

# Flood Control & Drainage

## Flood

Orissa falls under a tropical climatic zone and has 476.40 kms of coastline on the west of Bay of Bengal. The floods in the state occur mostly during monsoon season due to heavy rainfall caused by synoptic scale monsoon disturbances. Almost every alternate year, vast areas of the state are inundated due to flood or flood coupled with cyclone. Five major rivers namely Mahanadi, Brahmani, Baitatani, Subarnarekha and Rushikulya cause high floods in their delta. The rivers like Vamsadhara and Budhabalanga also cause flash floods due to instant runoff from their hilly catchments. The flood-prone area of the state has been assessed to be 33,400 km<sup>2</sup>. Flood experienced by the State in different years are enclosed in Annexure-XV.

## Flood Management

Total control of flood is not practicable from economic considerations & therefore flood management is essential. Flood management rationally refers provision of reasonable degree of protection against floods by structural /non-structural measures to mitigate the recurring havoc caused by floods. During the last five decades, a number of structural and non-structural measures have been taken to minimize flood. As a part of structural measures, reservoirs namely Hirakud on the Mahanadi River, Rengalion the Brahmani River, Upper Kolab in Kolab River & Upper Indravati in Indravati River have been constructed. Chanduli dam & Icha dam (under construction) in Jharkhand will control flood to some extent in Subarnarekha delta. Similarly, Kanupur Dam under construction in Keonjhar will also moderate flood to some extent in Baitarani delta. Rivers namely Rushikulya, Vamsadhara, Nagabali, Bahuda and Budhabalanga do not have flood control reservoirs. Besides, in the deltaic area, floods are being controlled by flood protection embankments constructed on both sides of the rivers. Total 7138kms of protective embankments, 1952 spurs & 253kms of stone packing have been constructed in different basins particularly in the deltaic areas to control the flood & saline ingress which is given in the following table.

**Table -5.1**  
**Status as on 31.03.2010**

Sl. No.	Name of Basin	Capital Embkt. (In km.)	Other Agricultural Embkt. (In km.)	Test Relief Embkt. (In km.)	Saline Embkt. (In km.)	Total (In km.)
1	2	3	4	5	6	7
1	Mahanadi	1189.386	1227.705	559.930	912.270	3896.291
2	Brahmani	208.431	291.314	290.279	372.485	1162.509
3	Baitarani	155.184	189.416	244.525	196.600	785.725
4	Rushikulya	0.000	680.417	9.565	30.000	719.982
5	Subarnarekha	30.000	26.500	123.700	28.000	208.200
6	Budhabalanga	0.000	17.200	206.000	21.200	244.400
7	Vansadhara	8.311	9.552	84.680	0.000	102.543
8	Bahuda	0.000	0.000	13.850	0.000	13.850
9	Nagavali	0.000	1.870	2.380	0.000	4.250
	<b>Total</b>	<b>1591.312</b>	<b>2443.974</b>	<b>1534.909</b>	<b>1567.555</b>	<b>7137.750</b>

For long term solution of flood problems, construction of reservoir with adequate flood cushion is required. Under the present circumstances, constructions of flood control reservoirs are difficult due to large scale submergence and other environmental and ecological aspects. Other measures such as construction of cascade reservoirs and to reframe the rule curves of existing reservoirs have been planned for flood moderation. Besides, raising and strengthening of flood protective embankments, clearance of river mouths, inter basin transfer of water in the State, Flood plain regulation / Flood plain zoning & Flood forecasting & warning systems have also been planned for effective flood management.

## **Schemes / Programmes implemented under Flood Control Sector are:**

1. Flood Management Programme (FMP)
2. RIDF
3. State Plan Scheme

### **1. Flood Management Programme**

#### **Background**

Devastation by flood is a recurrent annual phenomenon in India. Almost every year, some or other part of the country is affected by floods. Floods cause enormous damage to life, public property and disruptions to infrastructure besides psychological and emotional instability amongst the people. To address these problems, during X plan, four schemes namely Critical Anti-erosion works in Ganga Basin States, Critical Anti-erosion works in Coastal areas, Critical Flood Control and Anti-erosion schemes in Brahmaputra and Barrack valley States and Improvement of Drainage in critical areas in the country were sanctioned to provide central assistance to the flood prone states to take up flood control and river management works in critical areas. The above schemes have been merged together and a restructured scheme namely "Flood Management Programme" has been approved in principle, for XI Plan period during 2007-08.

#### **Scope of the Scheme**

The scheme covers critical flood control, river management, anti-river erosion, drainage development, anti-sea erosion, flood proofing works besides flood prone area development programme in critical regions. It would also include restoration of damaged flood control /management works.

#### **Eligibility Criteria and Financial Arrangements**

The proposals, which are appraised by the competent authority and secured all mandatory clearances from the specified Committees including State TAC, State Flood Control Board, Planning Commission, etc. would be considered and finalized for central assistance under this scheme by an Empowered Committee headed by Secretary (Expenditure), Ministry of Finance, Government of India. The Empowered Committee will have representatives from Ministry of Water Resources, Ministry of Finance, Planning Commission, Ministry of DONER, Ministry of Environment & Forests and other concerned organizations, as required.

Under the scheme, central assistance to the States would be provided for taking up flood management works in an integrated manner covering entire river / tributary or a major segment. In case of emergent situation arising due to high floods, the works in critical reaches would be taken up immediately after flood season. Funding pattern of central assistance would be as under:

- (a) Special Category States (North Eastern States, Sikkim, Himachal Pradesh, Jammu & Kashmir and Uttarakhand): 90% (Centre Share), 10 % (State Share).
- (b) Other States: 75% (Centre Share), 25% (State Share).

#### **Sector Status**

Twenty nine (29) project proposals of various categories such as construction of new embankment, raising and strengthening of existing embankment, anti sea erosion and river erosion works with an estimated cost of Rs.73.43 crore have been approved. Out of the above, one project was dropped and 28 projects have been taken up. By end of March 2010 an amount of Rs.59.52 crore has been spent and 25 projects have been completed. Remaining three projects are scheduled to be completed March 2011. Central Assistance of Rs.34.32 crore has been released in these projects by end of March 2010.

#### **Programme for 2010-11:**

An outlay of Rs.32.15 crore (central share-Rs.24.11 crore & state Share-Rs.8.04 crore.) has been provided during 2010-11 for completion of three ongoing projects and for sanction of thirty seven new projects.

## 2. RIDF:

During 2003-04, NABARD has agreed to provide loan for flood control & drainage works. So far, fifty three (53) flood control works have been taken up. The expenditure incurred by end of March 2010 and disbursement made by NABARD of these projects are given in the following table. An outlay of Rs.49.14 crore has been provided under this scheme during 2010-11.

**Table -5.2**  
**Status of RIDF project as on 31.03.2010**

Tranche	Projects(nos.)		Financial (Rs. In cr.)		
	Taken up	Completed	Estimated Cost	Expdr. Incurred ending 03/2010	Disbursement by NABARD ending 3/2010
RIDF-IV	1	1	3.26	3.00	2.22
RIDF-VII	1	1	0.87	1.00	0.71
RIDF-IX	1	1	1.03	1.22	0.91
RIDF-X	3	3	10.29	11.03	9.28
RIDF-XII	16	13	19.48	17.52	14.30
RIDF-XIII	5	-	38.73	19.21	13.75
RIDF-XIV	9	-	60.24	16.97	12.71
RIDF-XV	17	-	65.81	0.11	-
<b>Total</b>	<b>53</b>	<b>19</b>	<b>199.71</b>	<b>70.06</b>	<b>53.88</b>

## Flood Damage Restoration Works

Restoration of damaged assets normally requires resources well beyond those available with the Department. These works are taken up through CRF/NCCF/NFCR grant. The allotments received under different schemes for 2004-05, 2005-06, 2006-07, 2007-08, 2008-09 & 2009-10 are given in the following table.

**Table -5.3**  
**CRF/NFCR/NCCF Grant**

Year	Allotment Received (in cr.)	Expenditure incurred (in cr.)
2004-05	55.38	55.38
2005-06	71.56	71.56
2006-07	113.72	113.72
2007-08	45.10	45.10
2008-09	113.13	113.13
2009-10	36.85	36.85

## Flood Forecast and Warning

Non-structural measures like flood forecasting and warning of incoming floods have also played a significant role in reducing the loss of life and movable property apart from alerting the civil and engineering authorities' in-charge of various works to take appropriate advance action to fight the onslaught of floods. There are eleven flood forecasting stations managed by CWC located in our state at Naraj, Alipingal, Nimapada in Mahanadi Basin, Jenapur in Brahmani Basin, Anandapur & Akuapada in Baitarani Basin, NH5 (Gobindapur) in Budhabalanga Basin, Rajghat in Subernarekha Basin, Purusottampur in Subernarekha Basin and Gunupur, Kashinagar in Vamsadhara Basin. Apart from that one in flow forecasting station is functioning at Burla in Mahanadi Basin. In Upper Mahanadi Basin, modern technique such as telemetry system was installed for flood forecasting. CWC collects daily readings of river gauges, discharge and rainfall etc. of various water bodies in all basins. They also collect daily hydro meteorological data from State Departments, IMD and other agencies. CWC

maintains wireless communication network between their gauge stations in Orissa. Basing on the field information and IMD forecast, they prepare the forecast message and warnings and communicate them to different departments including Water Resources Department. This message is immediately communicated to the field functionaries/ Collectors including Revenue Department to take precautionary measures.

### Real Time Forecast System

Travel times of flood in different rivers have been worked out so that advance warning of flood in the delta region can be given. The basin-wise list of travel time from control structures / from important gauge station to station is given in the following page. A Flood Management Information Cell (FMIS) was established during 2007, which will provide real time information on early flood warning, possible flood inundation and its impact by using advanced space technology (Remote Sensing & Geographical Information system). At present, FMIS cell is collecting flood related data of Mahanadi Basin. National Remote Sensing Agency, Hyderabad has been requested to establish linkage for operational support and providing application software for the said purpose.

**Table -5.4**  
**Travel time between gauge Station of Different Rivers**

Station to Station	Travel Time	Distance in Km.
<b>Mahanadi Basin</b>		
i. Ghorari to Seorinarayan	14 hrs	102
ii. Nandaghat to Seorinarayan	08 hrs	104
iii. Seorinarayan to Saradihi	08 hrs	56
iv. Hasdeo to Saradihi	10 hrs	80
v. Saradihi to Hirakud Dam	12 hrs	97
vi. Tarapur to Hirakud Dam	14 hrs	103
vii. Deogaon to Hirakud Dam	09 hrs	90
viii. Hirakud to Khairmal	12-18 hrs	115
ix. Khairmal to Barmul	12-16 hrs	109
x. Barmul to Mundali	12-16 hrs	125
<b>Brahmani Basin</b>		
Rengali Dam to Talcher	6-7 hrs	40
Talcher to Jenapur	18-20 hrs	100
<b>Baitarani Basin</b>		
Champua to Swampatana	10 hrs	65
Swampatana to Anandapur	07 hrs	52
Anandapur to Akhupada	7-9 hrs	40
<b>Budhabalanga Basin</b>		
Chandanpur to Baripada	06 hrs	41
Baripada to NH5	08 hrs	69
<b>Subarnarekha Basin</b>		
Jamshedpur to Jamsolaghat	13 hrs	90
Jamsolaghat to Rajghat	20 hrs	90
Rajghat to Bhogarai	07 hrs	25
<b>Rushikulya Basin</b>		
Sorada to Purusottampur	11 hrs	67
Madhabarida to Purusottampur	12 hrs	60
<b>Vansadhara Basin</b>		
Gudari to Gunupur	05 hrs	35
Gunupur to Kashinagar	02 hrs	27

## PHOTOGRAPHS



Spur & Slope protection work at RD 17.42 km on River Paika (work Completed under Flood Management Programme)



Slope protection work in left bank of river Subarnarekha at Chitimisira (work in progress under FMP)



Bank protection at Sribantapur (work in under RIDF-X)



Restoration of marginal flood embankment from Chanipal to Mahurpal on Brahmani Left at village Bhuatal (work in completed under RIDF-XII)

## Drainage

The natural topographical factor (flat terrain) is the primary cause of drainage congestion in coastal belts of Orissa. Therefore, disposal of run-off resulting from rainfall takes considerable time. Further, the problem gets aggravated due to formation of sand bars across the river mouth sand tidal lockage. The drainage congestion affects crop yield. It has been estimated that 30% of the CCA i.e. 2.17 lakh ha suffers from poor drainage and water logging problems. To harness the potential for increased agricultural growth, a Master plan amounting to Rs.856.46 Cr. to retrieve 1.90 lakh ha. Of waterlogged area has been prepared & submitted to CWC for necessary clearance. The doab-wise abstract of Master Plan is given in the table below.

**Table -5.5  
Drainage Sector Status**

Sl. No.	Name	Area can be retrieved (Th. Ha.)	Length of Drainage System (Km.)			
			Primary Drain	Secondary Drain	Link Drain	Total
1	Doab-I (Mahanadi-Kathajodi-Devi)	20.50	388.99	421.99	302.24	1113.22
2	Doab-II (Mahanadi-Chitrotpala-Luna-Birupa)	29.50	113.00	452.00	342.00	907.00
3	Doab-III (Luna-Chitrotpala)	2.60	33.65	22.62	46.00	102.27
4	Doab-IV (Area to east of HLC Range-I)	3.00	165.40	168.70	39.20	373.30
5	Doab-V (Kathajodi-Kusabhadra)	20.00	204.48	246.33	559.65	1010.46
6	Doab-VI (Kusabhadra-Bhargavi)	11.00	84.20	234.87	171.50	490.57
7	Doab-VII (Daya-Bhargavi)	20.00	67.70	249.65	580.11	897.46
8	Doab-VIII (Area west of Daya)	4.00	37.00	59.35	89.00	185.35
9	Doab-IX (Subernarekha-Budhabalanga)	16.057	229.13	240.49	40.60	510.22
10	Doab-X (Budhabalanga-Kansabansa)	3.228	200.30	192.55	12.00	404.85
11	Doab-XI (Kansabansa-Montei)	10.50	37.20	144.40	139.55	321.15
12	Doab-XII (Montei-Salandi)	8.50	61.80	224.15	350.20	636.15
13	Doab-XIII (Salandi-Baitarani)	5.80	104.70	166.10	160.60	431.40
14	Doab-XIV (Baitarani-Brahmani)	19.50	190.00	0.00	607.50	797.50
15	Doab-XV (West of Daya-Salia)	6.55	123.40	88.00	21.50	232.90
16	Doab-XVI (Salia-Rushikulya)	4.29	88.00	92.00	61.00	241.00
17	Doab-XVII (Rushikulya-Vansadhara)	5.23	207.00	51.00	75.00	333.00
	<b>Total</b>	<b>190.255</b>	<b>2353.00</b>	<b>3030.17</b>	<b>3547.65</b>	<b>8930.82</b>

## Present Status:

To address drainage congestion and water logging problems, a separate drainage organization was created during 2001 to look after the drainage work. As there is no specific scheme for drainage development, most of the works are being carried out through RIDF, NCCF, SGRY funds. Scheme-wise details are given below.

### 1. RIDF:

During 2004-05, NABARD has agreed to provide loan for drainage works. So far, sixty-five (65) drainage works have been taken up. An outlay of Rs.65.84 crore has been provided for the year 2010-11 under this scheme. Tranche-wise physical and financial status is given in the following table

**Table -5.6**  
**Status as on 31.03.2010**

Tranche	Projects (nos.)		Financial (Rs. in Cr.)		
	Taken up	Completed	Estimated cost	Expdr. Incurred by 3/2010	Disbursement by NABARD ending 3/2010
RIDF-III	1	1	13.36	6.71	6.69
RIDF-XII	22	19	43.65	37.24	28.67
RIDF-XIII	10	4	16.16	10.13	7.79
RIDF-XIV	28	5	69.59	25.17	13.13
RIDF-XV	4	-	5.85	0.01	0.00
<b>Total</b>	<b>65</b>	<b>29</b>	<b>148.61</b>	<b>79.26</b>	<b>56.28</b>

### 2. Flood Management Programme:

In 2008-09, 41 projects were taken up at an estimated cost of Rs.119.59 under this scheme. By the end of March 2010, an amount of Rs.50.56 Crore has been spent for these works and 14 projects have been completed. Further, project proposal of 16new projects have been submitted to Government of India for inclusion under FMP. An outlay of Rs.61.21 crore (Central share Rs.45.91 crore, State Share Rs.15.30 crore) has been proposed during 2010-11 for ongoing and new projects.

### 3. State Fund:

**River Mouth Clearance Work:** The mouth of the rivers Daya, Luna, Bhargavi, Makara and their tributaries which outfall in to Chilika Lagoon, have been silted over a period of time causing water logging of vast cultivated land during rainy season and affecting the crop yields drastically. The State Government has decided to take up the work entrusted Ocean Engineering Department of Madras IIT to study the drainage congestion and suggest remedial measures. In the meantime, Madras IIT has submitted project report. The total cost involved for this work is Rs.29.49 crore. By end of March2010 an amount of Rs.20.45 crore has been spent for the work.



Chotagenguti drainage channel (work completed under FMP)



Improvement to Bahilpur drainage (dredging work in Progress under FMP)



Pile Foot Bridge over Junei drainage channel (completed under RIDF)



Canal aqueducts across Govari drainage system (completed RIDF-XII)

