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ANNUAL FLOOD REPORT OF WEST BENGAL

FOR THE YEAR - 1993

C O N T E N T S

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I N T R O D U C T I O N

The State of West Bengal consists of a combination of land varying from the high hills on the north to the Seas on the South. With the Tropic of Cancer running across it, the State is located between $21^0 31'$ and $27^0 13' 14"$ North latitudes and $85^0 45' 20"$ and $98^0 53'$ East longititudes. The geographical area of the State is about 87,853 Sq.Km. Flood season in State starts from 15th June and extends upto 15th October.

CLASSIFICATION OF AREAS

1.	Geographical area	= 87,853 Sq.Km.
2.	Area under forest	= 11,880. "
3.	Total flood prone area	= 37,660 "
4.	Area already protected	= 26,500 "

1.1. RIVER BASINS

The State can be demarcated into three district drainage basins, coming under the Ganga, Brahmaputra and Subarnarekha systems respectively. The afore stated main basins in turn can be divided into Sub-basins having individual catchments of their own. The area wise distribution of the above main basins in the State is under :-

1) Brahmaputra Basin - 14,208 Km^2
2) Ganga basin including Sundarban area. - 71,485. Km^2
3) Subarnarekha Basin. - 2,160 Km^2

1.2 RIVER SYSTEMS

1.2.1. Brahmaputra Basin Drainage the northen regions of the State, the rivers within the Brahmaputra x system consists of a total area of 14,200Km^2 the main rivers being Sankosh, Raidak, Torsa, Kaljani, Jaldhaka, Teesta.

The different tributaries of these rivers are listed below :-

A.	Sankosh	- Chiklajhore
B.	Torsa	- Raidak-I, Raidak-II, Turturi.
C.	Torsa	- Kaljani, Sil-Torsa, Char, Torsa, Sanjai, Holong, Ghargharia, Goram, Dina, Pana, Jainti. Gabur Basra.
D.	Jaldhaka	- Mujnai, Murti, Diana, Sutanga, Dolong, Dharala, Ghatia, Kumlai, Gilandi, Buduya.
E.	Teesta	- Great Rangeet, Ramam, Rangpo, Relli, Lish, Ghish, Chel, Mal, Neoro, Karali.

Brief description of the above rivers :-

A. Sankosh :- It is the eastern most river under Brahmaputra system in this State and serves as the natural boundary between West Bengal and Assam. After being joined by Raidk-II, it outfalls into Brahmaputra in Bangladesh by the name Gangadhar. The river has its origin in Bhutan.

B. Raidak :- Originate in Mt. Akungphu at an altitude 6400 Min Bhutan. The river bifurcate into two channels at Bhutanghat, close to Indo-Bhutan border. One of the branches, namely Raida-I joins the united stream of Torsa and Kaljani, while the Raidak-II is joined by Sankosh and outfalls into Brahmaputra in Bangladesh by the name Gangadhar.

C. Torsa :- The river Torsa rises in Chumbi Valley of Southern Tibet at an altitude of 7065 M. It flows through Tibet, Bhutan, West Bengal and Bangladesh. Below Hasimara Bridge(on NH 34), it bifurcates into two channels, viz. Sil Torsa and Char-Torsa. They reunite at Dalakhowa Forest. The river passes by the Coochbehar town and is joined by Kaljani river and Raidak-I. The combined flow outfalls into Brahmaputra near Nageswari at Rangpur in Bangladesh.

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D. Jaldhaka :- The river has its origin Bitang lake in Sikkim at an altitude of 4400M. It flows through Sikkim, Bhutan, West Bengal and Bangladesh. After the river is joined by a number of streams and tributaries both in the mountaneous and Sub-mountaneous regions, if finally flows into Dharals river and the combined stream, getting the name Dharala ultimately outfalls into Brahmaputra in Bangladesh.

E. Teesta :- Teesta originates in the glaciers of North Sikkim at an altitude of 6400 M and is formed by the union of two streams viz. Lachen and Lachung at Chungthung in Sikkim. It enters West Bengal at Rangpo and upto Melli, it forms the boundary between West Bengal and Sikkim. Two of its tributaries, viz. Great Rangit and Ramman, also serve as the natural boundary between the two states. It outfalls into Brahmaputra in Rangpur district of Bangladesh.

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1.2.2. GANGA BASIN :-

The Central, Southern and the South-Western parts of the State of West Bengal constitute the Ganga Basin. The Ganga only s stretch of which is now flowing throwing through the narrow central waist-line of the present shape of this State had been an active delta builder.

The Ganga system comprise a total area of 71,485Km^2 within the State of West Bengal. The catchment areas different rivers within this system in the State of West Bengal are as under :-

Sl.No.	Name of river Sub-Basins.	Catchment area in Km
A.	Mahananda	9460
B.	Punarbhaba	730
C.	Atrai	910
D.	Pagla-Bansloi	730
E.	Dwarka-Brahmani	2 500
F.	Bhagirathi-Hooghly	1170
G.	Jalangi	5344
H.	Mayurakshi	2720
I.	Ajoy	2490
J.	Khari-Gangur-Ghea	1302
K.	Churni	800
L.	Damodar	5250
M.	Dwarakeswar	4430
N.	24(South & North) Parganas and Calcutta Port Drainage Basin.	4330
O.	Kangsabati	8369
P.	Silabati	3952
Q.	Rupnarayan	2548
R.	Bichban	820
S.	Rasulpur	1130
T.	Haldi	980
U.	Tidal Zone(Sundarbans areas)	11320

The different tributaries of these rivers are listed below :-

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1.	Mahananda-Mechi, Balasan, Dauk, Nagar, Kulik, Gamar, Chiramati, Tangon.		
2.	Punarbhaba- Punarbhaba.		
3.	Atrai- Atrai.		
4.	Pagla-Bansloi	-	Pagla,Bansloi, Bagmari.
5.	Brahmani-Dwarka	-	Brhamani, Dwarka.
6.	Bhagirathi-Hooghly	--	Bhagirathi, Hooghly.
7.	Jalangi	--	Jalangi,Silamari,Bhairab,Suti
8.	Mayurakshi	--	Mayurakshi,Babla,Noon Beel, Siddheswari, Kuiya,Bakreswar, Kopai, Sal,Monikarnia,Daoki, Kana Mor, Gambhira.
9.	Ajoy	--	Ajoy,Hinglow, Kunoor.
10.	Khari-Gangur-Ghea	--	Khari, Brahmani, Banka, Bangur, Ghea, Behula, Kana.
11.	Churni	--	Churni.
12.	Damodar	-	Damodar, Barakar, Sali.
13.	Dwarkeswar	--	Gandheswari, Arksha, Berai, Dwarkeswar.
14.	Rupnarayan	--	Mundeswari,Dwarkeswar, Gandheswar,Berai,Damodar, Tarjuli, Sankari,Silabati, Joypanda, Kubai, Parang, Kanki.
15.	Haldi	--	Haldi, Kangsabati, Kumari, Bhairab, Banki, Tarafeni, Kaliaghai, Bagchai,Chandra, Kapaleswari.
16.	Rasulpur	--	Rasulpur. Dichaban.
17.	Tidal Rivers	--	Tolly's Nullah, Keorapukur, Ichamati, Raimangal,Kultigong, Jamuna, Kalindi, Haria Bhanga, Gosaba, Metia, Diali, Thakuran, Raidighi, Saptamukhi, Muri Gang

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A Brief note on the above Sub-basins.

1) Mahananda- The river Mahananda organates from Paglajhora near Kurseong town. It bifurcates into two channels, viz. Fulahar branch which flows through Bihar and Bansloi Branch which flows through West Bengal At places, it forms the Indo-Bangladesh border.Mahananda carrying the flow of four tributaries, namely Nagar, Kalindri, Tangon, and Punarbhaba, drains into Ganga from the north-Western side at Dogogarighat just downstream of the point where Ganga leaves the boundary of West Bengal.

2. Atrai :- Punarbhaba Some rivers like Sahu,Nim,Talma, Chani, Danga originate from the highlands in the district of Jalpaiguri. They gradually meet together afterwards, the combined stream assumes the name Karatowa. It then enters Bangladesh where it assumes the name Atrai and bifurcates into to channels viz. Dhepa and Atrai.

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The eastern channel i.e. Atrai reenters West [illegible] Kumarganj P.S. , of West Dinajpur district.Covering some length in the State it reenters into Bangladesh and ultimately outfalls into Brahmaputra.

The Dhepa on the other hand taking a south-Western course enters Gangarampur P.S.in West Bengal district, [illegible] the name Punarbhaba. Covering some 40 kms in length in W. Dinajpur district, it touches the eastern boundary of [illegible] District and enters Bangladesh.Further down, it meets [illegible] in Bangladesh.

3) Nagar-Kulik-Gamari Chiramati Tangon. Kalindri.

These rivers flow through Malda and West Dinajpur Districts.Somewhere they form the boundary either between West Bengal and Bihar or between West Bengal and Bangladesh. The ultimately outfall into Mahananda.

Nagar originating in Bangladesh flows along the boundary with West Bengal. Following a southernly course, it receives a small channel of Mahananda and is joined by Kulik which has also its origin in Bangladesh. The Gamari and Chiramati are two other small rivers that blow through North Dinajpur district before meeting the combined stream which ultimately outfalls into Mahananda.

Tangon is a tributory to Mahananda. It rises in Bangladesh. After flowing through the districts of West Dinajpur, Malda, it meets Mahananda on the boundary of Malda and Bangladesh.

River Kalindri has its origin in the North Bihar flowing across the plains of Purnea district, it enters Malda and outfalls into Mahananda.

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4) Pagla-Ba nsloi-Brahmani :- These rivers rise in Rajmahal hills of Bihar. Flowing eastard across Birbhum district, they enter Murshidabad district as the tributaries of Bhagirathi.

5) Jalangi-Bhairab :- Jalangi takes off from the right bank of river Padma in Murshidabad district, 165 Kms. downstream of Farakka. It is dead for all purposes, except during the rains when it receive water from Padma. The river ends its journey by finally out falling into Hooghly near Nabadwip town. In its lower stage of journey, it is also known as Kharia.

Bhairab takes off from Ganga in P. S. Lalbagh of Murshidabad district. It is now almost a dead channel but during rainy season for a few days, it receives water from Padma.

6) Ichamati-Churni :- River Mathabhanga rises near to the mouth of the Jalangi on the Padma. It is not an important river in this State as it flows mainly in Bangladesh. It flows only a few Kms.within Nadia district. At this stage, the river bifuracates into two channels. The Western branch, i.e. Churni runs a few Kms in the district in a south-West direction to meet Bhagirathi. The other branch is known as Ichamati which gets little supply from Mahananda and thrives on wash outs and tidal flows.

7) Bhagirathi-Hooghly :- Bhagirathi or Hooghly is the main river in the State. It is in fact the main artery of flow. Before the 12th century, the Ganga had its main course down Bhagirathi-Hooghly. Subsequently, the main flow was pushed to the east through the present course of Padma. The flow of Bhagirathi increases down stream due to the run off and outflow from a number of eastern and western tributaries.

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After its confluence with Jalangi, Bhagirathi is known as Hooghly and forms the boundary between 24-Parganas (North and Hooghly districts.

8. Mayurakshi-Babla :-

Mayurakshi originates from the high lands of Santhal Parganas. It is the main river in Birbhum district. Carrying flows of different tributaries, its outfalls into Hijol Beel of Murshidabad district. Babla takes off from the Beel and drains into Bhagirathi.

9) Ajoy :- It rises in the hills near Deoghar in Bihar. The principal tributaries of this river are Patro, Janiti, Darua, Kunoor and Hinglow.

10) Damodar :- It rises in the Palamao hills in Bihar. The river bifurcates into two channels at Beguahana. The main flow passes through Mundeswari channel and discharges into Rupnarayan. The other one, Amta channel carries discharge during high floods and outfalls into Hooghly.

11) Dwarkaswar-Silabati-Rupnarayan :-

The lower tidal reach below the confluence of Dwarkeswar and Silabati is known as Rupnarayan. After receiving the main flow of Damodar through Mundeswari and a branch of Kangsabati i.e. Old Conave of Palaspai khal, it ultimately outfalls into Hooghly. The river is tidal throughout its entire course.

Dwarkaswar rises from the highlands of Purulia district. River Gandheswari rising from Bankura district meets Dwarkeswar near Bankura town receiving waters of other strems like Arkasha, Berai, it enters Hooghly district and meets Silabati to form Rupnarayan.

Silabati originating in Purulia district, receiving water of Joypanda and after treversing through Midnapore district, it meets Dwarkeswar.

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12) Kangsabati-Kaliaghai-Taldi :-

River Kangsabati in Purulia district is joined by Kumari in Bankura district. Further down, it is joined by the combined stream of Bhairab Banki and Tarefeni rivers and thereafter flows on through the Midnapore district. After a tortous course, it bifurcates, the upper branch known as Old Cossye or Palaspai Khal outfalls into Rupnarayan.

River Kalaighai trickles out from Jhargram P.S. in Midnapore district. Along its journeyit is fed by the flow of tributaries Kapaleswari, Baghai and Chandia. The combined flow meets the another arm of Kangsabati, i.e. New Kossye to form Haldi which falls into Hooghly.

13) Rasulpur :- It is a river of Contai Sub-Division Midnapore district formed by the three streams Bagda, Sarpa Madhakhati and ultimately meets Hooghly.

14) Tidal rivers of Southern West Bengal :-

Apart from the rivers described earlier within Ganga and Brahmaputra system, there is a group of rivers in South part of the state which fall in the tidal zone. These rivers mostly lie in the deltie zone to the east of Hooghly river popularly known as Sundarbans and form an intricate network with a number of criss-cross into connecting channels, thus dividing the land into a number of islands. Most of these rivers were originally spill channels of Ganga, then upland supply running dry during winter months. But gradually their offtakes from Ganga have deteoriorated and in some cases being cut-off from the partnt river. Now these rivers drain off whatsoever fresh discharge comes country side, thus

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country side, thus ultimately draining into Bay of Bengal through one or other of the principal estuaries in the area which are, starting from Hooghly river successively the Barata of Muriganga or Channel Creek, Saptamukhi, Thakuran, Matla , Gosa, Hariabhangra, Raimangal etc.

The Tolly's Nullah or the Adi Ganga, as it is sometime called is a small but important tidal creek draining into the Hooghly from the left in the vicinity of the city of Calcutta.

1.2.3. SUBARNAREKHA BASIN :-

The river Subarnarekha, though it has every small catchment within this State has got separate entity as it direct falls into the Bay of Bengal. It has its origin in the hills of Chotanagpur range at an elevation of 609m. It drains a total areas of 18,951 Km^2(13,950 Km^2) in Bihar, 2160 Km^2 in West Bengal and 3201 Km^2 in Orissa) The main tributaries of the river are Kanchi and Kharkai above Chandil in Bihar, Khaldhai in Bihar and Orissa and Dolong in West Bengal.

2. RAINFALL :-

The main rainfall season in this State is the southwest monsoon season during which the entire land(excepting the extreme north, the extreme northeast and extreme south) gets 75% of the annual rainfall. The Gangetic plains of West Bengal 78% of annual rainfall during the four months period, June to September. During the last seventy five years the dates of onset of monsoon over West Bengal was spread between last week of May to last week of June and these of its withdrawal between last week of September to second week of October.

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2.1 RAINFALL PATTERN :-

The main channel of Ganga divides West Bengal in two parts which are by and large homogenous from the metero-logical point of view. The northern half is designated as Sub-Himalayan West Bengal and the Southern half Gangetic West Bengal. Sub-Himalayan West Bengal is more suscentible heavy rains both in respect of amount we well as in frequence of occurence. Very heavy rain is more frequent in first two monsoon months (June and July) than in subsequent in Sub-Hima-layan West Bengal. In Gangetic West Bengal the frequence is maximum in August followed by June, September and July in that order.

On the basis of rainfall distribution, the State can be sub-divided into two broad Zones.

1) The Himalayan and Sub-Himalayan Region.

2) The Gangetic Plains.

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The Himalayan and Sub-Himalayan regions comprising districts of Darjeeling, Jalpaiguri, Cooch-Behar and Northern part of Islampur Sub-Livision of West Dinajpur district of high incidence of rainfall from 200 cm. to over 400 cm, about 80% of which is found to occur during the monsoon season for June to September. On the average Darjeeling, Cooch-Behar and Jalpaiguri get 114.112 and 110 rainly days respectively in a year. The monsoon generally follow. a northernly track to ultimately break up against Eastern Himalayan causing very heavy rainfall and thereafter through of low pressure under break monsoon conditions, it shifts northwards to the Himalayan foot hills. It has been found that a precipitation to the tune of 200 to 300 m.m. in 2 hours is not unusual while in more than forty occasions of rainfall of 250 mm above have been registered during 1891-1965

The Gangetic plain which constitute the major portion of the State can be further Sub-divided into the following sectors on the basis of average rainfall :-

SECTOR-I. Comprising the districts of Bankura, Birbhum Murshidabad and Burdwan which receive an average rainfall between 1140 mm amd 1400 m.m.

SECTOR-II Consisting of the districts of Nadia, Hooghly, Western portion of West Dinajpur, Midnapur and North 24-Parganas having an average annual rainfall between 1650 m.m and 1900 m.m.

Such regional variations in the precipitation pattern causes flood condition from time to time.

The rainfall data as collected from Indian Meteorological Department for the districts is shown in ANNEXURE

3. Flood during 1993

3.1 PREAMBLE.

The year 1993 happened to be an year of severe flooding, drainage congestion which the State of West Bengal has rarely seen before. The main features of Long Range Forecast of Southwest Monsoon, 1993 issued by the India Meteorological Department (.I.M.D.) in the last week of May, 1993 were :-

(I) The quantum of monsoon rainfall over the country as a whole for the four-month monsoon season(June to September,1993) is likely to be 103% of the long period average value within the estimated model error of + 4%. This will mean that the country is not only heading towards sixth successive normal monsoon year but this year's rainfall will be more than that of last year's monsoonrain which was 93% of long period average.

(II) In this situation, this is a reasonable expectable that about 30 out of 35 meteorological sub-divisions of India should get normal or excess rainfa..

The hyetal scenario of the two of the meteorological sub-divisions of West Bengal.viz. Sub-Himalayan West Bengal and Gangetic West Bengal proved to be a great diviation from this meteorological forecast. The year happened to be one of heavy rainfalls, both in quantum as well as in intensity.The total amount of rainfall during the four monsoon months surpassed the normal ones by considerable margins as is accident from the following table :-

Stations.	Rainfall in mm from 1.6.93 to 30.9.93.	Departure
Cooch-Behar	2990	
Jalpaiguri	2754	265
[illegible]	1168	98
[illegible]	1333	86
[illegible]hampore	[illegible]	254
[illegible]pore	16[illegible]	403
[illegible]m Dum	1[illegible]25	431
Contai	1797	144
[illegible]in'[illegible]an	1159	541
Purulia	1186	242
		150

While the Sub-Himalayan Part of the State viz.Jalpaiguri and the s[illegible] districts recorded very heavy rainfall from 18.7.93 to 22.7.93 recip[illegible] 8. 93.

South-West monsoon was vigorous in Sub-Himalayan West Bengal from 17. [illegible]. Under its influence heavy to very heavy precipration occured in the Nor[illegible]ical areas. In some rainfall recording stations 24 Hours rainfall w[illegible] unprecedented and surpassed all previous records.While Jalpaiguri recorded 1[illegible] and 400mm rainfall on 19. 7. and 20. 7, Hasimara recorded 200,368 a[illegible]7[illegible] mm on 19.7.,20.7. and 21.7. It has been reported that a rainfall o[illegible] 1250mm was recorded on 20.7.93 during 24 hours at Atibari Tea State n[illegible] Kalchini in the Dooars regionof Jalpaiguri district surpassing previous global records.

A well marked low pressure area lay centered over North Bay and adjoining coastal areas of West Bengal on the morning of 11. 8. 93.Under its influence heavy precipatation occured in the Southern districts .The following amount of rainfall was recorded on 11.8.93 during the last 24-hours :-

Bankura - 210 mm.
Digha - 292 mm
Midnapore - 272 mm.

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These were some of the synoptic features of the rainfall behaviour during the year 1993. In the North Bengal areas such wide spread rainfall in the catchment areas of major rivers in North Bengal and also in the upper catchments situated in Sikkim and Bhutan resulted in swelling of almost all the rivers and wrought considerable damages to embankments, public utilities. The onslaughts of flood left behind a trail of disaster snapping communication lines like roads, railways, telegraph lines, severe damages towards standing crops, tea gardens, homestead lands. It was reported that while an area of about 3000 sq.Km was inundated in Jalpaiguri district, the extent of inundation in Cooch-Behar district was 2000 sq. Km and 35 sq. Km in Darjeeling district, the geographical area of the districts being 6245, 3387 and 3075 sq.k.m. respectively.

Consequent upon incessant heavy precipitation from 10.8.93 to 12.8.93 followed by intermittent heavy shower in the southern districts of the State viz. Midnapore, Bankura, Hooghly and Howrah, the flood scenario of the State took a new turn. The rivers in these districts were resting very high crossed Extreme Danger Level, some of the ganges even surpassed their highest ever recorded levels. Release from the reservoirs aggrieved the problem and the hitherto hampered drainage. The second spell of flood in the southern part of the State occured from 15th September to 20th September. The high tide levels of the river Rupnarayan combined with flood discharge of the rivers Dwarkeswar, Silabati and Hurda resulted in rising of the river levels alarmingly and the embankments on either bank of the river Rupnarayan were overtopped in some important places like Kolaghat, Tamluk, Bagnan etc. A number of breaches occured in some of the circuit embankments.

The Central part of the State comprising the districts of South Dinajpur, Malda, Murshidabad, Birbhum & Nadia also faced the onslaughts of flood furies when the rivers flowing the districts, viz. Mierka, Jalangi, Kuye, Babla, Tangon were in spate. A number of embankments were seriously threatened and breaches occured at a number of places causing inundation.

On the whole almost the entire State was reeling under flood during the year 1993.

3.2 FLOOD LEVELS OF WEST BENGAL RIVERS DURING 1993.

Vide Annexures

3.3 FLOOD SITUATION

The districtwise flood situation in the State is enumerated in the following paragraphs.

A. Districts Darjeeling Jalpaiguri & Cooch-Behar.

The main rivers flowing through this Northern part of the State are Mahananda, Teesta, Jaldhaka, Torsa, Kaljani, Raidak and Sankosh while notable important tributaries are Lish, Ghish, Chel, Kamala, Murti, Diana, Mujnai, Turfuri, Lhowla, Gadadhar, Ganer, Lima, Batason, Mechi, Lochka, etc. The main problems of all these rivers are viz. (i) soil erosion, (ii) Widening of river to make the waterway due to deposition of silt and detoriates materials in rivers bed, (iii) Change of river course and sometimes avulsion of main river through the tributaries, (iv) bank erosion (v) Spill over the bank resulting in flooding and sand deposition in agricultural land. All these problems in serious forms were faced during this year.

Consequent upon incessant and intensive precipitation and North Bengal during the period from 18. 7. 93 to 22. 7. 93 there had been devastating floods in almost all the rivers of North Bengal

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During the entire North Bengal experienced heavy rainfall during the period as detailed in Annexure . Recorded rainfall of 220mm on 19.7, 368mm, on 20.7, and 790.60mm on 21.7. at Hashimara situated in the catchment of river Kaljani deserves special mention.

To facilitate ready appreciation of the extent of rainfall the following figures are presented :-

Name of R.G. Stations.	Normal annual rainfall (mm)	Rainfall from 1.6.93 to 21.7.93 (mm)	Percentage of average annual rainfall
Jalpaiguri	3290	2503	76.08%
Siliguri	3150	1404	44.57%
Cooch-Behar	3580	2821	78.80%
Alipurduar	3796	2130	56.1%

Under the passage of this flood, the rivers were ruling high, crossed their respective danger levels, were in full fury. The Jalpaiguri town suffered severe drainage congestion, a major part of the town being water logged and a part of Siliguri town was under water on 20th The Kaljani river crossed Extreme Danger Level at Alipurduar town in the district of Jalpaiguri and over topped the town protective embankment resulting in several breaches on 20th. The river also overtopped its embankment further down stream in Dhupguri Sub-Divisin of Cooch-Behar district and several breaches occured. The embankmentof river Mujnas(left bank) was also overtopped at Falakata in the district of Jalpaiguri consequent upon such overtopping, the embankments in a number of places were breached and washed away. A statement showing water levels in different important rivers in the districts are enclosed in Annexure.

Moreover due to persistent high, water levelfor a long duration in the rivers, there were 52 nos. of breaches for a length of 4000 breaches in the district Jalpaiguri and 29 nos of breaches for a total length of 2500 metres in the district of Cooch-Behar. Damages were also caused to protective works of embankments, anti-erosion works in these districts.

Out of a total length of 657 Km of flood embankments in these districts, 333 Km. length being in Jalpaiguri, 301 Km in Cooch-Behar and 23 Km in Darjeeling, about 230 Km length of embankment have been severely damaged with all pertaining structures while 100 Km length was partially damaged.

A number of minor irrigation schemes in Siliguri Sub-Division of Darjeeling district as well as in Jalpaiguri district happened to be the victims of these flood furies.

A notable feature of the July, 1993 flood was the serious devastation of Hamiltongunj town in P.S. Kalchini district Jalpaiguri. A population of about 40,000 people was affected. The rivers Basra and Bar, both originating from Bhutan Hills unite at Machipara Tea Estate. The combined flow is is bridged by M.G.Railway line and subsequently by P.W.D. Road in P.S.Hamiltongunj in P.S.Kalchini and is named Basra. As a result of incessant rain in the catchment area of these rivers from 18. 7. to 21.7 heavy on rush of water accompanied with silt and debris attacked the Railway afflux bundh at Hamiltongunj which was constructed by the Railways to restrict the flow of water of river Barr to Kulchini and Hamiltongunj. The afflux bunch could not withstand such heavy rush of flood water coming down. Basra river resulting in breach in the bund for a length of about 400 metres on 20.7. 93.

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Due to deposition of enormous quantity of silt and debris along the river bed the original course was left out and the entire flow followed the depression through the breached afflux bundh and formed a new course through the Hamiltanguj and further joined the river Kalani in the downstream. Heavy damages were inflicted to the inhabitants, 350 nos of house were completely washed away the most affected villages being Forw Nagar, Rabindra Nagar, Surajit Nagar.

The extent of miseries let loose upon the inhabitants of the North Bengal districts by the fury of the floods can be judged from the figures of inundation as listed below :-

District.	Total Geographical area (Sq.km)	Flooded area (Sq.km)
Jalpaiguri	62[illegible]	3000
Cooch-Behar	3[illegible]96	2000
Darjeeling	30[illegible]	25

Abstract of cost for repair to breaches, damages [illegible] has been incorporated in the districtwise statement vide Ann[illegible]

B. UTTAR DINAJPUR AND DAKSHIN DINAJPUR DISTRICT

A number of rivers of these two district originate in Bangl Desh flowing through these districts for certain stretches of length, the pre-eater Bangladesh rivers like Kulik Nagar, Chiramati, Tangon, Punarbhaba have their outfalls in river Mahananda either in these two districts or Maldah or in Bangladesh while Mahananda ultimately outfalls into Padma Atrai however outfalls in Brahmaputra.

The uncontrolled high flood discharge from the different catchments combined with local rainfall caused flood in the rivers affecting some areas of the district flooding. The inundation in P.S. Hilli was caused due to the spilling of rivers Cheri, Ghagra, Jamuna and ingress of flood water from Bangladesh.

The two districts were however not much affected due to flood during this year and loss of public utilities was not so much. Some damages were however caused to some Engineering structures, sluices, embankments protective works at places.

C. DISTRICT MALDAH

The district has a topography having scattered low areas with dense population and intensive cultivation, slight excess rain over catchment may cause flood here spilling from rivers flowing in the dist. results in tremendous hazards accompanied with drainage congestion.

The main rivers in this district are Ganga, Fulahar, Mahananda, Kalindri and Punarbhaba. The district is bounded by Ganga in the South Fulahar and Mahananda on the north west and Punarbhaba on the east. Other rivers like Pagla, Crimati, Tangon, etc. traverse only through a small portion in the district.

The monsoon rainfall in the district surpass the normal quantum by 85 mm. The low lying areas were inundated and appreciable damages to Engineering structures were noticed. But no river barring Ganga and Fulahar crossed Danger Level/Extreme Danger Level at any time during the flood season of 1993. During this year's flood, the river Ganga continued its left ward tendency and the deep channel hugged towards the line of the marginal embankment at several places resulting in breach of the same at village Kadamtala. The length of the breach of the marginal embankment was about 1'5 Km resulting in inundation of an area of about 200 Sq.Km in P.S. Kaliachak and Manikchak.

River Mahananda in this district was also ruling high and yellow signal and subsequently red signal for protected areas of P.S. Harishchandrapur, Kharba, Gajol had to be imposed.

E. DISTRICT MURSHIDABAD

The main rivers in this district are Mayurakshi, Dwarka, Brahmani, Bhairab, Jalangi, Bansloi, all outfalling into river Bhagirathi which is the main drainage artery in this district. So when the river Bhagirathi rules high, flood situation is experienced in the basins of the tributaries. Hence a vast tract of land in the district of Murshidabad in P.S. Kandi, Bharatpur, Berhampore, Khargram, Barwan and Beldanga are subject to inundatin on the other hand due to high ruling of river Ganga, a substial area in P.S. Farakka, Samser ganj, Suti, Raghunathganj, Bhagangola, Ramnagar and Lalgola are inundated causing serious hardship to the people.

Due to sudden flash flood in the Upper region of Khargram along with release of huge quantity flood water through barrages the rivers Dwarka and Brahmani were in flood. A breach on the left bank of river occured for a length of 30 metres thus inundating an area of about 10 Sq.km. Several slips overtopping occured at a number of places over Kandi-Indra-Gangapara embankment. Action erosion along right bank of Ganga/Padma was noticed at Sukhalpur, Akheriganj, Raniganj in the district. An area of 70 Sq.km. in P.S. Khargram, Bharatpur, Burwan and Kandi, 10 Sq.Km in P.S. Berhampore, 17 Sq.Km. in P.S. Bhagwangola, 11 Sq.km. in P.S. Raghunathganj were inundated during the flood of 1993.

E. DISTRICT NADIA :

The topography of this district has some scattered low line area with dense population and intensive cultivation. So slight excess rainfall beyond the average may cause flood here. Spilling from the rivers like Jalangi, Churni and Bhagirathi results in flood hazards associated with drainage congestion.

The annual rainfall in this district surpassed the average by over 300mm. As a result acute flood problem in the district was exprinced The rivers Jalangi, Bhagirathi were ruling high. As a result, an unprotected area of 2.25 Sq.km near Mayapur and Prachin Mayapur suffered due to flood hazards. Besides inundation, severe bank erosion was observed at Ghusuridanga Jaranpur, Gauranga Setu at Nabadwip, Mayapur. Existing bank protective works also suffered partial damages.

FLOOD SITUATION IN THE SOUTHERN DISTRICTS

The southern districts of the State also suffered badly during the year due to flood Major floods came on two occasions, are during 10th to 14th August and the second one from 15th to 20th September. The three flood prone southern districts viz. Midnapore, Hooghly, and Howrah were severely affected due to such floods. The behaviours of flood during this year resembled to that of 1978 while all the rivers except the Hooghly were in spate, the discharge and flood levels of Silabati and Dwarekeswar exceeded the corresponding figures of 1978. The high tide period of new noon phase of September1993 synchronised with the flood discharge at Bandar being the confluence of these two rivers and obstructed quick drainage resulting in rise of river levels on the Rupnarayan and Silabati to more than 2 meters above extreme danger level at places. Heavy local rainfall at Bankura and Midnapore caused flood in Silabati, Dwarakeswar and Kangsabati in both the spells. Districtwise reports arefurnished below.

F. DISTRICT MIDNAPORE

Consequent upon intense precipitation to the extent of 270mm at Midnapore 210 mm at Bankura, 299.mm at Digha on 11. 8. 93 the rivers Silabati-Dwarakeswar -Old Cossye of Rupnarayan System, Kapaleswari, Bagha-Chandia-Kaliaghai New Cossye under Haldi System were rising at an alarming

fate. The rivers crossed their respective danger levels, subsequently extreme danger levels and were rising rapidly. A number of embankment were overtopped, breached and wrought extensive damages to the countryside. River Cossye at Mohanpur recorded a discharge of 2750 cumecs (97,000 cusecs) on 11th and the water level at the gauge station was rising at an alarming rate of 4 cms per hour . Such high ruling of river for a considerable period passed great threat to embankment Breaches occured to Kaliachandi flood embankment. Kaliaghye Right and Left Embankment, Paharpur Circuit Embankment, Kapaleswari Right Embankment. Paharpur Circuit embankment was the worst hit where as many as 10 breaches occured. Roads connecting Midnapore with Contai, Keshpur, Salbani, Bhakrabad were seriously damaged at places.

A low pressure area was formed over North-East Bay of Bengal and adjoining Northern Bay on 12. 9. 93 morning. This will marked low pressure area was lying over Coastal west Bengal and its neighbourhood on the morning of 13th. On the morning of 14th, it moved north-westwards and was lying over Gangetic West Bengal under its influence rainfall was widespread in the southern districts, viz. Midnapore, Hooghly, Howrah 24-Parganas aswell as in the Central districts with isolated heavy falls at places.

The 4 rivers in the district viz. Kangsabati, Silabati, Dwarakeswar and Rupnarayan were again in spate.

Midnapore, Panskura and Chatal recprded rainfall to the extent of 215.2mm, 180mm, and 218 mm respectiely from 13. 9. 93 to 14.9.93. This heavy precipitation accompanied with flood discharge from Kangsabati dam on 14th and 15th ranging between 1420 to 1700 cumecs (50,000 cusecs to 60,000 cusecs) resulted in flood in the Cossye system. The gauges on the old Cossye and New Cossye rivers crossed Extreme Danger Levels continued to remain over this for a number of days. The unfavourable outfall condition of the Rupnarayan, the water level of which ruled high due to high tide condition preventing on account of the new moon phase and flood discharge from the Durgapur Barrage caused a great hindrance towards the lowering of water levels in the Old and New Cossye System.

Such high ruling of river continued for a number of days brought about severe damages to embankments on either side of river. Slips, overtopped resulted at many places. The Kheras Buri Basin suffered considerably due to drainage congestion and Kherai-Buxi Khal could not drain into Kangsabati due to its high ruling, resulting in inundation to 30 Sq.km. area.

The incessant rain in the catchment of Silabati caused swelling of the river. The flood levels marked on thr Railway Bridge just upstream of Garbeta-Bankura surpassed the level of 1978. The river level rose abnormally in its lower stretch between Ghatal town and Banda as the high level of Rupnarayan did not allow the Silabati to drain into it. This unusually high levels in Silabati prevailing from 15.9.93 to 17.9.93 affected the portion of Chetua Circuit Embankment protecting the Ghatal town and its adjoining areas. Overtopping of embankment occured in a large scale. The Chetua circuit Embankment breached just by the side of the Ranichaksluice. The breach caused inundation of an area of 60 Sq.km. The entire structures of the Ranichak Pump House along with the pumps was submerged . The pipe lines and their supporting structures were also damaged.

Lower down, the Rupnarayan Right Embankment was overtopped at many places from Gopiganj to Geonkhali. The Hamilton Bridge on the Dehaty Khal downstream of the Dehaty outfall sluice was 60 cms under water. Spilled water of the Rupnarayan after overtopping the Rupnarayan Right Embankment at Dainan entered a portion of the township, after overtapping the Rupnarayan Right Embankment at Dainan entered a portion of the township at the Kolaghat Thermal Power Plant. At Tamluk also, large scale overtopping took place. The marginal embankments of a number of drainage channels were overtopped and breached at several places.

G. DISTRICT :- HOOGHLY

As a result of heavy precipitation on 13. 9. 93 & 14.9.93 in the Upper Catchments of rivers Dwarakeswar and Gandheswar, in Bankura District, the rivers were in spate. The combined discharge of these two rivers sharply increased from 2268 cumecs(80,000 cusecs) to 3877 cumecs (1,35,000 cusecs) within a time limit of only 8 hours on 14th. The quantum of discharge was further increased from the contribution of the catchments of these rivers from Bankura and Arambag .This resulted in crossing of Extreme Danger Level of river Dwarakeswar at Arambagh on 15th.The flood discharge of the Dwarakeswar river, during September,1993 flood even surpassed the record of 1978.The gauge at Dongal exceeded the highest level ever recorded. The Dwarakeswar Right and Left Embankment were severe damaged,breach resulted at Moyal.The Shaikhpur Circuit embankment was the worst hit where as many as 4 breaches occured.Inundation resulted in P.S. Khanakul.The length of the breach was about 360 M.Almost three fourth of the area enclosed by the circuit embankment was inundated by this breach.

Consequent upon persistent release of flood discharge from Maithon and Panchet dams the discharges from Durgapur barrage continues between 2500 cumecs (88,200 cusecs) to 3600 cumecs(1,27,000 cusecs) between 15. 9. 93 to 18. 9. 93 and rose to a peak of 3866 cumecs(1,36,392 cusecs) on 15. 9. 93 at 18 hours.There had been large scale spilling into the unprotected areas of Khanakul Block from the river Mundeswar.The flood spill could not drain quickly due to adverse outfall condition due to prevailing high tide level in the Rupnarayan in the New Moon Phase from 15. 9. 93 to 19. 9. 93. It is also worth mentioning at this stage that the tide level during the last New Moon Phase rose to extra ordinary height exceeding that of 1978. The banks of Mundeswari on the left were eroded at several places.

Because of drainage congestion, the drainage Channels like Madaria Khal, Róner Khal and Dakatia Khal failed to drain the area which suffered severely, the worst effected block being Jangipara.Some of the structures on these Khal were seriously affected

H. DISTRICT : HOWRAH

On account of high release from D.V.C.dams as stated earlier, the levels in the Damodar (Amta Channel) and the Hurhura Khal which is a branch of Mundeswari river. The river crossed Extreme Danger Level at Muchighata,rose to 1.13 M against it.Because of the high discharge from the Mundeswari,there were overtopping and breaches on the left bank of Rampur Khal resulting in inundation of large areas of Udaynarayanpur and Amta Block-II.The Hurhura left embankment was severely damaged. The Natibpur circuit embankment also breached at several places.

River Damodar at Amta crossed Extreme Danger Level on 17. 9. 93, continued to rule above it till 20th.Both Damodar Right and Left embankments were overtopped at several places causing large scale inundation in Amta Block-I, in the district.

Rupnarayan Left embankment in the district of Howrah overtopped at many places and breaches the forward embankment at Nowpala Point to a length of 30M.Several slips were also formed on the embankment including severe erosion at Charkatapukuria which engulfed a part of marginal embankment of Midnapore Canal, Even a portion of National Highway just on the bank of Rupnarayan also overtopped.

The Hooghly Right Embankment just at the end of Uluberia Municipality was damaged due to the formation of a large slip which engulfed about 65 M of the embankment.The embankment was also damaged in P.S.Bauria at several places.

I. DISTRICTS NORTH & SOUTH 24 PARGANAS

Due to prevailing high tides in the Bay of Bengal and other estuarine rivers during the 3rd Week of September, a number of embankmen of the North and South 24 Parganas districts were severely damaged.

J. DISTRICT : BIRBHUM

Due to incessant rain durin the period from 24. 8. 93 to 25.8.93 in the Upper Catchment area of the rivers Bansloi,Pagla, Brahmani,Tripita etc. high flood passed through these rivers on 24. 8. 93.The river Bansl crossed Extreme Danger Level and rose to a maximum of 0.32 Metre above it. A discharge of 2070 cumecs(73,000 cusecs) passed through the Railway Brid at Bansloi. Due to such sudden and abnormal rise of water level of the ri Bansloi, the either side of the xxxx embankment of this rivers was severely affected by breaching overtopping at different places.Rainfall recorded on 24.8.93 at 8 A.M. at different stations is as below :-

Paikar- 255 mm. Murarai- 18.6 mm, Nalhati -80 mm. Rampurhat-46.50mm

Due to this abnormal rainfall, high flood occured on 24.8.93 in the rivers Bansloi, Pagla affecting 33 Nos of xxx villages in 8 nos. of Gr Panchayats in P.S. Murari, The area of inundation was 62 Sq.kms affecting 8000 people in the district.

In the river Brahmani, 465 cumecs (16,436 cusecs) discharge passed through Baidara Barrage on 24. 8. 93 .This discharge, combined with the abnormal discharge of the river Tripita resulted in high flood down-stream of Rampurhat Nalhati Road Bridge and damaged the right and left embankment of river Brahmani at [illegible] inundating on area of 10 sq.kms.in P.S. Nalhati affecting 3000 people [illegible] Rampurhat II & Nalhati I Panchay Samity of the district.

RAINFALL DATA IN THE DISTRICTS OF WEST BENGAL

DURING 1993

NAME OF THE DISTRICT	FROM 1.1.93 to 31.5.93.		From 1.6.93 to 15.10.93		From 1.1.93 to 15.10.93		PERCENTAGE DEPARTURE ON 15.10
	Actual	Normal	Actual	Normal	Actual	Normal	
COOCHBEHAR	670.4	635.1	2662.5	2882.3	3332.9	3517.4	-0
JALPAIGURI	608.1	470.2	2915.0	2755.7	3523.1	3225.9	+0
DARJEELING	620.0	400.2	2467.4	2375.3	3287.4	2775.5	+1
KALIMPONG	157.2	105.2	1172.1	1165.6	1329.3	1350.8	-0
DINAJPUR	437.2	216.3	1421.7	1162.5	1858.9	1378.8	+3
MALDAHAD	191.2	210.2	1178.3	1143.5	1369.5	1353.7	+0
BIRBHUM	172.7	145.4	1350.8	989.6	1523.5	1135.0	+
BARDDHAMAN	278.5	266.9	1197.5	1135.2	1476.0	1402.1	+0
HOWRAH	145.3	108.9	1281.1	1126.4	1426.4	1315.3	+0
BANKURA	123.3	176.6	1411.4	1077.3	1534.7	1253.9	+0
PURULIA	131.2	114.3	1159.9	1125.2	1291.1	1239.5	+
MIDNAPORE	314.3	216.6	1747.8	1241.1	2062.1	1457.7	+41
HOOGHLY	267.5	180.8	1255.8	1289.4	1513.3	1470.2	+03
NADIA	229.9	282.7	1353.3	1333.2	1565.2	1615.9	-03
24-PARGANAS(S)	303.8	233.7	1900.8	1403.0	2204.6	1636.7	+35
24-PARGANAS(N)	367.3	180.8	1331.0	1289.4	1698.3	1470.2	+ 1

Source : India Meteorological Department, Alipore, Calcutta- 700 027.

S/C1293

FLOOD LEVELS OF WEST BENGAL
RIVERS DURING 1993
(NORTH BENGAL RIVERS)

U.A. Unprotected Area
P.A. Protected Area
H.W.L. Highest Water Level
D.L. Danger Level
E.D.L. Extreme Danger Level

All levels in metre

Gauge at	District	Yellow Signal Unprotected area	Yellow Signal Protected area	Red Signal Unprotected area	Red Signal Protected area	Date.	Time (Hr.)	Water Level above Y.S.& R.S.in M.	Remarks
ta Damohani	Jalpaiguri	85.30M	85.60M	85.60M	86.30M	20.6.93	10.30	85.32	Y.S.for U.A.
						22.6.93	10.30	85.21	Y.S.with drawn.
						23.6.93	18.20	85.32	Y.S.for U.A.
						24 6.93	10.30	85.10	Y.S.with drawn
						26.6.93	11.30	85.32	Y.S. for U.A.
						28.6.93	20.00	85.11	Y.S.with drawn
						30.6.93	7.00	85.44	Y.S.for U.A.
						2.7.93	10.40		Y.S with drawn
						4.7.93	12.30	85.47	Y.S.for U.A.
						5.7.93	11.30		Y.S.with drawn
						14.7.93	21.30	85.40	Y.S.for U.A.
						18.7.93	20.20		Y.S for U.A.
						19.7.93	11.30	85.62	Y.S for P.A.
						21.7.93	22.15	85.30	Y.S.for U.A.
						28.7.93	11.30	85.09	Y.S.with drawn
						30.7.93	9.30	85.33	Y.S.for U.A.
						2.8.93	9.40	85.11	Y.S. with dr
						4.8.93	9.00	85.40	Y.S for U.A
						5.8.93	10.00	85.16	Y.S. with
						6.8.93	8.00	85.36	Y. U.A.
						7.8.93	8.30	85.06	Y. dr
						8.8.93	15.00	85.35	Y. U.A
						13.8.93	9.40	85.02	Y.S. dr
						15.8.93	6.40	85.35	Y. U.
						20.8.93	9.40	85.10	Y. with drawn.

contd...2/-

						22.8.93	6.40	85.38	Y.S.for U.A. & continued upto 6.9.93
						7.9.93	7.30		Y.S.with-drawn.
						7.9.93	20.30		Y.S.for U.A.
						8.9.93	8.00		Y.S.with-drawn.
						29.9.93	21.30		Y.S.for U.A.& continued till 5.10.93
Jaldhaka	N.H.31-Xing	-do-	80.00	80.10	80.50	80.90	19.7.93	9.00	80.40	Y.S. for P.A.
							22.7.93	11.30		Y.S.with-drawn
							8.8.93	10.50		Y.S.for U.A.
							8.8.93	11.50		Y.S.for P.A.
							9.8.93	9.50		Y.S.with-drawn.
[illegible]daka	L.R.P.-Xing	Cooch-Behar	46.70	47.00	47.60	47.90	22.7.93	6.00	45.52	Seasons HWL.
[illegible]daka II	-do-	-do-	48.10	48.40	49.00	49.30	21.7.93	6.00	48.90	Y.S. for P.A.
[illegible]nkosh	-do-	-do-	48.20	48.50	49.10	49.40	21.7.93	6.00	48.92	Y.S. for P.A.
[illegible]sai	Mathabhanga	-do-	48.20	48.40	48.70	48.90	20.7.93	6.00	48.76	R.S. for P.A. & U.A
							21.7.93	6.00	49.00	R.S.for P.A. & U.A.
							[illegible]			[illegible]
							22.7.93	3.00	48.08	R.S.with-drawn.
							8.8.93	19.00		R.S.for U.A.
							9.8.93	6.00		R.S.with-drawn
[illegible]ani	Alipur-duar	Jalpai-guri	45.10	48.20	45.70	48.70	20. 7. 93	6.00	45.30	Y.S.for U.A.
[illegible]na	Chengmari	-do-	200.50	200.50	201.50	201.40	19.7.93	9.00	200.50	Y.S.for UA F.A. - U.A.
[illegible]	Hasimara		116.30		116.90	117.50	19.7.93	6.00	116.60	YS for UA
							20.7.93	6.00	116.42	-do-
							21. 7.93	8.00	116.44	
							8.8.93	9.00	116.66	Y.S. for UA&PA

(1)	(2)	(3)	(4) L.L.	(5) E.D.L.	(6) Date.	(7) Time	(8) Water Level	(9) Remarks
[illegible]hananda	Siliguri	Darjee-ling	115.275	116.59	20.7.93	9.00	114.7[illegible]	Seasons HWL.

A N N E X U R E - III

FLOOD LEVELS OF RIVERS OF W ST BENGAL DURING 1993

(CENTRAL BENGAL RIVERS)

D. L - DANGER LEVEL

E.D.L. EXTREME DANGER LEVEL

All Levels in Metre.

Name of River	Gauge at	District	Danger Level	Extreme Danger Level	Date.	Time (hr.)	Flood level above D.L.& E.D.L.	Remarks
1.	2.	3.	4.	5.	6.	7.	8.	9.
Ganga	Nurpur	Murshidabad	21.03	21.64M	11.9.93	6.00	21.05	Above D.L.
					13.9.93	6.00	21.34	-do-
					15.9.93	6.00	21.50	-do-
					16.9.93	6.00	21.60	Above D.L.
					17.9.93	6.00	21.80	-do-
					19.9.93	6.00	21.96	-do-
					20.9.93	6.00	22.01	-do-
					21.9.93	6.00	22.05	-do-
					24.9.93	6.00	22.00	-do-
					26.9.93	6.00	21.99	-do-
					27.9.93	6.00	22.03	-do-
					28.9.93	6.00	22.02	-do-
					29.9.93	6.00	22.10	-do-
					30.9.93	6.00	22.02	-do-
					1.10.93	6.00	21.77	-do-
					3.10.93	6.00	21.23	Above D.L.
					4.10.93	6.00	21.07	-do-
					6.10.93	6.00	20.69	Below D.L.
					7.10.93	6.00	20.45	-do-
Ganga	Farakka	Murshidabad	22.25	23.77M	23.9. 93	6.00	23.72	Above DL
					1.10.93	6.00	23.01	-do-
GANGA	Manikchakghat	Malda	24.68	25.30	21.9.93	6.00	25.18	Above DL
					23.9.93	6.00	25.38	Above EDL
Ganga	Giriya	Murshidabad	20.57	21.18	15.9.93	6.00	20.72	Above DL
					17. 9.93	6.00	21.00	-do-

1.	2.	3.	4.	5.	6.	7.	8.	
Ganga	Giriya	Murshidabad	20.57	21.10	19.9.93	6.00	21.96	Abo
					20.9.93	6.00	21.25	-d
					21.9.93	6.00	21.31	-d
					24.9.93	6.00	21.24	-d
					26.9.93	6.00	21.99	-d
					27.9.93	6.00	21.26	-d
					28.9.93	6.00	21.30	-d
					29.9.93	6.00	21.34	-d
Bhairab	Altheriganj	-do-	18.44	19.05	18.9.93	6.00	18.45	Abo
					3 .9.93	6.00	18.44	-
					2.10.93	6.00	18.05	Bel
Jalangi	Swarupganj	Nadia	8.44M	9.05M	1. 9. 93	9.00	8.44	Cross
					3.9.93	10.00	8.67	Abov
					5.9.93	6.00	8.93	Abo
					7.9.93	9.00	9.06	Abov
					8.9.93	6.00	9.12	-
					10.9.93	6.00	9.07	-
					12.9.93	6.00	8.97	Abov
					13.9.93	6.00	8.96	-d
					14.9.93	6.00	8.91	-d
					15.9.93	6.00	8.85	-do-
					16.9.93	6.00	8.57	-do
					17.9.93	6.00	8.99	-do-
					18.9.93	6.00	9.01	Above
					19.9.93	6.00	9.12	-do-
					20.9.93	6.00	9.09	-do-
					23.9.93	6.00	8.81	Above
					24.9.93	6.00	8.67	-do
					25.9.93	6.00	8.54	-do-

1.	2.	3.	4.	5.	6.	7.	8.	9
Jalangi	Swarupganj	Nadia	8.44	9.05	26.9.93	6.00	8.44.	Crossed
					27.9.93	6.00	8.38	Below
					28.993	6.00	8.43	-do
					29.9.93	6.00	8.49	Above D
					30.9.93	6.00	8.62	-do-
					1.10.93	6.00	8.71	-do-
					2.10.93	6.00	8.77	-do
					4.10.93	6.00	8.87	-do
					7.10	6.00	8.69	-do
					8.10	6.00	8.56	-do
					9.10	6.00	8.36	Below
Churni	Hanskhali	Nadia	7.53	8.14	15.9.93	6.00	6.95	Below
Punar-bhaba	Gangarampur	Dakshin Dinajpur	25.82	26.12	3.9.93	6.00	25.45	-do
Dwarka	Sankoghat	Birbhum	20.42	21.30	25.8.93	9.00	20.70	Above
					26.8.93	9.00	20.05	Below
					27.8.93	9.00	20.65	Above D.I
					28.8.93	9.00	20.15	Below D.I
					29.8.93	9.00	20.05	Below D.
					1.9.93	9.00	21.30	Crossed
					2.9.93	9.00	21.58	Above D
					5.9.93	9.00	21.10	Above
					6.9.93	9.00	20.75	-do-
					15.9.93	9.00	20.85	-do
					16.9.93	9.00	21.25	-do-
					17.9.93	9.00	20.88	-do-
					29.9.93	9.00	20.65	-do-
Kuye	Angerpur-ghat	Birbhum		20.05	3.9.93	9.00	20.14	Above D.
Tangon	Bansihari	Dakshin Dinajpur	25.60	26.21	2. 9. 93	18.00	26.04	Above
					3.9.93	6.00	26.12	-do-
Atrai	Balurghat	Uttar Dinajpur	23.19	23.76	3.9.93	6.00	21.97	Below D

FLOOD LEVELS OF RIVERS OF WEST BENGAL DURING - 1993

(SOUTH BENGAL RIVERS)

D.L. DANGER LEVEL
EDL -EXTREME DANGER LEVEL

NAME OF RIVER	GAUGE AT	DISTRICT	DANGER LEVEL	EXTREME DANGER LEVEL	DATE	TIME (HR.)	FLOOD LEVEL ABOVE DANGER LEVEL & EXTREME DANGER LEVEL (M)	REMA
1.	2.	3.	4.	5.	6.	7.	8.	9
Kaliaghye	Dehati	Midnapore	6.55M	7.01M	21.7.93	6.00	6.56	Above D.
					27.7.93	6.00	6.56	-do-
					12.8.93	9.00	8.86	Above D.
					13.8.93	9.00	8.50	-do-
					14.8.93	15.00	8.22	-do-
					15.8.93	6.00	8.18	-do-
					16.8.93	0.00	7.82	-do-
					19.8.93	18.00	7.09	-do-
					24.8.93	18.00	6.10	Above D
					13.9.93	18.00	6.30	-do-
					14.9.93	15.00	7.25	Above D.
					16.9.93	6.00	7.92	-do-
					17.9.93	6.00	7.55	-do-
					18.9.93	15.00	7.12	-do-
					19.9.93	6.00	8.90	-do-
					20.9.93	15.00	6.58	Above D.
					26.9.93	6.00	6.78	-d
					30.9.93	6.00	6.50	-d
Kaliaghye	Bhakrabad	-do-	8.33	8.84	25.7.93	7.00	8.90	Above D.
					13.8.93	6.00	9.00	-d
					14.9.93	14.00	9.50	-d
					17.9.93	6.00	7.95	Below D
Kaliaghye	Amgachia	-do-	5.79M	6.40M	17.8.93	6.00	6.75	Above ED
					20.8.93	6.00	6.09	Above D.
					14.9.93	21.00	5.79	-do-
					15.9.93	12.00	6.18	-do-
					16.9.93	6.00	6.46	AboveEDL
					18.9.93	6.00	6.36	Above D.

1.	2.	3.	4.	5.	6.	7.	8.	9.
Kapaleswari	Nara-yanbazh	Midnapore	5.33	5.94M	19.7.93	9.00	5.98M	Above D.L.
					27.7.93	6.00	5.36M	-do-
					29.7.93	6.00	5.40M	-do-
					12.8.93	12.00	6.03M	Above DL
					13.8.93	6.00	6.93	-do-
					14.8.93	12.00	6.00M	-do-
					16.8.93	6.00	6.75	-do-
					20.8.93	12.00	5.94M	-do-
					23.8.93	6.00	5.44M	Above DL
					14.9.93	17.30	5.80M	Above DL
					15.9.93	12.00	6.20	Above EDL
					16.9.93	6.00	6.40	-do-
					17.9.93	6.00	6.47	-do-
					18.9.93	15.00	6.22	-do-
					19.9.93	6.00	6.00	-do-
					20.9.93	18.00	5.70	Above DL
					30.9.93	6.00	5.45	-do-
Chandia	Barisha	Midnapore	4.57	5.03	12.8.93	10.00	4.57M	Crossed DL
					13.8.93	6.00	5.03M	Above EDL
					14.9.93	15.00	4.57M	Above DL
					15.9.93	7.15	5.09M	Above EDL
					16.9.93	17.20	5.39M	-do-
					17.9.93	15.30	5.51	-do-
					18.9.93	15.00	5.56	-do-
					19.9.93	9.10	5.41	-do-
					20.9.93	15.20	5.24	-do-
Rupnarayan	Dainan	-do-	5.02	5.10	16. 9. 93	17.00	5.32M	Above EDL

contd....3..

1.	2.	3.	4.	5.	6.	7.	8.	9.
Rupnarayan	Bandar	Midnapore	6.85M	7.46M	13.9.93	12.00	7.50M	Above EL
					15.9.93	10.00	7.76	-do-
					15.9.93	5.00	6.91	Above DL
Cassye	Panskura	Midnapore	9.30	9.90	15.9.93	7.00	10.10	Above EDL
					17.9.93	23.00	10.44	-do-
Cossye	Mohanpur	-do-	25.75	26.36	11.9.93	18.00	26.50	Above EDL
					14.9.93	14.20	25.75	Above DL
					15.9.93	1.00	26.70	Above EDL
Cossye	Dehati	-do-	5.02		11.9.93	21.00	5.20	Above DL
					13.9.93	9.00	5.74	-do-
					14.9.93	6.00	5.50	-do-
Silabati	Banka	-do-	15.00	15.69	12.9. 93	9.00	16.10	Above EDL
					13.9.93	12.30	15.37	Above DL
					15.9.93	9.00	15.22	-do-
					14.9.93	6.00	16.25M	Above EDL
					15.9.93	6.00	16.13	-do-
Old Cossye	Kalmijo,e	-do-	9.90	9.60	11.9.93	24.00	10.05	Above EDL
					12.9.93	9.00	10.18	-do-
					13.9.93	12.00	9.60	-do-
Silabati	Godghat	-do-	9.99	9.60	13.9.93	12.00	9.10	Above DL
					14.9.93	16.00	8.99	-do-
Mundeswari	Harinkhola	Hooghly	12.19	12.80	17.9.93	6.00	13.73	Above EDL
Damodar	Amta	Howrah	5.66		3.10.93	6.00		Crossed DL
Cossye	Kapastikri	Midnapore	16.00	16.61	11.9. 93	19.00	17.00	Above EDL
Old Cossye	Kalmijole	-do-	9.99	9.60	15.9.93	8.00	10.00	Above EDL
Rupnara-yan	Bandar	-do-	6.85	7.46	13.9.93	10.00	7.86	-do-

A N N E X U R E - V.

Area flooded in different districts of West Bengal during 1993.

Serial No.	Name of districts.	Geographical area in Sq.Km.	Area flooded in Sq.Km.
1.	Cooch-Behar	3386	2000
2.	Jalpaiguri	6245	3000
3.	Darjeeling	3075	25
4.	Uttar Dinajpur	5206	NIL
5.	Dakshin Dinajpur		NIL
6.	Maldah	3713	39
7.	Murshidabad	5341	127
8.	Nadia	3926	02
9.	Burdwan	7028	NIL
10.	Birbhum	4545	72
11.	Howrah	1467	100
12.	24 Parganas(North)	13796	01
13.	24-Parganas(South)		26
14.	Purulia	6259	NIL
15.	Bankura	6881	NIL
16.	Hooghly	3145	227
17.	Midnapore	13724	1886
		87,853	7505

A N N E X U R E - VI

Flood Release from Reservoir

A. Kangsabati

Date of Release	Time(hr.)	Discharge in Cumecs.
14. 9. 93	23.00	1416.43
15. 9. 93	01.00	1713.62
16. 9. 93	12.00	570.73
17. 9. 93	07.00	288.70
18. 9. 93	07.00	141.64

B. D. V. C.

7. 9. 93	06.00	855.26
8. 9. 93	06.00	944.47
9. 9. 93	06.00	1592.29
10.9.93	06.00	1783.45
11.9.93	06.00	2051.78
12.9.93	06.00	863.05
13.9.93	06.00	600.39
14.9.93	06.00	619.50
15.9.93	18.00	3865.20
16.9.93	06.00	3600.60
17.9.93	06.00	3084.00
18.9.93	18.00	2533.62
19.9.93	18.00	1558.78

ANNEXURE - 'II

The probable estimate for restoration of the flood embankment, & flood protective works which have been severely damaged during the flood of July, 1993

FOR THE LISTRICT OF JALPAIGURI

(Rupees in lakhs)

Serial No.	Items.	Qty.	Unit.	Rate.	Amount
1.	Jorai Irrigation Scheme & Jateswar Irrigation Schemes.	200M	Per M	3000/-	6.00
2.	Breaches in the flood embkt.	4000M	Per M	8000/-	340.00
3.	Repairs of embankment by earth work & turfing including repairs to inspection path.	90KM	Per M	300000/-	270.00
4.	Repairs of existing armoured embankment & repairs to apron.	28 KM	Per KM	800000/-	224.00
5.	Repairs to bank protn.work	20 KM	Per KM	400000/-	80.00
6.	Repairs to existing spurs	15 Nos.	Per No.	800000/-	120.00
7.	Repairs to existing Irrigation Scheme	2 Nos.	PER No.	1500000/-	30.00
8.	Repairs to existing Irrigation scheme.	10 Nos.	PER No.	200000/-	20.00
9.	Repairs to buildings, godown, Rest shed.	(L.S.)			10.00
				Total..	Rs.1100.00 Lakhs

ANNEXURE -VI-

Estimate for Restoration of the flood embankment and flood protective works which have been severely damaged during July, 1993.

FOR THE DISTRICT OF COOCHBEHAR

(Rs. in ...)

Serial No.	Items.	Qty.	Unit.	Rate.	Amount
1.	Closing of breaches	2500 M	Per M	8000/-	200...
2.	Repairs for flood embankment by earthwork and turfing.	80 KM	Per KM	3,00,000/-	2...
3.	Repairs to existing armoured embankment with apron & pitching.	25 KM	"	8,00,000	2...
4.	Repairs to existing bank protection work.	40 KM	"	4,00,000	1...
5.	Repairs to existing spur.	8 No.	Per No.	8,00,000/-	...
6.	Repairs to drainage sluices	6 Nos.	"	2,00,000	...
7.	Repairs to Buildings, godown and Rest shed.	(L.S.)			1...
8.	Repairs to existing irrigation schemes.	(L.S.)			--
					86...

ANNEXURE -VII C-

Estimate for Restoration of the flood embankment and flood protective works which have been severely damaged during July, 1993

For the District of Darjeeling :-

(Rs. in Lakhs)

Serial No.	Item.	Quantity.	Unit	Rate.	Amount
1.	Closing breaches in Irrigation Canals	330M	Per M	3,000	10.00
2.	Repairs to flood embankment by earth work & turfing.	5 K.M.	Per K.M.	3,00,000	15.0
3.	Repairs to existing armoured embankment & repair to apron.	0.750 Km	Per K.M	8,00,000	6.00
4.	Repairs for bank erosion work.	14.75KM	Per K.M.	4,00,000	59.0
5.	Repairs to Irrigation Schemes :-				
	1) Taipu Irrigation Scheme 2) Siavita Irrigation Scheme. 3) Manja Irrigation Scheme. 4) Gosaipur Irrigation Scheme. 5) Jamaitullah (I) Scheme	5 Nos.	Each.	15,00,000/-	75.
6.	Works already under execution for palliative works.	...	Lump Sum		6.00
			TOTAL :		Rs.171.00 Lakhs

1.	2.	3.	4.	5.	6.
THE KELIAGHAI-KAPALESWARI LAC SYSTEM					
1.	Breach/Cuts	NO	4	15.00	--
2.	Damage due to slips, ghoges toe erosion etc.	KM	70	18.00	--
3.	Damage due to protection work.	KM	10	17.00	--
4.	Damage to structures : a) Sluices b) Inlets c) Regulators/Other Structures	NO NO NO	10	5.50	--
5.	Damage to inspection Path.	KM	10	5.00	--
6.	Restoration of embankment by :- a) Raising and strengthening of the embankment.	KM	40	28.00	--
	b) Protection work to the Embankment.	KM	10	30.00	
	TOTAL :-			118.50	
THE COSSYE-OLD COSSYE-NEW COSSYE-SILABATI SYSTEM					
1.	Breach/Cuts	NO	1	35.00	--
2.	Damages due to slips, ghoges toe erosion etc.	KM	120	50.00	183
3.	Damage to protection work	KM	30	20.00	50
4.	Damage to structures :- a) Sluices	NO	20	15.00	25
	b) Inlets	NO	--	--	--
	c) Regulators/Other Structures	NO	20	15.00	25
5.	Damage to inspection path	KM	20	10.00	15
6.	Restoration of embankment by :- a) Raising and strengthening of the embankment.	KM	70	35.00	45
	TOTAL :-			180.00	

Flood Embankment on the Drainage Channel.		Circuit/Ex-Zamindary Embankment		Irrigation Canal		Remarks
Affected length	Cost of repair (Rs.in lakhs)	Affected length	Cost of repair (Rs.in lakhs)	Affected length	Cost of Repair (Rs.in lakhs)	
8.	9.	10.	11.	12.	13.	14.
--	--	10	3.00			
--	--	6	4.00			
--	--	--	--			
--	--	--	--			
--	--	--	--			
--	--	25	15.00			
--	--	--	--			
			22.00			
	12.00	--	--	40	8.50	
	8.00	--	--	--	--	
	--	--	--	--	--	
	6.00	--	--	--	--	
	5.00	--	--	25	10.00	
	6.00	--	--	--	--	
	--	--	--	--	--	
	8.00	--	--	40	10.00	
	39.00				29.50	

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Flood Embankment on the Drainage Channel.		Circuit/Ex-Zamindary Embankment		Irrigation Canal		Remarks
Affected length	Cost of repair (Rs.in lakhs)	Affected length	Cost of repair (Rs.in lakhs)	Affected length	Cost of Repair (Rs.in lakhs)	
8.	9.	10.	11.	12.	13.	14.
--	--	10	3.00			
--	--	6	4.00			
--	--	--	--			
--	--	--	--			
--	--	--	--			
--	--	25	15.00			
--	--	--	--			
			22.00			
	12.00	--	--	40	8.50	
	8.00	--	--	--	--	
	--	--	--	--	--	
	6.00	--	--	--	--	
	5.00	--	--	25	10.00	
	6.00	--	--	--	--	
	--	--	--	--	--	
	8.00	--	--	40	10.00	
	39.00				29.50	

contd.to page-2

DISTRICT : MIDNAPORE

Damage Report for 1st and 2nd Phase of Flood 1993

Serial No.	Type of Damage/ Repair	Unit.	Sch.'D'Embankment		Taccavi Embankment	
			Affected length	Cost of repaif (Rs.in. lakhs)	Affected length	Cost of repair (Rs.in lakhs)
THE HALDI						
1.	Breach/Cuts.	NO	--	--	--	--
2.	Damage due to slips ghoges toe erosion etc.	KM	1.5	3.50	--	--
3.	Damage due to protection work.	KM	1.5	5.50	--	--
4.	Damage to structures :					
	a) Sluices	NO	4	4.00		
	b) Inlets	NO	-	--		
	c) Regulators/other Structures	NO	--	--		
5.	Damage to inspection Path.	KM	** 2	** 1.00		
6.	Restoration work by :-					
	a) Raising & strengthening of the embankment	KM				
	b) Protection work to the Embankment	KM	4	4.00		
		T O T A L :-		18.00		
THE RUPNARAYAN						
1.	Breach/Cuts	No	--	--	--	--
2.	Damage due to slips, ghoges toe-erosion etc.	KM	2	2.00	--	--
3.	Damage to protection work	KM	3	20.00	--	--
4.	Damage to structures :					
	a) Sluices	NO				
	b) Inlets	NO				
	c) Regulators/ other strucrures	NO				
5.	Damage to inspection path.	KM				
6.	Restoration work by :-					
	a) Raising & strengthening of the embankment	KM	4	4.00		
	b) Protection work to the embankment.	KM				
				26.00		

contd.page-3

Flood Embankment on the Drainage Channel.		Circuit/Ex-Zamindary Embankment		Irrigation Canal		Remarks
Affected length	Cost of Repair (Rs.in lakhs)	Affected length	cost of repair (Rs.in lakhs)	Affected length	Cost of repair (Rs.in lakhs)	
--	--	---	--	---	--	
--	--	--	--	--	--	
--	--	--	--	--	--	

8	2.50
10	3.00
10	5.00
7.	2.50
	13.00

contd.to page-3

Damage Report for 1st and 2nd.Phase of Flood 1993

DISTRICT : MIDNAPORE

Serial No.	Type of Damage/ Repair	Unit.	Sch.'D'Embktt.		Taccavi Embktt.	
			Affected Length	Cost of repair (Rs.in lakhs)	Affec-ted length	Cos of rep (Rs, lak
THE HOOGHLY :						
1.	Breach/Cuts	NO.	--	--	--	--
2.	Damage due to slips, ghoges toe erosion etc,	KM	1	3.75	--	--
3.	Damage due to protection work.	KM	--	--	--	--
4.	Damage to structures :-					
	a) Sluices	NO	--	--	--	--
	b) Inlets	NO				
	c) Regulator/Other Structures	NO				
5.	Damage to inspection Path.	KM	0.5	0.25	--	--
6.	Restoration work by :-					
	a) Raising & Strengthening of the embankment.	KM	--	--	--	--
	b) Protection work to the Embankment.	KM				
	T O T A L :-			4.00		
THE DAMAGE TO THE WORKS OF DUBDA BASIN DRG.SCHEME.						
1.	Breach/Cuts	NO				
2.	Damages due to slips, ghoges toe-erosion etc.	KM				
3.	Damage to protection work	KM				
4.	Damage to structures :-					
	a) Sluices	NO				
	b) Inlets	NO				
	c) Regulators/other structures	NO				
5.	Damage to inspection path.	KM				
6.	Restoration work by :-					
	a) Raising & Strengthe-ning of the embankment	KM				
	b) Protection work to the embankment	KM				

Flood Embankment on the Drainage Channel		Circuit/Ex. Zamindary Embankment		Irrigation Canal		Remark
Affected length	Cost of repair (Rs.in lakhs)	Affected length	Cost of repair (Rs.in lakhs)	Affected length	Cost of repair (Rs.in lakhs)	
--	--	--	--	--	--	
--	--	--	--	--	--	
--	--	--	--	--	--	
--	--	--	--	--	--	
--	--	--	--	--	--	
--	--	--	--	--	--	

[redacted]

4	1.00
10	10.00
10	5.00
	16.00

GRAND TOTAL FOR MIDNAPORE DISTRICT-5981 [illegible] lakhs

ANNEXURE - V

DAMAGE REPORT FOR 1st and 2nd Phase of Flood 1993

DISTRICT: HOOGHLY

Serial No.	Type of Damage/Repair	Unit	Sch.'D' Embktt. Affected	Sch.'D' Embktt. Cost of repair (Rs.in lakhs)	Tacavv. Affected length
THE DAMAKESWAR					
1.	Breach/Cuts.	NO	~~XXXXX~~	~~XXXX~~	xxx
2.	Damage due to slips, ghoges toe erosion etc.	KM	1(360M)	40.00	---
3.	Damage due to protection work.	KM	20	45.00	---
4	Damage to structures :				
	a) Sluices	NO			
	b) Inlets	NO	--	--	---
	c) Regulators/Other structures.	NO	15	7.50	---
5	Damage to inspection Path.	KM	---	----	---
6.	Damage to ~~XXX~~ Restoration work By :-				
	a) Raising & Strengthening of the embankment.	KM			
	b) Protection work to the Embankment.	KM	15M	25.00	
	T O T A L :			142.50 ✓	
THE AMOLAR					
1.	Breach/Cuts	NO			
2	Damage due to slips, ghoges toe-erosion etc.	KM		---	---
	Damage to protection work.	KM	1	5.00	---
	Damage to structures :-				
	a) Sluices	NO	--	---	---
	b) Inlets	NO			
	c) Regulators/Other Structures	NO			
	Damage to inspection path	KM			
	Restoration work by :-				
	a) Raising & Strengthening of the embankment	KM			
	b) Protection work to theembankment.	KM			
	T O T A L :-			5.00 ✓	
THE UTTARESWARI					
1.	Severe embktt.erosion	KM	3	15.00 ✓	
	TOTAL			15.00	
THE HOOGHLY					
2.	Damage due to ghoges, slips erosion etc.	KM	2	7.50 ✓	
				7.50	

Flood Embankment on the Drainage Channel		Circuit/Ex-Zamindary Embankment		Irrigation Canal		REMAR
Affected Length	Cost of repair (Rs.in lakhs)	Affected Length	Cost of repair (Rs.in lakhs)	Affected length.	Cost of repair (Rs.in lakhs)	
--	--	4	50.00	--	--	Breache Embankm maintai by Zill Parish
--	--	--	--	--	-	
--	--	--	--	--	--	
--	--	--	--	--	--	
--	--	--	--	--	--	
--	--	--	--	--	--	
--	--	--	--	--	--	
2	5.00	--	--	--	--	
--	--	--	--	--	--	
	5.00					

GRAND TOTAL FOR HOOGHLY DISTRICT-Rs.175 la

ANNEXURE -VI

Damage Report for 1st and 2nd Phases of Flood 1993

DISTRICT : HOWRAH

Serial No.	Due to Damage/Repair	Unit	Sch.'D' Embktt.		Taccavi Embktt	
			Affected	Cost of repair in(lakhs)	Affected length	Cost of repai (Rs.i lakh
THE WURHURA KHA L/RAMPUR KHAL						
1.	Breach/Cuts	NO	1	10.00		
2.	Damage due to slips, ghoges toe erosion etc.	KM	15	10.00		
3.	Damage due to protection work.	KM	2	4.00		
4.	Damage to structures :					
	a) Sluices	NO	10	2.00		
	b) Inlets	NO	--	--		
	c) Regulators/other structures	NO	--	--		
5.	Damage to inspection path	KM	--	--		
6.	Restoration work by :-					
	a) Raising & strengthening of the embankment	KM	15	15.00		
	b) Protection work to the Embankment	KM	--	--		
	TOTAL :-			41.00		
THE HOOGHLY						
1.	Breach/Cuts	NO				
2.	Damages due to slips, ghoges toe-erosion etc.	KM	2	10.00		
3.	Damage to protection work	KM	--	--		
4.	Damage to structures :-					
	a) Sluices	NO	--	--		
	b) Inlets	NO	--	--		
	c) Regulators/other structures	NO	--	--		
5.	Damage to inspection path	KM	--	--		
6.	Restoration work by :-					
	a) Raising & strengthening of the embankment	KM	--	--		
	b) Protection work to the embankment.					
	TOTAL :			10.00		

Damage Report for 1st and 2nd Phases of Flood 1993

DISTRICT : HOWRAH

Serial No.	Type of Damage/Repair	Unit	Sch.'D'Embktt.		Taccavi Embktt.	
			Affected length	Cost of repair (Rs.in lakhs)	Affected length	Cost of [illegible]
THE DAMODAR						
1.	Breach/Cuts	NO	--	--	--	
2.	Damage due to slips, ghoges toe erosion etc.	KM	15	10.00		
3.	Damage due to protection work.	KM	--	--		
4.	Damage to structures :-					
	a) [illegible]	NO	[illegible]	[illegible]		
	b) Inlets	NO	20	4.00		
	c) Regulators/other Structures	NO	--	--		
5.	Damage to inspection path	KM	--	--		
6.	Restoration work by :-					
	a) Raising & strengthening of the embankment	KM	--	--		
	b) Protection work to the Embankment	KM	--	--		
	T O T A L :-			14.00		
THE RUPNARAYAN						
1.	Breach/Cuts	NO	1	4.00		
2.	Damages due to slips, ghoges toe-erosion etc.	KM	20	20.00		
3.	Damage to protection work	KM	5	10.00		
4.	Damage to structures :-					
	a) Sluices	NO	15	3.00		
	b) Inlets	NO	--	--		
	c) Regulators/other structures	NO	--	--		
5.	Damage to inspection path.	KM	--	--		
6.	Restoration work by :-					
	a) Raising & strengthening of the embankment	KM	--	--		
	b) Protection work to the embankment.	KM	--	--		
	T O T A L :-			37.00		

GRAND TOTAL FOR HOWRAH DISTRICT ; Rs.102 lakhs

Flood Embankment on the Drainage Channel.		Circuit/Ex-Zamindary Embankment		Irrigation Canal		Remarks.
Affected	Cost of Repair (Rs.in lakhs)	Affected length	Cost of repair (Rs.in lakhs)	Affected length	Cost of repair (Rs.in lakhs)	
----	--	--	--	--	--	

ANNEXURE- VII-G

DISTRICT- NADIA

Serial No.	Particulars of damages caused to the Engineering works and Quantum of such damages.	Rs.in lacs. Approx.cost of restoration(in lacs of Rupees)
1.	Damage to different flood protective Embankments at Gopia, Kadamtala, Gurguria, Bajadurpur, Jagatkhali (34 Kms. appx.)	34.00 lakhs
2.	Damages to Bank protective works at Prachin Mayapur, Serakhali, Tarapur, Bapujinagar, Jurangpur, Ghasunidanga, Serakhali, [illegible]avnagar, Balirab, Palashipara, Harisala & Ghurni, covering a total length of 1.04 Km.	57.50 lakhs
3.	Damages to sluices & other structures. 48 Nos.	6.50 lakhs
		98.00 Lakhs

ANNEXURE -VII-H

DISTRICT - MURSHIDABAD

1.	Damages to different flood protective Embankment of Mayurakshi Kuya, Babla river system(15 Kms)	45.00 Lakhs
2.	Damages to different flood protective embankments of Dwarka, Brahmani river system 12 Kms)	13.00 Lakhs
3.	Damages to different flood protective embankments of Jalangi, Bhairab river system (11 Kms)	14.00 Lakhs
4.	Damages to Bank protective works sluice & other structures(15 Nos.	10.00 Lakhs
5.	Damages to the Ganga-Bhagirathi Embankment at Sekhalipur in P.S. Lalgola length of Breached and collapsed Embankment(85 [illegible]s.)	
6.	Damages to the bed bar No.1, 2, & 3 at Aurangabad.	125.00 Lakhs
7.	Aggressive Bank erosion on the RightBank of Ganga/Padma was noticed this year particularly in the areas of Sekhalipur in P.S.Lalgola, Rajnagar & Nalbona in P.S.Baninagar, Hassanpur & Islampur area in P.S.Suti Paikmari & Char-Khettybari area in P.S. Bhagabangola.	
		207.00 Lakhs

ANNEXURE -VII-I

DISTRICT-MALDAH

1.	Damages to the spill checking embankment on the Left Bank of Ganga Upstream of Farakka Barrage in P.S.Kaliachak & Manikchak.	4.00 lacs.
2.	Damages to the Forward Embankment Upstream of Farakka Barrage in P.S. Kaliachak.	2.00 lacs
3.	Damages to the tagging embankment of spur no.8 in P.S. Kaliachak.	5.00 lacs.
4.	Damages to the Bank protective works for a length of 100 metre near Regulator Gate of Farakka Barrage Project on Manikchak-Valuka Road.	150.00 lacs.
5.	Damages to the Different spurs on the Left Bank of Ganga Upstream of Farakka ~~Rxxx~~ Barrage.	
6.	Damages in the form of Ghoges, raincuts, slips etc. to the left Fulahar embankment.	7.00 lacs.
7.	Damages in the form of Ghoges, raincuts, slips etc. to the ~~left Fulahar embankmentxx~~ Mahananda embankment at places in District-Malda.	11.00 lacs.
8.	Damages to the Sambalpur Circuit embankment in P.S.Malda.	4.00 lacs.
9.	Damages dut to erosion of the Bank protective works on the Lt.Fulahar Embankment at Khopakati in P.S.Malda.	2.00 lacs.
		185.00 lacs

DISTRICT-UTTAR DINAJPUR & ~~DAKSHIN~~ DINAJPUR (COMBINED)

ANNEXURE -VII-J

1.	Damages to the embankment 7 K.M.	Rs.10.00 lacs
2.	Damages to the sluices 30 K.M.	Rs.15.00 lacs
3.	Damages to the spurs and bed bars- 13 Nos.	Rs. 7.50 lacs
4.	Damages to the Building 30 Nos.	Rs. 4.50 lacs
5.	Damages to the Inspection path- 14 Kms.	Rs.14.00
	Total for Uttar & Dakshin Dinajpur Irrigation Division :-	Rs.51.00 lacs

REPORT OF DAMAGE DURING FLOOD - 1982 IN NORTH & SOUTH 24-PARGANAS DISTRICT.

Sl. No.	District	Police Station.	Name of Major Rivers.	Nature & extent of damages to Embktt.				Cost of Sluice Repair (Rs. in lakhs)
				Washed out Portion	Severely damaged	Partly damaged	Damage to dry brick pitching revetment	
							Sluice.	
1.	2.	3.	4.	5.	6.	7.	8.	9. 10.
1.	South 24-Parga.	Kakdwip, Sagar, Patharpratima Namkhana, Gosaba Basanti, Canning, Mathurapur, Kulpi, Diamond Harbour & Falta.	Hooghly, Muriganga, Saptamukhi, Bay of Bengal, Matla, Thakuran Haridanga, Bhanga, Bidya. Gomar, Hogol, Raimangal, Hooghly (Left Embktt.)	6975M.	99225M	4940M	15000 Nil No.	Rs.273'91 (Lakhs)
2.	North 24-Parga.	Basirhat, Hasnabad, Sandeshkhali, Hasnabad.	Ichamati, Bidyadhari, Raimangal, Kalindi, Chhotkolgachi.	110M	12500M	6000M	16000M -	Rs. 42'85 (Lakhs)

ANNEXURE VIII

RAINFALL REPORTS OF DIFFERENT RAINGAUGE STATIONS
IN THE DISTRICTS OF JALPAIGURI COOCH BEHAR AND DARJEELING.
DURING STORMY JULY DAY'S 1993.

Sl. No.	Name of Raingauge Station.	Rainfall in Mili-Metre. 18.7.93	19.7.93	20.7.93	21.7.93	22.7.93.	Total Rain-Fall during the period of 5 days.
1.	Hasimara. (Jalpaiguri).	4.40	220.00	368.00	790.60	2.00	1385.00
2.	Jalpaiguri.	44.00	160.00	315.00	23.00	117.00	659.00
3.	Alipurduar.	45.60	190.80	231.00	N.A	N.A	467.40 (For 3 days)
4.	Cooch Behar.	121.70	111.80	284.00	154.00	N.A.	671.50 (For 4 days)
5.	Mathabhanga (Cooch-Behar)	107.20	89.60	205.80	41.40	57.00	401.00
6.	Siliguri(Darjeeling).	3.80	198.40	378.00	13.00	34.00	627.20

RAINFALL RECORDS OF DIFFERENT RAIN GAUGE STATIONS
IN THE DISTRICTS OF JALPAIGURI COOCH BEHAR AND DARJEELING.
DURING STORMY JULY DAYS 1993.

Sl. No.	Name of Rain gauge Station.	Rainfall in Mill-Metre. 18.7.93	19.7.93	20.7.93	21.7.93	22.7.93.	Total Rain-Fall during the period of 5 days.
1.	Hasimara. (Jalpaiguri).	4.40	220.00	368.00	790.60	2.00	1385.00
2.	Jalpaiguri.	44.00	160.00	315.00	23.00	117.00	659.00
3.	Alipurduar.	45.60	190.80	231.00	N.A	N.A	467.40 (For 3 days).
4.	Cooch Behar.	121.70	111.80	284.00	154.00	N.A.	671.50 (For 4 days)
5.	Mathabhanga (Cooch-Behar)	107.20	89.60	205.80	41.40	57.00	401.00
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