FLOOD FORECASTING AND WARNING NETWORK PERFORMANCE APPRAISAL 2008

GOVERNMENT OF INDIA
CENTRAL WATER COMMISSION
FLOOD FORECAST MONITORING DIRECTORATE

NEW DELHI – 110066 **Feb, 2010**

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 network comprised of 175 Flood Forecasting Stations including 28 inflow forecast during the year 2008, 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 21 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 2008 witnessed unprecedented flood events in recent history. Both the river Subarnarekha at Rajghat and river Ghaghra at Ayodhya had once again recorded in 2008 a fresh "unprecedented Flood", for the second consecutive year after experiencing a similar event in 2007. In addition, "unprecedented Flood" was recorded on river Puthimari at N.H.Road crossing, river Devi, a distributory of river Mahanadi at Alipingal and Gharghra at Elgin Bridge. The year witnessed moderate intensity floods in most part of the northern India, after a gap of few years. No forecasts were required to be issued at 36 stations.

During the flood season 2008, in all, 6691 flood forecasts were issued, out of which 1021 were inflow forecasts and 5670 level forecasts. Out of 5670 level forecasts, 5551 forecasts i.e., 97.90% of the forecasts were found within permissible limit of accuracy of +/ - 15 cm. Similarly out of 1021 inflow forecasts, 1003 inflow forecasts i.e., 98.24% of the inflow forecasts were found within permissible limits of accuracy of +/-20%. Thus on the whole, out of 6691 forecasts, 6554 forecasts i.e., 97.95% forecasts were found within permissible limit of accuracy.

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 monitoring the flood forecasting activities of the field offices.

Flood Forecast Monitoring (FFM) Directorate plays an important role in compiling the information received from various field offices and issues daily bulletins which are sent to various offices of the MOWR, MHA, Railway Board, Transport Ministry, 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 2008 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 the period of unprecedented floods especially for formulating & issuing three hourly special flood bulletins. Special mention is made of Shri Chhotey Lal, Director (till November 2009), Shri. R. Shimray, Director (at present) Shri. A.K.Srivastava, Deputy Director (Comm), Shri.S.Venkataraman, AD (HM), Shri. Krishna Kumar, EAD (HM) , Shri R.Jayachandran, Sr.P.A (HM) and Shri.S.N.Biswas, Sr.P.A (HM), Shri.Rajbir Singh, Data Entry Operator, Shri.Jameel Ahmed, Steno-Gr-II, and in preparing this Appraisal Report.

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

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

New Delhi
February, 2010

MEMBER (RM)

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EXECUTIVE SUMMARY

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 2008 (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 36 flood forecasting sites, as they did not cross the respective warning levels in the flood season 2008.

In all, 6691 flood forecasts were issued during the flood season 2008, the second largest so far in any season, which includes 1021 inflow forecasts and 5670 level forecasts. Out of 5670 level forecasts, 5551 forecasts i.e. 97.90 % forecasts were found within permissible limit of accuracy of ± 15cm. Similarly, out of 1021 inflow forecasts, 1003 forecasts (98.24 %) were found within permissible limit of accuracy of ± 20%. Thus, out of 6691 forecasts, 6554 forecasts (97.95 %) were found within permissible limit of accuracy.

2 Flood Forecasting Performance

2.1 River basinwise

During the flood season 2008, 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 (3020) were issued for the Ganga river and its tributaries. Out of which, 3020 (98.31%) forecasts were found within permissible limit of accuracy. This is as per normal situation every year as floods occur more frequently either in Ganga or in Brahmaputra river and their tributaries. Next highest numbers of forecasts i.e. 2683 forecasts were issued for the Brahamaputra and its tributaries with an accuracy of 98.32 percent. The minimum numbers i.e. 57 forecasts were issued for the Western Rivers basin, whereas no forecast were issued for Southern Rivers (Pennar).

2.2 Statewise

The analysis of Statewise forecasts data of the flood season 2008 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, 2691 forecasts (40.22 percent of total forecasts) were issued, out of which 2653 (98.59percent) forecasts were found within permissible limit of accuracy. Next highest numbers of forecasts i.e. 1463 forecasts (21.87%) were issued in the rivers of the state of Bihar, out of which 1457 forecasts (99.59 %) were found within permissible limit of accuracy.

At 82 sites in the 12 states, all the forecasts issued during the flood season 2008 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	6	7	Karnataka	4
2	Assam	12	8	Maharashtra	2
3	Bihar	27	9	Orissa	5
4	Chattisgarh	1	10	Uttar Pradesh	10
5	Gujarat	1	11	Uttarakhand	1
6	Jharkhand	5	12	West Bengal	8

At 46 forecast stations, there was no necessity to issue forecasts, as the water levels at these stations did not cross respective warning levels.

2.3 Divisionwise

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 framing 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.

During the flood season 2008, the analysis of forecasts data of the flood season reveals that the maximum number of forecasts i.e. 1344 forecasts were issued by the Upper Brahmaputra Division, Dibrugarh, out of which, 1329 forecasts (i.e. 98.88 %) were found within permissible limit of accuracy. The minimum numbers of forecasts i.e. only 4 forecasts were issued by the Himalayan Ganga Division, Dehradun which were found within permissible limit of accuracy i.e. with 100 percent performance accuracy. However, no forecast was issued to Gandhisagar Dam in Chambal Division, Jaipur, Mahi Division, Gandhinagar and Narmada Division, Bhopal. Forecasts issued by the Lower Yamuna Division, Agra were also found to be 100% accurate.

3 Data Communication System

There is a network of about 582 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 situations and forecasts at the National level.

In addition, there were 223 telemetry stations monitoring real time hourly water levels, 15 minutes rainfall as well as hourly rainfall, and other important parameters, established in Krishna, Godavari, Mahanadi, Chambal and Brahmaputra Basins. 2 telemetry control stations (DDRGS) are located at Jaipur and Burla respectively. These were used to prepare forecasts using MIKE-11 software of the Danish Hydraulic Institute, Denmark, which is being used by CWC under various names like NAM, System-11, Mike-11 etc, since 1980's.

The monitoring of floods during the flood season at the Commission's head quarters has revealed that there was no direct wireless link between the nodal division MBD/ HOC, Guwahati, LBD, Jalpaiguri, KGBO, Hyderabad and Delhi for past few years. As a result, the forecasts and other concerned hydrological and hydro-meteorological data from the Brahmaputra basin, which includes the river Tista and other tributaries, besides Barak System, were not being received directly by headquarter wireless, as the 500W HF wireless set meant for the purpose was out of order. This had resulted into more dependency on other mode of communications, namely, telephone as well as fax for data transmission. As a matter of fact, similar condition existed between Mahanadi Division, Burla and Delhi, particularly during high/ unprecedented flood situations since the year 2005 particularly in late evening hours. Similar condition existed between Tapi Division, Surat, and Mahi Division, Ahmedabad and Delhi, particularly during severe flood situations in the year 2006 also. During high flood situations, the data was mostly received on telephone / fax or through india-water.com (a web dedicated for FF activities of CWC) by few Divisions regularly. On the whole, telephone, internet and fax links have ultimately proved to be very useful, reliable and dependable means of communication of flood data, in all important and critical flood situations, between the field divisions and the head quarter of the Commission. The existing wireless communication system has to be strengthened, as it has proved the only dependable communication in disastrous floods so far.

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.

The analysis of forecasts data also revealed that the Brahmaputra river system is most flood prone and the flood season starts earlier sometime in first week of May and extends upto late October. As a result of longer flood periods, more number of forecasts were issued for the State of Assam.

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. ± 15cm for stage forecasts and ± 20% 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. For example, applying same criteria of accuracy to all the forecasting sites on the mainstream Ganga in Bihar and to the forecasting site at Rishikesh on the Ganga in Uttarakhand is not logically correct. It is observed that in Bihar the rate of rise or fall in the level of the Ganga is very gentle & mostly even during high flood times less than 15 cm in 24 hours, which is the permissible limit of deviation in the forecast while at Rishikesh, where river width about 500 m, sometimes there is rise of more than 15 cm in less than 3 hours. Even for Brahmaputra at Dibrugarh where width of the river over 10 km in the flood season, the rate of rise 7 cm/ hr sufficiently high during high floods in 2008. River Jiabharali (width about 450 m) at N.T.Road Crossing had recorded a rise of 24 cm per hour beyond its Danger level occurred during High/ Unprecedented floods. Similarly, on river Vamsadhara at Gunupur, 0.5 m rise was noticed during high floods. 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 peak water level or peak inflow and "time" of occurrences. It is also observed that in many cases the peak 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.

Also, the analysis of forecasts data reveals that it is not correct to compare the forecasts performance accuracy of the divisions with insignificant number of forecasts (e.g. 10 forecasts in case of Narmada Division, Bhopal) , with the performance of Divisions with large number of forecasts(e.g. UBD, Dibrugarh which has issued 1344 forecasts for various sites under its jurisdiction in flood season 2008) because where the numbers of forecasts issued are less accuracy level likely to have large variation even if one forecast goes out of permissible limit of accuracy then, the percentage accuracy. But it is not so with the Divisions where number of forecasts issued is large. There is a need to correlate number of forecasts also in the formula for determining performance.

The study of the forecasts data also reveals that of issuing maximum number of forecasts (2691 forecasts) were issued in the flood season 2008 for the

state of Assam. This is because of higher frequency and longer duration of floods as well as due to more number of sites being on flashy rivers & thus requiring more than one forecast a day.

5 Flood Forecast Monitoring at the CWC's Headquarter

The field units of the Central Water Commission located in various flood affected states are responsible for issuing real time daily flood forecasts of the various forecasting sites to the users. At the Headquarter of the Central Water Commission, the "Flood Forecast Monitoring Directorate (FFM)" 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 forecast monitoring 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 unprecedented and high flood situations, three-hourly flood situations / levels of the concerned sites are also being collected through telephone / fax/ wireless and subsequently special "Red" or "Orange" (renamed from Yellow) 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 the following authorities.

1. The Hon'ble Minister of Water Resources, Shram Shakti Bhawan, New Delhi-110001.
2. The Secretary, MoWR, Shram Shakti Bhawan, New Delhi-110001.
3. The Chairman, CWC, Sewa Bhawan, R.K. Puram, New Delhi-110066.
4. The Member (RM), CWC, Sewa Bhawan, R.K. Puram, New Delhi-110066.
5. The Commissioner (Ganga), MoWR, Block No.11, C.G.O. Complex, Lodi Road, New Delhi-110003.
6. The Chief Engineer (FM), CWC, Sewa Bhawan, R.K. Puram, New Delhi-110066.
7. The Director, National Disaster Management (NDM) Cell, Ministry of Home Affairs, Room No. 12, North Block, New Delhi-110001

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 during the flood season 2008 has issued 154 Nos. daily bulletins besides 52 Nos. **"Orange"** (renamed from Yellow, under instructions of Standard Operating Procedure (SOP) of NDMA) and 41 Nos. **"Red"** bulletins.

6 Response of User Agencies

Since 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. It is the later one which is the user of the flood forecast & warning issued by CWC.

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.

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	21
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	70
10.	No. of states including union -territories covered under F.F.Programme	17
11.	No. of forecasting sites	173
12.	No. of exclusive base stations	350
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) 8233 (in 2007)
17.	Average no. of forecasts being issued every years	6000
18.	No. of forecasts issued in flood season 2006	6663
19.	No. of forecasts issued in flood season 2007	8223
20.	No. of forecasts issued in flood season 2008	6691

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 2008 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	2008	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 2008 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.	Name of 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. 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)	Orange
I	Unprecedented Flood (Water Level equal and above Highest Flood Level-HFL)	Red

In addition, All Ministries/ Departments/ Agencies will be required to transmit 12 hourly updates for Orange Stage. For Red stage, the

monitoring will be done using 3 hourly updates.

Although, technically such flood situations when the flood level at a forecasting site just touches its previous HFL and does not crosses the same, (i.e. it equals the previous HFL), cannot be termed as unprecedented flood situations, yet such flood situation are also given the same importance by the CWC in its flood messages as to the unprecedented flood situations.

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 and moderate floods in Godavari Basins, it is high time that similar criteria are fixed for inflow forecasts too. The reservoirs cannot store beyond its FRL or MFL and thus all records of inflow will never occur either in yellow/ red bulletins, whereas the impact of the record inflows are phenomenal. For example, the criterion for issue of inflow forecast should be the "LOW" and the highest ever attained inflow (in Cumecs/ Volume in MCM in a given duration) should be the "Unprecedented" ever attained criterion. The other two, viz., Moderate and the High are to be fixed, as per each forecast station's historical data. 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. As the inflow computation on hourly basis requires the hourly reservoir levels and hourly outflows, the data processing is more complicated and time consuming. It is to be mentioned that the inflow computed on hourly basis, on historical data should be completed and then criteria are decided. The owner of the data of reservoir is generally the State Government and thus it will require lot of efforts to collect and compile.

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. After flood season 2004, following one inflow forecasting site was added in flood season 2005.

S.No.	New added flood forecast sites	River	State
1	Gandhisagar Dam	Chambal	Madhya Pradesh

After flood season 2005, the following two level forecasting sites were added.

S.No.	New added flood forecast sites	River	State
1	Sahibganj	Ganga	Jharkhand
2	Arjunwad	Krishna	Maharashtra

With the addition of above sites, total flood forecasting sites became 175. Due to trial run of the MIKE-11 model at the Jaipur Division on real time basis, the forecasts issued were not accounted for the flood season 2005. However, few forecasts issued were accounted for in the flood season 2006 onwards.

The details of all the sites basin-wise as well as statewise during the flood season 2008, is shown at **Annex-I** and **Annex-II** respectively.

1.5 DAMAGE DUE TO FLOODS/ HEAVY RAINS BETWEEN 1953 TO 2008

The damage due to floods for the entire country were estimated to be Rs.2214.405 crore (tentative) during the flood season 2008 as compared to Rs.3939.898 crore during 2007. The average annual damages to crops, houses and public utilities from the year 1953 to 2008 as reported by the States/UT's are of the order of Rs. 1827.31 crore (tentative), the maximum annual damage being Rs.8864.54 crore during 2000.

A comparative details showing the details of damages occurred during the flood season 2006 to 2008 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, 2006 to 2008

Sl. No.	Items	Flood damages during Year the Year			Flood Damages during 1953-2008		
		2006	2007	2008	Average	Maximum	
						Year	Damage (year)
1	Area affected (in mha)	0.495	3.549	0.000	7.375	1978	17.500 (1978)
2	Population affected (in millions)	28.57	41.462	19.213	32.661	1978	70.45 (1978)
3	Damaged to Crops(area in mha)	0.433	6.309	1.783	3.620	2005	16.830 (2005)
4	Damaged to crops(value in Rs. Crore)	306.826	1336.315	679.284	712.647	2000	4246.62 (2000)
5	Damaged to houses (in numbers)	737355	1686135	914251	1212046	1978	3507542 (1978)
6	Damaged to houses (value in Rs. Crore)	46.053	1011.967	441.105	282.743	1995	1307.89 (1995)
7	Cattle lost (in number)	8932	70650	17214	91478	1979	618248 (1979)
8	Human lives lost (in numbers)	1500	2439	2143	1611	1977	11316 (1977)
9	Damaged to publicUtilities (in Rs. Crores)	312.727	1591.616	1188.016	831.920	2001	5604.46 (2001)
10	Total damages to crops, houses & public utilities (in Rs. Crores)	665.606	3939.898	2214.405	1846.838	2000	8864.54 (2000)

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 corore 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. 13.996 crore.

1.8 NOMINAL COST OF FLOOD FORECASTING NETWORK

Flood Forecasting and Warning Network has helped in reducing flood damages. It has also helped in utilizing water resources in a better way by properly regulating the reservoirs/ barrages, ensuring safety of reservoirs, obviating unnecessary dislocation of population, reduction of expenditure on flood fighting. The average annual expenditure on flood forecasting services during X^{th} plan was Rs 4.66 crore only against an average annual flood damage of Rs 1360 crores i.e. less than 0.33%. Though there are no data about prevention of damages as result of flood forecasting services, yet it is worth while even if it has resulted in saving of a few lives.

1.8.1 Equivalent value of Inflow forecast

It is to be noted that 1 Thousand Million Cubic Feet (TMC) (about 28.304 Million Cubic metre) of Volume of water (the volume of water approximately 311 cubic metre per second flow continuing for entire 24 hours) can produce electricity in Hydel Power house costing to the tune of Rs. 1 crore (as per 2003 prices), whereas the same 1 TMC of water can produce 10 crores worth of agricultural produce, provided at least 90 TMC of water is made available for a duration of a crop (either Kharif / Rabi). At least in inflow forecasts (28 sites at present) at least 28 TMC of water would have been saved because of timely forecasts by CWC, and this amount is actually received by respective Electricity Boards and Revenue Departments of various State Governments. This amount should be reconciled for CWC for its forecasting services every year.

1.9 ANALYSIS OF PERFORMANCE OF FLOOD FORECASTING NETWORK

CWC carries out analysis and appraisal of the forecasting work, at the end of monsoon season. Based on this, measures for improvements, if necessary, are identified. A summary of the performance of the work carried out by the field divisions during the flood season 2008 presented in chapter-

III. On the whole, 97.95 percent of forecasts where within limits of accuracy. While the performance of the flood forecasting system is satisfactory, yet there is constant endeavor for better performance as new technology and more data are becoming available.

1.10 ORGANISATIONAL SET-UP OF FLOOD FORECASTING NETWORK

The present organizational set up of Flood-forecasting & Warning Establishment of Central Water Commission under the Member (River-Management) is spread over regional offices of CWC each headed by a Chief Engineer. Eleven Circle Offices and twenty one 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 **Figure-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 Malabar 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) since 2002 for the purpose of studies of rainfall/monsoon activities. The details of meteorological sub- divisions are shown in **Table 2.1.**

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

Table 2.1: Details of Meteorological Sub-divisions

S.No.	Meteorological Sub-Division	S.No.	Meteorological Sub-Division
1	Jammu & Kashmir	19	Tamilnadu & Pondicherry
2	Himachal Pradesh	20	Kerala
3	Punjab	21	South Interior Karnataka
4	Haryana,Chandigarh & Delhi	22	North Interior Karnataka
5	Uttaranchal	23	Coastal Karnataka
6	West Uttar Pradesh	24	Konkon & Goa
7	East Uttar Pradesh	25	Madhya Maharashtra
8	Bihar	26	Marathawada
9	Jharkhand	27	Vidarbha
10	Gangetic West Bengal	28	Chhatisgarh
11	Sub-Himalayan W.B. & Sikkim	29	East Madhya Pradesh
12	Assam & Meghalaya	30	West Madhya Pradesh
13	Arunachal Pradesh	31	Gujarat region
14	Nagaland, Manipur, Mizoram & Tripura	32	Sourashtra, Kutch & Diu
15	Orissa	33	East Rajasthan
16	Telangana	34	West Rajasthan
17	Coastal Andhra Pradesh	35	Lakshadweep
18	Rayalaseema	36	Andaman & Nicobar Island

2.2 HIGHLIGHTS OF SOUTH-WEST MONSOON 2008

2.2.1 Cumulative rainfall distribution during monsoon season 2008 (June to September)

- The cumulative seasonal rainfall for the country as a whole was near normal. Rainfall for the season (1st June to 30th September, 2008) was 98% of its long period average (LPA).
- Seasonal rainfall was 107% of its LPA over Northwest India, 96% of its LPA over Central India, 96% of its LPA over south Peninsula and 94 % of its LPA over Northeast India.
- Out of 36 meteorological subdivisions, 30 meteorological subdivisions recorded normal rainfall. Only 2 (Punjab and Orissa) and 4 (Nagaland, Manipur, Mizoram & Tripura, West Madhya Pradesh, Vidarbha and Kerala) subdivisions recorded excess and deficient rainfall respectively.
- Out of 36 meteorological subdivisions, 92% of the country's area comprising 32 meteorological subdivisions received excess/normal rainfall and the remaining 8% received deficient rainfall during the season.
- Monsoon rainfall was marked by large temporal variations for the country as a whole, as rainfall was 24% above LPA in June and in July it was 17% below LPA. The rainfall was near normal during August and September as it was 3% and 1% below the LPA respectively.
- While, there was rapid progress of monsoon over most parts of the country after the onset over Kerala on 31st May, there was delay in withdrawal of monsoon from northwest India. Monsoon covered the entire country on 10th

July against its normal date of 15th July. The withdrawal of monsoon from west Rajasthan commenced on 29th September 2008 against normal date of 1st September.

- IMD's long range forecast for the seasonal rainfall over the country as whole and over different homogeneous regions except northwest India have been accurate. However, the seasonal rainfall over northwest India and rainfall during July for the country as a whole have not been accurate. While the prediction overestimated the rainfall during July for the country as a whole, it underestimated the seasonal rainfall over northwest India.

2.3 ONSET OF SOUTH-WEST MONSOON SEASON 2008

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 Figure No. 2.1 and Figure No.2.2 are showing 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 10 May, 2008, about 5 days ahead of its normal date (Fig. 1). The monsoon set in over Kerala on 31 May, one day prior to the normal date. Further, advance took place quite rapidly mainly due to a depression (5 – 6 June) over the east central Arabian Sea and a well marked low pressure area (9 – 11 June) over Saurashtra & Kutch and neighbourhood. By 16 June, southwest monsoon had covered most parts of the country except for some parts of Rajasthan. The rapid advance of monsoon could be attributed to the interaction of the monsoon circulation with mid-latitude westerly system. Subsequently, there was a hiatus in the further advance due to the weakening of the monsoon current. The monsoon covered the entire country by 10 July, against normal date of 15 July. The advance of south west monsoon 2008 is enclosed as Fig.2.3.

2.4 SYNOPTIC FEATURES ASSOCIATED WITH THE MONSOON 2008

The mid latitude westerly intrusion, which occurred during advance phase, resulted into above normal rainfall over most parts of north India (North of Lat.20o N) during June. The monsoon trough with normal southward tilt with height could not be active due to the absence of normal large scale north-south horizontal temperature gradient. The break monsoon

conditions also prevailed over the country during second fortnight of July. It adversely affected the rainfall over the central and south peninsular India in July.

Compared to last two years, the frequency of monsoon depressions has been less with development of only four depressions during this monsoon season. These included one depression over the Arabian Sea and another over Bay of Bengal during June, one land depression over coastal Orissa during August and one deep depression over the Bay of Bengal during September. The tracks of these systems are shown in Fig. 2.4. The month of July was devoid of any monsoon depression like the previous July of 1995, 1998, 2000, 2001, 2002 and 2004. However, seven low pressure areas developed during the season and contributed to the seasonal rainfall.

The depression over the Arabian Sea during 5th to 6th June moved away westwards and weakened over the Ocean. The second depression over the Bay of Bengal during 16th to 18th June crossed Bangladesh coast and moved across Gangetic West Bengal and Jharkhand. It then moved as a low pressure area upto east Uttar Pradesh and adjoining east Madhya Pradesh. The system caused heavy to extremely heavy rainfall over Gangetic West Bengal, north Orissa and Jharkhand leading to flood over these regions. The third system was a land depression (9 – 10 August) over coastal Orissa and was short lived with the life period of less than 12 hours. The fourth system was a deep depression (15–19 September) over the northwest Bay of Bengal which crossed Orissa coast near Chandbali and moved across north Orissa, north Chhattisgarh, northeast Madhya Pradesh and central Uttar Pradesh. The remnant low pressure area moved upto northwest Uttar Pradesh. This system caused heavy to extremely heavy rainfall over Orissa and Chhattisgarh leading to severe flood over Orissa. This system also interacted with mid-latitude westerly systems and caused good rainfall over northwest India and led to flood over Haryana and Himachal Pradesh. Apart from the above systems, 7 low pressure areas formed during the season.

2.5 RAINFALL DISTRIBUTION IN INDIA DURING THE MONSOON SEASON (2008)

The southwest monsoon rainfall (June to September) for the period 1 June to 30 September 2008 for the country as a whole and four broad homogeneous regions are as follows:

Table 2.2: Southwest monsoon rainfall (June to September) for the country as a whole and four broad homogenous regions

Region	Actual (mm)	Normal (mm)	Percentage Departure
All –India	873.2	892.2	-2%
Northwest India	651.7	611.6	7%
Central India	956.9	993.9	-4%
South Peninsula	692.5	722.6	-4%
Northeast India	1356.0	1427.3	-6%

2.6 WITHDRAWAL OF MONSOON SEASON 2008

There was a delay in the commencement of withdrawal of southwest monsoon from extreme west Rajasthan. The southwest monsoon withdrew this year from entire Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Chandigarh & Delhi, west Rajasthan, most parts of Uttarakhand, west Uttar Pradesh and east Rajasthan, some parts of north Gujarat State and north Arabian Sea on 29th September. The normal date of withdrawal of southwest monsoon from west Rajasthan is 1 September. The delay was mainly due to the presence of systems in westerlies over northwest India interacting with the monsoon circulation. Comparing with recent years (1990-2007), the latest withdrawal in recent years from west Rajasthan took place on 30 September during 2007.

(Note: Sources of this Chapter have been taken from "end of Monsoon report-2008" 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 in reservoir regulation, the stage forecast is done 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

According to the present norms of Central Water Commission, a forecast of a flood forecasting site is considered to be reasonably accurate if the difference between the forecast and the corresponding actual observed level of river lies within +/-15cm. In case of inflow forecasts, a variation within +/-20% cumec/MCM is considered acceptable.

3.3 FLOOD FORECASTING ACTIVITIES

During the flood season 2008, there were 175 flood forecasting sites including 28 inflow forecasting sites in operational condition.

3.4 RIVERWISE DETAILS OF FLOOD FORECASTING ACTIVITES & ACCURACY OF FORECAST

3.4.1 Brahmaputra Basin

During the flood season 2008, analysis of the flood forecasts issued reveals that out of 6691 forecasts, 2683 forecasts (40.10%) were issued for sites located on the main Brahmaputra and tributaries. Out of these, 2638 (98.32 %) were found within permissible limit of accuracy.

3.4.2 Barak and Meghna Basin

During the flood season 2008, 162 forecasts (2.42 %) were issued for five sites. Out of these, 161 forecasts (99.38 %) forecasts were found within permissible limit of accuracy

3.4.3 Ganga Basin

During the flood season 2008, 3020 forecasts (45.14 %) were issued for 64 sites, out of total 87 sites located on the main Ganga and its tributaries. No forecast was issued for the remaining 23 sites. Out of these, 2969 forecasts (98.31%) were found within permissible limit of accuracy.

3.4.4 Eastern Rivers Basins including Mahanadi

During the flood season 2008, 148 forecasts (2.21 %) were issued for all nine sites and 129 (87.16 %) forecasts were found within permissible limit of accuracy. Also 87 forecasts (1.30 %) were issued for two sites located on the Mahanadi river basin, of which 83 forecasts (95.40 %) were found within permissible limit of accuracy.

3.4.5 Godavari Basin

During the flood season 2008, 137 forecasts (2.05 %) were issued for all forecasting sites, of which 124 forecasts were found with 90.51 percent accuracy. The highlight of this year is the "record flood" in the upper most reaches of Godavari (from source to Kopergaon), which had demolished the infrastructure of CWC's telemetry system at Nasik, and major damages at some sites downstream.

3.4.6 Krishna Basin

During the flood season 2008, 397 forecasts (5.93 %) of the total number of forecasts, were issued for seven forecasting sites and 395 forecasts (99.50 %) were found within permissible limit of accuracy. River Pennar, the lone river in southern river system, the river did cross the warning level, for a short while, and one forecast was issued which was within limits.

3.4.7 West Flowing Rivers

During the flood season 2008, for the West-flowing rivers which comprises of the Narmada, the Tapi etc, 57 forecasts (0.85 %) were issued for sites, out of fifteen sites. Here, 55 forecasts (96.49 %) were found within permissible limit of accuracy.

3.4.8 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 2008 season varies from a maximum of 99.50 % for Krishna Basin and its tributaries to a minimum of 87.16% for the Eastern Rivers (excluding Mahanadi). The overall accuracy performance was of the order of 97.95% for the country as a whole.

Further analysis of forecasts performance for the flood season 2008, also reveals that 100% forecasts were issued for the 82 flood forecasting sites as listed in **Table 3.1**

Table 3.1 : List of Forecasts Stations with 100% accuracy

Name of the river	Name of FF site	Name of the river	Name of FF site
Ganga	1 Haridwar	Yamuna	1 Mathura
	2 Dalmau		2 Agra
	3 Ghazipur	Ken	1 Banda
	4 Buxar	Gomati	1 Lucknow
	5 Ballia	Ghaghra	1 Darauli
	6 Patna (Dighaghat)		2 Gangpur Siswan
	7 Patna (Gandhighat)	Rapti	1 Bansi
	8 Hathidah		2 Gorakpur
	9 Munger	Sone	1 Maner
	10 Bhagalpur	Gandak	1 Chatia
	11 Kahalgaon		2 Rewaghat
	12 Sahibgunj		3 Hazipur
Ramganga	1 Moradabad	Burhi	1 Lalbeghiaghat
Bagmati	1 Benibad		2 Muzaffarpur
	2 Hayaghat		3 Samastipur
Adhwara	1 Kamtaul		4 Rosera
	2 Ekmighat		5 Khagaria
Kamla Balan	1 Jhanjharpur	Jaldhaka	1 NH-31
Kosi	1 Basua		2 Mathabhanga
	2 Baltara	Tista	1 Domohani
	3 Kursela		2 Mekhliganj
Mahananda	1 Jhawa	Barak	1 APGhat
Mayurakshi	1 Massanjore Dam	Katakhal	1 Matizuri
	2 Tilpara Barrage	Subernarekha	1 Rajghat
Ajoy	1 Gheropara	Burhabalang	1 NH_5 _Road Bridge
Damodar	1 Tenughat Dam	Rushikulya	1 Purushottampur
	2 Panchet Dam	Mahanadi	1 Alipingal Devi
	3 Durgapur Barrage		2 Nimapara
Barakar	1 Maithon Dam	Godavari	1 Jaikwadi Dam
Brahmaputra	1 Dibrugrah		2 Sriram Sagar
	2 Neamatighat		3 Eturunagaram
	3 Goalpara		4 Dummagudam
	4 Dhubri	Wainganga	1 Bhandara
Dikhow	1 Shivsagar	Manjira	1 Nizamsagar Dam
Subansiri	1 Badatighat	Indravati	1 Jagdalpur
Dhansiri (S)	1 Numaligarh	Krishna	1 Alamati Dam
Kopilli	1 Kampur		2 Narayanpur Dam
	2 Dharmatul		3 Priyadarshini
Beki	1 Beki NHX		4 Srisailam Dam
Mundeshwari	1 Harinkhola	Bhima	1 Deongaon
Damanganga	1 Madhuban Dam	Tungbhadra	1 Tungabhadra Dam
Total in the year : 82			

There was no site where all the issued forecasts were beyond the prescribed limit of accuracy during the flood season 2008. Sitewise "Forecast Performance" out of 175 operational sites in flood season 2008 is shown in **Table 3.2**.

Table 3.2: Site wise "Forecast Performance" of flood forecasting sites of CWC in Flood Season, 2008

Sl. No.	Details of sites within different range of permissible limit of accuracy (+/-15cm,+/-20%cumec)	Flood Season 2008	
		No. of Sites	% age
1	Sites with performance accuracy between 0.0 % to 25.0%	0	Nil
2	Sites with performance accuracy between 25.1 % to 50.0%	0	Nil
3	Sites with performance accuracy between 50.1 % to 75.0%	4	03.13%
4	Sites with performance accuracy between 75.1 % to 99.99%	42	32.81 %
5	Sites with 100% performance accuracy i.e. where all forecasts issued were within permissible limit of accuracy	82	64.06 %
6	Sites with 0.0% performance accuracy i.e. where all forecasts issued were beyond permissible limit of accuracy	nil	Not applicable
7	Total sites where forecasts were issued	128	

The other details of the Basin-wise , River-wise forecasting sites, such as their names, warning levels, danger levels, previous highest flood levels and the maximum levels attained during the flood season 2008 together with number of forecasts issued, the number of forecasts within permissible limit of accuracy and the percentage of accuracy, are given in **Annex-I**. The major Basin-wise performance of flood forecasting stations in India is given in **Annex-10.**

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 2008, is given in **Annex –II.** Their salient features are as under:

3.5.1 Andhra Pradesh

During the flood season 2008 out of 9 level forecasting sites and 7 inflow forecasting sites, no forecast was required on 4 level forecasting site viz., Kaleswaram, Kunavaram, Rajahmundry on Godavari and Nellore Anicut on Pennar. Forecasts were issued for all others. It is revealed that 52 level forecasts and 240 inflow forecasts, out of which 46 forecasts (88.46 %) and 234 forecasts (97.50%) 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 2008 season, 2653 forecasts out of 2691 forecasts (98.59 %) were found within limit of accuracy.

3.5.3 Bihar

In the state of Bihar, there were 32 level forecasting sites. Out of 1463 forecasts during the flood season 2008, 1457 forecasts (99.59 %) were found within limit of accuracy, issued for 29 forecast stations.

3.5.4 Chhatisgarh

In the state of Chhatisgarh there was only one level flood forecasting site (i.e. Jagdalpur) on the Indravati river (a tributary of the Godavari river). 11 forecasts, out of 11 forecasts (100 %) were found within limit of accuracy during the flood season 2008.

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 two inflow forecasting sites. Out of 34 forecasts issued, 33 forecasts (97.06 %) were found within limits of accuracy during the flood season 2008.

3.5.6 Haryana

Neither any hydrological data was collected nor any forecast was issued for the lone site Tajewala weir on the river Yamuna in the state of Haryana during the flood season 2008 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. The Upper Yamuna Division will be asked to try for inflow forecasts either to Hathinikund or Tajewala wherever real time data are available.

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 2008, all 252 inflow forecasts (100 %) and all 80 level forecasts (again 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 2008, all 175 inflow forecasts issued for 3 stations as well as 1 level forecast, were found within limit of accuracy (both 100%).

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. During the flood season 2008, Necessity did not arise to issue any forecasts, either level or inflow.

3.5.10 Maharashtra

There were eight forecasting sites including two inflow forecasting sites, in the state of Maharashtra. Forecasts were issued for all six level forecasting sites. During the flood season 2008, forecasts were issued for the lone level forecasting sites, viz at Kopergaon. It is seen that out of 26 level forecasts, 25 level forecasts (96.20 %) were found within limit of accuracy. 107 inflow forecasts were issued for two inflow forecasting sites and 101 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 2008, 150 level forecasts (90.36 %) out of 166 level forecasts were found within limit of accuracy. For inflow forecasting site 54 forecasts (94.74%) out of 57 forecasts were found within limit of accuracy.

3.5.12 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 the remaining sites, viz., Haridwar and Rishikesh. During the flood season 2008, all 4 forecasts issued only to Haridwar (100.00 %) were found within limit of accuracy.

3.5.13 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 2008, out of 790 level forecasts, 762 forecasts (96.46%) were found within limit of accuracy. Further out of 70 nos., 67 inflow forecasts (95.71 %) were found within limit of accuracy.

3.5.14 West Bengal

In the state of West Bengal, there were 14 flood forecasting sites, which include three inflow forecasting sites. During the flood season 2008, out of 331 level forecasts, 315 forecasts (95.17 %) were found within limit of accuracy. and out of 157 inflow forecasts, 153 (99.44 %) were found within limit of accuracy, issued for 12 sites in total (10 level and two inflow stations).

3.5.15 Dadra & Nagar Haveli

In the Union Territory of Dadra & Nagar Haveli, there was only one flood forecasting site at Daman on river Damaganga. No flood forecast was issued for the site during the flood season 2008. (The Madhuban Dam listed in this Union Territory up to 2004, actually belonged to Gujarat (Valsad District) and the modification has been done in subsequent reports.

3.5.16 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 Nazafgarh drain within Delhi town. Both the sites are level forecasting sites. Forecast was issued for Delhi Railway Bridge only. During the flood season 2008, Out of 27 forecasts, 25 forecasts (92.59 %) were within limits of accuracy

The Statewise performance of flood forecasting stations in India is given in **Annex-11**.

3.6 AN OVERVIEW OF FLOOD FORECASTING PERFORMANCE

During the flood season 2008, an average number of flood forecasts issued per forecasting site was 52.27. The number of forecasting sites where the performance accuracy of the issued forecasts was found above 97.95 % (National average for flood season 2008) was 87 sites (67.97 %) which includes 82 (46.5 %) flood forecasting stations having 100 % accurate forecast.

The flood forecasting performance of the level forecasting as well as inflow forecasting sites from 1986 to 2008 is given in **Annex-12.**

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 2008. During the flood season 2008, all the 175 flood forecasting sites including 28 inflow forecasting sites, were operational. Out of 147 level forecasting sites, water levels at sites (excluding Kanpur), equaled or exceeded their warning levels and at 102 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- 5** and **Annex-6** respectively. Moderate and low flood events were observed at 32 and 50 sites respectively as listed at **Annex-7,** for the year. River wise flood events are described in the following paragraphs.

4.2 FLOOD EVENTS IN THE 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 2008, 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.

Sl. No.	Name of the river	Total no.of f/c sites	Forecasts necessary at	Sl. No.	Name of the river	Total no.of f/c sites	Forecasts necessary at
Ganga Basin:							
1	Ganga	22	17	14	PunPun	1	1
2	Alaknanda	1	0	15	Gandak	4	4
3	Ramganga	2	1	16	Burhi Gandak	5	5
4	Yamuna	11	4	17	Bagmati	2	2
5	Sahibi	1	0	18	Adhwara Group	2	2
6	Chambal	1	0	19	Kamla Balan	1	1
7	Betwa	2	0	20	Kosi	3	3
8	Ken	1	1	21	Mahananda	2	2
9	Gomati	2	2	22	Mayurakshi	3	2
10	Sai	1	1	23	Ajoy	1	1
11	Ghaghra	6	5	24	Damodar	3	3
12	Rapti	3	3	25	Barakar	1	1
13	Sone	3	1	26	Mundeshwari	1	1
				27	Kangsabati	2	1
					Total	87	64

During the flood season 2008, the unprecedented flood occurred only at Elgin Bridge and Ayodhya on Ghagra, a major tributary of Ganga. Refer Annex-5. High flood events occurred at Harinkhola on Mundeshwari, Elgin Bridge and Ayodhya on Ghaghra,Balrampur on Rapti, Ekmighat on Adhwara Group, Benibad and Hayaghat on Bagmati, Chatia and rewaghat on Gandak, Muzaffarpur, Samastipur and Rossra on Burhi-Gandak, Jhanjharpur on Kamla Balan, Basua on Kosi. Refer Annex-**6.** The occurrence of Moderate and low flood events is given in **Annex-7.**

4.3 FLOOD EVENTS IN BRAHMAPUTRA BASIN

The Flood Forecasting and Warning Network of the Central Water Commission carried of the main river Brahmaputra and its 16 tributaries / sub-tributaries during the flood season 2008. The details are shown below.

Sl. No.	Name of the river	Total no.of f/c sites	Fore-casts neces-sary at	Sl. No.	Name of the river	Total no.of f/c sites	Fore-casts neces-sary at
1	Brahmaputra	6	6	10	Beki	1	1
2	Burhi Dihing	2	1	11	Pagladiya	1	1
3	Desang	1	1	12	Manas	1	1
4	Dikhow	1	1	13	Sankosh	1	1
5	Subansiri	1	1	14	Raidak-1	1	1
6	Dhansiri (S)	2	2	15	Torsa	1	1
7	Jiabharali	1	1	16	Jaldhaka	2	2
8	Kopilli	2	2	17	Tista	2	2
9	Puthimari	1	1		Total:	27	26

During the flood season 2008, the "Unprecedented" flood event occurred at NH Road Crossing on Puthimari (Assam). "High" flood events occurred at Road bridge on Beki, in addition to location mentioned in Unprecedented floods. Refer Annex -6. The occurrence of Moderate and low floods is given in Annex-8.

4.4 FLOOD EVENTS IN 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, Kaliashahar and Sonamura, 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. There is no inflow forecasting site on any of these rivers. Forecasts were issued for 3 sites during the flood season 2008.

excluding Kailashahar and Sonamura. The occurrence of Moderate and low floods is given in Annex-8.

4.5 FLOOD EVENTS IN EASTERN RIVERS SYSTEM

The Eastern Rivers under the Flood Forecasting and Warning Network of Central water Commission are the Subernarekha, the Burhabalang, the Baitarni, 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 2008, flood forecasts were issued for all forecasting sites, excluding Rajghat on Subarnarekha. At all the 9 forecast sites, forecasts were issued.

During 2008, once again Subarnarekha at Rajghat recorded "Unprecedented" flood (refer **Annex 5)** as well as "High" flood (refer **Annex 6).** Moderate and low flood events are tabulated in **Annex- 9.**

4.6 FLOOD EVENTS IN THE MAHANADI BASIN

In the Mahandi 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 2008, 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 and only "High" flood occurred at Naraj on Mahanadi, Nimapara on Kushabhadra, a distributory of Mahanadi and Alipinagal on Devi, another distributory of Mahanadi during flood seasons 2008. However, the moderate and low flood events observed are given.

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 Indravati rivers. There were 18 flood forecasting sites which were operational during the flood seasons 2008. Out of these, 12 sites were on the main Godavari river including two inflow forecasting sites, Jaikwadi dam and Sriram Sagar (Pochampad), one in Wardha river, two each on the Manjira and Waingaga rivers, and one in the Indravati river. Two sites on Manjira, namely, Singur dam & Nizamsagar Dam were also inflow forecasting sites. The details are shown below.

Sl. No.	Name of the river	Total no.of f/c sites	Fore-casts neces-sary at	Sl. No.	Name of the river	Total no.of f/c sites	Fore-casts neces-sary at
1	Godavari	12	7	2	Wainganga	2	1
3	Wardha	1	0	4	Manjira	2	2
5	Indravati	1	1				

During 2008 season no unprecedented or high flood events were recorded in this Basin. The details of moderate and low events are shown in **Annex-9**.

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, 2008. 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. At all the sites inflow/ level forecasts were issued.

During 2008 season, no major flood event occurred anywhere in the basin. The details of moderate and low events are shown in **Annex-9**.

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 inflow and one level forecasting sites are located on the Tapi, and one inflow and two level forecasting site are on the Damanganga. During 2008, only inflow forecasts were issued at Hatnur Dam and Ukai Dam on river Tapi and at Madhuban dam on Damanganga.

During the flood season, 2008, there were no unprecedented as well as high flood events in any of these sites. The details of moderate and low events are shown in **Annex-9**.

4.10 FLOOD EVENTS IN SOUTHERN RIVER SYSTEM

There was one forecasting site at Nellore on the Pennar river. During 2008, no forecast was necessary, as the river did not cross warning level. Details are given in **Annex-9.**

4.11 AN OVERVIEW OF FORECAST EVENTS

The unprecedented events were experienced at 5 sites in the year 2008 in the rivers Puthimari, Subarnarekha, Mahanadi (Devi- Distributory) and Ghaghra, and "High" flood events occurred at 13 sites. No forecasts were issued at 47 sites (42 level forecast sites and 5 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 2008

Abstract of some of the messages received by our field unit during the flood season 2008 are given below:

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

Lr.no: FC-II-CWC-28/08/459 dated 19.12.2008

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

5.2.2 District Magistrate & Collector, Keonjhar, Orissa.

"Flood forecast received from you..... is highly beneficial for arranging relief and preventive measures".

5.2.3 Superintending Engineer, Damanganga Project Circle, Valsad, (Gujarat).

"The flood forecasting services rendered by your division during 2008 was useful to Damanganga reservoir project. It is requested to render such services in future also. However, it is also requested you to send the forecasts

timely so that necessary action can be taken to release the water from the Dam accordingly".

5.2.4 Executive Enginner, Jalgaon Irrigation Division, Jalgaon, (Maharashtra).

"It is to inform that the flood forecasting services rendered by CWC, Tapi Division, Surat, and Upper Tapi Sub-Division, Bhusaval were very much useful to Hathnur Da. The forecasts received well in time and helped us considerably in planning of the reservoir storage optimizing in utilization of water for various purposes, flood routing and dam safety, due to this forecast, gate operation can be done in time so as to release moderate flood or to maintain inflow and outflow as required. Hence no damage is observed during monsoon 2008. It is requested to render such services in future also".

5.2.5 Superintending Engineer, Flood Control Circle, Khagaria. (Bihar)

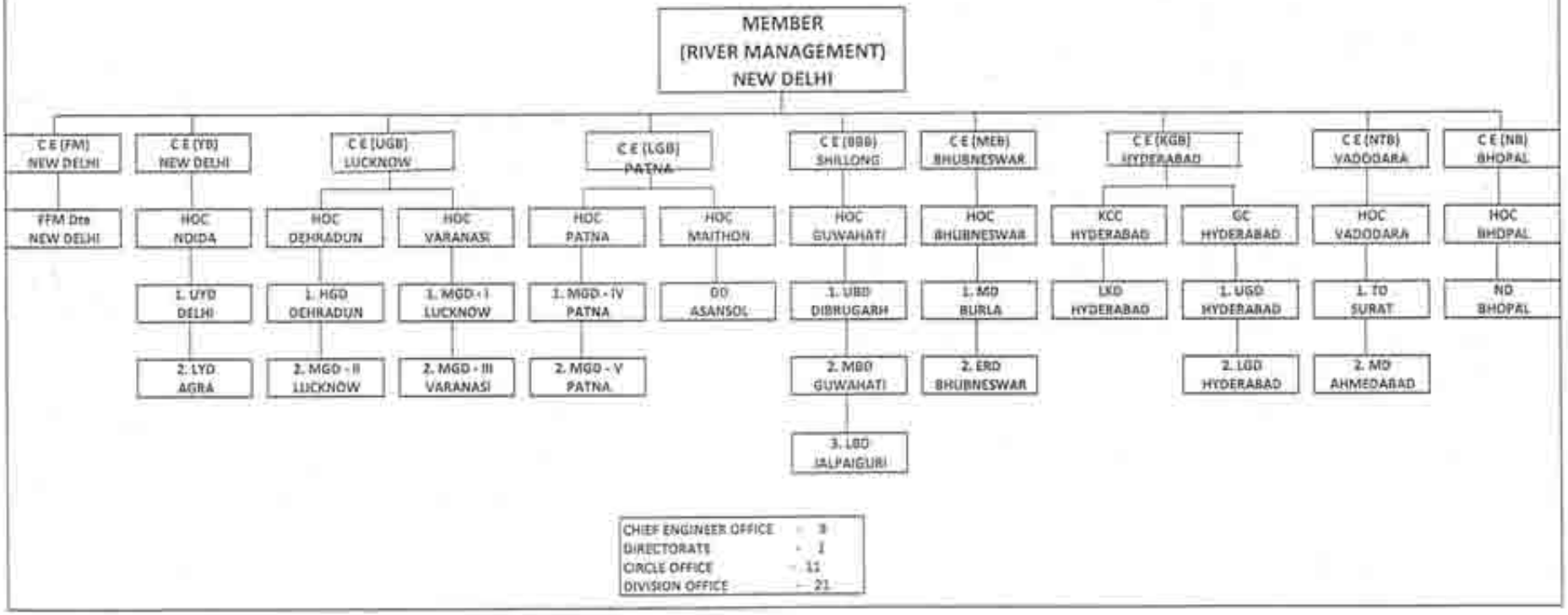
"The daily water level and forecasting bulletins are regularly received in this office, which is quite appreciable. These bulletins are useful to us. It is my suggestion that these bulletins should be made more presentable and the practice of regularly sending these may be continued in the next flood season. In addition the water level and rainfall data for the period 15th June to 15th Ocober may please be made available in soft as well as hard copies."

5.2.6 Superintending Engineer, Flood Control Circle, Samastipur. (Bihar)

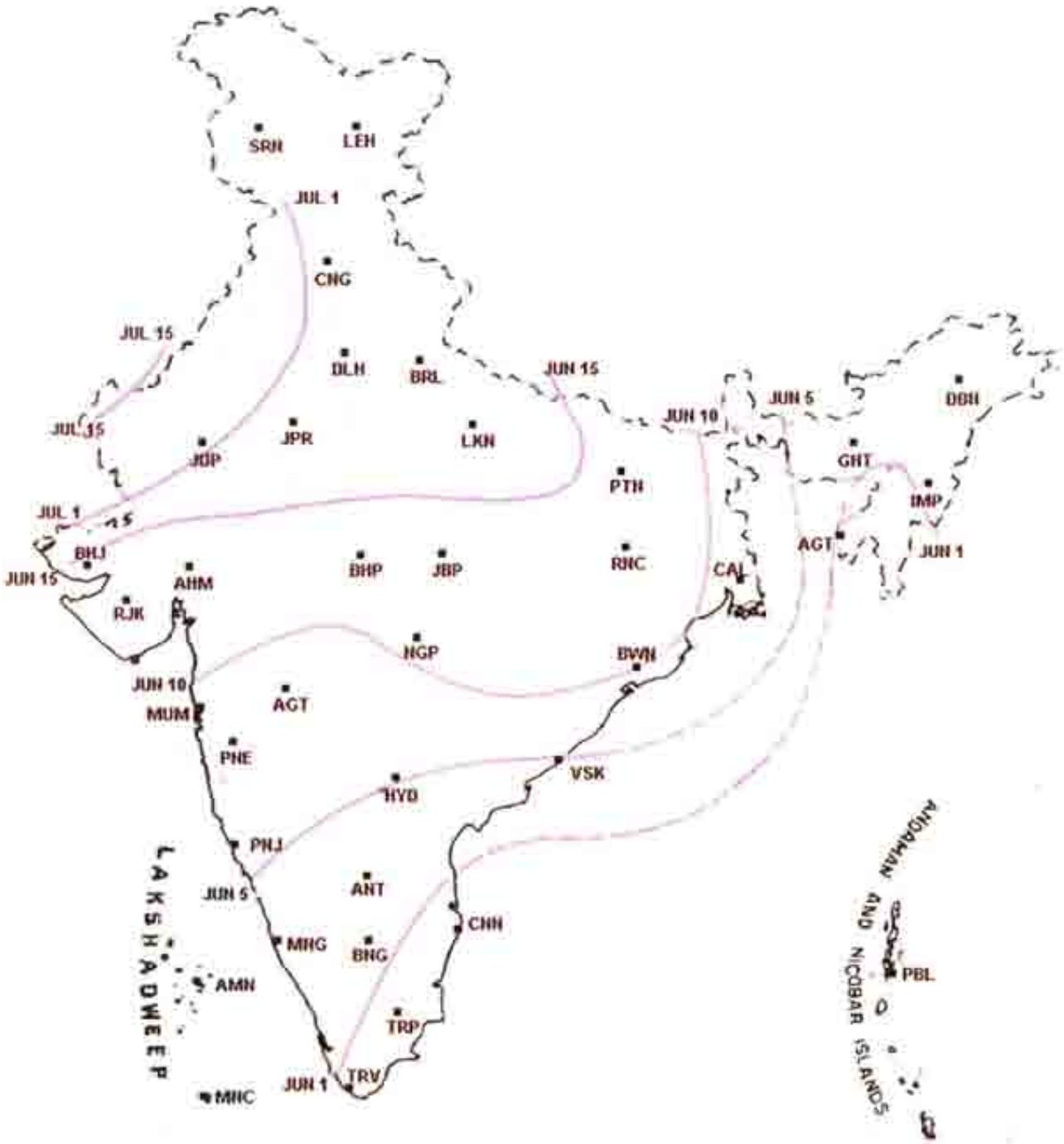
"The *flood forecasting during 2008 flood season was very much appreciable. The daily flood forecasts related to the river basins under the jurisdiction of this Circle, truly reflected the flood positions during the season. These information should be continued in future so that there should be no problem in flood control and warning measures taken by the authority."*

Fig 1

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



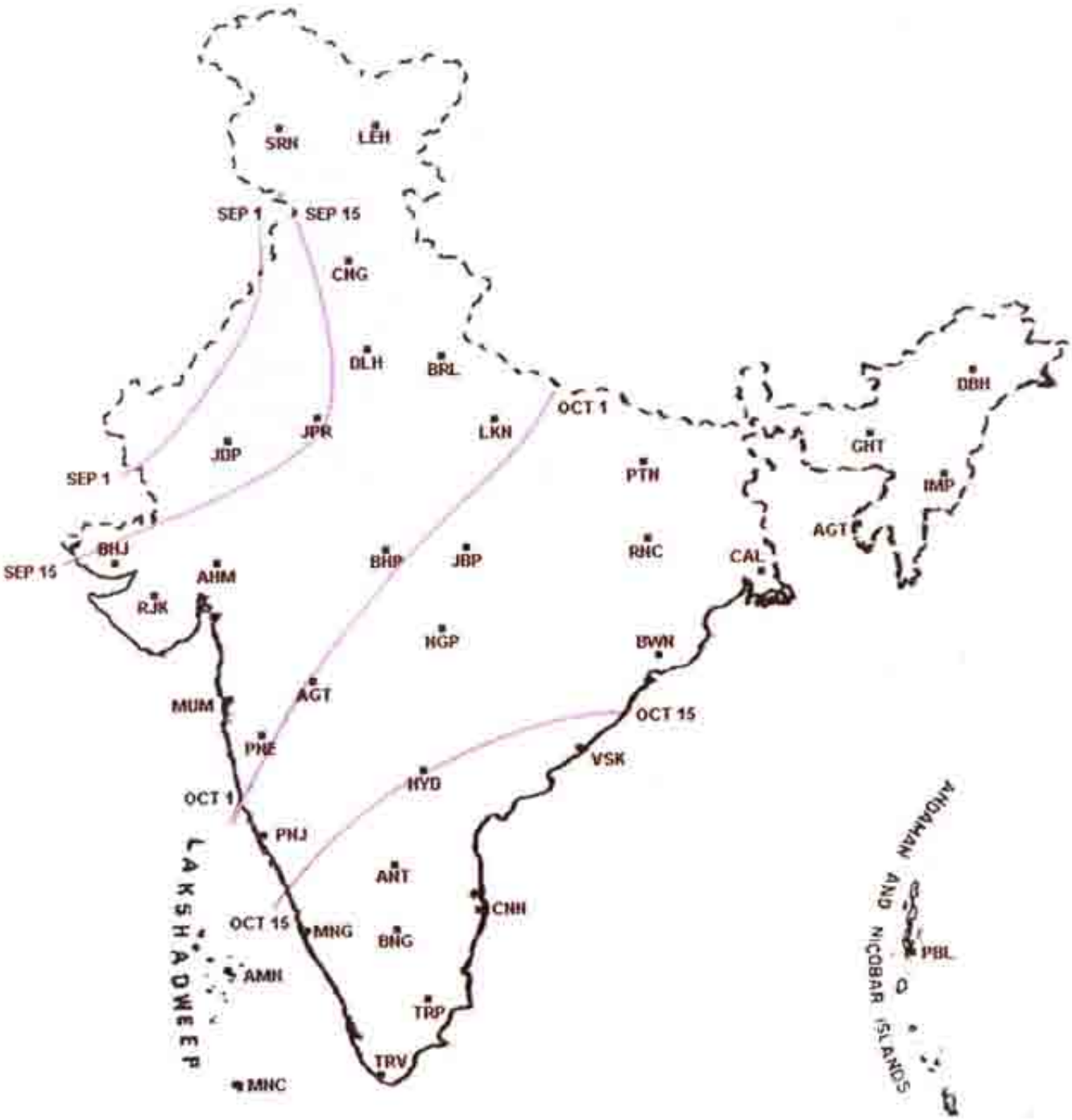
NORMAL DATES OF ONSET



Source: IMD's web document

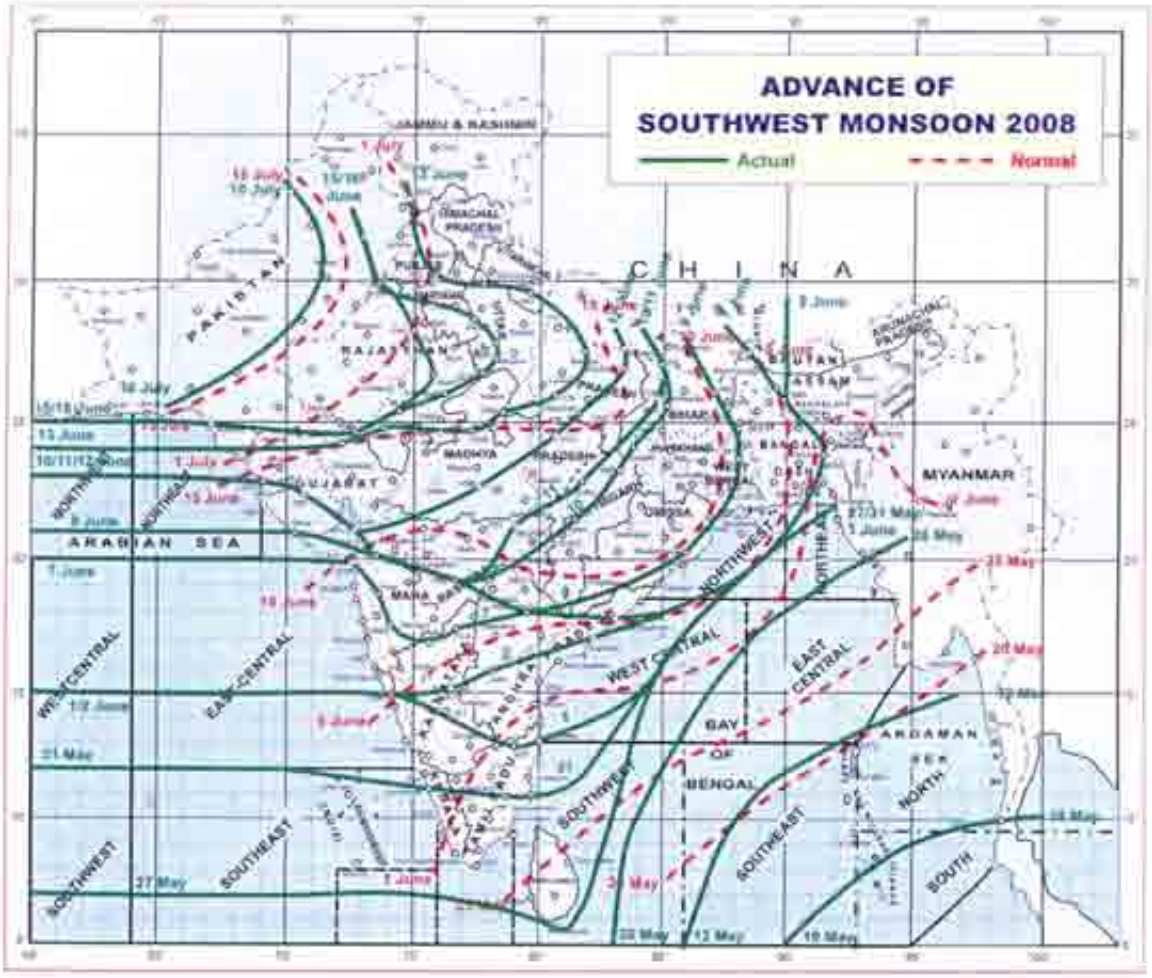
Figure 2.1

NORMAL DATES OF WITHDRAWAL



Source: IMD's web document

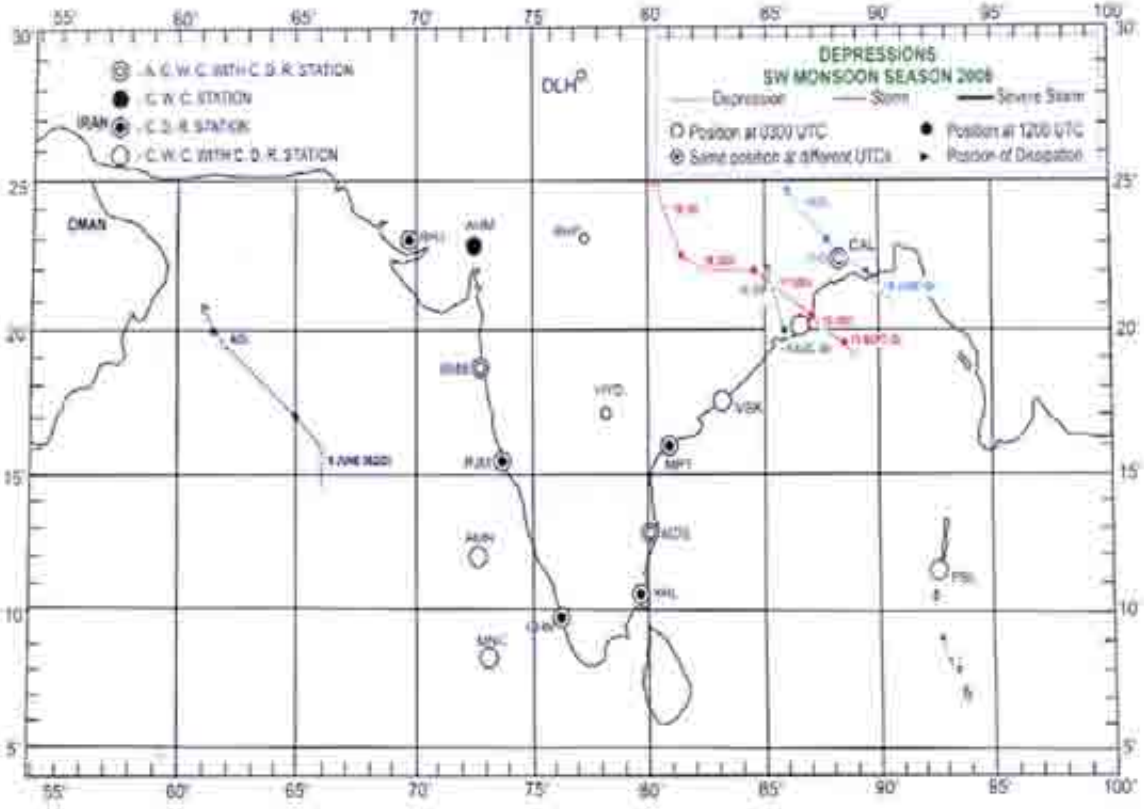
Figure 2.2



Source: IMD's End of season report -2008 (web document)

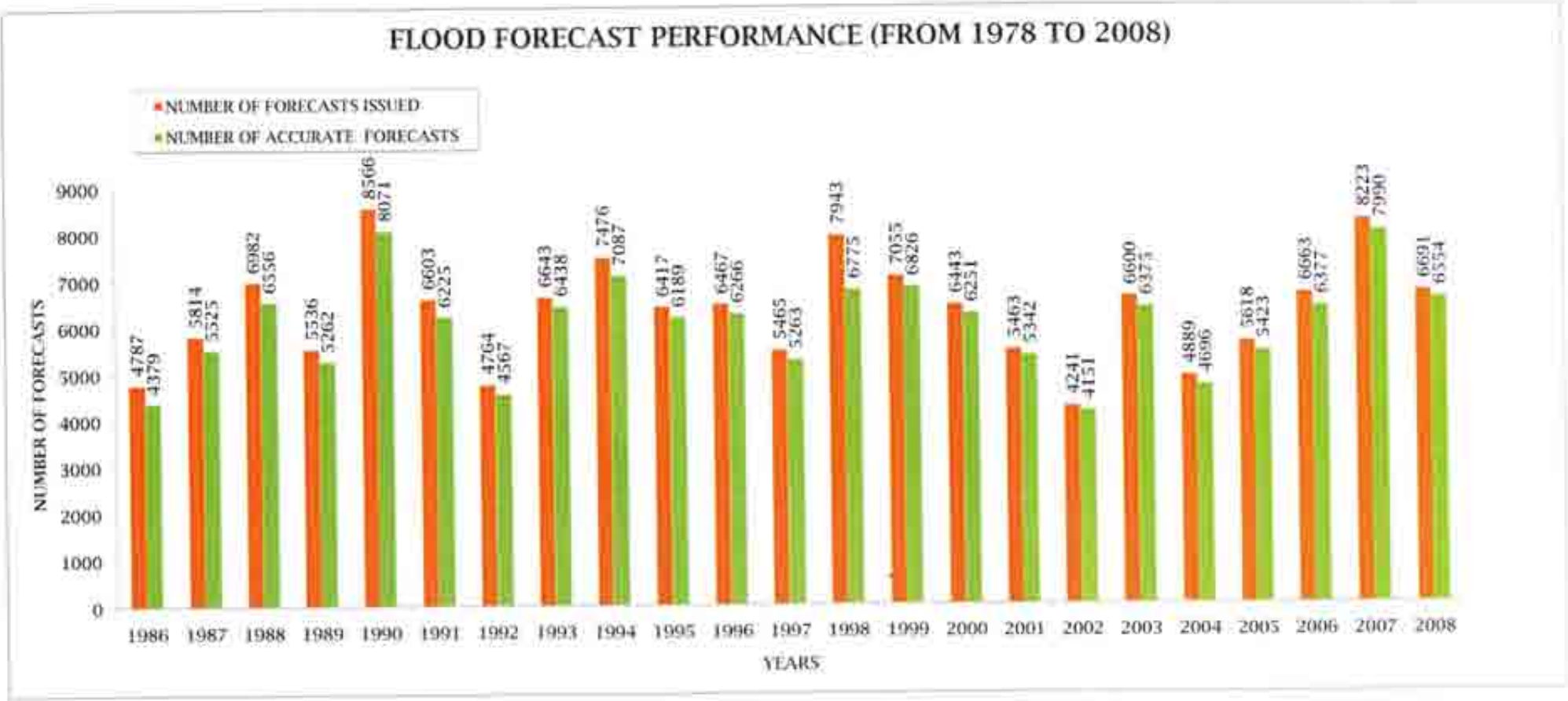
Fig 2.3

Tracks of the low pressure systems over Indian seas during the Southwest Monsoon Season– 2008



Source: IMD's End of season report -2008 (web document)

Fig 2.4


FLOOD FORECAST PERFORMANCE (FROM 1978 TO 2008)
NUMBER OF FORECASTS ISSUED
NUMBER OF ACCURATE FORECASTS
NUMBER OF FORECASTS
YEARS
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008
4787 4379
5814 5525
6982 6556
5536 5262
8566 8071
6603 6225
4764 4567
6643 6438
7476 7087
6417 6189
6467 6266
5465 5263
7943 6775
7055 6826
6443 6251
5463 5342
4241 4151
6600 6373
4889 4696
5618 5423
6663 6377
8223 7990
6691 6554

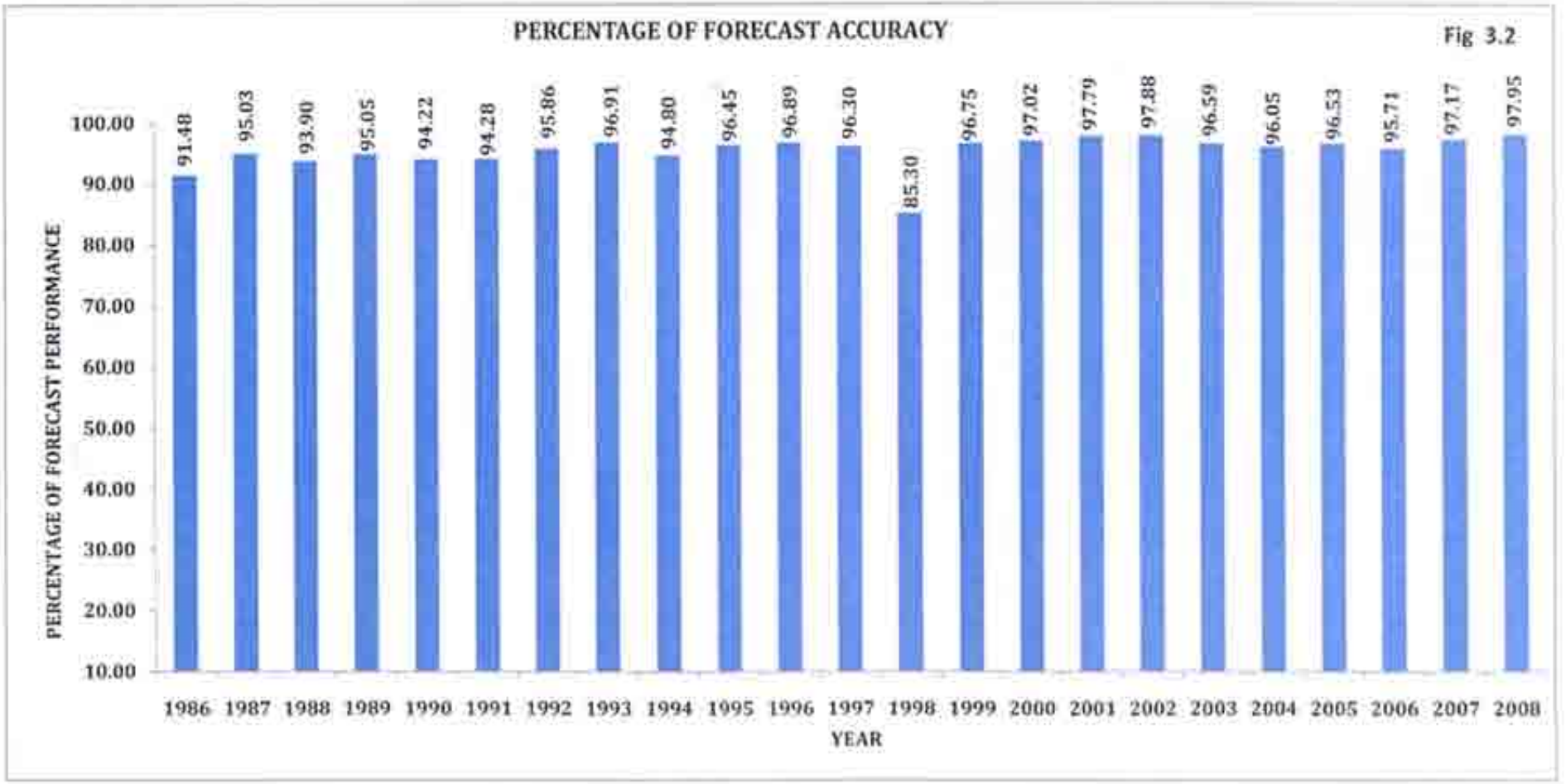

PERCENTAGE OF FORECAST ACCURACY
PERCENTAGE OF FORECAST PERFORMANCE
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
91.48
95.03
93.90
95.05
94.22
94.28
95.86
96.91
94.80
96.45
96.89
96.30
85.30
96.75
97.02
97.79
97.88
96.59
96.05
96.53
95.71
97.17
97.95
1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008
YEAR

Fig 3.2

Annex-1

Flood Forecasting Information (Basinwise and Riverwise) in India during Flood Season 2008

Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY: HH)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12	13
	Ganga Basin											
1	Alaknanda	Srinagar	Uttaranchal	539.00	540.00	536.85	05/09/1995	534.22	31-07-08	0	0	
2	Ganga	Rishikesh	Uttaranchal	339.50	340.50	341.72	03/09/1978	339.12	31-07-08	0	0	
3	Ganga	Haridwar	Uttaranchal	293.00	294.00	296.23	02/09/1978	293.60	31-07-08	4	4	100.00
4	Ganga	Narora Barrage	Uttar Pradesh				06/09/1978	179.16	20-08-08	70	67	95.71
5	Ganga	Kannauj	Uttar Pradesh	124.97	125.97	126.24	29/08/1998	125.96	24-08-08	35	34	97.14
6	Ganga	Ankinghat	Uttar Pradesh	123.00	124.00	124.31	09/09/1978	123.68	24-08-08	35	32	91.43
7	Ganga	Kanpur	Uttar Pradesh	113.00	114.00	113.47	02/09/1967	113.11	26-08-08	50	48	96.00
8	Ganga	Dalmau	Uttar Pradesh	98.36	99.36	99.84	03/08/1973	99.15	27-08-08	23	23	100.00
9	Ganga	Phaphamau	Uttar Pradesh	83.73	84.73	87.98	08/09/1978	81.09	14-08-08	0	0	
10	Ganga	Allahabad Chhatnag	Uttar Pradesh	83.73	84.73	88.03	08/09/1978	80.06	13-08-08	0	0	
11	Ganga	Mirzapur	Uttar Pradesh	76.72	77.72	80.34	09/09/1978	73.37	14-08-08	0	0	
12	Ganga	Varanasi	Uttar Pradesh	70.26	71.26	73.90	09/09/1978	68.23	14-08-08	0	0	
13	Ganga	Ghazipur	Uttar Pradesh	62.11	63.11	65.22	09/09/1978	62.23	15-08-08	1	1	100.00
14	Ganga	Buxar	Bihar	59.32	60.32	62.09	1948	59.33	15-08-08	1	1	100.00
15	Ganga	Ballia	Uttar Pradesh	56.62	57.62	60.25	14/09/2003	58.45	16-08-08	50	50	100.00
16	Ganga	Patna Dighaghat	Bihar	49.45	50.45	52.52	23/08/1975	50.40	23-08-08	40	40	100.00
17	Ganga	Patna Gandhighat	Bihar	47.60	48.60	50.27	14/08/1994	49.32	23-08-08	71	71	100.00
18	Ganga	Hathidah	Bihar	40.76	41.76	43.15	07/08/1971	42.42	25-08-08	59	59	100.00
19	Ganga	Munger	Bihar	38.33	39.33	40.99	19/09/1976	38.85	25-08-08	18	18	100.00
20	Ganga	Bhagalpur	Bihar	32.68	33.68	34.20	17/09/2003	33.73	24-08-08	50	50	100.00
21	Ganga	Kahalgaon	Bihar	30.09	31.09	32.87	17/09/2003	31.96	21-08-08	74	74	100.00
22	Ganga	Sahibgunj	Jharkhand	26.25	27.25	30.91	1998	28.52	21-08-08	80	80	100.00
23	Ganga	Farakka	West Bengal	21.25	22.25	25.14	07/09/1998	23.62	03-09-08	172	164	95.35
24	Ramganga	Moradabad	Uttar Pradesh	189.60	190.60	192.68	03/09/1978	190.32	21-07-08	6	6	100.00
25	Ramganga	Bareilly	Uttar Pradesh	162.70	163.70	162.88	06/08/1978	161.81	23-07-08	0	0	
26	Yamuna	Tajewala Weir	Haryana				03/09/1978			0	0	
27	Yamuna	Mawi	Uttar Pradesh	230.00	230.85	232.45	26/09/1988	231.26	22-09-08	19	17	89.47
28	Yamuna	Delhi Rly Bridge	NCT Delhi	204.00	204.83	207.49	06/09/1978	206.00	23-09-08	27	25	92.59
29	Yamuna	Mathura	Uttar Pradesh	164.20	165.20	169.73	08/09/1978	165.53	26-09-08	45	45	100.00

Annex-1 contd....

Flood Forecasting Information (Basinwise and Riverwise) in India during Flood Season 2008												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY: HH)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12	13
30	Yamuna	Agra	Uttar Pradesh	151.40	152.40	154.76	09/09/1978	150.32	27-09-08	3	3	100.00
31	Yamuna	Etawa	Uttar Pradesh	120.92	121.92	126.13	11/09/1978	120.36	24-08-08	0	0	
32	Yamuna	Auraiya	Uttar Pradesh	112.00	113.00	118.19	25/08/1996	106.34	15-07-08	0	0	
33	Yamuna	Kalpi	Uttar Pradesh	107.00	108.00	112.98	25/08/1996	101.54	15-07-08	0	0	
34	Yamuna	Hamirpur	Uttar Pradesh	102.63	103.63	108.59	12/09/1983	97.64	13-08-08	0	0	
35	Yamuna	Chilaghat	Uttar Pradesh	99.00	100.00	105.16	08/09/1978	94.76	13-08-08	0	0	
36	Yamuna	Naini	Uttar Pradesh	83.74	84.74	87.99	08/09/1978	80.75	14-08-08	0	0	
37	Sahibi	Dhansa	NCT Delhi	211.44	212.44	213.58	06/08/1977	210.80	11-08-08	0	0	
38	Chambal	Gandhisagar Dam	Madhya Pradesh							0	0	
39	Betwa	Mohana	Uttar Pradesh	121.66	122.66	133.69	11/09/1983	119.87	12-08-08	0	0	
40	Betwa	Sahjina	Uttar Pradesh	103.54	104.54	108.67	12/09/1983	99.29	12-08-08	0	0	
41	Ken	Banda	Uttar Pradesh	103.00	104.00	113.29	07/07/2009	107.08	22-06-08	6	6	100.00
42	Gomati	Lucknow HanumanSetu	Uttar Pradesh	108.50	109.50	110.85	10/09/1971	109.03	28-08-08	6	6	100.00
43	Gomati	Jaunpur	Uttar Pradesh	73.07	74.07	77.74	22/09/1971	73.48	30-08-08	13	12	92.31
44	SAI	Raibareli	Uttar Pradesh	100.00	101.00	104.81	17/09/1982	100.53	22-08-08	5	4	80.00
45	Ghaghra	Elgin Bridge	Uttar Pradesh	105.07	106.07	107.18	14/09/1983	107.48	23-09-08	97	92	94.85
46	Ghaghra	Ayodhya	Uttar Pradesh	91.73	92.73	93.74	02/08/2007	93.85	24-09-08	109	103	94.50
47	Ghaghra	Turtipar	Uttar Pradesh	63.01	64.01	66.00	28/08/1998	64.96	27-09-08	90	87	96.67
48	Ghaghra	Darauli	Bihar	59.82	60.82	61.74	29/08/1998	60.98	24-08-08	81	81	100.00
49	Ghaghra	Gangpur Siswan	Bihar	56.04	57.04	58.01	18/09/1983	57.75	25-08-08	63	63	100.00
50	Ghaghra	Chhapra	Bihar	52.68	53.68	54.59	03/09/1982	51.52	01-08-08	0	0	
51	Rapti	Balrampur	Uttar Pradesh	103.62	104.62	105.25	11/09/2000	104.18	24-09-08	13	12	92.31
52	Rapti	Bansi	Uttar Pradesh	83.90	84.90	85.82	21/08/1998	85.26	25-07-08	20	20	100.00
53	Rapti	Gorakpur Birdghat	Uttar Pradesh	73.98	74.98	77.54	23/08/1998	76.75	27-07-08	36	36	100.00
54	Sone	Inderpuri	Bihar	107.20	108.20	108.85	23/08/1975	104.99	02-07-08	0	0	
55	Sone	Koelwar	Bihar	54.52	55.52	58.88	20/07/1971	53.06	23-08-08	0	0	
56	Sone	Maner	Bihar	51.00	52.00	53.79	10/09/1976	51.50	23-08-08	13	13	100.00
57	PunPun	Sripalpur	Bihar	49.60	50.60	53.91	18/09/1976	52.77	18-08-08	52	50	96.15
58	Gandak	Khadda	Uttar Pradesh	95.00	96.00	97.50	23/07/2002	95.64	28-08-08	128	125	97.66
59	Gandak	Chatia	Bihar	68.15	69.15	70.04	26/07/2002	68.60	30-08-08	11	11	100.00
60	Gandak	Rewaghat	Bihar	53.41	54.41	55.41	17/09/1985	54.07	01-09-08	30	30	100.00
61	Gandak	Hazipur	Bihar	49.32	50.32	50.93	1948	49.92	23-08-08	25	25	100.00

Annex-1 contd....

Flood Forecasting Information (Basinwise and Riverwise) in India during Flood Season 2008												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY: HH)	No.of Forecasts Issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12	13
62	Burhi Gandak	Lalbeghiaghat	Bihar	62.20	63.20	67.09	30/07/1975	63.60	26-07-08	13	13	100.00
63	Burhi Gandak	Muzaffarpur Sikandarpur	Bihar	51.53	52.53	54.29	15/08/1987	52.70	29-07-08	15	15	100.00
64	Burhi Gandak	Samastipur	Bihar	45.02	46.02	49.38	15/08/1987	47.07	31-07-08	27	27	100.00
65	Burhi Gandak	Rosera	Bihar	41.63	42.63	46.35	16/08/1987	44.25	31-07-08	40	40	100.00
66	Burhi Gandak	Khagaria	Bihar	35.58	36.58	39.22	1976	37.75	24-08-08	69	69	100.00
67	Bagmati	Benibad	Bihar	47.68	48.68	50.01	12/07/2004	49.34	22-07-08	113	113	100.00
68	Bagmati	Hayaghat	Bihar	44.72	45.72	48.96	14/08/1987	45.58	28-07-08	20	20	100.00
69	Adhwara Group	Kamtaul	Bihar	49.00	50.00	52.99	12/08/1987	50.48	27-07-08	42	42	100.00
70	Adhwara Group	Ekmighat	Bihar	45.94	46.94	49.52	12/07/2004	46.93	28-07-08	27	27	100.00
71	Kamla Balan	Jhanjharpur	Bihar	49.00	50.00	53.01	10/07/2004	51.09	29-08-08	54	54	100.00
72	Kosi	Basua	Bihar	46.75	47.75	48.87	11/07/2004	48.47	23-07-08	137	137	100.00
73	Kosi	Baltara	Bihar	32.85	33.85	36.40	15/08/1987	34.06	28-07-08	49	49	100.00
74	Kosi	Kursela	Bihar	29.00	30.00	32.04	06/09/1998	31.03	20-08-08	78	78	100.00
75	Mahananda	Dhengraghat	Bihar	34.65	35.65	38.09	1968	36.59	30-08-08	63	59	93.65
76	Mahananda	Jhawa	Bihar	30.40	31.40	33.51	14/08/1987	32.03	31-08-08	128	128	100.00
77	Mayurakshi	Massanjore Dam	Jharkhand	121.31		122.87	25/09/1999	121.31	12-10-08	15	15	100.00
78	Mayurakshi	Tilpara Barrage	West Bengal	62.79		67.05	27/09/1978	62.79	23-09-08	12	12	100.00
79	Mayurakshi	Narayanpur	West Bengal	26.99	27.99	29.69	27/09/1995	25.68	21-08-06	0	0	
80	Ajoy	Gheropara	West Bengal	38.42	39.42	43.94	27/09/1978	38.45	16-07-08	1	1	100.00
81	Damodar	Tenughat Dam	Jharkhand	268.83		265.56	17/09/1985	262.55	09-07-08	61	61	100.00
82	Damodar	Panchet Dam	Jharkhand	132.59		132.89	02/10/1959	128.33	25-09-08	102	102	100.00
83	Damodar	Durgapur Barrage	West Bengal	64.47		64.47	31/10/2002	64.47		95	95	100.00
84	Barakar	Maithon Dam	Jharkhand	150.88		151.79	02/10/1959	147.88	10-10-08	74	74	100.00
85	Mundeshwari	Harinkhola	West Bengal	11.80	12.80	14.58	29/09/1978	11.98	21-07-08	4	4	100.00
86	Kangsabati	Kangsabati Dam	West Bengal	134.11		134.71	02/09/1978	133.26	26-09-08	50	46	92.00
87	Kangsabati	Mohanpur	West Bengal	24.73	25.73	29.87	02/09/1978	24.80	13-07-08	0	0	
	Brahmaputra Basin											
88	Brahmaputra	Dibrugrah	Assam	103.24	104.24	106.48	03/09/1998	105.86	22-07-08	307	307	100.00
89	Brahmaputra	Neamatighat	Assam	84.04	85.04	87.37	11/07/1991	86.09	23-07-08	99	99	100.00
90	Brahmaputra	Tezpur	Assam	64.23	65.23	66.59	27/08/1988	65.63	04-09-08	75	74	98.67
91	Brahmaputra	Guwahati	Assam	48.68	49.68	51.46	21/07/2004	49.84	04-09-08	45	44	97.78
92	Brahmaputra	Goalpara	Assam	35.27	36.27	37.43	31/07/1954	36.24	06-09-08	52	52	100.00
93	Brahmaputra	Dhubri	Assam	27.62	28.62	30.36	28/08/1988	29.60	05-09-08	187	187	100.00

Annex-1 contd....

Flood Forecasting Information (Basinwise and Riverwise) in India during Flood Season 2008												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY: HH)	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12	13
94	Burhidihing	Naharkatia	Assam	119.40	120.40	122.69	17/06/1973	117.90	01-09-08	0	0	
95	Burhidihing	Khowang	Assam	101.11	102.11	103.92	25/08/1988	103.01	07-07-08	44	42	95.45
96	Desang	Nanglamoraghat	Assam	93.46	94.46	98.49	06/09/1998	95.47	17-07-08	53	48	90.57
97	Dikhow	Shivsagar	Assam	91.40	92.40	95.62	08/07/1974	93.34	20-07-08	37	37	100.00
98	Subansiri	Badatighat	Assam	81.53	82.53	86.84	28/06/1972	82.73	03-09-08	95	95	100.00
99	Dhansiri (S)	Golaghat	Assam	88.50	89.50	91.30	11/10/1986	89.86	02-08-08	60	59	98.33
100	Dhansiri (S)	Numaligarh	Assam	76.42	77.42	79.87	24/09/1985	78.82	24-08-08	215	215	100.00
101	Jiabharali	Jiabharali_NTX	Assam	76.00	77.00	78.50	26/07/2007	77.80	05-07-08	321	315	98.13
102	Kopilli	Kampur	Assam	59.50	60.50	61.86	16/06/1973	61.05	01-09-08	6	6	100.00
103	Kopilli	Dharmatul	Assam	55.00	56.00	58.09	21/07/2004	56.04	07-09-08	32	32	100.00
104	Puthimari	Puthimari_NHX	Assam	50.81	51.81	55.04	27/07/2007	55.08	31-08-08	272	261	95.96
105	Pagladiya	Pagladia_NTX	Assam	51.75	52.75	55.45	08/07/2004	54.03	30-08-08	49	43	87.76
106	Beki	Beki NHX	Assam	44.10	45.10	48.20	04/08/2000	45.89	30-08-08	401	401	100.00
107	Manas	Manas NHX	Assam	47.81	48.42	50.08	15/09/1984	48.44	31-08-08	39	38	97.44
108	Sankosh	Golakganj	Assam	28.94	29.94	30.95	08/09/2007	30.39	30-08-08	140	137	97.86
109	Raidak-I	Tufanganj	West Bengal	34.22	35.30	36.36	21/07/1993	35.40	30-08-08	29	23	79.31
110	Torsa	Ghughumari	West Bengal	39.80	40.41	41.46	03/08/2000	40.43	30-08-08	31	29	93.55
111	Jaldhaka	NH-31	West Bengal	80.00	80.90	81.33	28/07/1972	80.30	29-08-08	16	16	100.00
112	Jaldhaka	Mathabhanga	West Bengal	47.70	46.20	49.85	07/09/2007	47.94	29-08-08	9	9	100.00
113	Tista	Domohani	West Bengal	85.65	85.95	89.30	04/10/1968	86.04	20-06-08	32	32	100.00
114	Tista	Mekhliganj	West Bengal	65.45	65.95	66.45	13/07/1996	65.86	29-08-08	37	37	100.00
	Barak & Meghna Basins											
115	Barak	APGhat	Assam	18.83	19.83	21.84	01/08/1989	19.87	06-08-08	44	44	100.00
116	Katakhal	Matizuri	Assam	19.27	20.27	22.73	10/09/2007	20.69	05-08-08	28	28	100.00
117	Kushiyara	Karimganj	Assam	13.94	14.94	16.55	09/09/2007	15.71	06-08-08	90	89	98.89
118	Manu	Kailashar	Tripura	24.34	25.34	25.79	07/06/1993	21.91	09-10-08	0	0	
119	Gumti	Sonamura	Tripura	11.50	12.50	14.42	23/07/1993	11.28	30-08-08	0	0	
	Eastern Rivers (Excluding Mahanadi)											
120	Subernarekha	Rajghat	Orissa	9.45	10.36	12.38	06/07/2007	12.69	19-06-08	11	11	100.00
121	Burhabalang	NH_5_Road Bridge	Orissa	7.21	8.13	9.50	12/10/1973	8.00	18-06-08	8	8	100.00
122	Baitarni	Anandpur	Orissa	37.44	38.36	41.20	19/08/1975	40.18	18-06-08	17	14	82.35
123	Baitarni	Akhuapada	Orissa	17.83	17.83	21.95	16/08/1960	19.63	18-06-08	10	7	70.00
124	Brahmani	Jenapur	Orissa	22.00	23.00	24.78	20/08/1975	22.70	18-09-08	4	3	75.00
125	Rushikuluya	Purushottampur	Orissa	15.83	16.83	19.65	04/11/1990	16.85	16-09-08	6	6	100.00

Annex-1 contd....

Flood Forecasting Information (Basinwise and Riverwise) in India during Flood Season 2008												
Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY: HH)	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
126	Vamsadhara	Gunupur	Orissa	83.00	84.00	88.75	17/09/1980	85.84	17-09-08	11	9	81.82
127	Vamsadhara	Kashinagar	Orissa	53.60	54.60	58.93	18/09/1980	56.60	18-09-08	69	63	91.30
128	Vamsadhara	Gotta Barrage	Andhra Pradesh	34.84	47.40	39.92	07/10/1999			12	8	66.67
	Mahanadi Basin											
129	Mahanadi	Hirakud Dam	Orissa	192.02		192.30	30/01/1998	192.02	18-09-08	57	54	94.74
130	Mahanadi	Naraj	Orissa	25.41	26.41	27.61	31/08/1982	27.18	20-09-08	12	11	91.67
131	Mahanadi	Alipingal Devi	Orissa	10.85	11.76	12.90	17/07/2001	13.05	20-09-08	9	9	100.00
132	Mahanadi	Nimapara	Orissa	9.85	10.76	11.60	31/08/1982	11.40	20-09-08	9	9	100.00
	Godavari Basin											
133	Godavari	Kopergaon	Maharashtra	490.90	493.68	499.17	1969	495.04	20-08-08	47	40	85.11
134	Godavari	Jaikwadi Dam	Maharashtra	463.91		464.69	12/10/1990	463.91	28-09-08	13	13	100.00
135	Godavari	Gangakhed	Maharashtra	374.00	375.00	377.57	1947	372.60	22-09-08	0	0	
136	Godavari	Nanded	Maharashtra	353.00	354.00	355.65	1983	349.10	22-09-08	0	0	
137	Godavari	Sriram Sagar	Andhra Pradesh	332.54		332.72	13/10/1990	332.54	25-09-08	12	12	100.00
138	Godavari	Kaleswaram	Andhra Pradesh	103.50	104.75	107.05	1986	102.32	05-08-08	0	0	
139	Godavari	Eturunagaram	Andhra Pradesh	73.29	75.79	77.66	1990	73.94	06-08-08	11	11	100.00
140	Godavari	Dummagudam	Andhra Pradesh	53.00	55.00	60.25	16/08/1986	52.95	06-08-08	2	2	100.00
141	Godavari	Bhadrachalam	Andhra Pradesh	45.72	48.77	55.66	16/08/1986	47.03	06-08-08	15	11	73.33
142	Godavari	Kunavaram	Andhra Pradesh	37.74	39.24	51.30	16/08/1986	37.14	07-08-08	0	0	
143	Godavari	Rajamundri	Andhra Pradesh	17.68	19.51	20.48	16/08/1986	16.61	07-08-08	0	0	
144	Godavari	Dowlaiswaram	Andhra Pradesh	14.25	16.08	18.36	16/08/1986	14.57	07-08-08	9	8	88.89
145	Wardha	Balharsha	Maharashtra	171.50	174.00	176.00	1986	170.77	05-08-08	0	0	
146	Wainganga	Bhandara	Maharashtra	244.00	244.50	250.90	16/09/2005	244.58	02-08-08	7	7	100.00
147	Wainganga	Pauni	Maharashtra	226.73	227.73	232.35	07/09/1994	226.22	02-08-08	0	0	
148	Manjira	Singur Dam	Andhra Pradesh	523.60		523.60	1999	523.59	24-09-08	7	6	85.71
149	Manjira	Nizamsagar Dam	Andhra Pradesh	428.24		428.24	1999	428.24	15-09-08	3	3	100.00
150	Indravati	Jagdalpur	Chhatisgarh	539.60	540.80	544.66	1973	540.32	11-08-08	11	11	100.00
	Krishna Basin											
151	Krishna	Arjunward	Maharashtra	542.07	543.29	543.69	05/08/2005					
152	Krishna	Alamati Dam	Karnataka	519.60		519.60	18/09/2002	519.60	27-08-08	51	51	100.00
153	Krishna	Narayanpur Dam	Karnataka	492.25		492.11	29/10/1997	492.22	26-09-08	37	37	100.00
154	Krishna	Priyadarshini	Andhra Pradesh	318.52		316.50	21/10/1993	317.45	14-10-08	62	62	100.00
155	Krishna	Srisailam Dam	Andhra Pradesh	269.75		269.93	13/10/1990	269.75	21-09-08	66	66	100.00
156	Krishna	Prakasham Barrag	Andhra Pradesh	18.30		21.60	07/10/2003	17.48	06-09-08	78	77	98.72

Annex-1 contd....

Flood Forecasting Information (Basinwise and Riverwise) in India during Flood Season 2008

Sl.No.	Name of the river	Name of FF site	Name of State	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
						Level (m)	Date/ Month/ Year	Level (m)	Date and Time DD/MM/YY: HH)	No.of Forecasts Issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12	13
157	Bhima	Deongaon	Karnataka	402.00	404.50	407.34	13/08/2006	402.09	23-09-08	1	1	100.00
158	Tungbhadra	Tungabhadra Dam	Karnataka	497.74		497.74	05/10/1992	497.74	20-08-08	87	87	100.00
159	Tungbhadra	Mantralayam	Andhra Pradesh	310.00	312.00	315.80	19/11/1992	312.59	15-08-08	15	14	93.33
	Southern River System:											
160	Pennar	Nellore	Andhra Pradesh	15.91	17.28	18.70	30/11/1982	13.41	25-10-08	0	0	
	Western River Systems:											
161	Banas	Dantiwada Dam	Gujarat	182.88	185.06	186.04	01/09/1973	168.98	03-08-08	0	0	
162	Sabarmati	Dharoi Dam	Gujarat	187.45	192.25	189.63	03/09/1990	183.66	23-09-08	0	0	
163	Sabarmati	Ahmedabad Shubhash Bridge	Gujarat	44.09	45.34	46.85	18/07/1993	41.92	14-09-08	0	0	
164	Mahi	Kadana Dam	Gujarat	126.19	127.71	127.74	09/09/1989	124.87	03-10-08	0	0	
165	Mahi	Wanakbori	Gujarat	71.00	72.54	74.77	24/08/1990	67.28	16-08-08	0	0	
166	Naramada	Mandla	Madhya Pradesh	437.20	437.80	439.41	18/08/1974	435.76	01-08-08	0	0	
167	Naramada	Hoshangabad	Madhya Pradesh	292.83	293.83	300.90	30/08/1973	290.00	02-08-08	0	0	
168	Naramada	Garudeswar	Gujarat	30.48	31.09	41.65	06/09/1970	18.24	20-09-08	0	0	
169	Naramada	Bharuch	Gujarat	6.71	7.31	12.65	07/09/1970	5.00	04-07-08	0	0	
170	Tapi	Hatnur Dam	Maharashtra	212.02	214.00	214.00	12/10/1989	214.00	05-10-08	23	22	95.65
171	Tapi	Ukai Dam	Gujarat	102.41	105.16	105.51	08/10/1990	102.25	12-10-08	17	16	94.12
172	Tapi	Surat	Gujarat	8.50	9.50	12.01	03/08/2004	4.70	05-07-08	0	0	
173	Damanganga	Madhuban Dam	Gujarat	79.86	82.40	80.60	27/09/1993	80.05	02-10-08	17	17	100.00
174	Damanganga	Vapi Town	Gujarat	18.20	19.20	23.76	1976	17.15	11-08-08	0	0	
175	Damanganga	Daman	Dadra & Nagar Hav	2.60	3.40	4.00	03/08/2004	2.10	04-07-08	0	0	
								Total Forecasts		6691	6554	97.95
								Level Forecasts		5670	5551	97.90
								Inflow Forecast		1021	1003	98.24

Annex- 2

Flood Forecasting Information (Statewise) In India during Flood Season 2008

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
					Level (m)	Date/ Month/ Year	Level (m)	Date/ Month/ Year	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12
	Andhra Pradesh										
1	Vamsadhara	Gotta Barrage	FRL34.84	MWL47.40	39.92	07-10-1999			12	8	66.67
2	Godavari	Sriram Sagar	FRL=332.54		332.72	13-10-1990	332.54	25-09-2008	12	12	100.00
3	Godavari	Kaleswaram	103.50	104.75	107.05	1986	102.32	05-08-2008	0	0	
4	Godavari	Eturunagaram	73.29	75.79	77.66	1990	73.94	06-08-2008	11	11	100.00
5	Godavari	Dummagudam	53.00	55.00	60.25	16-08-1986	52.95	06-08-2008	2	2	100.00
6	Godavari	Bhadrachalam	45.72	48.77	55.66	16-08-1987	47.03	06-08-2008	15	11	73.33
7	Godavari	Kunavaram	37.74	39.24	51.30	16-08-1988	37.14	07-08-2008	0	0	
8	Godavari	Rajamundri	17.68	19.51	20.48	16-08-1989	16.61	07-08-2008	0	0	
9	Godavari	Dowalaiswaram	14.25	16.08	18.36	16-08-1990	14.57	07-08-2008	9	8	88.89
10	Manjira	Singur Dam	FRL=523.60		523.60	1999	523.59	24-09-2008	7	6	85.71
11	Manjira	Nizamsagar Dam	FRL=428.24		428.24	1999	428.24	15-09-2008	3	3	100.00
12	Krishna	Priyadarshini	FRL=318.52		316.50	21-10-1993	317.45	14-10-2008	62	62	100.00
13	Krishna	Srisailam Dam	FRL=269.75		269.93	13-10-1990	269.75	21-09-2008	66	66	100.00
14	Krishna	Prakasham Barrage	FRL=18.30		21.50	07-10-1903	17.48	06-09-2008	78	77	98.72
15	Tungbhadra	Mantralayam	310.00	312.00	315.80	19-11-1992	312.59	15-08-2008	15	14	93.33
16	Pennar	Nellore	15.91	17.28	18.70	30-11-1982	13.41	25-10-2008	0	0	
	Assam										
17	Brahmaputra	Dibrugrah	103.24	104.24	106.48	03-09-1998	105.86	22-07-2008	307	307	100.00
18	Brahmaputra	Neamatighat	84.04	85.04	87.37	11-07-1991	86.09	23-07-2008	99	99	100.00
19	Brahmaputra	Tezpur	64.23	65.23	66.59	27-08-1988	65.63	04-09-2008	75	74	98.67
20	Brahmaputra	Guwahati	48.68	49.68	51.37	29-08-1988	49.84	04-09-2008	45	44	97.78
21	Brahmaputra	Goalpara	35.27	36.27	37.43	31-07-1954	36.24	06-09-2008	52	52	100.00
22	Brahmaputra	Dhubri	27.62	28.62	30.36	28-08-1988	29.60	06-09-2008	187	187	100.00
23	Burhidihing	Naharkatia	119.40	120.40	122.69	17-06-1973	117.90	01-09-2008	0	0	#DIV/0!
24	Burhidihing	Khowang	101.11	102.11	103.92	25-08-1988	103.01	07-07-2008	44	42	95.45
25	Desang	Nanglamoraghat	93.46	94.46	96.49	06-09-1998	95.47	17-07-2008	53	48	90.57
26	Dikhow	Shivsagar	91.40	92.40	95.62	08-07-1974	93.34	20-07-2008	37	37	100.00
27	Subansiri	Badatighat	81.53	82.53	86.84	28-06-1972	82.73	03-09-2008	95	95	100.00
28	Dhansiri (S)	Golaghat	88.50	89.50	91.30	11-10-1986	89.86	02-08-2008	60	59	98.33

Flood Forecasting Information (Statewise) In India during Flood Season 2008

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
					Level (m)	Date/ Month/ Year	Level (m)	Date/ Month/ Year	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12
29	Dhansiri (S)	Numaligarh	76.42	77.42	79.87	24-09-1985	78.82	24-08-2008	215	215	100.00
30	Jiabharali	Jiabharali_NTX	76.00	77.00	78.25	26-06-1998	77.80	05-07-2008	321	315	98.13
31	Kopilli	Kampur	59.50	60.50	61.86	16-06-1973	61.05	01-09-2008	6	6	100.00
32	Kopilli	Dharmatul	55.00	56.00	57.68	24-05-1988	56.04	07-09-2008	32	32	100.00
33	Puthimari	Puthimari_NHX	50.81	51.81	54.92	20-06-1993	55.08	31-08-2008	272	261	95.96
34	Pagladiya	Pagladia_NTX	51.75	52.75	55.38	15-09-1984	54.03	30-08-2008	49	43	87.76
35	Beki	Beki NHX	44.10	45.10	46.20	04-08-2000	45.89	30-08-2008	401	401	100.00
36	Manas	Manas NHX	47.81	48.42	50.08	15-09-1984	48.44	31-08-2008	39	38	97.44
37	Sankosh	Golakganj	28.94	29.94	30.91	21-07-1993	30.39	30-08-2008	140	137	97.86
38	Barak	APGhat	18.83	19.83	21.84	01-08-1989	19.87	06-08-2008	44	44	100.00
39	Katakhal	Matizuri	19.27	20.27	22.58	09-08-2002	20.69	05-08-2008	28	28	100.00
40	Kushiyara	Karimganj	13.94	14.94	16.36	23-07-1993	15.71	06-08-2008	90	89	98.89
	Bihar										
41	Ganga	Buxar	59.32	60.32	62.09	1948	58.45	16-08-2008	50	50	100.00
42	Ganga	Patna Dighaghat	49.45	50.45	52.52	23-08-1975	50.40	23-08-2008	40	40	100.00
43	Ganga	Patna Gandhighat	47.6	48.6	50.27	14-08-1994	49.32	23-08-2008	71	71	100.00
44	Ganga	Hathidah	40.76	41.76	43.15	07-08-1971	42.42	25-08-2008	59	59	100.00
45	Ganga	Munger	38.33	39.33	40.99	19-09-1976	38.85	25-08-2008	18	18	100.00
46	Ganga	Bhagalpur	32.68	33.68	34.20	17-09-2003	33.73	24-08-2008	50	50	100.00
47	Ganga	Kahalgaon	30.09	31.09	32.87	17-09-2003	31.96	21-08-2008	74	74	100.00
48	Ghaghra	Darauli	59.82	60.82	61.74	29-08-1998	60.98	24-08-2008	81	81	100.00
49	Ghaghra	Gangpur Siswan	56.04	57.04	58.01	18-09-1983	57.75	25-08-2008	63	63	100.00
50	Ghaghra	Chhapra	52.68	53.68	54.59	03-09-1982	51.52	01-08-2008	0	0	
51	Gandak	Chatia	68.15	69.15	70.04	26-07-2002	68.60	30-08-2008	11	11	100.00
52	Gandak	Rewaghat	53.41	54.41	55.41	17-09-1986	54.07	01-09-2008	30	30	100.00
53	Gandak	Hazipur	49.32	50.32	50.93	1948	49.92	23-08-2008	25	25	100.00
54	Burhi Gandak	Lalbeghiaghat	62.20	63.20	67.09	30-07-1975	63.60	26-07-2008	13	13	100.00
55	Burhi Gandak	Muzaffarpur Sikandarpur	51.53	52.53	54.29	15-08-1987	52.70	29-07-2008	15	15	100.00
56	Burhi Gandak	Samastipur	46.02	46.02	49.38	15-08-1987	47.07	31-07-2008	27	27	100.00

Annex- 2 contd.....

Flood Forecasting Information (Statewise) In India during Flood Season 2008

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
					Level (m)	Date/ Month/ Year	Level (m)	Date/ Month/ Year	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12
57	Burhi Gandak	Rosera	41.63	42.63	46.35	16-08-1987	44.25	31-07-2008	40	40	100.00
58	Burhi Gandak	Khagaria	35.58	36.58	39.22	1976	37.75	24-08-2008	69	69	100.00
59	Bagmati	Benibad	47.68	48.68	50.01	2004	49.34	22-07-2008	113	113	100.00
60	Bagmati	Hayaghat	44.72	45.72	48.96	14-08-1987	45.58	28-07-2008	20	20	100.00
61	Adhwara Group	Kamtaul	49.00	50.00	52.99	12-08-1987	50.48	27-07-2008	42	42	100.00
62	Adhwara Group	Ekmighat	45.94	46.94	49.27	14-08-1987	46.93	28-07-2008	27	27	100.00
63	Kamla Balan	Jhanjharpur	49.00	50.00	52.73	11-08-1987	51.08	29-08-2008	54	54	100.00
64	Kosi	Basua	46.75	47.75	48.76	21-07-1996	48.47	23-07-2008	137	137	100.00
65	Kosi	Baltara	32.85	33.85	36.40	15-08-1987	34.06	28-07-2008	49	49	100.00
66	Kosi	Kursela	29.00	30.00	32.04	06-09-1998	31.03	20-08-2008	78	78	100.00
67	Mahananda	Dhengraghat	34.65	35.65	38.09	1968	36.59	30-08-2008	63	59	93.65
68	Mahananda	Jhawa	30.40	31.40	33.51	14-08-1987	32.03	31-08-2008	128	128	100.00
69	Sone	Inderpuri	107.20	108.20	108.85	23-08-1975	104.99	02-07-2008	0	0	
70	Sone	Koelwar	54.52	55.52	58.88	20-07-1971	53.06	23-08-2008	0	0	
71	Sone	Maner	51.00	52.00	53.79	10-09-1976	51.50	23-08-2008	13	13	100.00
72	PunPun	Sripalpur	49.60	50.60	53.91	18-09-1976	52.77	18-08-2008	52	50	96.15
	Chhatisgarh										
73	Indravati	Jagdalpur	539.50	540.80	544.68	1973	540.32	11-08-2008	11	11	100.00
	Dadra & Nagar Haveli										
74	Damanganga	Daman	2.60	3.40	2.40	02-07-1981	2.10	04-07-2008	0	0	
	Gujarat										
75	Banas	Dantiwada Dam	182.88	185.06	186.04	01-09-1973	168.98	03-08-2008	0	0	
76	Sabarmati	Dharoi Dam	187.45	192.25	189.63	03-09-1990	183.655	23-09-2008	0	0	
77	Sabarmati	Ahmedabad Shubhash Bridge	44.09	45.34	46.85	16-07-1993	41.92	14-09-2008	0	0	
78	Mahi	Kadana Dam	126.19	127.71	127.74	09-09-1969	124.87	03-10-2008	0	0	
79	Mahi	Wanakbori	71.00	72.54	74.77	24-08-1990	67.28	16-08-2008	0	0	
80	Naramada	Garudeswar	30.48	31.09	41.65	06-09-1970	16.24	20-09-2008	0	0	
81	Naramada	Bharuch	6.71	7.31	12.65	07-09-1970	5.00	04-07-2008	0	0	
82	Tapi	Ukai Dam	102.41	105.16	105.51	08-10-1990	102.25	12-10-2008	17	16	94.12

Annex- 2 contd.....

Flood Forecasting Information (Statewise) In India during Flood Season 2008

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
					Level (m)	Date/ Month/ Year	Level (m)	Date/ Month/ Year	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12
83	Tapi	Surat	8.50	9.50	12.01	1968	4.70	05-07-2008	0	0	
84	Damanganga	Madhuban Dam	79.86	82.4	80.60	27-09-1993	80.05	02-10-2008	17	17	100.00
85	Damanganga	Vapi Town	18.20	19.20	20.72	1976	17.15	11-08-2008	0	0	
	Haryana										
16	Yamuna	Tajewala Weir	PL=323.70		328.27	03-09-1978			0	0	
	Jharkhand										
87	Ganga	Sahibgunj	26.25	27.25	30.91	1998	28.52	21-08-2008	80	80	100.00
88	Mayurakshi	Massanjore Dam	FRL = 121.31		122.87	25-09-1999	121.31	12-10-2008	15	15	100.00
89	Damodar	Tenughat Dam	FRL = 268.83		265.56	17-09-1985	262.55	09-07-2008	61	61	100.00
90	Damodar	Panchet Dam	FRL = 132.59		132.89	02-10-1959	128.33	25-09-2008	102	102	100.00
91	Barakar	Maithon Dam	FRL= 150.88		151.79	02-10-1959	147.88	10-10-2008	74	74	100.00
	Karnataka										
92	Krishna	Alamati Dam	FRL=519.60		519.60	18-09-2002	519.6	27-08-2008	51	51	100.00
93	Krishna	Narayanpur Dam	FRL=492.25		492.11	29-10-1997	492.22	26-09-2008	37	37	100.00
94	Bhima	Deongaon	400.00	407.00	406.30	29-08-1997	402.09	23-09-2008	1	1	100.00
95	Tungbhadra	Tungabhadra Dam	FRL=497.74		497.74	05-10-1992	497.74	20-08-2008	87	87	100.00
	Madhya Pradesh										
96	Chambal	Gandhisagar Dam	FRL & MWL=399.90						0	0	
97	Naramada	Mandla	437.20	437.80	439.40	18-08-1974	435.76	01-08-2008	0	0	
98	Naramada	Hoshangabad	292.83	293.83	300.90	30-08-1973	290.00	02-08-2008	0	0	
	Maharashtra										
99	Godavari	Kopergaon	490.90	493.68	499.17	1969	495.04	20-09-2008	47	40	85.11
100	Godavari	Jaikwadi Dam	FRL=463.91		464.69	12-10-1990	463.91	28-09-2008	13	13	100.00
101	Godavari	Gangakhed	374.00	375.00	377.57	1947	372.60	22-09-2008	0	0	
102	Godavari	Nanded	353.00	354.00	355.65	1983	349.10	22-09-2008		0	
103	Wardha	Balharsha	171.50	174.00	176.00	1986	170.77	05-08-2008	0	0	
104	Wainganga	Bhandara	244.00	244.50	250.90	16-09-2006	244.58	02-08-2008	7	7	100.00
105	Wainganga	Pauni	231.50	232.50	237.12	07-09-1994	226.22	02-08-2008	0	0	
106	Krishna	Arjunward	Not yet started								
107	Tapi	Hatnur Dam	212.02	214.00	214.00	12-10-1989	214.00	05-10-2008	23	22	95.65

Annex- 2 contd.....

Flood Forecasting Information (Statewise) In India during Flood Season 2008

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
					Level (m)	Date/ Month/ Year	Level (m)	Date/ Month/ Year	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12
	NCT Delhi										
108	Yamuna	Delhi Rly Bridge	204.00	204.83	207.49	06-09-1978	206.00	23-09-2008	27	25	92.59
109	Sahibi	Dhansa	211.44	212.44	213.58	06-08-1977	210.80	11-08-2008	0	0	
	Orissa										
110	Subernarekna	Rajghat	9.45	10.36	12.20	07-08-1997	12.69	19-06-2008	11	11	100.00
111	Burhabalang	NH_5 _Road Bridge	7.21	8.13	9.50	12-10-1973	8.00	18-06-2008	8	8	100.00
112	Baitarni	Anandpur	37.44	38.36	41.20	19-08-1975	40.18	18-06-2008	17	14	82.35
113	Baitarni	Akhuapada	18.29	19.20	21.95	16-08-1960	19.63	18-06-2008	10	7	70.00
114	Brahmani	Jenapur	22.00	23.00	24.78	20-08-1975	22.70	18-09-2008	4	3	75.00
115	Rushikuluya	Purushottampur	15.83	16.83	19.65	04-11-1990	16.85	18-09-2008	6	6	100.00
116	Vamsadhara	Gunupur	83.00	84.00	88.75	17-09-1980	85.84	17-09-2008	11	9	81.82
117	Vamsadhara	Kashinagar	53.60	54.60	58.93	18-09-1980	56.60	18-09-2008	69	63	91.30
118	Mahanadi	Hirakud Dam	FRL=192.02		192.30	30-01-1998	192.02	18-09-2008	57	54	94.74
119	Mahanadi	Naraj	25.41	26.41	27.61	31-08-1982	27.18	20-09-2008	12	11	91.67
120	Mahanadi	Alipingal Devi	10.85	11.76	12.90	17-07-2001	13.05	20-09-2008	9	9	100.00
121	Mahanadi	Nimapara	9.85	10.76	11.60	31-08-1982	11.40	20-09-2008	9	9	100.00
	Tripura										
122	Manu	Kailashar	24.34	25.34	25.79	1993	21.91	09-10-2008	0	0	
123	Gumti	Sonamura	11.50	12.50	14.42	1993	11.28	30-08-2008	0	0	
	Uttar Pradesh										
124	Ganga	Narora Barrage	PL= 180.79 at D/S		180.18	06-09-1978	179.16	20-08-2008	70	67	95.71
125	Ganga	Kannauj	124.90	125.97	126.24	29-08-1998	125.96	24-08-2008	35	34	97.14
126	Ganga	Ankinghat	123.00	124.00	124.31	09-09-1978	123.68	24-08-2008	35	32	91.43
127	Ganga	Kanpur	113.00	114.00	113.47	02-09-1967	113.11	26-08-2008	50	48	96.00
128	Ganga	Dalmau	98.36	99.36	99.84	03-08-1973	99.15	27-08-2008	23	23	100.00
129	Ganga	Phaphamau	83.73	84.73	87.98	08-09-1978	81.09	14-08-2008	0	0	
130	Ganga	Allahabad Chhatnag	83.73	84.73	88.03	08-09-1978	80.06	13-08-2008	0	0	
131	Ganga	Mirzapur	76.72	77.72	80.34	09-09-1978	73.37	14-08-2008	0	0	
132	Ganga	Varanasi	70.26	71.26	73.90	09-09-1978	68.23	14-08-2008	0	0	

Annex- 2 contd.....

Flood Forecasting Information (Statewise) In India during Flood Season 2008

Sl.No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
					Level (m)	Date/ Month/ Year	Level (m)	Date/ Month/ Year	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12
133	Ganga	Ghazipur	62.11	63.11	65.22	09-09-1978	62.23	15-08-2008	1	1	100.00
134	Ganga	Ballia	56.62	57.62	60.25	14-09-2003	59.33	15-08-2008	1	1	100.00
135	Ramganga	Moradabad	189.60	190.60	192.68	03-09-1978	190.32	21-07-2008	6	6	100.00
136	Ramganga	Bareilly	162.07	163.07	162.88	06-08-1978	161.81	23-07-2008	0	0	
137	Yamuna	Mawi	230.00	230.85	232.45	26-09-1988	231.26	22-09-2008	19	17	89.47
138	Yamuna	Mathura	164.20	165.20	169.73	08-09-1978	165.53	26-09-2008	45	45	100.00
139	Yamuna	Agra	151.40	152.40	154.76	09-09-1978	150.32	27-09-2008	3	3	100.00
140	Yamuna	Etawa	120.92	121.92	126.13	11-09-1978	120.36	24-08-2008	0	0	
141	Yamuna	Auraiya	112.00	113.00	118.19	25-08-1996	106.34	15-07-2008	0	0	
142	Yamuna	Kalpi	107.00	108.00	112.98	25-08-1996	101.54	15-07-2008	0	0	
143	Yamuna	Hamirpur	102.63	103.63	108.59	12-09-1983	97.64	13-08-2008	0	0	
144	Yamuna	Chilaghat	99.00	100.00	105.16	06-09-1978	94.76	13-08-2008	0	0	
145	Yamuna	Naini	83.74	84.74	87.99	08-09-1978	80.75	14-08-2008	0	0	
146	Betwa	Mohana	121.66	122.66	133.69	11-09-1983	119.87	12-08-2008	0	0	
147	Betwa	Sahjina	103.54	104.54	108.67	12-09-1983	99.29	12-08-2008	0	0	
148	Ken	Banda	103.00	104.00	113.28	14-09-1992	107.08	22-06-2008	6	6	100.00
149	Gomati	Lucknow HanumanSetu	108.5	109.5	110.85	10-09-1971	109.03	28-08-2008	6	6	100.00
150	Gomati	Jaunpur	73.07	74.07	77.74	22-09-1971	73.48	30-08-2008	13	12	92.31
151	SAI	Raibareli	100.00	101.00	104.81	17-09-1982	100.53	22-08-2008	5	4	80.00
152	Ghaghra	Elgin Bridge	105.07	106.07	107.18	14-09-1983	107.48	23-09-2008	97	92	94.85
153	Ghaghra	Ayodhya	91.73	92.73	93.65	19-08-1998	93.85	24-09-2008	109	103	94.50
154	Ghaghra	Turtipar	63.01	64.01	66.00	28-08-1998	64.96	27-09-2008	90	87	96.67
155	Rapti	Balrampur	103.62	104.62	105.25	11-09-2000	104.18	24-09-2008	13	12	92.31
156	Rapti	Bansi	83.90	84.90	85.82	21-08-1998	85.26	25-07-2008	20	20	100.00
157	Rapti	Gorakhpur Birdghat	73.98	74.98	77.54	23-08-1998	76.75	27-07-2008	36	36	100.00
158	Gandak	Khadda	95.00	96.00	97.50	23-07-2002	95.64	28-08-2008	128	125	97.66
	Uttaranchal										
159	Alaknanda	Srinagar	539.00	540.00	535.85	05-09-1995	534.22	31-07-2008	0	0	

Annex- 2 contd.....

Flood Forecasting Information (Statewise) In India during Flood Season 2008

No.	Name of the river	Name of FF site	Warning Level (m)	Danger level (m)	Highest Flood Level		Maximum Level -2008		During 2008		
					Level (m)	Date/ Month/ Year	Level (m)	Date/ Month/ Year	No.of Forecasts issued	No.of Forecasts within limits	Percent-age of accuracy
1	2	3	4	5	6	7	8	9	10	11	12
160	Ganga	Rishikesh	339.50	340.50	341.72	05-09-1995	339.12	31-07-2008	0	0	
161	Ganga	Haridwar	293.00	294.00	296.23	02-09-1978	293.60	31-07-2008	4	4	100.00
	West Bengal										
162	Ganga	Farakka	21.25	22.25	25.14	07-09-1998	23.62	03-09-2008	172	164	95.35
163	Mayurakshi	Tilpara Barrage	PL= 62.79		67.05	27-09-1978	62.79	23-09-2008	12	12	100.00
164	Mayurakshi	Narayanpur	26.99	27.99	29.69	27-09-1995	25.68	21-08-2008	0	0	
165	Ajoy	Gheropara	38.42	39.42	43.94	27-09-1978	38.45	16-07-2008	1	1	100.00
166	Damodar	Durgapur Barrage	PL= 64.47		64.47	31-10-2002	64.47	00-01-1900	95	95	100.00
167	Mundeshwari	Harinkhola	11.80	12.80	14.58	29-09-1978	11.98	21-07-2008	4	4	100.00
168	Kangsabati	Kangsabati Dam	FRL=134.11		134.71	02-09-1978	133.26	26-09-2008	50	46	92.00
169	Kangsabati	Mohanpur	24.73	25.73	29.87	02-09-1978	24.80	13-07-2008	0	0	
170	Raidak-I	Tufanganj	34.22	35.30	36.36	21-07-1993	35.40	30-08-2008	29	23	79.31
171	Torsa	Ghughumari	39.80	40.41	41.46	03-08-2000	40.43	30-08-2008	31	29	93.55
172	Jaldhaka	NH-31	80.00	80.90	81.33	28-07-1972	80.30	29-08-2008	16	16	100.00
173	Jaldhaka	Mathabhanga	48.20	48.70	49.60	29-07-1972	47.94	29-08-2008	9	9	100.00
174	Tista	Domohani	85.65	85.95	86.78	13-06-1971	86.04	20-06-2008	32	32	100.00
175	Tista	Mekhliganj	65.45	65.95	66.45	13-07-1996	65.86	29-08-2008	37	37	100.00
							Total Forecasts		*6691*	*6554*	**97.95**
							Level Forecasts		**5670**	**5551**	**97.90**
							Inflow Forecast		**1021**	**1003**	**98.24**

Annex- 3

Performance of Flood Forecasting Stations (Divisionwise) in India during Flood Season 2008

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	0	4	4	100.00	0	0	0	0	N.A	3	0	4	4	100.00
2	Middle Ganga Division 1, Lucknow	6	6	385	350	95.89	0	0	0	0	N.A	6	6	385	350	95.89
3	Middle Ganga Division 2, Lucknow	8	1	160	153	95.63	1	1	70	67	95.71	9	2	230	220	95.65
4	Middle Ganga Division 3, Varanasi	7	4	64	63	98.44	0	0	0	0	N.A	7	4	64	63	98.44
5	Middle Ganga Division 4, Patna	17	13	1014	1007	99.31	0	0	0	0	N.A	17	13	1014	1007	99.31
6	Middle Ganga Division 5, Patna	18	15	829	819	98.79	0	0	0	0	N.A	18	15	829	819	98.79
7	Upper Yamuna Divn, Delhi	4	3	91	87	95.60	1	0	0	0	N.A	5	3	91	87	95.60
8	Chambal Division, Jaipur	0	0	0	0	N.A	1	1	0	0	N.A	1	1	0	0	N.A
9	Lower Yamuna Divn, Agra	10	2	9	9	100.00	0	0	0	0	N.A	10	2	9	9	100.00
10	Damodar Divn, Asansol	4	0	5	5	100.00	7	7	409	405	99.02	11	7	414	410	99.03
11	Upper Brahmaputra Divn, Dibrugarh	13	10	1344	1329	98.88	0	0	0	0	N.A	13	10	1344	1329	98.88
12	Middle Brahmaputra Divn, Guwahati	9	7	580	561	96.72	0	0	0	0	N.A	9	7	580	561	96.72
13	Lower Brahmaputra Divn, Jalpaiguri	10	10	921	909	98.70	0	0	0	0	N.A	10	10	921	909	98.70
14	Eastern Rivers Divn, Bhubaneswar	11	10	166	150	90.36	1	1	12	8	66.67	12	11	178	158	88.76
15	Mahanadi Divn, Burla	0	0	0	0	N.A	1	1	57	54	94.74	1	1	57	54	94.74
16	Upper Godavari Divn, Hyderabad	3	3	0	0	N.A	4	4	35	34	N.A	7	7	35	34	97.14
17	Lower Godavari Divn, Hyderabad	11	10	102	90	88.24	0	0	0	0	N.A	11	10	102	90	88.24
18	Lower Krishna Divn, Hyderabad	4	3	16	15	93.75	6	6	381	380	99.74	10	9	397	395	99.50
19	Mahi Divn, Ahmedabad	2	1	0	0	N.A	3	2	0	0	N.A	5	3	0	0	N.A
20	Tapi Divn,Surat	5	0	0	0	N.A	3	3	57	55	96.49	8	3	57	55	96.49
21	Narmada Divn, Bhopal	2	2	0	0	N.A	0	0	0	0	NA	2	2	0	0	N.A
	Total	147	100	6870	5551	97.90	28	26	1021	1003	98.24	175	126	6891	6554	97.95

Annex-4

List of Real time data stations and Wireless Control Stations (Wireless stations in CWC) in 2008 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	DRF		77	LBD Jalpaiguri	Gazaldoba	
8	UBD Dibrugarh	Dharamtul		43	MBD Guwahati	Melabazar		78	LBD Jalpaiguri	Ghuguman	
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	Naiban (*)		80	LBD Jalpaiguri	Hashimara	
11	UBD Dibrugarh	Dibrugarh_Sub div (*)	*	46	MBD Guwahati	Suklai		81	LBD Jalpaiguri	Jalpaiguri Div. CR(*)	
12	UBD Dibrugarh	Dillighat		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	Majlithar	
15	UBD Dibrugarh	Itanagar (Naharlagan) (*)		50	MBD Guwahati	Annapurnaghat		85	LBD Jalpaiguri	Mathabhanga	
16	UBD Dibrugarh	Jorhat (*)		51	MBD Guwahati	Badarpurghat		86	LBD Jalpaiguri	Matthanguri	
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 (Mamas)	
23	UBD Dibrugarh	Motipur (#)		58	MBD Guwahati	Matizuri		93	LBD Jalpaiguri	Panbari	
24	UBD Dibrugarh	Seppa		59	MBD Guwahati	Silchar (*)		94	LBD Jalpaiguri	Ranggo	
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	Saraipara	
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 (sill)		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		Note: (#) Data through Telephone/ Spl.Messenger/ Temporary Wireless			
34	UBD Dibrugarh	Tezpur		69	LBD Jalpaiguri	CoronationBridge					
35	UBD Dibrugarh	Tezu		70	LBD Jalpaiguri	Llah ($$)		($$) Communication temporarily suspended.			

List of Real time data stations and Wireless Control Stations (Wireless stations in CWC) in 2008 season.

(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	Kakardhan		74	MGD5 Patna	Hathidah	
5	HGDivn DHRN	Kameprayag _Alak		40	MGD1 Lucknow	Kakarhi		75	MGD5 Patna	Hazipur	
6	HGDivn DHRN	Marora		41	MGD1 Lucknow	Katemiaghat		76	MGD5 Patna	Inderpuri	
7	HGDivn DHRN	Rishikesh		42	MGD1 Lucknow	Lucknow_MGD-1Div (*)		77	MGD5 Patna	Japta	
8	HGDivn DHRN	Rudraprayag_DS		43	MGD1 Lucknow	Mukhlishpur		78	MGD5 Patna	Kahalgaon	
9	HGDivn DHRN	Srinagar		44	MGD1 Lucknow	Pallakalan		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	Manet	
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-Alba (S/D)(*)		86	MGD5 Patna	Gandhighat	
17	MGD2 Lucknow	Dalmau		52	MGD3 Varanasi	Chopan		87	MGD5 Patna	Rewaghat	
18	MGD2 Lucknow	Fathegarh		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	Baltara	
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	Dalltonganj		103	MGD4 Patna	Galgalia	
34	MGD1 Lucknow	Chanderdeepghat		69	MGD5 Patna	Daraull		104	MGD4 Patna	Hayaghat	
35	MGD1 Lucknow	Elgin Bridge		70	MGD5 Patna	Dehri on Sone (*)		105	MGD4 Patna	Jainagar	

List of Real time data stations and Wireless Control Stations (Wireless stations in CWC) in 2006 season.

(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	Kushkarni		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_PoylaGhat	T
115	MGD4 Patna	Purnea (*)		150	DD Asansol	Phulberia		185	LYD AGRA	Auriya	
116	MGD4 Patna	Runisaidpur		151	DD Asansol	Punhansha		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	Sikaria		189	LYD AGRA	Etawah	
120	MGD4 Patna	Sonebarsha		155	DD Asansol	Simulia		190	LYD AGRA	Garrauli	
121	MGD4 Patna	Talbpur		156	DD Asansol	Suri (*)		191	LYD AGRA	Hamirpur	
122	MGD4 Patna	Triveni		157	DD Asansol	Tantloi		192	LYD AGRA	Jhansi (*)	
123	MGD4 Patna	Dhang Bridge		158	DD Asansol	Tenughat Dam	T	193	LYD AGRA	Kalmaha	
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	Hanpur	T	203	CD Jaipur	Kota Barrage (*)	
134	DD Asansol	Jamtara		169	UYD DELHI	Hathidhari (Bausan)	T	204	CD Jaipur	Manderiat	
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	Kamal					
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	Mawi	T				

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

List of Real time data stations and Wireless Control Stations (Wireless stations in CWC) in 2008 season.

(C) Penisular 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	Balkunthpur	T	37	ERD Bbsr	Akhuapada		72	ERD Bbsr	Thakurmunda	
3	MD Burla	Bamnidhi	T	38	ERD Bbsr	Altuma		73	ERD Bbsr	Jaraikela	
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	Kanas		82	UGD Hyderabad	Aurangabad (*)	
13	MD Burla	Korba	T	48	ERD Bbsr	Manthagal		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	Kuttaguda		103	UGD Hyderabad	Palkhed Dam	
34	ERD Bbsr	Nimapara	T	69	ERD Bbsr	Madhabanda		104	UGD Hyderabad	Purna	T
35	ERD Bbsr	Athpingal	T	70	ERD Bbsr	Mahendragarh		105	UGD Hyderabad	Saigaon	T

List of Real time data stations and Wireless Control Stations (Wireless stations in CWC) in 2008 season.

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	Hoshangabad (*)	
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	Koida	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	

List of Real time data stations and Wireless Control Stations (Wireless stations in CWC) in 2008 season.

Sl.No	Division	Real Time station	TM
211	TD Surat	Hathnur Dam	
212	TD Surat	Kakrapar	
213	TD Surat	Lakhpuri	
214	TD Surat	Mohkheda	
215	TD Surat	Morane (Dhulia)	
216	TD Surat	Mortakka	
217	TD Surat	Nanipalsan	
218	TD Surat	Rajpipla	
219	TD Surat	Sarangkheda	
220	TD Surat	Savkheda	
221	TD Surat	Silvassa	
222	TD Surat	Solachar (*)	
223	TD Surat	Surat	
224	TD Surat	Ukai Dam	
225	TD Surat	Vapi	
226	TD Surat	Yerli	
227	TDSurat	Teska	
228	TD Surat	Ozarkheda	
229	TDSurat	Madhuban Dam	
230	Mahi D Ahmd	Abu Road	
231	Mahi D Ahmd	Ambaji (seas)	
232	Mahi D Ahmd	Anas (Phase 2)	
233	Mahi D Ahmd	Bakudar (sipu Dam)	
234	Mahi D Ahmd	Chakaliya	
235	Mahi D Ahmd	Chitrasani	
236	Mahi D Ahmd	Dantiwada dam	
237	Mahi D Ahmd	Deesa	
238	Mahi D Ahmd	Derol Bridge	
239	Mahi D Ahmd	Dhariawad	
240	Mahi D Ahmd	Dharoi Dam	
241	Mahi D Ahmd	Gandinagar DIV CRI (*)	
242	Mahi D Ahmd	Ghanod	
243	Mahi D Ahmd	Harnav Weir	
244	Mahi D Ahmd	Hathamati Weir	
245	Mahi D Ahmd	Himmat Nagar	
246	Mahi D Ahmd	Jotasan	
247	Mahi D Ahmd	Kadana Dam	
248	Mahi D Ahmd	Khanpur	
249	Mahi D Ahmd	Kheda	
250	Mahi D Ahmd	Kherol	
251	Mahi D Ahmd	Lowara	
252	Mahi D Ahmd	Mahi Bajaj Sagar Dam	
253	Mahi D Ahmd	Mataji	
254	Mahi D Ahmd	Mount Abu (seas)	
255	Mahi D Ahmd	Nadiad	
256	Mahi D Ahmd	Paderdibadi	
257	Mahi D Ahmd	Palanpur (*)	
258	Mahi D Ahmd	Panam Dam	
259	Mahi D Ahmd	Ratanpur	
260	Mahi D Ahmd	Rerska Weir	
261	Mahi D Ahmd	Saroty	
262	Mahi D Ahmd	Sei Dam	
263	Mahi D Ahmd	Amba Dam	
264	Mahi D Ahmd	Subash Bridge	
265	Mahi D Ahmd	Swaroopganj	
266	Mahi D Ahmd	Vautha	
267	Mahi D Ahmd	Wanakbori Weir	
268	Mahi D Ahmd	Watrak Dam	
269	HD Chennai	Annamayya Proj	
270	HD Chennai	Chennur	
271	HD Chennai	Kadapa Sub Div (*)	
272	HD Chennai	Nandipally	
273	HD Chennai	NelloreAnicut	
274	HD Chennai	NelloreCWC	
275	HD Chennai	Somasila Project	

Division	Stns	Total
UBD,Dibrugarh	35	
MBD,Guwahati	26	
LBD,Jalpaiguri	41	102
HGDiv, Dehradun	11	
MGD1,Lucknow	22	
MGD2,Lucknow	16	
MGD3, Varanasi	15	
MGD4, Patna	25	
MGD5, Patna	35	
DD,Asansol	38	
UYD,Delhi	20	
LYD,Agra	16	
CD, Jaipur	7	205
MD, Burla	32	
ERD,BBSR	49	
UGD,Hyderabad	28	
WD,Nagpur	18	
LGD,Hyderabad	21	
LKD,Hyderabad	27	
UKD,Pune	6	
ND,Bhopal	13	
TD,Surat	35	
MD,Ahmedabad	39	
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 Wireless
($$) Communication temporarily suspended.
(T) CWC Telemetry station existing

List of Real time data stations and Wireless Control Stations (Wireless stations in CWC) in 2008 season.

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

Sl.No	Division	Real Time station	TM	Sl.No	Division	Real Time station	TM	Sl.No	Division	Real Time station	TM
1	UBD Dibrugarh	Tuting	T	36	UGD Hyderabad	G.R.Bridge	T				
2	UBD Dibrugarh	Ningguing	T	37	UGD Hyderabad	Betmogra	T				
3	UBD Dibrugarh	Karkoo	T	38	WD Nagpur	Kedari	T				
4	UBD Dibrugarh	Gette	T	39	WD Nagpur	Bhishnur	T				
5	UBD Dibrugarh	Yao	T	40	WD Nagpur	Salebirdi	T		Divn	Telemetry Stns	RTW
6	UBD Dibrugarh	Rigga	T	41	WD Nagpur	Kumhari	T		Eastern Rivers & Mahandai Basins:	44	
7	UBD Dibrugarh	Dalbung	T	42	WD Nagpur	Medapalli	T		MD, Burla	36	29
8	UBD Dibrugarh	Ghasing	T	43	LGD Hyderabad	Murthahandi	T		ERD,BBSR	8	7
9	UBD Dibrugarh	Bamdo	T	44	LGD Hyderabad	Wyragarh	T		Godavari Basin:	63	
10	UBD Dibrugarh	Rotung	T	45	LGD Hyderabad	Somanapally	T		UGD Hyderabad	17	14
11	UBD Dibrugarh	Kane	T	46	LGD Hyderabad	Cheerlbeda	T		LGD Hyderabad	27	20
12	UBD Dibrugarh	Buchi	T	47	LGD Hyderabad	Medadapalli	T		WD Nagpur	19	14
13	UBD Dibrugarh	Tiimukh	T	48	LGD Hyderabad	Injaram	T		Krishna Basin:	41	
14	UBD Dibrugarh	Dhemaji	T	49	LGD Hyderabad	Potteru	T		UKD Pune	13	5
15	UBD Dibrugarh	Jiadhoimukh	T	50	LGD Hyderabad	Amabai	T		LKD Hyderabad	21	17
16	UBD Dibrugarh	Abaypur	T	51	UKD Hyderabad	Mudhol	T		CD, Bangaluru	7	
17	UBD Dibrugarh	Bordoloni	T	52	UKD Hyderabad	Tallkot	T		Brahmaputra Basin:	21	
18	UBD Dibrugarh	Basudevthan	T	53	UKD Hyderabad	Malkhed	T		UBD Dibrugarh	21	3
19	DD Asansol	Palgani	T	54	UKD Hyderabad	Sholapur	T		Ganga Basin	56	
20	DD Asansol	Giridhi	T	55	UKD Hyderabad	Pandegaon			DD Asansol	20	13
21	DD Asansol	Jamua	T	56	UKD Hyderabad	Navalgund			UYD DELHI	14	12
22	DD Asansol	Churi	T	57	UKD Hyderabad	Narsinggpur	T		LYD AGRA	1	1
23	DD Asansol	Chandrapura	T	58	UKD Hyderabad	Bonomerga	T		CD, Jaipur	21	0
24	DD Asansol	Pupunki	T	59	LKD Hyderabad	Khustagi	T		Grand Total:	225	
25	DD Asansol	Jamalpur	T	60	LKD Hyderabad	Hagari Bommanahalli	T		Master Control (less)	-2	
26	UYD DELHI	Galeta	T	61	LKD Hyderabad	Jewargi	T		Field stations:	223	135
27	UYD DELHI	Tuini (Pabar)	T	62	LKD Hyderabad	Bawaputram	T		Basin wise Telemetry & Wireless availability		
28	MD Burla	Jondhra	T	63	LKD Hyderabad	Koilsagar	T		Godavari Basin	63	48
29	MD Burla	Ravishankar Sagar Dam	T	64	LKD Hyderabad	Keesra	T		Krishna Basin:	41	22
30	MD Burla	Dhudhwa	T	65	LKD Hyderabad	Pondugala	T		Brahmaputra Basin:	21	3
31	MD Burla	Monumsili	T	66	LKD Hyderabad	Damaracherla	T		Eastern Rivers	8	7
32	MD Burla	Sarangpal	T	67	CD Bengaluru	Byladahalli	T		Mahanadi Basin	36	29
33	MD Burla	Burla (Control)	T	68	CD Bengaluru	Bhupasamudram	T		Ganga Basin	56	25
34	ERD Bbsr	Gopalpur	T	69	CD Bengaluru	A.K.Bridge	T			225	134
35	UGD Hyderabad	Yelli	T								

Annexure-5

Unprecedented Flood situation recorded by various Flood Forecast station during 2008 season											
Sl. No	River	station	State	District	Danger Level (m)	Existing HFL		Duration		New HFL	
						Level (m)	Date	From	To	Level (m)	Date
1	Subamarekha	Rajghat	Orissa	Balasore	10.36	12.38	06-07-2007	18-06-08: 15	19-06-08: 20	12.69	04-06/19.06
2	Puthimari	NH Rd.Crossing	Assam	Kamrup	51.81	55.04	27-07-2007	31-08-08: 02	31-08-08: 03	55.08	02-03/31.08
3	Mahanadi- Devi	Alinpingal	Orissa	Jagatsinghpur	11.76	12.90	17-07-2001	20-09-08: 01	20-09-08: 12	13.05	05/20.09
4	Ghaghra	Elgin Bridge	Uttar Pradesh	Barabanki	106.07	107.18	14-09-1983	22-09-08: 22	25-09-08: 08	107.48	21/23.09-04/24.09
5	Ghaghra	Ayodhya	Uttar Pradesh	Faizabad	92.73	93.74	02-08-2007	24-09-08: 09	26-09-08: 10	93.84	20/24.09-16/25.09

Annexure- 6

High Flood Events during Flood Season - 2008 (Between Existing HFL and 0.50 below)

Sl. No	River	station	State	District	Danger Level (m)	Existing HFL		Duration above High Flood	
						Level (m)	Date	From	To
1	Subarnarekha	Rajghat	Orissa	Balasore	10.36	12.38	07-07-2007	18-06-2008 01	20-06-2008 12
2	Kosi	Basua	Bihar	Supaul	47.75	48.87	11-07-2004	23-07-2008 03	24-07-2008 17
3	Ghaghra	Ayodhya	Uttar Pradesh	Faizabad	92.73	93.74	02-08-2007	18-08-2008 14	27-08-2008 07
								27-08-2008 16	31-08-2008 04
								22-09-2008 15	28-09-2008 23
4	Ghaghra	Elgin Bridge	Uttar Pradesh	Barabanki	106.07	107.18	14-09-1983	20-08-2008 07	22-08-2008 23
								21-09-2008 22	27-09-2008 12
5	Ganga	Kannauj	Uttar Pradesh	Kannauj	125.97	126.24	29-08-1998	19-08-2008 13	27-08-2008 20
6	Ganga	Kanpur	Uttar Pradesh	Kanpur	114.00	113.47	02-09-1967	20-08-2008 22	28-08-2008 03
7	Ganga	Bhagalpur	Bihar	Bhagalpur	33.68	34.20	17-09-2003	23-08-2008 01	26-08-2008 08
8	Ghaghra	Gangpur Siswan	Bihar	Siwan	57.04	58.01	18-09-1983	22-08-2008 11	30-08-2008 05
9	Beki	Road Bridge	Assam	Barpeta Road	45.10	46.20	04-06-2000	28-08-2008 15	29-08-2008 16
								30-08-2008 09	31-08-2008 01
10	Puthimari	NH Rd.Crossing	Assam	Kamrup	51.81	55.04	27-07-2007	30-08-2008 22	31-08-2008 06
11	Mahanadi	Naraj	Orissa	Cuttack	26.41	27.61	31-08-1982	19-09-2008 23	20-09-2008 22
12	Mahanadi-Kushbhadra	Nimapara	Orissa	Puri	10.76	11.60	31-08-1982	20-09-2008 01	21-09-2008 09
13	Mahandai-Devi	Alinpingal	Orissa	Jagatsingpur	11.76	12.90	17-07-2001	19-09-2008 18	20-09-2008 23

Annex-7

Moderate and Low Flood Events during Flood Season - 2008- Ganga and its Tributaries

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		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	293.60	31-Jul-08	31-07-08: 11	31-07-08: 18	1			
								01-08-08: 07	01-08-08: 09	1			
								17-08-08: 07	17-08-08: 17	1			
								18-08-08: 05	18-08-08: 12	1			
2	Ganga	Kannauj	Uttar Pradesh	124.97	125.97	125.96	24-Aug-08	20-07-08: 23	30-07-08: 12	11			
								08-08-08: 06	01-09-08: 23	26			
								26-09-08: 03	27-09-08: 06	2			
3	Ganga	Ankinghat	Uttar Pradesh	123.00	124.00	123.68	24-Aug-08	20-07-08: 14	30-07-08: 17	11			
								07-08-08: 02	30-08-08: 14	25			
								26-09-08: 07	27-09-08: 01	2			
4	Ganga	Kanpur	Uttar Pradesh	113.00	114.00	113.11	26-Aug-08	20-07-08: 02	04-09-08: 12	47			
								25-09-08: 10	01-10-08: 00	7			
5	Ganga	Dalmau	Uttar Pradesh	98.36	99.36	99.15	27-Aug-08	23-07-08: 09	31-07-08: 17	9			
								16-08-08: 09	31-08-08: 01	16			
6	Ganga	Ghazipur	Uttar Pradesh	62.11	63.11	62.23	15-Aug-08	14-08-08: 20	16-08-08: 07	2			
7	Ganga	Buxar	Bihar	59.32	60.32	59.33	15-Aug-08	15-08-08: 14	15-08-08: 20	1			
8	Ganga	Ballia	Uttar Pradesh	56.62	57.62	58.45	16-Aug-08	07-07-08: 00	11-07-08: 12	5			
								16-07-08: 13	23-07-08: 13	8			
								25-07-08: 01	04-08-08: 08	11			
								06-08-08: 23	05-09-08: 06	30	13-08-08: 14	01-09-08: 00	19
9	Ganga	Patna_ Dighaghat	Bihar	49.45	50.45	50.40	23-Aug-08	24-07-08: 11	04-08-08: 14	12			
								08-08-08: 08	04-09-08: 12	28			
10	Ganga	Patna _ Gandhighat	Bihar	47.60	48.60	49.32	23-Aug-08	05-07-08: 05	14-07-08: 03	10			
								15-07-08: 00	08-09-08: 17	57	27-07-08: 06	03-08-08: 10	8
											08-08-08: 17	04-09-08: 05	27
								27-09-08: 21	01-10-08: 21	5			
11	Ganga	Hathidah	Bihar	40.76	41.76	42.42	25-Aug-08	19-07-08: 01	10-09-08: 04	54	14-08-08: 12	04-09-08: 22	22
								28-09-08: 02	02-10-08: 21	6			
12	Ganga	Munger	Bihar	38.33	39.33	38.85	25-Aug-08	16-08-08: 11	03-09-08: 06	19			
13	Ganga	Bhagalpur	Bihar	32.68	33.68	33.73	24-Aug-08	21-07-08: 07	07-09-08: 10	49	20-08-08: 04	26-08-08: 15	7
14	Ganga	Kahalgaon	Bihar	30.09	31.09	31.96	21-Aug-08	06-07-08: 10	11-09-08: 16	68	24-07-08: 07	07-09-08: 03	46
								29-09-08: 05	04-10-08: 00	6			
15	Ganga	Sahibgunj	Jharkhand	26.25	27.25	26.52	21-Aug-08	04-07-08: 22	14-09-08: 06	72	16-07-08: 17	09-09-08: 12	54
								27-09-08: 14	05-10-08: 00	8			
16	Ganga	Farakka	West Bengal	21.25	22.25	23.62	03-Sep-08	04-07-08: 22	16-09-08: 18	75	19-07-08: 01	11-09-08: 22	56
								27-09-08: 10	07-10-08: 20	11			
17	Ramganga	Moradabad	Uttar Pradesh	169.60	190.60	190.32	21-Jul-08	17-07-08: 22	23-07-08: 15	7			

Annex-7 contd.....

Moderate and Low Flood Events during Flood Season - 2008- Ganga and its Tributaries

Sl. No	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		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	Yamuna	Mawi	Uttar Pradesh	230.00	230.85	231.26	22-Sep-08	09-08-08: 20	10-08-08: 19	2			
								14-08-08: 20	22-08-08: 15	9			
								23-08-08: 04	23-08-08: 12	1			
								23-08-08: 18	25-08-08: 02	2			
								20-09-08: 23	25-09-08: 15	6	22-09-08: 02	23-09-08: 09	2
19	Yamuna	Delhi Rly Bridge	NCT Delhi	204.00	204.83	206.00	23-Sep-08	15-07-08: 22	16-07-08: 04	1			
								02-08-08: 12	03-08-08: 06	2			
								08-08-08: 12	08-08-08: 14	1			
								09-08-08: 19	27-08-08: 10	19	15-08-08: 15	21-08-08: 21	7
								21-09-08: 01	26-09-08: 23	7	22-09-08: 00	25-09-08: 07	4
20	Yamuna	Mathura	Uttar Pradesh	164.20	165.20	165.53	26-Sep-08	14-07-08: 04	16-07-08: 01	3			
								17-07-08: 08	19-07-08: 15	3			
								04-08-08: 18	06-08-08: 07	3			
								08-08-08: 22	09-08-08: 03	1			
								09-08-08: 11	03-09-08: 04	26	21-08-08: 07	26-08-08: 10	6
								23-09-08: 01	01-10-08: 00	9	25-09-08: 03	28-09-08: 06	4
21	Ken	Banda	Uttar Pradesh	103.00	104.00	107.08	22-Jun-08	21-06-08: 09	23-06-08: 02	3	21-06-08: 11	22-06-08: 23	3
								11-08-08: 17	12-08-08: 09	2			
22	Gomati	Lucknow_ HanumanSe tu	Uttar Pradesh	108.50	109.50	109.03	28-Aug-08	28-08-08: 05	01-09-08: 02	7			
23	Gomati	Jaunpur	Uttar Pradesh	73.07	74.07	73.48	30-Aug-08	25-08-08: 16	07-09-08: 00	13			
24	SAI	Raibareli	Uttar Pradesh	100.00	101.00	100.53	22-Aug-08	21-08-08: 20	26-08-08: 09	6			
								29-08-08: 02	29-08-08: 22	2			
25	Ghaghra	Elgin Bridge	Uttar Pradesh	105.07	106.07	107.48	23-Sep-08	16-06-08: 07	18-06-08: 09	3			
								21-06-08: 23	23-06-08: 22	3			
								27-06-08: 13	18-07-08: 01	21	15-07-08: 00	16-07-08: 05	2
								19-07-08: 01	09-09-08: 06	53	20-07-08: 22	31-08-08: 14	43
								20-09-08: 06	05-10-08: 21	17	21-09-08: 01	29-09-08: 10	9
								06-10-08: 10	08-10-08: 20	3			
26	Ghaghra	Ayodhya	Uttar Pradesh	91.73	92.73	93.85	24-Sep-08	16-06-08: 13	11-09-08: 03	88			
											04-07-08: 14	09-07-08: 01	5
											14-07-08: 20	19-07-08: 05	5
											20-07-08: 20	04-08-08: 13	16
											07-08-08: 02	03-09-08: 00	28
								20-09-08: 17	12-10-08: 00	22	21-09-08: 08	01-10-08: 03	11

Annex-7 contd.....

Moderate and Low Flood Events during Flood Season - 2008- Ganga and its Tributaries

Sl No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No of days
27	Ghaghra	Turtipar	Uttar Pradesh	63.01	64.01	64.96	27-Sep-08	19-06-08: 00	19-06-08: 15	2			
								24-06-08: 17	24-06-08: 21	1			
								29-06-08: 20	12-09-08: 04	75	16-07-08: 08	20-07-08: 09	5
											21-07-08: 10	04-09-08: 00	46
								05-09-08: 01	09-09-08: 00	5			
								21-09-08: 23	06-10-08: 07	15	22-09-08: 23	01-10-08: 05	9
28	Ghaghra	Daraull	Bihar	59.62	60.62	60.99	24-Aug-08	30-06-08: 16	13-07-08: 05	14			
								15-07-08: 00	11-09-08: 12	59	25-07-08: 03	31-07-08: 16	8
											17-08-08: 19	30-08-08: 13	14
								23-09-08: 19	02-10-08: 16	10	27-09-08: 20	29-09-08: 20	3
29	Ghaghra	Gangpur Siswari	Bihar	56.04	57.04	57.75	25-Aug-08	17-07-08: 16	07-09-08: 00	52	25-07-08: 10	02-08-08: 20	9
											16-08-08: 17	03-09-08: 15	18
								25-09-08: 01	01-10-08: 12	7			
3	Rapti	Balrampur	Uttar Pradesh	103.62	104.62	104.18	24-Sep-08	21-07-08: 23	31-07-08: 03	10	22-07-08: 22	28-07-08: 21	7
								21-08-08: 20	24-08-08: 23	4			
								27-08-08: 13	29-08-08: 12	3			
								24-09-08: 09	27-09-08: 10	4			
31	Rapti	Bansi	Uttar Pradesh	83.90	84.90	85.28	25-Jul-08	21-07-08: 01	31-07-08: 03	11	22-07-08: 22	28-07-08: 21	7
								21-08-08: 20	24-08-08: 22	4			
								27-08-08: 22	01-09-08: 04	5			
								24-09-08: 09	27-09-08: 10	4			
32	Rapti	Gorakpur_ Birdghat	Uttar Pradesh	73.98	74.98	76.75	27-Jul-08	16-07-08: 11	17-07-08: 00	2			
								19-07-08: 01	06-08-08: 09	19	22-07-08: 02	03-08-08: 14	13
								08-08-08: 16	10-08-08: 15	3			
								20-08-08: 12	04-09-08: 08	16			
33	Sone	Maner	Bihar	51.00	52.00	51.50	23-Aug-08	21-08-08: 04	03-09-08: 07	14			
34	PunPun	Sripalpur	Bihar	49.60	50.60	52.77	18-Aug-08	29-06-08: 23	12-07-08: 10	13	30-06-08: 05	10-07-08: 03	11
								14-07-08: 02	02-08-08: 05	20	16-07-08: 01	29-07-08: 02	14
								10-08-08: 10	28-08-08: 15	19	11-08-08: 10	27-08-08: 03	17
								29-08-08: 08	31-08-08: 08	3			
35	Gandak	Khadda	Uttar Pradesh	95.00	96.00	95.64	28-Aug-08	15-06-08: 15	16-06-08: 01	1			
								19-06-08: 19	19-06-08: 23	1			
								21-06-08: 12	21-06-08: 23	1			
								24-06-08: 19	25-06-08: 07	1			
								27-08-08: 22	28-08-08: 15	2			
								29-06-08: 10	30-06-08: 14	2			
								03-07-08: 13	04-07-08: 03	2			
								13-07-08: 09	24-07-08: 06	12			
								26-07-08: 22	18-08-08: 21	24			
								18-08-08: 11	24-08-08: 02	7			
								26-08-08: 12	01-09-08: 02	7			

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Moderate and Low Flood Events during Flood Season - 2008- Ganga and its Tributaries

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
36	Gandak	Chatia	Bihar	68.15	69.15	68.60	30-Aug-08	15-08-08: 15	19-08-08: 19	5			
								21-08-08: 18	23-08-08: 23	3			
								29-08-08: 02	03-09-08: 07	6			
37	Gandak	Rewaghat	Bihar	53.41	54.41	54.07	01-Sep-08	23-07-08: 10	25-07-08: 11	3			
								30-07-08: 20	31-07-08: 06	1			
								09-08-08: 05	13-08-08: 21	6			
								14-08-08: 07	27-08-08: 02	14			
								28-08-08: 10	04-09-08: 08	8			
38	Gandak	Hazipur	Bihar	49.32	50.32	49.92	23-Aug-08	10-08-08: 10	04-09-08: 04	26			
								21-07-08: 00	01-08-08: 05	12	25-07-08: 02	29-07-08: 21	6
								31-08-08: 11	02-09-08: 20	3			
39	Burhi Gandak	Muzaffarpur – Sikandarpur	Bihar	51.53	52.53	52.70	29-Jul-08	27-07-08: 18	01-08-08: 09	6			
40	Burhi Gandak	Samastipur	Bihar	45.02	46.02	47.07	31-Jul-08	20-07-08: 16	06-08-08: 12	18	25-07-08: 03	05-08-08: 07	12
								01-09-08: 02	09-09-08: 14	9			
41	Burhi Gandak	Rosera	Bihar	41.63	42.63	44.25	31-Jul-08	18-07-08: 09	08-08-08: 01	22	23-07-08: 21	06-08-08: 13	15
								22-08-08: 05	28-08-08: 00	7			
								30-08-08: 08	11-09-08: 23	14	02-09-08: 11	08-09-08: 23	7
42	Burhi Gandak	Khagaria	Bihar	35.58	36.58	37.75	24-Aug-08	08-07-08: 09	13-07-08: 10	6			
								17-07-08: 07	13-09-08: 02	59	24-07-08: 15	08-08-08: 05	16
											10-08-08: 16	08-09-08: 10	30
								29-09-08: 04	03-10-08: 16	5			
43	Bagmati	Benibad	Bihar	47.68	48.68	49.34	22-Jul-08	15-06-08: 18	24-06-08: 14	10			
								26-06-08: 04	22-09-08: 15	89			
											06-07-08: 07	09-07-08: 20	5
											14-07-08: 23	24-08-08: 08	41
											27-08-08: 09	11-09-08: 20	16
											14-09-08: 16	16-09-08: 23	3
								23-09-08: 22	05/10/08:08	13			
44	Bagmati	Hayaghat	Bihar	44.72	45.72	45.58	28-Jul-08	22-07-08: 14	04-08-08: 10	14			
								04-09-08: 09	11-09-08: 08	8			
45	Adhwara Group	Kamtaul	Bihar	49.00	50.00	50.48	27-Jul-08	06-07-08: 05	09-07-08: 08	4			
								14-07-08: 18	01-08-08: 12	19			
											23-07-08: 16	30-07-08: 02	7
								06-08-08: 08	10-08-08: 21	4			
								20-08-08: 13	22-08-08: 23	3			
								26-08-08: 20	10-09-08: 15	16	31-08-08: 08	05-09-08: 02	6

Moderate and Low Flood Events during Flood Season - 2008- Ganga and its Tributaries

Sl No	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
46	Adhwara Group	Ekmighat	Bihar	45.94	46.94	46.93	28-Jul-08	16-07-08: 11	04-08-08: 19	18			
								01-09-08: 20	11-09-08: 08	11			
47	Kamla Balan	Jhanjharpur	Bihar	49.00	50.00	51.08	29-Aug-08	26-06-08: 22	27-06-08: 07	1			
								04-07-08: 22	05-07-08: 13	2			
								06-07-08: 04	07-07-08: 14	2	06-07-08: 11	06-07-08: 20	1
								12-07-08: 20	13-07-08: 04	1			
								15-07-08: 11	19-07-08: 06	5			
								19-07-08: 20	29-07-08: 03	10	23-07-08: 15	23-07-08: 19	1
											24-07-08: 03	26-07-08: 17	4
								26-08-08: 21	08-09-08: 01	13	28-08-08: 04	29-08-08: 07	2
											29-08-08: 12	01-09-08: 17	4
											02-09-08: 21	03-09-08: 06	1
								23-09-08: 15	24-09-08: 06	2			
								29-09-08: 17	30-09-08: 07	2			
48	Kosi	Basua	Bihar	46.75	47.75	48.47	23-Jul-08	15-06-08: 01	22-08-08: 13	69			
											05-07-08: 04	08-07-08: 21	5
											17-07-08: 07	18-07-08: 16	2
											19-07-08: 00	30-07-08: 11	12
											03-08-08: 12	19-08-08: 09	17
49	Kosi	Baltara	Bihar	32.85	33.85	34.06	28-Jul-08	14-07-08: 17	22-08-08: 17	40	26-07-08: 03	01-08-08: 11	7
								29-08-08: 22	09-09-08: 14	12			
50	Kosi	Kursela	Bihar	29.00	30.00	31.03	20-Aug-08	04-07-08: 14	12-09-08: 21	71	19-07-08: 12	08-09-08: 17	52
								28-09-08: 12	04/10/08: 18	7			
51	Mahananda	Dhengragha t	Bihar	34.65	35.65	36.59	30-Aug-08	21-06-08: 02	22-06-08: 07	2			
								28-06-08: 05	29-06-08: 02	2			
								04-07-08: 10	09-07-08: 22	7	05-07-08: 04	08-07-08: 07	4
								12-07-08: 01	30-07-08: 03	19	16-07-08: 09	17-07-08: 11	2
											22-07-08: 15	26-07-08: 03	5
								04-08-08: 11	10-08-08: 02	7			
								13-08-08: 08	13-09-08: 00	32	14-08-08: 18	22-08-08: 03	8
											27-08-08: 09	06-09-08: 02	11
											06-09-08: 16	07-09-08: 19	2
								29-09-08: 18	01-10-08: 05	2			
52	Mahananda	Jhawa	Bihar	30.40	31.40	32.03	31-Aug-08	05-07-08: 02	09-07-08: 23	6	07-07-08: 11	07-07-08: 23	1
								12-07-08: 11	01-08-08: 14	21	23-07-08: 13	26-07-08: 01	3
								03-08-08: 18	11-08-08: 06	9			
								13-08-08: 12	13-09-08: 09	32	16-08-08: 05	22-08-08: 22	8
											29-08-08: 00	08-09-08: 12	13
								13-09-08: 20	14-09-08: 08	1			
								30-09-08: 04	01-10-08: 09	2			
53	Ajoy	Gheropara	West Bengal	38.42	39.42	38.45	16-Jul-08	16-07-08: 16	16-07-08: 18	1			
54	Mundeshwari	Harinkhola	West Bengal	11.80	12.80	11.98	21-Jul-08	21-07-08: 09	23-07-08: 08	3			

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Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		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	105.86	22-07-2008	15-05-08: 01	16-10-08: 00	155	20-05-08: 22	22-05-08: 18	3
											26-05-08: 22	15-10-08: 12	143
2	Brahmaputra	Neamatighat	Assam	84.04	85.04	86.09	23-07-2008	10-06-08: 00	17-09-08: 04	100	15-06-08: 17	16-06-08: 02	1
											20-06-08: 05	29-06-08: 12	10
											04-07-08: 06	09-07-08: 18	7
											13-07-08: 19	04-08-08: 02	22
											06-08-08: 16	08-08-08: 13	3
											14-08-08: 08	09-09-08: 05	27
3	Brahmaputra	Tezpur	Assam	64.23	65.23	65.83	04-09-2008	14-06-08: 21	17-06-08: 19	4			
								21-06-08: 10	30-06-08: 08	10			
								04-07-08: 16	10-07-08: 18	7	07-07-08: 05	07-07-08: 18	2
								13-07-08: 22	05-08-08: 18	24	24-07-08: 07	25-07-08: 17	2
											26-07-08: 20	26-07-08: 22	1
								06-08-08: 03	09-08-08: 13	4			
								14-08-08: 16	11-09-08: 05	29	19-08-08: 15	22-08-08: 08	4
											31-08-08: 05	07-09-08: 06	8
4	Brahmaputra	Guwahati	Assam	48.68	49.68	49.84	04-09-2008	06-07-08: 21	09-07-08: 10	4			
								16-07-08: 09	18-07-08: 18	3			
								24-07-08: 05	03-08-08: 18	12			
								16-08-08: 10	11-09-08: 20	27	02-09-08: 14	06-09-08: 16	5
5	Brahmaputra	Goalpara	Assam	35.27	36.27	36.24	06-09-2008	07-07-08: 20	10-07-08: 07	3			
								17-07-08: 01	20-07-08: 08	4			
								21-07-08: 19	06-08-08: 05	16			
								16-08-08: 11	12-09-08: 16	28			
6	Brahmaputra	Dhubri	Assam	27.62	28.62	29.60	06-09-2008	18-06-08: 18	17-09-08: 21	94	09-07-08: 06	10-07-08: 05	2
											22-07-08: 20	03-08-08: 02	12
											18-08-08: 14	12-09-08: 16	26
7	Burhidihing	Khowang	Assam	101.11	102.11	103.01	07-07-2008	13-06-08: 12	16-06-08: 11	4			
								04-07-08: 20	09-07-08: 19	6	05-07-08: 19	06-07-08: 23	4
								13-07-08: 11	27-07-08: 22	15	22-07-08: 00	26-07-08: 03	5
								31-07-08: 05	03-08-08: 12	4			
								18-08-08: 12	24-08-08: 00	7			
								27-08-08: 19	05-09-08: 03	9	01-09-08: 11	03-09-08: 02	3
8	Desang	Nanglamoragnat	Assam	93.46	94.46	95.47	17-07-2008	13-06-08: 03	14-06-08: 01	2			
								15-06-08: 03	17-06-08: 01	3			
								27-06-08: 12	28-06-08: 14	2			
								04-07-08: 23	09-07-08: 04	5	06-07-08: 00	08-07-08: 11	3
								15-07-08: 04	20-07-08: 10	6	15-07-08: 14	19-07-08: 13	5
								21-07-08: 07	22-07-08: 19	3			
								30-07-08: 17	03-08-08: 08	5	01-08-08: 01	02-08-08: 10	2
								25-08-08: 12	26-08-08: 18	2			
								31-08-08: 23	05-09-08: 12	6			

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Moderate and Low Flood Events during Flood Season - 2008- Brahmaputra and its Tributaries

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
9	Dikhow	Shivsagar	Assam	91.40	92.40	93.34	20-07-2008	05-07-08: 12	07-07-08: 23	3	06-07-08: 02	07-07-08: 03	2
								15-07-08: 02	18-07-08: 01	4	15-07-08: 12	17-07-08: 00	3
								20-07-08: 08	22-07-08: 10	3	20-07-08: 11	21-07-08: 15	2
								23-07-08: 08	23-07-08: 19	1			
								19-08-08: 10	21-08-08: 03	3			
								21-08-08: 11	22-08-08: 05	2			
								22-08-08: 18	23-08-08: 06	2			
10	Subansiri	Badatighat	Assam	81.53	82.53	82.73	03-09-2008	14-06-08: 20	15-06-08: 05	1			
								05-07-08: 08	07-07-08: 16	3			
								15-07-08: 00	17-07-08: 00	3			
								22-07-08: 10	04-08-08: 04	14			
								07-08-08: 02	08-08-08: 05	2			
								14-08-08: 10	10-09-08: 14	28	19-08-08: 15	21-08-08: 05	3
											31-08-08: 14	05-09-08: 05	6
11	Dhansiri (S)	Golaghat	Assam	88.50	89.50	89.86	02-08-2008	20-07-08: 00	21-07-08: 20	3			
								30-07-08: 06	07-08-08: 06	9	01-08-08: 09	02-08-08: 02	2
											02-08-08: 11	04-08-08: 18	3
								09-08-08: 00	11-08-08: 04	3			
								16-08-08: 13	17-08-08: 04	2			
								20-08-08: 01	27-08-08: 04	8	22-08-08: 04	22-08-08: 17	2
											22-08-08: 20	24-08-08: 12	3
											25-08-08: 01	25-08-08: 22	2
								11-09-08: 11	14-09-08: 10	4			
								24-09-08: 00	25-09-08: 09	2			
								27-09-08: 07	28-09-08: 14	2			
								30-09-08: 09	01-10-08: 08	2			
								07-10-08: 13	09-10-08: 17	3			
12	Dhansiri (S)	Numaligarh	Assam	76.42	77.42	78.82	24-08-2008	18-06-08: 00	20-06-08: 11	3			
								27-06-08: 05	10-07-08: 00	14	28-06-08: 21	30-06-08: 19	3
											06-07-08: 18	07-07-08: 06	1
								10-07-08: 05	13-07-08: 04	4			
								14-07-08: 01	20-09-08: 17	70	20-07-08: 10	22-07-08: 03	3
											30-07-08: 07	11-08-08: 10	13
											12-08-08: 11	12-08-08: 18	1
											16-08-08: 06	29-08-08: 03	14
											11-09-08: 05	15-09-08: 03	5
								23-09-08: 07	13-10-08: 17	21	24-09-08: 07	25-09-08: 07	2
											27-09-08: 18	28-09-08: 08	2
											30-09-08: 14	01-10-08: 16	2
											06-10-08: 07	06-10-08: 19	1
											07-10-08: 05	09-10-08: 22	4

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Sl No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
13	Jiabharali	Jiabharali_NTX	Assam	76.00	77.00	77.80	05-07-2008	20-05-08: 15	21-05-08: 00	1			
								21-05-08: 14	23-05-08: 22	3			
								28-05-08: 05	12-09-08: 23	109	02-06-08: 08	02-06-08: 13	1
											12-06-08: 06	12-06-08: 07	1
											14-06-08: 01	15-06-08: 11	2
											18-06-08: 13	19-06-08: 12	2
											20-06-08: 08	20-06-08: 11	1
											21-06-08: 06	21-06-08: 09	1
											21-06-08: 16	22-06-08: 04	1
											22-06-08: 09	22-06-08: 12	1
											27-06-08: 09	27-06-08: 16	1
											03-07-08: 13	03-07-08: 16	1
											04-07-08: 13	06-07-08: 12	3
											12-07-08: 04	16-07-08: 07	5
											19-07-08: 10	20-07-08: 04	2
											21-07-08: 08	21-07-08: 18	1
											23-07-08: 09	23-07-08: 10	1
											25-07-08: 02	27-07-08: 08	3
											12-08-08: 11	21-08-08: 05	10
											30-08-08: 05	30-08-08: 16	1
											31-08-08: 06	31-08-08: 08	1
											01-09-08: 14	02-09-08: 03	2
											02-09-08: 09	04-09-08: 08	3
											05-09-08: 04	06-09-08: 06	2
14	Kopilli	Kampur	Assam	59.50	60.50	61.05	01-09-2008	30-08-08: 08	03-09-08: 05	5	31-08-08: 13	02-09-08: 01	3
								06-09-08: 09	08-09-08: 07	3			
15	Kopilli	Dharmatul	Assam	55.00	56.00	56.04	07-09-2008	30-08-08: 04	15-09-08: 05	17	07-09-08: 04	08-09-08: 15	2
16	Puthimari	Puthimari_NHX	Assam	50.81	51.81	55.08	31-08-2008	01-06-08: 23	14-06-08: 03	13			
								14-06-08: 10	16-10-08: 00	125	15-07-08: 05	17-07-08: 06	3
											21-07-08: 18	24-07-08: 14	4
											26-07-08: 04	27-07-08: 13	2
											11-08-08: 12	12-08-08: 02	2
											12-08-08: 14	15-08-08: 04	4
											16-08-08: 15	17-08-08: 15	2
											19-08-08: 08	21-08-08: 06	3
											21-08-08: 10	21-08-08: 14	1
											26-08-08: 23	09-09-08: 00	14
											28-09-08: 14	29-09-08: 01	1

Annex-8 contd.....

Moderate and Low Flood Events during Flood Season - 2008- Brahmaputra and its Tributaries

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
17	Pagladiya	Pagladia_NTX	Assam	51.75	52.75	54.03	30-08-2008	02-06-08: 04	02-06-08: 22	2			
								05-07-08: 14	06-07-08: 00	1			
								15-07-08: 12	16-07-08: 05	2			
								21-07-08: 11	28-07-08: 13	8	22-07-08: 16	22-07-08: 23	1
											25-07-08: 10	25-07-08: 14	1
								19-08-08: 13	19-08-08: 23	1			
								28-08-08: 11	10-09-08: 02	14	28-08-08: 17	28-08-08: 18	1
											29-08-08: 08	29-08-08: 23	2
											30-08-08: 09	01-09-08: 02	3
											02-09-08: 09	03-09-08: 04	2
											03-09-08: 09	04-09-08: 20	2
18	Beki	Beki NHX	Assam	44.10	45.10	45.89	30-08-2008	05-06-08: 14	06-06-08: 09	2			
								06-06-08: 12	07-06-08: 02	2			
								07-06-08: 11	08-06-08: 05	2			
								08-06-08: 11	09-06-08: 05	2			
								09-06-08: 12	10-06-08: 05	2			
								10-06-08: 10	14-09-08: 06	97	19-06-08: 11	19-06-08: 20	1
											18-07-08: 10	18-07-08: 15	1
											19-07-08: 11	19-07-08: 19	1
											20-07-08: 05	20-07-08: 18	2
											21-07-08: 08	24-07-08: 00	4
											26-07-08: 07	27-07-08: 02	2
											27-07-08: 11	28-07-08: 00	2
											31-07-08: 15	01-08-08: 01	1
											01-08-08: 18	01-08-08: 20	1
											11-08-08: 12	11-08-08: 21	1
											12-08-08: 07	12-08-08: 22	2
											16-08-08: 08	17-08-08: 07	2
											17-08-08: 16	17-08-08: 20	1
											18-08-08: 14	19-08-08: 03	2
											19-08-08: 06	21-08-08: 08	3
											23-08-08: 00	23-08-08: 01	1
											26-08-08: 05	27-08-08: 20	3
											28-08-08: 04	01-09-08: 23	6
											02-09-08: 02	03-09-08: 00	2
											03-09-08: 09	03-09-08: 23	2
											04-09-08: 02	04-09-08: 17	2
											05-09-08: 09	05-09-08: 21	1

Moderate and Low Flood Events during Flood Season - 2008- Brahmaputra and its Tributaries

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		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	48.44	31-08-2008	22-07-08: 12	23-07-08: 16	2			
								12-08-08: 13	13-08-08: 20	2			
								20-08-08: 10	21-08-08: 09	2			
								27-08-08: 12	30-08-08: 08	4			
								30-08-08: 14	01-09-08: 08	3			
								04-09-08: 00	04-09-08: 19	2			
20	Sankosh	Golakganj	Assam	28.94	29.94	30.39	30-08-2008	15-06-08: 05	15-06-08: 09	1			
								19-06-08: 01	23-06-08: 11	5			
								02-07-08: 04	08-07-08: 06	7			
								12-07-08: 16	08-09-08: 17	59	21-07-08: 20	22-07-08: 04	1
											23-07-08: 18	24-07-08: 04	1
											18-08-08: 21	18-08-08: 22	1
											19-08-08: 22	21-08-08: 06	2
											28-08-08: 23	01-09-08: 15	5
21	Raidak-I	Tufanganj	West Bengal	34.22	35.30	35.40	30-08-2008	22-07-08: 00	24-07-08: 16	4			
								18-08-08: 17	21-08-08: 16	4			
								24-08-08: 08	28-08-08: 04	5			
								28-08-08: 19	02-09-08: 10	6	30-08-08: 05	31-08-08: 02	2
								02-09-08: 13	02-09-08: 22	1			
								03-09-08: 18	04-09-08: 11	2			
								06-09-08: 10	07-09-08: 05	2			
22	Torsa	Ghughumari	West Bengal	39.80	40.41	40.43	30-08-2008	20-06-08: 20	21-06-08: 06	1			
								02-07-08: 18	02-07-08: 22	1			
								04-07-08: 13	04-07-08: 18	1			
								21-07-08: 13	21-07-08: 19	1			
								22-07-08: 11	23-07-08: 00	2			
								23-07-08: 10	24-07-08: 04	2			
								11-08-08: 13	11-08-08: 16	1			
								16-08-08: 15	16-08-08: 23	1			
								25-08-08: 08	25-08-08: 11	1			
								25-08-08: 15	25-08-08: 23	1			
								26-08-08: 08	27-08-08: 13	2			
								28-08-08: 11	01-09-08: 06	5	29-08-08: 23	30-08-08: 04	1
23	Jaldhaka	NH-31	West Bengal	80.00	80.90	80.30	29-08-2008	04-07-08: 07	04-07-08: 14	1			
								05-07-08: 08	05-07-08: 12	1			
								23-07-08: 10	23-07-08: 11	1			
								25-07-08: 11	25-07-08: 13	1			
								18-08-08: 05	18-08-08: 07	1			
								28-08-08: 10	28-08-08: 20	1			
								29-08-08: 01	30-08-08: 00	2			
								31-08-08: 03	31-08-08: 14	1			
								02-09-08: 05	02-09-08: 09	1			

Moderate and Low Flood Events during Flood Season - 2008- Brahmaputra and its Tributaries

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		Flood period above warning level			Flood period above danger level		
						Level in metres	From	From	To	No.of days	From	To	No.of days
24	Jaldhaka	Mathabhanga	West Bengal	47.70	48.20	47.94	29-08-2008	22-07-08: 15	22-07-08: 22	1			
								23-07-08: 16	24-07-08: 03	1			
								28-08-08: 16	29-08-08: 00	1			
								29-08-08: 13	30-08-08: 05	2			
25	Tista	Domohani		65.65	65.95	66.04	20-06-2008	20-06-08: 04	21-06-08: 02	2	20-06-08: 13	20-06-08: 21	1
								22-06-08: 06	22-06-08: 14	1			
								06-07-08: 08	06-07-08: 11	1			
								18-07-08: 13	18-07-08: 19	1			
								20-07-08: 09	20-07-08: 16	1			
								22-07-08: 06	22-07-08: 18	1			
								04-08-08: 12	04-08-08: 16	1			
								19-08-08: 08	19-08-08: 22	2			
								26-08-08: 09	26-08-08: 10	1			
								26-08-08: 15	27-08-08: 10	2			
								28-08-08: 06	30-08-08: 09	3			
								31-08-08: 03	31-08-08: 14	1			
								02-09-08: 07	02-09-08: 10	1			
								03-09-08: 10	03-09-08: 15	1			
								04-09-08: 04	04-09-08: 11	1			
								05-09-08: 10	06-09-08: 01	2			
26	Tista	Mekhliganj	West Bengal	65.45	65.95	65.86	29-08-2008	18-06-08: 16	19-06-08: 00	1			
								20-06-08: 15	21-06-08: 04	2			
								30-06-08: 17	30-06-08: 21	1			
								06-07-08: 06	06-07-08: 17	1			
								20-07-08: 14	21-07-08: 00	1			
								22-07-08: 07	23-07-08: 08	2			
								19-08-08: 12	20-08-08: 04	2			
								26-08-08: 14	27-08-08: 22	2			
								28-08-08: 09	30-08-08: 14	3			
								31-08-08: 06	31-08-08: 21	2			
								01-09-08: 11	01-09-08: 16	1			
								02-09-08: 10	02-09-08: 14	1			
27	Barak	APGhat	Assam	18.83	19.83	19.87	06-08-08	03-08-08: 19	09-08-08: 09	7	05-08-08: 21	06-08-08: 08	1
								16-08-08: 15	18-08-08: 16	3			
								21-08-08: 05	03-09-08: 15	14	25-08-08: 08	25-08-08: 17	1
28	Katakhal	Matizuri	Assam	19.27	20.27	20.69	06-08-08	04-08-08: 12	07-08-08: 00	3	04-08-08: 21	06-08-08: 01	2
								22-08-08: 08	27-08-08: 21	7	25-08-08: 06	26-08-08: 11	2
								30-08-08: 16	02-09-08: 16	4			
								24-09-08: 10	26-09-08: 05	3			
29	Kushiyara	Karimganj	Assam	13.94	14.94	15.71	06-08-08	03-08-08: 05	16-09-08: 18	46	04-08-08: 15	10-08-08: 09	7
											23-08-08: 10	05-09-08: 22	15

Annex-9

Moderate and Low Flood Events during Flood Season - 2008- Peninsular rivers

Sl. No.	River	Station	State	Warning level in metres	Danger level in metres	Peak level in 2008		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	Subernarekna	Rajghat	Orissa	9.45	10.36	12.69	19-06-08	17-06-08: 17	22-06-08: 07	6	17-06-08: 18	21-06-08: 09	5
											11-07-08: 06	11-07-08: 12	1
								18-09-08: 20	19-09-08: 11	2			
2	Burhabalang	NH_5 _Road Bridge	Orissa	7.21	8.13	8	18-06-08	17-06-08: 18	19-06-08: 20	3			
								18-09-08: 00	19-09-08: 00	2			
3	Baitarni	Anandpur	Orissa	37.44	38.36	40.18	18-06-08	17-06-08: 20	19-06-08: 21	3	17-06-08: 22	19-06-08: 12	3
								21-08-08: 06	21-08-08: 11	1			
								17-09-08: 15	19-09-08: 03	3	17-09-08: 19	18-09-08: 18	2
4	Baitarni	Akhuapada	Orissa	17.83	17.83	19.63	18-06-08	Warning Level not fixed			18-06-08: 01	20-06-08: 13	3
											17-09-08: 17	19-09-08: 23	3
5	Brahmani	Jenapur	Orissa	22	23	22.7	18-09-08	18-09-08: 09	19-09-08: 16	2			
6	Rushikulyya	Purushottampur	Orissa	15.83	16.83	16.85	18-09-08	17-09-08: 16	19-09-08: 12	3	18-09-08: 12	18-09-08: 13	1
7	Vamsadhara	Gunupur	Orissa	83	84	85.84	17-09-08	09-08-08: 01	09-08-08: 06	1	17-09-08: 16	18-09-08: 09	2
8	Vamsadhara	Kashinagar	Orissa	53.8	54.6	56.6	18-09-08	05-08-08: 03	05-08-08: 19	2			
								09-08-08: 00	11-08-08: 23	4	09-08-08: 02	09-08-08: 02	1
								17-08-08: 16	20-08-08: 06	4			
								25-08-08: 10	25-08-08: 22	1			
								11-09-08: 23	24-09-08: 06	13	16-09-08: 16	17-09-08: 00	1
9	Mahanadi	Naraj	Orissa	25.41	26.41	27.18	20-09-08	18-09-08: 13	24-09-08: 03	7	18-09-08: 22	23-09-08: 01	5
10	Mahanadi	Alipingal Devi	Orissa	10.85	11.76	13.05	20-09-08	19-09-08: 06	23-09-08: 17	5	19-09-08: 13	23-09-08: 04	5
11	Mahanadi	Nimapara	Orissa	9.85	10.76	11.4	20-09-08	19-09-08: 11	23-09-08: 16	5	19-09-08: 18	22-09-08: 01	3
12	Godavari	Kopergaon	Maharashtra	490.9	493.68	495.04	20-09-08	11-08-08: 22	14-08-08: 13	4			
								13-09-08: 09	14-09-08: 18	2	13-09-08: 19	14-09-08: 06	1
								18-09-08: 10	18-09-08: 15	1			
								19-09-08: 19	21-09-08: 21	3	20-09-08: 03	21-09-08: 00	2
13	Godavari	Eturunagaram	Andhra Pradesh	73.29	75.79	73.94	06-08-08	05-08-08: 15	06-08-08: 20	2			
14	Godavari	Bhadrachalam	Andhra Pradesh	45.72	48.77	47.03	06-08-08	05-08-08: 23	07-08-08: 10	2			
								11-08-08: 23	12-08-08: 05	1			
15	Godavari	Dowlaiswaram	Andhra Pradesh	14.25	16.08	14.57	07-08-08	08-08-08: 22	08-08-08: 02	2			
16	Wainganga	Bhandara	Maharashtra	244	244.5	244.58	02-08-08	01-08-08: 23	02-08-08: 14	2	02-08-08: 06	02-08-08: 09	1
17	Indravati	Jagdalpur	Chhattisgarh	539.5	540.8	540.32	11-08-08	10-08-08: 13	11-08-08: 19	2			
18	Bhima	Deongaon	Karnataka	402	404.5	402.09	23-09-08	23-09-08: 06	23-09-08: 16	1			
19	Tungbhadra	Mantralayam	Andhra Pradesh	310	312	312.59	15-08-08	14-08-08: 12	18-08-08: 19	5	14-08-08: 20	17-08-08: 19	4
								04-09-08: 19	06-09-08: 07	3			

Annex-10

Performance of Flood Forecasting Stations (Major Basinwise) in India during Flood Season 2008

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	15	13	2	2541	2497	98.27	479	472	98.54	3020	2969	98.31
2	Brahamputra and its tributaries	27	27	0	1	1	0	2683	2638	98.32	0	0	N.A	2683	2638	N.A
3	Barak and its tributaries	5	5	0	2	2	0	162	161	99.38	0	0	N.A	162	161	N.A
4	Eastern Rivers	9	8	1	0	0	0	136	121	88.97	12	8	66.67	148	129	87.16
5	Mahanadi and its tributaries	4	3	1	0	0	0	30	29	96.67	57	54	94.74	87	83	95.40
6	Godavari and its tributaries	18	14	4	7	7	0	102	90	88.24	35	34	97.14	137	124	90.51
7	Krishna and its tributaries	9	3	6	0	0	0	16	15	93.75	381	380	99.74	397	395	99.50
8	West Flowing rivers	15	9	6	10	7	3	0	0	N.A	57	55	96.49	57	55	96.49
9	Southern rivers	1	1	0	1	1	0	0	0	N.A	0	0	N.A	0	0	N.A
	Total	175	147	28	36	31	5	5670	5551	97.90	1021	1003	98.24	6691	6554	97.95

Annex-11

Performance of Flood Forecasting Stations (Statewise) in India during Flood Season 2008

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	Andhra Pradesh	16	9	7	4	4	0	52	46	88.46	240	234	97.50	292	280	95.89
2	Assam	24	24	0	1	1	0	2691	2653	98.59	0	0	N.A	2691	2653	98.59
3	Bihar	32	32	0	3	3	0	1512	1506	99.60	0	0	N.A	1512	1506	99.60
4	Chattisgarh	1	1	0	0	0	0	11	11	100.00	0	0	N.A	11	11	100.00
5	Gujarat	11	6	5	9	6	3	0	0	N.A	34	33	97.06	34	33	97.06
6	Karnataka	4	1	3	1	1	0	1	1	100.00	175	175	100.00	176	176	100.00
7	Maharashtra	9	7	2	5	5	0	54	47	87.04	36	35	97.22	90	82	91.11
8	Madhya Pradesh	3	2	1	3	2	1	0	0	N.A	0	0	N.A	0	0	-
9	Orissa	12	11	1	0	0	0	166	150	90.36	57	54	94.74	223	204	91.48
10	Tripura	2	2	0	2	2	0	0	0	N.A	0	0	N.A	0	0	-
11	Uttar Pradesh	35	34	1	13	13	0	741	713	96.22	70	67	95.71	811	780	96.18
12	Uttaranchal	3	3	0	2	2	0	4	4	100.00	0	0	N.A	4	4	100.00
13	West Bengal	14	11	3	2	2	0	331	315	95.17	157	153	97.45	488	468	95.90
14	NCT, DELHI	2	2	0	1	1	0	27	25	92.59	0	0	N.A	27	25	92.59
15	D,NH	1	1	0	1	1	0	0	0	N.A	0	0	N.A	0	0	-
16	Haryana	1	0	1	1	0	1	0	0	N.A	0	0	N.A	0	0	-
17	Jharkhand	5	1	4	0	0	0	80	80	100.00	252	252	100.00	332	332	100.00
	Total	175	147	28	48	43	5	5670	5551	97.90	1021	1003	98.24	6691	6554	97.95

Annex- 12

FLOOD FORECASTING PERFORMANCE FROM 1986 TO 2008

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	867	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
Cumul.	116747	105541	90.40	28602	27496	96.13	145349	138688	95.35