuna	Tajewala Weir	PL=323.70		328.27	03/09/1978	335.80	11-09-2009			
	Jharkhand										
87	Ganga	Sahibgunj	26.25	27.25	30.91	1998	27.19	28-08-2009	34	34	100
88	Mayurakshi	Massanjore Dam	FRL = 121.31		122.87	25/09/1999	119.31	09-10-2009	5	5	100
89	Damodar	Tenughat Dam	FRL = 268.83		265.56	17/09/1985	263.33	07-09-2009	20	20	100
90	Damodar	Panchet Dam	FRL = 132.59		132.89	02/10/1959	131.57	07-09-2009	40	40	100
91	Barakar	Maithon Dam	FRL= 150.88		151.79	02/10/1959	151.36	07-09-2009	26	21	80.77
	Karnataka										
92	Krishna	Alamati Dam	FRL=519.60		519.60	18/09/2002	519.60	24-08-2009	41	36	87.8

Annex III

Statewise Flood Forecasting Information In India during Flood Season 2003

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2009				
					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	5	6	7	8	9	10	11	12	13
93	Krishna	Narayanpur Dam	FRL=492.25		492.22	26-09-2008	492.21	22-09-2009	34	30	88.24
94	Bhima	Deongaon	402.00	404.50	407.34	13/08/2006	404.22	01-10-2009	8	7	87.5
95	Tungbhadra	Tungabhadra Dam	FRL=497.74		497.74	05/10/1992	497.74	08-08-2009	141	136	96.45
	Madhya Pradesh										
96	Chambal	Gandhisagar Dam							0	0	
97	Naramada	Mandla	437.20	437.80	439.41	18/08/1974	434.54	09-09-2010	0	0	
98	Naramada	Hoshangabad	292.83	293.83	300.90	30/08/1973	296.70	10-09-2009	11	10	90.91
	Maharashtra										
99	Godavari	Kopergaon	490.90	493.68	499.17	1969	489.75	25-07-2009	0	0	
100	Godavari	Jaikwadi Dam	FRL=463.91		464.69	12/10/1990	458.47	06-10-2009	0	0	
101	Godavari	Gangakhed	374.00	375.00	377.57	1947	366.56	26-08-2009	0	0	
102	Godavari	Nanded	353.00	354.00	357.10	06-08-2006	344.52	06-10-2009	0	0	
103	Wardha	Balharsha	171.50	174.00	176.00	15-08-1986	161.47	04-09-2009	0	0	
104	Wainganga	Bhandara	244.00	244.50	250.90	16/09/2005	244.05	23-07-2009	3	3	100
105	Wainganga	Pauni	226.73	227.73	232.35	07/09/1994	226.73	23-07-2009	4	3	75
106	Krishna	Arjunward	542.07	543.29	543.69	05/08/2005	0.00	00-01-1900	0	0	
107	Tapi	Hatnur Dam	212.02	214.00	214.00	12/10/1989	214.00	27-09-2009	31	29	93.55
	NCT Delhi										
108	Yamuna	Delhi Rly Bridge	204.00	204.83	207.49	06/09/1978	205.33	15-09-2009	5	4	80
109	Sahibi	Dhansa	211.44	212.44	213.58	06/08/1977	210.50	14-09-2009	0	0	
	Orissa										
110	Subernarekna	Rajghat	9.45	10.36	12.69	19-06-2008	11.17	09-09-2009	7	7	100
111	Burhabalang	NH_5_Road Bridge	7.21	8.13	9.50	12/10/1973	8.30	02-10-2009	4	3	75
112	Baitarni	Anandpur	37.44	38.36	41.20	19/08/1975	37.67	21-07-2009	2	2	100
113	Baitarni	Akhuapada	17.83	17.83	21.95	16/08/1960	18.00	03-10-2009	7	7	100
114	Brahmani	Jenapur	22.00	23.00	24.78	20/08/1975	22.50	22-07-2009	2	2	100
115	Rushikuluya	Purushottampur	15.83	16.83	19.65	04/11/1990	17.30	20-07-2009	8	8	100
116	Vamsadhara	Gunupur	83.00	84.00	88.75	17/09/1980	84.00	19-07-2009	7	6	85.71
117	Vamsadhara	Kashinagar	53.60	54.60	58.93	18/09/1980	55.65	19-07-2009	81	76	93.83
118	Mahanadi	Hirakud Dam	FRL=192.02		192.30	30/01/1998			50	49	98
119	Mahanadi	Naraj	25.41	26.41	27.61	31/08/1982	26.11	21-07-2009	17	16	94.12
120	Mahanadi	Alipingal Devi	10.85	11.76	13.05	20/09/2008	10.86	21-07-2009	1	1	100
121	Mahanadi	Nimapara	9.85	10.76	11.60	31/08/1982	10.04	21-07-2009	4	4	100
	Tripura										

Annex III

Statewise Flood Forecasting Information In India during Flood Season 2009

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2009				
					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	5	6	7	8	9	10	11	12	13
122	Manu	Kailashar	24.34	25.34	25.79	07/06/1993	24.37	01-07-2009	0	0	
123	Gumti	Sonamura	11.50	12.50	14.42	23/07/1993	11.64	02-07-2009	1	1	100
	Uttar Pradesh										
124	Ganga	Narora Barrage	PL= 180.79 at D/S		180.18	06/09/1978	179.16	29-07-2009	4	3	75
125	Ganga	Kannauj	124.97	125.97	126.24	29/08/1998	124.48	15-09-2009	0	0	
126	Ganga	Ankinghat	123.00	124.00	124.31	09/09/1978	122.62	15-09-2009	0	0	
127	Ganga	Kanpur	113.00	114.00	113.47	02/09/1967	111.98	16-09-2009	0	0	
128	Ganga	Dalmau	98.36	99.36	99.84	03/08/1973	97.85	17-09-2009	0	0	
129	Ganga	Phphamau	83.73	84.73	87.98	08/09/1978	78.77	17-08-2009	0	0	
130	Ganga	Allahabad	83.73	84.73	88.03	08/09/1978	77.53	14-09-2009	0	0	
131	Ganga	Mirzapur	76.72	77.72	80.34	09/09/1978	70.52	14-09-2009	0	0	
132	Ganga	Varanasi	70.26	71.26	73.90	09/09/1978	65.31	15-09-2009	0	0	
133	Ganga	Ghazipur	62.11	63.11	65.22	09/09/1978	59.29	15-09-2009	0	0	
134	Ganga	Ballia	56.62	57.62	60.25	14/09/2003	55.89	16-09-2009	0	0	
135	Ramganga	Moradabad	189.60	190.60	192.68	03/09/1978	189.95	13-09-2009	5	5	100
136	Ramganga	Bareilly	162.70	163.70	162.88	06/08/1978	161.12	19-08-2009	0	0	
137	Yamuna	Mawi	230.00	230.85	232.45	26/09/1988	230.98	12-09-2009	4	4	100
138	Yamuna	Mathura	164.20	165.20	169.73	08/09/1978	165.15	16-09-2009	8	8	100
139	Yamuna	Agra	151.40	152.40	154.76	09/09/1978	149.98	17-09-2009	0	0	
140	Yamuna	Etawa	120.92	121.92	126.13	11/09/1978	119.00	18-09-2009	0	0	
141	Yamuna	Auraiya	112.00	113.00	118.19	25/08/1996	104.68	27-07-2009	0	0	
142	Yamuna	Kalpi	107.00	108.00	112.98	25/08/1996	99.53	28-07-2009	0	0	
143	Yamuna	Hamirpur	102.63	103.63	108.59	12/09/1983	93.46	28-07-2009	0	0	
144	Yamuna	Chilaghat	99.00	100.00	105.16	06/09/1978	92.56	13-09-2009	0	0	
145	Yamuna	Naini	83.74	84.74	87.99	08/09/1978	78.22	13-09-2009	0	0	
146	Betwa	Mohana	121.66	122.66	133.35	11/09/1983	114.95	12-09-2009	0	0	
158	Betwa	Sahjina	103.54	104.54	108.67	12/09/1983	93.98	12-09-2009	0	0	
147	Ken	Banda	103.00	104.00	113.29	07-07-2005	105.50	12-09-2009	5	5	100
148	Gomati	Lucknow	108.50	109.50	110.85	11-09-1971	106.47	16-10-2009	0	0	
149	Gomati	Jaunpur	73.07	74.07	77.74	22/09/1971	70.55	10-10-2009	0	0	
150	SAI	Raibareli	100.00	101.00	104.81	17/09/1982	98.97	18-09-2009	0	0	
151	Ghaghra	Elgin Bridge	105.07	106.07	107.48	23-09-2008	107.56	10-10-2009	69	60	86.96
152	Ghaghra	Ayodhya	91.73	92.73	93.84	24-09-2008	94.01	11-10-2009	79	75	94.94
153	Ghaghra	Turtipar	63.01	64.01	66.00	28/08/1998	64.71	13-10-2009	58	57	98.28

Statewise Flood Forecasting Information In India during Flood Season 2009

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2009		No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
					Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY)			
1	2	3	5	6	7	8	9	10	11	12	13
154	Rapti	Balrampur	103.62	104.62	105.25	11/09/2000	104.64	21-08-2009	26	26	100
155	Rapti	Bansi	83.90	84.90	85.82	21/08/1998	84.87	25-08-2009	22	21	95.45
156	Rapti	Gorakpur Birdghat	73.98	74.98	77.54	23/08/1998	76.00	22-08-2009	39	37	94.87
157	Gandak	Khadda	95.00	96.00	97.50	23/07/2002	95.84	18-08-2009	44	42	95.45
	Uttaranchal										
159	Alaknanda	Srinagar	539.00	540.00	536.85	05/09/1995	534.35	11-09-2009	0	0	
160	Ganga	Rishikesh	339.50	340.50	341.72	03/09/1978	339.02	11-09-2009	0	0	
161	Ganga	Handwar	293.00	294.00	296.23	02/09/1978	293.15	11-09-2009	1	0	0
	West Bengal										
162	Ganga	Farakka	21.25	22.25	25.14	07/09/1998	22.58	27-08-2009	82	81	98.78
163	Mayurakshi	Tilpara Barrage	PL= 62.79		67.05	27/09/1978	62.79	06-10-2009	4	4	100
164	Mayurakshi	Narayanpur	26.99	27.99	29.69	27/09/1995	25.17	10-09-2009	0	0	
165	Ajoy	Gheropara	38.42	39.42	43.94	27/09/1978	40.15	07-09-2009	2	2	100
166	Damodar	Durgapur Barrage	PL = 64.47		64.47	31/10/2002	64.47	00-01-1900	28	28	100
167	Mundeshwari	Harinkhola	11.80	12.80	14.58	29/09/1978	14.43	08-09-2009	6	6	100
168	Kangsabati	Kangsabati Dam	FRL=134.11		134.71	02/09/1978	133.33	07-09-2009	17	17	100
169	Kangsabati	Mohanpur	24.73	25.73	29.87	02/09/1978	24.18	09-09-2009	0	0	
170	Raidak-I	Tufanganj	34.22	35.30	36.36	21/07/1993	34.65	06-07-2009	7	7	100
171	Torsa	Ghughumari	39.80	40.41	41.46	03/08/2000	40.40	20-08-2009	38	36	94.74
172	Jaldhaka	NH-31	80.00	80.90	81.33	28-08-1972	80.49	08-10-2009	11	11	100
173	Jaldhaka	Mathabhanga	47.70	48.20	49.85	07/09/2007	48.18	20-08-2009	2	2	100
174	Tista	Domohani	85.65	85.95	89.30	04/10/1968	86.45	20-08-2009	56	56	100
175	Tista	Mekhliganj	65.45	65.95	66.45	13/07/1996	66.10	20-08-2009	24	24	100
							Total Forecasts		***4010***	***3927***	**97.93**
							Level Forecasts		**3343**	**3298**	**98.65**
							Inflow Forecast		**667**	**629**	**94.30**

Annex IV

Performance of Flood Forecasting Stations (Divisionwise) in India during Flood Season 2009

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	Accu-racy
1	Himalayan Ganga Divn, Dehradun	3	1	1	0	0.00	0	0	0	0	-	3	1	1	0	0.00
2	Middle Ganga Division 1, Lucknow	7	6	293	276	94.20	0	0	0	0	-	7	6	293	276	94.20
3	Middle Ganga Division 2, Lucknow	8	1	5	5	100.00	1	1	4	3	75.00	9	2	9	8	88.89
4	Middle Ganga Division 3, Varanasi	7	0	0	0	-	0	0	0	0	-	7	0	0	0	-
5	Middle Ganga Division 4, Patna	17	17	731	724	99.04	0	0	0	0	-	17	17	731	724	99.04
6	Middle Ganga Division 5, Patna	18	9	204	203	99.51	0	0	0	0	-	18	9	204	203	99.51
7	Upper Yamuna Divn, Delhi	4	3	17	16	94.12	1	0	0	0	-	5	3	17	16	94.12
8	Chambal Division, Jaipur	0	0	0	0	-	1	0	0	0	-	1	0	0	0	-
9	Lower Yamuna Divn, Agra	10	2	5	5	100.00	0	0	0	0	-	10	2	5	5	100.00
10	Damodar Divn, Asansol	4	2	8	8	100.00	7	7	140	135	100.00	11	9	148	143	96.62
11	Upper Brahmaputra Divn, Dibrugarh	13	12	915	914	99.89	0	0	0	0	-	13	12	915	914	99.89
12	Middle Brahmaputra Divn, Guwahati	9	8	365	362	99.18	0	0	0	0	-	9	8	365	362	99.18
13	Lower Brahmaputra Divn, Jalpaiguri	10	10	616	614	99.68	0	0	0	0	-	10	10	616	614	99.68
14	Eastern Rivers Divn, Bhubaneswar	11	11	140	132	94.29	1	1	10	10	100.00	12	12	150	142	94.67
15	Mahanadi Divn, Burla	0	0	0	0	-	1	1	50	49	98.00	1	1	50	49	98.00
16	Lower Godavari Divn, Hyderabad	14	2	7	6	85.71	4	0	0	0	-	18	2	7	6	85.71
17	Lower Krishna Divn, Hyderabad	3	2	25	23	92.00	6	6	414	385	93.00	9	8	439	408	92.94
18	Mahi Divn, Ahmedabad	2	0	0	0	-	3	1	5	5	100.00	5	1	5	5	100.00
19	Tapi Divn,Surat	5	0	0	0	-	3	3	44	42	95.45	8	3	44	42	95.45
20	Narmada Divn, Bhopal	2	1	11	10	90.10	0	0	0	0	-	2	1	11	10	90.10
	Total	**147**	**87**	**3343**	**3298**	98.65	**28**	**20**	**667**	**629**	94.30	**175**	107	**4010**	**3927**	**97.93**

Annex V

Performance of Flood Forecasting Stations (Major Basinwise) in India during Flood Season 2009

Sl. No	Name of the Major River basin	Total no.of FF sites			No.of FF sites where no forecast was required			Level Forecasts			Inflow Forecasts			Overall Forecasts		
		Total no	Level FF sites	Inflow FF sites	Total no	Level FF sites	Inflow FF sites	Total No.	Within limits	% of Accu-racy	Total No.	Within limits	% of Accu-racy	Total No.	Within limits	% of Accu-racy
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Ganga and its tributaries	87	77	10	38	36	2	1264	1237	97.86	144	138	95.83	1408	1375	97.66
2	Brahamputra and its tributaries	27	27	0	1	1	0	1806	1800	99.67	0	0	-	1806	1800	99.67
3	Barak and its tributaries	5	5	0	1	1	0	90	90	100.00	0	0	-	90	90	100
4	Eastern Rivers	9	8	1	0	0	0	118	111	94.07	10	10	100.00	128	121	94.53
5	Mahanadi and its tributaries	4	3	1	0	0	0	22	21	95.45	50	49	98.00	72	70	97.22
6	Godavari and its tributaries	18	14	4	16	12	4	7	6	85.71	0	0	-	7	6	85.71
7	Krishna and its tributaries	9	3	6	1	1	0	25	23	92.00	414	385	93.00	439	408	92.94
8	West Flowing rivers	15	9	6	10	8	2	11	10	90.91	49	47	95.92	60	57	95.00
9	Southern rivers	1	1	0	1	1	0	0	0	-	0	0	-	0	0	-
	Total	175	147	28	68	60	8	3343	3298	98.65	667	629	94.30	4010	3927	97.93

FLOOD FORECASTING PERFORMANCE FROM 1986 TO 2009									
Year	No.of Level Forecasts issued			No.of Inflow Forecasts issued			Total No.of Forecasts issued		
	Total	Within +/- 15 cm of deviation from actual	Percentage of accuracy	Total	Within +/- 20% cumec of deviation from actual	Percentage of accuracy	Total	Within +/- 15 cm or +/- 20% cumec of deviation from actual	Percentage of accuracy
1986	3956	3635	91.89	831	744	89.53	4787	4379	91.48
1987	4793	4560	95.14	1021	965	94.52	5814	5525	95.03
1988	5472	5131	93.77	1510	1425	94.37	6982	6556	93.90
1989	4323	4081	94.40	1213	1181	97.36	5536	5262	95.05
1990	6578	6124	93.10	1988	1947	97.94	8566	8071	94.22
1991	5234	4890	93.43	1369	1335	97.52	6603	6225	94.28
1992	3588	3418	95.26	1176	1149	97.70	4764	4567	95.86
1993	5226	5066	96.94	1417	1372	96.82	6643	6438	96.91
1994	5472	5158	94.26	2004	1929	96.26	7476	7087	94.80
1995	5393	5201	96.44	1024	988	96.48	6417	6189	96.45
1996	5104	4945	96.88	1363	1321	96.92	6467	6266	96.89
1997	4059	3895	95.96	1406	1368	97.30	5465	5263	96.30
1998	6401	5264	82.24	1542	1511	97.99	7943	6775	85.30
1999	5550	5428	97.80	1505	1398	92.89	7055	6826	96.75
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
Cumul.	120090	114390	95.25	29269	28125	96.09	149359	142515	95.42

Annex VIII

Unprecedented flood events in India under CWC FF & W Network - 2009 flood season

Sl .No	River	Station	State	Danger level in metres	Existing Highest Flood Level (HFL)		New HFL		Duration of Unprecedented Flood Situation	
					Level in metres	Date of occurrence	Level in metres	Date of occurrence	From	To
1	Ghaghra	Elgin Bridge	Uttar Pradesh	106.07	107.48	23/09/2008	107.58	10-10-2009	10-10-09: 06	10-10-09: 16
2	Ghaghra	Ayodhya	Uttar Pradesh	92.73	93.84	24/09/2008	94.01	11-10-2009	11-10-09: 11	11-10-09: 20
3	Tungabhadra	Mantralayam	Andhra Pradesh	312.00	315.80	19/11/1992	316.77	02-10-2009	01-10-09: 22	03-10-09: 07

Annex IX

High Flood Events during Flood Season - 2009

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	Ghaghra	Elgin Bridge	Uttar Pradesh	Barabanki	106.07	107.48	23/09/2008	20-08-09: 13	22-08-09: 17
								08-10-09: 19	12-10-09: 04
2	Ghaghra	Ayodhya	Uttar Pradesh	Faizabad	92.73	93.84	24/09/2008	21-08-09: 03	24-08-09: 18
							24/09/2008	09-10-09: 09	14-10-09: 08
3	Bagmati	Benibad	Bihar	Muzaffarpur	48.68	50.01	12/07/2004	20-08-09: 17	23-08-09: 22
4	Kosi	Basua	Bihar	Supaul	47.75	48.87	11/07/2004	17-08-09: 11	22-08-09: 04
5	Mundeshwari	Harinkhola	West Bengal	Hooghly	12.8	14.58	29-09-1978	08-09-09: 12	09-09-09: 16
6	Desang	Nanglamoraghat	Assam	Sibsagar	94.46	96.49	06/091998	11-07-09: 16	12-07-09: 15
5	Tungbhadra	Mantralayam	Andhra Pradesh	Kurnool	312	315.8	19/11/1992	01-10-09: 19	03-10-09: 08

High Flood Level= HFL-0.50 M

Low and Moderate flood events on main Ganga and its tributaries- 2009 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2009		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	Ganga	Haridwar	Uttaranchal	293.00	294.00	293.15	11-09-2009	11-09-09: 05	11-09-09: 09	1			
2	Ganga	Hathidah	Bihar	40.76	41.76	40.91	28-08-2009	23-08-09: 13	28-08-09: 06	6			
3	Ganga	Kahalgaon	Bihar	30.09	31.09	30.59	27-08-2009	22-08-09: 04	30-08-09: 22	10			
								12-09-09: 17	15-09-09: 00	3			
4	Ganga	Sahibgunj	Jharkhand	26.25	27.25	27.19	28-08-2009	19-08-09: 18	04-09-09: 10	17			
								11-09-09: 03	21-09-09: 01	11			
								14-10-09: 13	19-10-09: 22	6			
5	Ganga	Farakka	West Bengal	21.25	22.25	22.58	27-08-2009	13-08-09: 21	22-09-09: 17	41	23-08-09: 09	31-08-09: 06	9
								17-10-09: 11	18-10-09: 11	2			
6	Ramganga	Moradabad	Uttar Pradesh	189.60	190.60	189.95	13-09-2009	11-09-09: 17	15-09-09: 18	5			
7	Yamuna	Mawi	Uttar Pradesh	230.00	230.85	230.98	12-09-2009	11-09-09: 01	15-09-09: 13	5	12-09-09: 14	13-09-09: 06	2
											13-09-09: 12	14-09-09: 06	2
8	Yamuna	Delhi Rly Bridge	NCT Delhi	204.00	204.83	205.33	15-09-2009	12-09-09: 00	16-09-09: 19	5	12-09-09: 21	15-09-09: 18	4
9	Yamuna	Mathura	Uttar Pradesh	164.20	165.20	165.15	16-09-2009	13-09-09: 17	21-09-09: 14	9			
10	Ken	Banda	Uttar Pradesh	103.00	104.00	105.50	12-09-2009	10-09-09: 20	11-09-09: 06	1			
								11-09-09: 13	13-09-09: 03	3	11-09-09: 19	12-09-09: 23	2
11	Ghaghra	Elgin Bridge	Uttar Pradesh	105.07	106.07	107.56	10-10-2009	21-07-09: 14	23-07-09: 18	3			
								29-07-09: 04	02-08-09: 12	5	29-07-09: 22	31-07-09: 07	2
								03-08-09: 15	04-08-09: 16	2			
								07-08-09: 00	19-09-09: 03	44	17-08-09: 08	25-08-09: 10	9
											08-09-09: 06	09-09-09: 09	2
											12-09-09: 08	14-09-09: 20	3
								07-10-09: 01	21-10-09: 21	16	07-10-09: 08	14-10-09: 15	8
12	Ghaghra	Ayodhya	Uttar Pradesh	91.73	92.73	94.01	11-10-2009	22-07-09: 08	24-07-09: 10	3			
								29-07-09: 11	03-08-09: 09	6	30-07-09: 11	31-07-09: 18	2
								03-08-09: 18	05-08-09: 11	3			
								07-08-09: 12	26-09-09: 22	51	08-08-09: 20	10-08-09: 18	3
											18-08-09: 18	26-08-09: 00	8
											08-09-09: 19	10-09-09: 00	2
											12-09-09: 14	16-09-09: 09	5
								07-10-09: 03	21-10-09: 22	16	07-10-09: 20	15-10-09: 13	9
13	Ghaghra	Turtipar	Uttar Pradesh	63.01	64.01	64.71	13-10-2009	31-07-09: 01	03-08-09: 18	5			
								09-08-09: 04	15-08-09: 19	8			
								15-08-09: 22	20-09-09: 23	37	19-08-09: 22	27-08-09: 03	8
											15-09-09: 07	16-09-09: 01	2
								08-10-09: 08	18-10-09: 21	12	09-10-09: 18	16-10-09: 05	7
14	Ghaghra	Daraulli	Bihar	59.82	60.82	60.82	14-10-2009	20-08-09: 08	28-08-09: 07	9			
								10-09-09: 12	11-09-09: 20	2			
								09-10-09: 03	17-10-09: 06	9			
15	Ghaghra	Gangpur Siswan	Bihar	55.04	57.04	57.25	25-08-2009	02-08-09: 01	02-08-09: 20	2			
								11-08-09: 01	13-08-09: 02	3			

Low and Moderate flood events on main Ganga and its tributaries- 2009 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2009		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
								18-08-09: 23	28-08-09: 22	11	23-08-09: 17	27-08-09: 06	5
								10-10-09: 12	17-10-09: 21	8	13-10-09: 14	16-10-09: 01	3
								09-08-09: 10	11-08-09: 01	3			
								04-09-09: 13	08-09-09: 11	5			
								08-10-09: 22	12-10-09: 16	5			
16	Rapti	Bansi	Uttar Pradesh	83.90	84.90	84.87	25-08-2009	15-08-09: 06	29-08-09: 11	15			
								02-09-09: 19	03-09-09: 06	1			
17	Rapti	Gorakpur_Birdghat	Uttar Pradesh	73.98	74.98	76.00	22-08-2009	30-07-09: 12	06-09-09: 19	39	15-08-09: 23	30-08-09: 09	15
18	Sone	Maner	Bihar	51.00	52.00	51.15	25-08-2009	23-08-09: 15	27-08-09: 10	5			
19	PunPun	Sripatpur	Bihar	49.60	50.60	52.99	13-09-2009	17-08-09: 01	20-08-09: 04	4			
								02-09-09: 06	03-09-09: 06	2			
								08-09-09: 04	16-09-09: 02	9	08-09-09: 09	15-09-09: 10	8
20	Gandak	Khadda	Uttar Pradesh	95.00	96.00	95.84	18-08-2009	27-07-09: 23	30-07-09: 09	3			
								31-07-09: 14	01-08-09: 11	2			
								04-08-09: 03	04-08-09: 12	1			
								06-08-09: 08	09-08-09: 02	4			
								09-08-09: 09	22-08-09: 08	14			
								31-08-09: 23	01-09-09: 11	1			
21	Gandak	Chatia	Bihar	68.15	69.15	68.31	20-08-2009	20-08-09: 00	22-08-09: 03	3			
22	Gandak	Rewaghat	Bihar	53.41	54.41	53.53	21-08-2009	02-08-09: 23	03-08-09: 02	1			
								09-08-09: 19	10-08-09: 19	2			
								20-08-09: 06	22-08-09: 16	3			
23	Burhi Gandak	Muzaffarpur_Sikandarpur	Bihar	51.53	52.53	51.77	25-08-2009	23-08-09: 08	29-08-09: 01	7			
24	Burhi Gandak	Samastipur	Bihar	45.02	46.02	46.76	28-08-2009	10-08-09: 00	14-08-09: 18	6			
								22-08-09: 16	31-08-09: 10	10			
								21-08-09: 14	01-09-09: 09	12	27-08-09: 05	29-08-09: 16	3
								13-09-09: 03	14-09-09: 05	2			
25	Bagmati	Benibad	Bihar	47.68	48.68	49.72	09-07-2009	02-07-09: 16	12-07-09: 16	11	09-07-09: 16	09-07-09: 21	1
								28-07-09: 17	16-09-09: 09	51	29-07-09: 18	02-09-09: 13	36
								10-10-09: 06	11-10-09: 06	2			
26	Bagmati	Hayaghat	Bihar	44.72	45.72	46.77	27-08-2009	04-08-09: 08	12-09-09: 02	40	20-08-09: 05	05-09-09: 16	17
											19-08-09: 03	28-08-09: 20	11
								07-09-09: 17	08-09-09: 13	2			
27	Adhwara Group	Ekmighat	Bihar	45.94	46.94	47.72	26-08-2009	03-08-09: 07	13-09-09: 16	42	20-08-09: 00	05-09-09: 12	17
28	Kamla Balan	Jhanjharpur	Bihar	49.00	50.00	51.83	22-08-2009	01-07-09: 09	01-07-09: 23	2			
								04-07-09: 03	04-07-09: 14	1			
								27-07-09: 13	29-07-09: 14	3	28-07-09: 12	29-07-09: 04	2
								30-07-09: 02	11-08-09: 06	13	31-07-09: 05	02-08-09: 10	3
											06-08-09: 15	08-08-09: 12	3
											12-08-09: 13	12-08-09: 16	1

Annex X

Low and Moderate flood events on main Ganga and its tributaries- 2009 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2009		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
								16-08-09: 11	29-08-09: 09	14	16-08-09: 17	25-08-09: 11	10
29	Kosi	Basua	Bihar	46.75	47.75	48.85	18-08-2009	29-06-09: 07	21-09-09: 16	85	03-07-09: 19	05-07-09: 09	3
											27-07-09: 10	03-08-09: 09	8
											05-08-09: 01	09-08-09: 17	5
											10-08-09: 19	28-08-09: 07	19
											29-08-09: 01	30-08-09: 13	3
											31-08-09: 11	02-09-09: 04	3
30	Kosi	Baltara	Bihar	32.85	33.85	35.36	27-08-2009	01-07-09: 09	26-07-09: 04	26	02-07-09: 19	11-07-09: 01	9
											14-07-09: 19	17-07-09: 11	4
								27-07-09: 13	19-09-09: 04	55	06-08-09: 23	13-09-09: 08	38
31	Kosi	Kursela	Bihar	29.00	30.00	29.85	28-08-2009	20-08-09: 14	02-09-09: 01	13			
								11-09-09: 14	16-09-09: 08	5			
								02-07-09: 11	09-07-09: 03	8	06-07-09: 17	07-07-09: 09	2
								28-07-09: 01	04-08-09: 13	9	31-07-09: 08	31-07-09: 11	1
								06-08-09: 00	11-08-09: 15	7	07-08-09: 04	08-08-09: 09	2
								13-08-09: 05	30-08-09: 18	19	17-08-09: 03	25-08-09: 13	9
								31-08-09: 12	01-09-09: 02	2			
								20-09-09: 12	21-09-09: 01	2			
								08-10-09: 02	11-10-09: 02	4	08-10-09: 08	09-10-09: 15	2
32	Mahananda	Jhawa	Bihar	30.40	31.40	32.02	22-08-2009	03-07-09: 09	05-07-09: 09	3			
								06-07-09: 08	09-07-09: 00	4			
								28-07-09: 22	02-08-09: 23	6			
								06-08-09: 07	12-08-09: 01	7			
								12-08-09: 13	01-09-09: 14	21	17-08-09: 09	19-08-09: 15	3
											19-08-09: 22	26-08-09: 13	8
								08-10-09: 07	11-10-09: 17	4	08-10-09: 16	09-10-09: 21	2
33	Ajoy	Gheropara	West Bengal	38.42	39.42	40.15	07-09-2009	07-09-09: 08	08-09-09: 08	2	07-09-09: 09	07-09-09: 18	1
34	Mundeshwari	Harinkhola	West Bengal	11.80	12.80	14.43	08-09-2009	08-09-09: 09	11-09-09: 23	5	08-09-09: 10	11-09-09: 09	4

Low and Moderate flood events on main Brahamaputra and its tributaries- 2009 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2009		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
1	Brahmaputra	Dibrugrah	Assam	103.24	104.24	105.53	01-Jul-09	15-05-09: 01	16-10-09: 00	155	15-05-09: 01	16-05-09: 21	3
											24-05-09: 14	25-05-09: 15	2
											26-05-09: 19	03-10-09: 00	130
											07-10-09: 15	15-10-09: 07	9
2	Brahmaputra	Neamatighat	Assam	84.04	85.04	85.56	02-Jul-09	29-06-09: 10	03-09-09: 03	67	01-07-09: 06	07-07-09: 03	7
											09-07-09: 05	12-07-09: 14	4
											14-08-09: 11	15-08-09: 07	2
											17-08-09: 18	26-08-09: 01	9
								21-09-09: 13	24-09-09: 05	4			
								10-10-09: 15	12-10-09: 09	3			
3	Brahmaputra	Tezpur	Assam	64.23	65.23	65.25	24-Aug-09	01-07-09: 22	15-07-09: 06	14			
								29-07-09: 11	03-08-09: 11	6			
								05-08-09: 05	07-08-09: 08	3			
								07-08-09: 11	09-08-09: 05	3			
								13-08-09: 12	29-08-09: 08	17			
4	Brahmaputra	Guwahati	Assam	48.68	49.68	48.94	24-Aug-09	17-08-09: 10	17-08-09: 18	1			
								20-08-09: 13	27-08-09: 05	8			
5	Brahmaputra	Goalpara	Assam	35.27	36.27	35.74	26-Aug-09	04-07-09: 17	08-07-09: 00	4			
6	Brahmaputra	Dhubri	Assam	27.62	28.62	28.99	22-Aug-09	03-07-09: 08	18-07-09: 00	16			
								30-07-09: 04	04-09-09: 16	37	17-08-09: 10	29-08-09: 06	13
7	Burhidihing	Khowang	Assam	101.11	102.11	102.49	23-Aug-09	04-07-09: 11	13-07-09: 02	10			
								16-08-09: 21	26-08-09: 10	11	17-08-09: 20	19-08-09: 02	2
											22-08-09: 05	24-08-09: 00	3
								11-10-09: 09	12-10-09: 13	2			
8	Desang	Nanglamoraghat	Assam	93.46	94.46	96.04	11-Jul-09	04-07-09: 09	15-07-09: 00	12	07-07-09: 09	14-07-09: 09	8
								31-07-09: 00	10-08-09: 19	12	31-07-09: 09	03-08-09: 00	4
											06-08-09: 07	10-08-09: 01	5
								13-08-09: 19	19-08-09: 09	7			
								23-08-09: 18	24-08-09: 20	2			
								19-09-09: 04	22-09-09: 18	5	19-09-09: 18	22-09-09: 00	3
								10-10-09: 13	11-10-09: 18	2			
9	Dikhow	Shivsagar	Assam	91.4	92.4	94.14	11-Jul-09	09-07-09: 06	13-07-09: 06	5	09-07-09: 14	12-07-09: 16	4
								30-07-09: 13	31-07-09: 21	2			
								02-08-09: 20	04-08-09: 01	2			
								04-08-09: 13	05-08-09: 07	2			
								06-08-09: 09	08-08-09: 21	3			
								23-08-09: 12	25-08-09: 18	3	23-08-09: 14	24-08-09: 23	2

Annex XI

Low and Moderate flood events on main Brahamaputra and its tributaries- 2009 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2009		Flood period above warning level			Flood penod above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
								19-09-09: 00	20-09-09: 08	2			
10	Subansiri	Badatighat	Assam	81.53	82.53	82.1	24-Aug-09	03-07-09: 05	09-07-09: 11	7			
								10-07-09: 00	12-07-09: 18	4			
								13-08-09: 09	27-08-09: 15	15			
11	Dhansiri (S)	Golaghat	Assam	88.5	89.5	88.9	26-Sep-09	24-08-09: 08	25-08-09: 21	3			
								25-09-09: 06	27-09-09: 05	3			
								10-10-09: 13	11-10-09: 04	2			
12	Dhansiri (S)	Numaligarh	Assam	76.42	77.42	77.8	25-Aug-09	10-07-09: 07	11-07-09: 04	2			
								28-07-09: 23	01-09-09: 12	36	22-08-09: 23	27-08-09: 02	5
								15-09-09: 23	21-09-09: 05	6			
								22-09-09: 04	30-09-09: 17	10	25-09-09: 14	27-09-09: 05	3
								10-10-09: 07	14-10-09: 02	5			
13	Jiabharali	Jiabharali_NTX	Assam	76	77	77.56	29-Jul-09	22-05-09: 13	24-05-09: 00	2			
								26-05-09: 17	28-05-09: 23	3	27-05-09: 02	27-05-09: 09	1
								02-06-09: 06	03-06-09: 00	2			
								10-06-09: 23	11-06-09: 13	2			
								12-06-09: 05	12-06-09: 07	1			
								14-06-09: 05	16-06-09: 22	4			
								21-06-09: 15	21-06-09: 20	1			
								27-06-09: 01	14-07-09: 05	18	30-06-09: 23	01-07-09: 21	2
											02-07-09: 09	03-07-09: 04	2
											03-07-09: 14	03-07-09: 15	1
											07-07-09: 11	07-07-09: 20	1
											09-07-09: 09	09-07-09: 12	1
											10-07-09: 05	10-07-09: 21	2
											11-07-09: 11	11-07-09: 13	1
								14-07-09: 10	14-07-09: 23	2			
								16-07-09: 09	16-07-09: 15	1			
								18-07-09: 10	18-07-09: 17	1			
								22-07-09: 03	22-07-09: 10	1			
								25-07-09: 15	10-08-09: 06	17	27-07-09: 07	28-07-09: 13	2
											29-07-09: 06	30-07-09: 13	2
											01-08-09: 02	02-08-09: 09	2
											05-08-09: 13	05-08-09: 15	1
								11-08-09: 10	11-08-09: 21	1			
								12-08-09: 19	31-08-09: 18	20	13-08-09: 06	14-08-09: 07	2
											16-08-09: 06	17-08-09: 17	2
											18-08-09: 05	18-08-09: 12	1

Low and Moderate flood events on main Brahamaputra and its tributaries- 2009 flood season

Sl. No	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2009		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
											19-08-09: 09	22-08-09: 21	5
											23-08-09: 15	24-08-09: 06	2
								11-09-09: 15	12-09-09: 02	1			
								19-09-09: 08	24-09-09: 14	6	21-09-09: 07	21-09-09: 14	1
								24-09-09: 22	25-09-09: 14	2			
								07-10-09: 12	09-10-09: 22	3			
14	Kopilli	Kampur	Assam	59.5	60.5	61.08	11-Oct-09	10-10-09: 04	12-10-09: 22	4	10-10-09: 06	12-10-09: 00	3
15	Kopilli	Dharmatul	Assam	55	56	55.17	11-Oct-09	10-10-09: 17	13-10-09: 05	3			
16	Puthimari	Puthimari _NHX	Assam	50.81	51.81	52.82	03-Jul-09	27-05-09: 02	31-05-09: 05	5	27-05-09: 04	24-05-09: 21	-1
								13-06-09: 07	14-06-09: 03	2			
								14-06-09: 19	16-06-09: 03	2			
								30-06-09: 08	06-10-09: 00	99	30-06-09: 14	01-07-09: 05	2
											01-07-09: 10	06-07-09: 02	6
											27-07-09: 02	28-07-09: 01	2
											29-07-09: 11	01-08-09: 09	4
											05-08-09: 12	06-08-09: 06	2
											15-08-09: 02	15-08-09: 15	2
											16-08-09: 08	17-08-09: 21	3
											19-08-09: 22	23-08-09: 03	4
								07-10-09: 13	16-10-09: 00	9	08-10-09: 21	09-10-09: 11	2
17	Pagladiya	Pagladia_NTX	Assam	51.75	52.75	52.78	02-Jul-09	30-06-09: 16	06-07-09: 05	7	02-07-09: 19	02-07-09: 20	1
								10-07-09: 08	11-07-09: 03	2			
								21-08-09: 08	22-08-09: 14	2			
								30-08-09: 14	31-08-09: 16	2			
18	Beki	Beki NHX	Assam	44.1	45.1	45.38	20-Aug-09	26-05-09: 15	29-05-09: 14	4			
								29-06-09: 10	14-07-09: 08	16			
								27-07-09: 02	01-09-09: 19	38	29-07-09: 17	30-07-09: 05	1
											31-07-09: 18	31-07-09: 19	1
											13-08-09: 06	13-08-09: 18	1
											17-08-09: 11	17-08-09: 19	1
											19-08-09: 15	20-08-09: 06	2
											21-08-09: 05	21-08-09: 22	2
											25-08-09: 05	25-08-09: 20	2
											26-08-09: 16	26-08-09: 20	1
								02-09-09: 12	07-09-09: 01	6			
								11-09-09: 15	14-09-09: 03	3			
								18-09-09: 18	23-09-09: 22	6			
								08-10-09: 03	12-10-09: 16	5			

Annex XI

Low and Moderate flood events on main Brahamaputra and its tributaries- 2009 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2009		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
19	Manas	Manas NHX	Assam	47.81	48.42	48.08	17-Aug-09	17-08-09: 00	18-08-09: 03	2			
20	Sankosh	Golakganj	Assam	28.94	29.94	30.24	20-Aug-09	27-05-09: 13	28-05-09: 07	2			
								01-07-09: 16	07-07-09: 22	7			
								30-07-09: 09	02-08-09: 15	4			
								06-08-09: 16	01-09-09: 12	27	19-08-09: 20	21-08-09: 21	3
								08-10-09: 08	10-10-09: 03	3			
21	Raidak-I	Tufanganj	West Bengal	34.22	35.3	34.65	06-Jul-09	02-07-09: 02	03-07-09: 07	2			
								05-07-09: 21	07-07-09: 03	2			
								17-08-09: 06	17-08-09: 13	1			
22	Torsa	Ghughumari	West Bengal	39.8	40.41	40.4	20-Aug-09	27-05-09: 00	27-05-09: 19	2			
23	Torsa	Ghughumari	West Bengal	39.8	40.41	40.4	20-Aug-09	01-07-09: 07	02-07-09: 02	2			
								03-07-09: 15	04-07-09: 05	2			
								04-07-09: 12	05-07-09: 02	2			
								05-07-09: 11	06-07-09: 03	2			
								04-08-09: 19	04-08-09: 21	1			
								05-08-09: 13	05-08-09: 20	1			
								06-08-09: 03	06-08-09: 14	1			
								13-08-09: 09	13-08-09: 18	1			
								16-08-09: 10	17-08-09: 03	2			
								19-08-09: 09	20-08-09: 05	2			
								20-08-09: 08	23-08-09: 17	4			
								08-10-09: 07	09-10-09: 04	2			
24	Jaldhaka	NH-31	West Bengal	80	80.9	80.49	08-Oct-09	05-07-09: 10	05-07-09: 15	1			
								30-07-09: 14	30-07-09: 17	1			
								16-08-09: 09	16-08-09: 16	1			
								17-08-09: 04	17-08-09: 06	1			
								19-08-09: 09	19-08-09: 14	1			
								20-08-09: 08	20-08-09: 18	1			
								07-10-09: 18	08-10-09: 08	2			
25	Jaldhaka	Mathabhanga	West Bengal	47.7	48.2	48.18	20-Aug-09	20-08-09: 12	20-08-09: 23	1			
26	Tista	Domohani	West Bengal	85.65	85.95	86.45	20-Aug-09	26-05-09: 21	27-05-09: 16	2	26-05-09: 22	27-05-09: 05	1
								30-06-09: 08	30-06-09: 11	1			
								03-07-09: 06	03-07-09: 21	2	03-07-09: 10	03-07-09: 14	1
								04-07-09: 09	04-07-09: 11	1			
								05-07-09: 07	05-07-09: 19	1			
								10-07-09: 17	10-07-09: 19	1			
								26-07-09: 10	26-07-09: 17	1			
								27-07-09: 09	30-07-09: 00	4	29-07-09: 08	29-07-09: 15	1

Low and Moderate flood events on main Brahamaputra and its tributaries- 2009 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2009		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
								30-07-09: 04	30-07-09: 20	2	30-07-09: 08	30-07-09: 12	1
								31-07-09: 02	31-07-09: 20	2			
								01-08-09: 05	01-08-09: 18	2			
								05-08-09: 10	05-08-09: 15	1			
								06-08-09: 07	06-08-09: 16	1			
								12-08-09: 13	12-08-09: 14	1			
								16-08-09: 07	16-08-09: 20	2	16-08-09: 11	16-08-09: 16	1
								18-08-09: 08	18-08-09: 14	1			
								19-08-09: 06	19-08-09: 23	2			
								20-08-09: 03	21-08-09: 04	2	20-08-09: 08	20-08-09: 21	2
								21-08-09: 11	22-08-09: 21	2			
								23-08-09: 04	23-08-09: 21	2			
								19-09-09: 04	19-09-09: 16	1			
								07-10-09: 15	09-10-09: 04	3	08-10-09: 09	08-10-09: 19	1
27	Tista	Mekhliganj	West Bengal	65.45	65.95	66.1	20-Aug-09	27-05-09: 05	27-05-09: 19	2			
								03-07-09: 12	03-07-09: 23	1			
								27-07-09: 14	27-07-09: 19	1			
								29-07-09: 10	29-07-09: 23	2			
								30-07-09: 14	30-07-09: 22	1			
								16-08-09: 16	16-08-09: 21	1			
								19-08-09: 16	20-08-09: 20	2			
								20-08-09: 09	21-08-09: 07	2	20-08-09: 13	20-08-09: 18	1
								19-09-09: 10	19-09-09: 20	1			
								07-10-09: 20	09-10-09: 02	2			
28	Barak	APGhat	Assam	18.83	19.83	19.48	02-Aug-09	16-08-09: 15	18-08-09: 05	3			
								20-08-09: 17	25-08-09: 08	6			
								24-09-09: 23	26-09-09: 01	2			
29	Katakhal	Matizuri	Assam	19.27	20.27	19.74	28-Aug-09	22-08-09: 13	26-08-09: 09	5			
								27-08-09: 18	29-08-09: 06	3			
30	Kushiyara	Karimganj	Assam	13.94	14.94	15.96	22-Aug-09	01-08-09: 16	02-08-09: 04	1			
								05-08-09: 06	31-08-09: 14	27	07-08-09: 00	10-08-09: 05	4
											16-08-09: 11	28-08-09: 20	13
								23-09-09: 22	28-09-09: 14	6			
											24-09-09: 23	26-09-09: 20	3
31	Gumti	Sonamura	Tripura	11.5	12.5	11.64	02-Jul-09	02-07-09: 01	02-07-09: 11	1			

Low and Moderate flood events on various river systems (excluding Ganga and Brahmaputra basins)- 2009 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2009		Flood period => warning level			Flood period => danger level		
						Level in metres	From	From	To	No. of days	From	To	No. of days
1	Subernarekna	Rajghat	Orissa	9.45	10.36	11.17	09-Sep-09	07-09-09: 13	11-09-09: 23	5	07-09-09: 20	11-09-09: 00	4
2	Burhabalang	NH_5 _Road Bridge	Orissa	7.21	8.13	8.30	02-Oct-09	02-10-09: 06	04-10-09: 07	3	02-10-09: 19	03-10-09: 08	2
3	Baitarni	Anandpur	Orissa	37.44	38.36	37.67	21-Jul-09	21-07-09: 09	21-07-09: 14	1			
4	Baitarni	Akhuapada	Orissa	17.83	17.83	18.00	03-Oct-09				21-07-09: 15	22-07-09: 03	1
											02-10-09: 22	04-10-09: 00	2
5	Brahmani	Jenapur	Orissa	22.00	23.00	22.50	22-Jul-09	22-07-09: 01	22-07-09: 15	2			
6	Rushikuluya	Purushottampur	Orissa	15.83	16.83	17.30	20-Jul-09	14-07-09: 14	15-07-09: 23	2			
								19-07-09: 20	20-07-09: 21	2	20-07-09: 00	20-07-09: 11	1
								03-10-09: 21	04-10-09: 09	1			
7	Vamsadhara	Gunupur	Orissa	83.00	84.00	84.00	19-Jul-09	19-07-09: 11	20-07-09: 03	2	19-07-09: 16	19-07-09: 19	1
								20-07-09: 16	21-07-09: 02	1			
8	Vamsadhara	Kashinagar	Orissa	53.60	54.60	55.65	19-Jul-09	03-07-09: 11	03-07-09: 23	1			
								13-07-09: 22	17-07-09: 10	5	14-07-09: 02	14-07-09: 06	1
								15-07-09: 20	15-07-09: 22	1			
								19-07-09: 02	23-07-09: 17	6			
								19-07-09: 13	20-07-09: 09	2			
								20-07-09: 18	21-07-09: 06	1			
								28-07-09: 09	29-07-09: 05	2			
								25-08-09: 07	29-08-09: 17	5			
								30-08-09: 16	01-09-09: 14	3			
								02-09-09: 15	02-09-09: 23	1			
								07-09-09: 15	07-09-09: 17	1			
								05-10-09: 16	06-10-09: 19	2			
								07-10-09: 17	08-10-09: 04	1			
								08-10-09: 18	09-10-09: 04	1			
9	Mahanadi	Naraj	Orissa	25.41	26.41	26.11	21-Jul-09	15-07-09: 04	17-07-09: 08	3			
								17-07-09: 14	17-07-09: 18	1			
								20-07-09: 09	26-07-09: 10	7			
10	Mahanadi	Alipingal Devi	Orissa	10.85	11.76	10.85	21-Jul-09	21-07-09: 13	21-07-09: 18	1			
								21-07-09: 12	22-07-09: 11	2			
11	Mahanadi	Nimapara	Orissa	9.85	10.76	11.60	31-Aug-82	21-07-09: 12	22-07-09: 11	2			
12	Wainganga	Bhandara	Maharashtra	244.00	244.50	244.05	23-Jul-09	23-07-09: 12	23-07-09: 17	1			
13	Wainganga	Pauni	Maharashtra	226.73	227.73	226.73	23-Jul-09	23-07-09: 17	23-07-09: 17	1			
14	Bhima	Deongaon	Karnataka	402.00	404.50	404.22	01-Oct-09	01-10-09: 08	02-10-09: 06	2			

Low and Moderate flood events on various river systems (excluding Ganga and Brahmaputra basins)- 2009 flood season

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2009		Flood period => warning level			Flood period => danger level		
						Level in metres	From	From	To	No. of days	From	To	No. of days
								03-10-09: 17	06-10-09: 11	4			
15	Tungbhadra	Mantralayam	Andhra Pradesh	310.00	312.00	318.77	02-Oct-09	23-07-09: 07	23-07-09: 09	1			
								01-09-09: 21	03-09-09: 12	3			
								07-09-09: 21	10-09-09: 04	3			
								15-09-09: 21	16-09-09: 01	1			
								22-09-09: 10	24-09-09: 08	3			
								30-09-09: 16	05-10-09: 17	6	01-10-09: 08	04-10-09: 04	4
								06-10-09: 02	08-10-09: 08	3			
16	Naramada	Hoshangabad	Madhya Pradesh	292.83	293.83	296.70	10-Sep-09	09-09-09: 15	11-09-09: 22	3	09-09-09: 16	11-09-09: 16	3


IND
FLOOD FORECASTIN
LEGEND
INTERNATIONAL BOUNDARY
STATE BOUNDARY
RIVER
STATE CAPITAL
REGIONAL OFFICE
CIRCLE OFFICE
DIVISION OFFICE
FLOOD FORECASTING STATION
INFLOW FORECASTING STATION
HO + CIRCLE + DIV.
CIRCLE + DIV.