



## CHAPTER - 5 Flood Control & Drainage

### General Flood Problem

The flood & cyclones in Odisha are regular features. 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, Baitarani, Subarnarekha and Rushikulya cause high floods in their delta. The rivers like Vansadhara and Budhabalanga also cause flash floods due to instant runoff from their hilly catchments. The catchment areas of Mahanadi, Brahmani and Baitarani are much larger than their Deltas. These rivers carries large amount of silt from mountain ranges during moonson and in reaching the plains, the velocity of river suddenly reduced and silt gets deposited in the river beds. This causes formation of levees and obstruct free discharge of flood water. Along the sea coast, these exist a steady northward littrol drift. This drifts tends to form sand bars across the river mouth from south to north. These bars form unbroken sand dunes by the wind during hot weather. During monsoon, these bars obstruct draining of water in to the sea. Added to this fact, the tidal current in the Bay of Bengal coupled with high moonson wind raise the sea level which obstruct free discharge of flood water. Due to these problems the river in the delta head out

flank in their banks and sometimes spill over the banks causing flood.

### Flood Management

Total control of flood is not practicable from economic considerations & therefore flood management is essential. So far, 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, Rengali on the Brahmani river, Upper Kolab in the Kolab river & Upper Indravati in the Indravati river have been constructed. Chandil dam & Ichha dam (under construction) in Jharkhand will control flood to some extent in Subernarekha delta. Similarly, Kanpur dam under construction in Keonjhar will also moderate flood in Baitarani delta. Rivers namely Rushikulya, Vansadhara, Nagabali, Bahuda and Budhabalanga do not have flood control reservoirs. In the deltaic area, floods are being controlled by flood protection embankments constructed on both sides of the rivers. Total 7138 kms of protective embankments,1952 spurs & 253 kms 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 of embankments as on 31.03.2015**

Sl. No.	Name of Basin	Capital Embkt. (in Km.)	Other Agricultural Embkt. (inKm.)	Test Relief Embkt. (in Km.)	Saline Embkt. (in Km.)	Total (in Km.)
1	Mahanadi	1189.386	1227.705	559.930	919.2700	3896.291
2	Brahmani	208.431	291.314	290.279	372.4850	1162.509
3	Baitarani	155.184	189.416	244.525	196.6000	785.725
4	Rushikulya	0.000	680.417	9.565	30.0000	719.982
5	Subarnarekha	30.000	26.500	123.700	28.0000	208.200
6	Budhabalanga	0.000	17.200	206.000	21.2000	244.400
7	Vamsadhara	8.311	9.552	84.680	0.0000	102.543
8	Bahuda	0.000	0.000	13.850	0.0000	13.850
9	Nagavali	0.000	1.870	2.380	0.0000	4.250
<b>Total</b>		<b>1591.312</b>	<b>2443.974</b>	<b>1534.909</b>	<b>1567.5550</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, construction 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 has been planned for flood moderation. Besides, raising and strengthening of flood protective embankments, clearance of river mouths, inter basin transfer of water within the state, Flood plain regulation / Flood plain zoning & Flood forecasting & warning systems have also been planned for effective flood management.

## Schemes / Programmes

### 1. Rural Infrastructure Development Fund (RIDF)

During 2003-04, NABARD has agreed to provide loan for flood control & drainage works. So far, two hundred eighty nine (289) projects comprising of two hundred sixty eight (268) flood control works and twenty one (21) bridges and road improvement works have been sanctioned. Out of which eighty six (86) projects have been completed by March 2015. The tranche-wise expenditure incurred and disbursement made by NABARD up to end of March 2015 of these projects are given in the following table.

**Table -5.2**  
**Status of RIDF projects as on 31.03.2015**

Tranche	Projects (Nos.)		Financial (₹ in Cr.)		
	Takenup	Completed	Estimated Cost	Expdr. incurred ending 03/2015	Disbursement by NABARD ending 3/2015
RIDF-IX	1	1	1.03	1.22	0.91
RIDF-X	2	2	9.94	10.57	9.23
RIDF-XII	16	16	19.31	19.20	17.51
RIDF-XIII	5	4	42.66	31.55	28.75
RIDF-XIV	10	10	72.18	74.67	58.31
RIDF-XV	15	11	46.39	39.83	35.81
RIDF-XVI	23	17	87.29	64.27	58.55
RIDF-XVII	23	11	152.46	120.66	110.40
RIDF-XVIII	36	1	307.91	170.30	169.27
RIDF-XIX	31	0	245.40	126.65	119.81
RIDF-XX	106	0	775.93	5.62	95.87
<b>Total</b>	<b>268</b>	<b>73</b>	<b>1760.50</b>	<b>664.54</b>	<b>704.42</b>
Other works	21	13	60.75	48.37	35.37
<b>G. Total</b>	<b>289</b>	<b>86</b>	<b>1821.25</b>	<b>712.91</b>	<b>739.79</b>

Note : 105 Projects not started (project details in Annexure-XIX & XX)



Sluice constructed at Baranga under RIDF (Mirichia-Jhirkidia Gherry)



### 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 from 2004-05 to 2014-15 are given in the table below.

**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
2010-11	38.42	38.42
2011-12	162.16	162.16
2012-13	45.82	45.82
2013-14	54.90	54.90
2014-15	79.14	74.36

### 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 Rushikulya Basin and Gunupur, Kashinagar in Vansadhara Basin. Apart from that one inflow 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 Odisha. 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 (FMIC) was established during 2007, in the office of the Engineer-in-Chief, Water Resources which is providing real time information on early flood warning, possible flood inundation and its impact by using advanced space technology (Remote Sensing & Geographical Information system). FMIC is collecting flood related data of Mahanadi Basin.



**Table-5.4**  
**Travel time of flood water between gauge Stations of Different Rivers**

Sl. No.	Name of the Station	Travel Time in hours	Distance in Km.
<b>1</b>	<b>Mahanadi basin</b>		
i)	Ghorari to Seorinarayan	14	102
ii)	Nandaghat to Seorinarayan	8	104
iii)	Seorinarayan to Saradihi	8	56
iv)	Hasdeo to Saradihi	10	80
v)	Saradihi to Hirakud Dam	12	97
vi)	Tarapur to Hirakud Dam	14	103
vii)	Deogaon to Hirakud Dam	9	90
viii)	Hirakud to Khairmal	12- 18	115
ix)	Khairmal to Barmul	12- 16	109
x)	Barmul to Mundali	12- 16	125
<b>2</b>	<b>Brahmani Basin</b>		
i)	Rengali Dam to Talcher	6-7	40
ii)	Talcher to Jenapur	18-20	100
<b>3</b>	<b>Baitarani Basin</b>		
i)	Champua to Swampatana	10	65
ii)	Swampatana to Anandapur	7	52
iii)	Anandapur to Akhuapada	7-9	40
<b>4</b>	<b>Burhabalanga Basin</b>		
i)	Chandanpur to Baripada	6	41
ii)	Baripada to NH5	8	69
<b>5</b>	<b>Subarnarekha Basin</b>		
i)	Jamshedpur to Jamsolaghat	13	90
ii)	Jamsolaghat to Rajghat	20	90
iii)	Rajghat to Bhogarai	7	25
<b>6</b>	<b>Rushikulya Basin</b>		
i)	Sorada to Purusottampur	11	67
ii)	Madhabarida to Purusottampur	12	60
<b>7</b>	<b>Vamsadhara Basin</b>		
i)	Gudari to Gunupur	5	35
ii)	Gunupur to Kashinagar	2	27



## PHOTOGRAPHS (FLOOD CONTROL WORKS)



*Kusabhadra Left Embankment (Slope protection work and spur at Behera completed under RIDF)*



*Old Maratha Embankment (Rising and Strengthening of embankment & Slope protection work completed under RIDF)*



## Drainage

The natural topographical factor (flat terrain) is the primary cause of drainage congestion in coastal belts of Odisha. 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 mouths and tidal lockage. The drainage congestion affects crop

yield. It has been estimated that 30% of the CCA in deltaic area about 2.17 lakh ha suffers from poor drainage and water logging problems. To harness the potential for increased agricultural growth, a Master plan to retrieve 1.90 lakh ha. of waterlogged area has been prepared. 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-Vamsadhara)	5.23	207.00	51.00	75.00	333.00
	<b>Total</b>	<b>190.255</b>	<b>2335.95</b>	<b>3054.20</b>	<b>3597.65</b>	<b>8987.80</b>

### Present Status:

To address drainage congestion and waterlogging problems, a separate drainage organization was created during 2001 to look after the drainage work. The drainage development, works are being carried out through RIDF, NCCF, State funds.

1. **RIDF:** During 2004-05, NABARD has agreed to provide loan for drainage works. So far, hundred one (101) drainage works have been taken up, out of which 70 works have been completed. Tranche-wise physical and financial status is given in the following table.



**Table -5.6**  
**Status of RIDF Projects as on 31.03.2015**

Tranche	Projects (Nos.)		Financial (Rs. in Cr.)		
	Takenup	Completed	Estimated Cost	Expenditure incurred by 3/2015	Disbursement by NABARD ending 3/2015
RIDF-III	1	1	13.36	6.71	6.68
RIDF-XII	22	22	44.50	43.47	36.29
RIDF-XIII	9	9	14.48	14.39	12.23
RIDF-XIV	28	25	73.37	70.31	60.22
RIDF-XV	4	3	6.64	6.00	5.24
RIDF-XVI	12	7	113.38	73.22	70.86
RIDF-XVII	11	3	74.06	64.17	60.04
RIDF-XVIII	1	-	1.16	1.21	1.10
RIDF-XIX	10	-	35.98	2.16	2.02
RIDF-XX	3	-	6.63	0.00	1.26
<b>Total</b>	<b>101</b>	<b>70</b>	<b>383.56</b>	<b>281.64</b>	<b>255.94</b>

Note : 9 projects not started (Project Details in Annexure-XIX & XX).

## 2. Drainage Improvement Programme (DIP)

To address drainage congestion in the irrigated, un-irrigated command and in urban areas, State Government have launched "Drainage Improvement Programme (DIP)" with an outlay of ₹1000.00 crores to be implemented over a period of five years i.e. from 2014-15 to 2018-19. The Scheme will be operational in the seventeen Doabs facing drainage congestion where a part of agricultural land is mostly water logged due to poor drainage, selected urban areas and low lying area around wetlands where flooding for a longer period possess threat to the life and property of the affected people. The main objectives of the scheme are as follows:

i) Retrieval of about 1,79,000 ha. of cultivable area,

- ii) Increase in crop productivity by an average of 10% in the area of influence,
- iii) Arresting saline ingress in around 10,000 ha. of Gross Cultivable Area (GCA),
- iv) Reduction of inundation time through improvement of carrying capacity by way of removal of shoals and islands etc. from rivers and drainage channels and river mouth clearance.
- v) Improved natural drainage facilities in select urban areas and areas facing acute drainage problem around wetlands through gravity or by pumping arrangement,
- vi) Renovation and de-silting of select urban water bodies.

During 2014-15, an amount of ₹ 85.99 crore has been spent under this programme.