CHAPTER-3

River System & Basin Planning

River System

There are twelve major rivers flowing in the State, of which the Mahanadi is the longest and the Bahuda is the shortest. The rivers of Odisha are mainly rainfed. Brief details of the rivers are given below.

(i) The Mahanadi

It originates from the Amarkantak hills of the Bastar Plateau near Pharasiya village in Raipur district of Chhatisgarh. The river traverses a total distance of 851 Km (in Odisha - 494 Km.) and falls in to the Bay of Bengal. The important tributaries of Mahanadi inside Odisha are Ib, Ong, Tel, Jira, Salki, Kuanria, Hariharjore, Sagada, Ret, Hati, Indra, Suktel, Utei, Udanti, Lanth, Sapua etc. The major branches and sub-branches of Mahanadi are Kathajodi, Birupa, Kuakhai, Daya, Bhargavi, Kushabhadra, Biluakhai, Devi, Kandala, Luna, Chitrotpala, Karandia, Paika and Badagenguti. All the major branches and sub-branches including Mahanadi falls into Bay of Bengal except Daya & Bhargavi which fall in to Chilika Lake.

(ii) The Brahmani

It is the second largest river in Odisha. Two major rivers, the Sankh and the Koel, originate from the Chhotanagpur Plateau and join at Vedavyasa near Rourkela in Sundargarh district of Odisha to form a major river called the Brahmani. It flows through Sundargarh, Keonjhar, Dhenkanal, Cuttack and Jajpur districts in the Coastal Plains and enters into the Bay of Bengal at Dhamra. The Brahmani is 799 Km long. There are 45 major tributaries of the Brahmani, of which the important ones are Sankha, Chandrinalla, Katangamunda nalla, Rukura, Badjore, Kaunish nalla, Kalanalla, Usthalinalla, Chudakhainallah, Gohira, Chilanti river, Tikira, Singadajore, Bangaru river, Nandiranalla, Nigra river, Bangusingha nalla, Barha, Daunri, Kumaria, Kelua river, Birupa, Hansua, Kharsuan, Patasala in right side and Koel, Suidihi, Champalijore, Kuradihi, Amrudi, Korapani, Mankada, Ambahari, Samakoi, Gambhiria, Raijore, Indrajeet, Ramiala, Pandra, Kharasuan, Daudi in the left side.

(iii) The Baitarani

It rises from the Gonasika in the Guptaganga hills of Keonjhar district. The river traverses a total distance of 360 kms. before falling into the Bay of Bengal. There are 64 large, medium and small tributaries, out of which 35 join on the left side and 29 join on the right side of the river. The main tributaries are Kangira, Ardei, Khairi Bhandan, Deo, Kanjhari, Sita, Musal, Remal, Kusei and Salandi river. The Salandi originates from the Meghasani hills of the Similipal in Mayurbhanja district. It flows a distance of 144 Km with a catchment area of 1800 Sq.Km.

(iv) The Subarnarekha

It originates near Nagri village of the Chhotnagpur plateau of Jharkhand. Total length of the river from its origin to its outfall into Bay of Bengal is 446.12 Km, including 79 Km in side Odisha. The prominent tributaries of the Subarnarekha are Raru river, Kanchi river, Damra river, Karru river, Kharkhai river, Chinguru river, Karakari river, Gurma river, Garra river, Singaduba river, Kodia river, Dulunga river and Khaijori river.

(v) The Budhabalanga

The Budhabalanga originates from the Similipal range of hills on Mayurbhanj district and travels a total length of 198.75 km. before it finally empties into the Bay of Bengal. The prominent tributaries of the Budhabalanga are Palapala, Sunei, Kalo, Sanjo, Deo, Gangahari and Katra.

(vi) The Jambhira

It originates from Chandra Reserve forest in Mayurbhanj district and travels a total length of 90 km before it finally falls in Bay of Bengal. The prominent tributaries of river Jambhira are Mahanti, Gulfa, Surudi, Murli, Saan, Bans and Hansakara.

(vii) The Rushikulya

It rises from the Rushyamala hills of the Eastern Ghats in Kandhamal district and flows in the south east direction and falls into the Bay of Bengal near Chatrapur. The prominent tributaries of the river Rushikulya are Padma, Boringanalla, Joro, Badanadi, Baghua, Dhanei and Ghodhado. It has no delta in its mouth.

(viii) The Bahuda

It rises near village Luba from the Singharaj hills of the Eastern Ghats in Gajapati district. It flows in the north east direction upto 55km, south east direction for 17 Km in Odisha before entering Andhra Pradesh to flow for 18 Km. Then it turns in North-east direction for 6 Km in Odisha before meeting the Bay of Bengal near the village Sunapurapeta, Odisha. The river traverses a total length of 96 Km & the prominent tributaries are Poichandia, Bogiriadi, Batrada Nalla & Kantajura Nalla.

(ix) The Vansadhara

It originates from the flanks of the Durgakangar hills (Lingaraj hills) of the Eastern Ghats in Kalahandi district. The river traverses a total distance of 239 Kms before its outfall into the Bay of Bengal in Andhra Pradesh. The prominent tributaries of river Vansadhara are Bhangi, Pedagoda on right side and Badanalla, Chauladhua, Pandaka Nalla, Badajhar, Harbhangi, Sananadi, Mahendratanaya on left side.

(x) The Nagavali

It originates from the Bijipur hills of the Eastern Ghats near village Lakhabahal in Kalahandi district. The total length of the river is 217 Km of which 125 Km lies in Odisha and remaining portion in Andhra Pradesh.The prominent tributaries are Pitadar Nalla, Datteibannda Nalla, Sana-nadi, Barha-nadi, Baldiya-nadi, Sat Nalla, Sitagura Nalla, Ghora Nalla, Sitaghera Nalla, Srikona-nadi, Bonamarha-nadi, Errigeda Nalla & Jhanjhabati river.

(xi) The Indravati

It originates from the Eastern Ghats of Dandakaranya range in Kalahandi district & flows in a westerly direction; enters into Jagdalpur district in Chhatisgarh state. It further traverses in the westerly direction & there after in southern direction before finally meeting river Godavari at the border of Maharastra, Chhatisgarh & Andhra Pradesh. The major tributaries of river Indravati are Keshadhara Nalla, Kandabindha Nalla, Chandragiri Nalla, Golagar Nalla, Poragarh Nalla, Kapur Nalla, Muran River, Bangiri Nalla, Telengi Nalla, Parlijori Nalla, Turi Nalla, Chourijori Nalla, Damayanti Sayarh, Kora river, Modang river, Padrikundijori river, Jaura river & Bhaskel river.

(xii) The Kolab

It originates from the Sinkaran hills of the Eastern Ghats in Koraput districts and finally meets the Godavari in Andhra Pradesh. The prominent tributaries of Kolab are Karandi Nalla, Guradi Nalla, Kangar Nalla, Garia, Dharmageda Nalla, Jam Nadi, Malengar river, Mulervagu Nalla, Potteru Vagu Nalla, Machhakund river, Sileru river.

Basin Planning

Introduction

The State of Odisha comprises of 11 Nos of major river basins covering a geographical area of 1,51,976 Sq.Km and minor river basins draining directly to the Bay of Bengal from an area of 3731 Sq.Km wih a total area of 1,55,707 Sq.Km.

Objective of River Basin Planning

The planning process for a river basin can be described as an orderly procedure to obtain an optimum development of the water and related land resources. It offers a frame work for bringing out integration in planning consistence with overall economic, social and environmental policies of the country by development of providing drinking water, Ecology, Irrigation, Hydropower, Industrial use and navigationThe objective of preparing river basin plans in Odisha are as follows:

i) To prepare a long term perspective plan for the development of the Basin's Water Resources.

ii) To develop a comprehensive and integrated approach to the development of water and other natural resources using water with due regard to constraints imposed by configuration of water availability.

iii) To create a data bank for benefit of future generation.

iv) To review the management of existing water resources projects and incorporate necessary changes on both administrative and technical aspect so as to make the projects sustainable.

v) To identify and set priorities for promoting water resources development projects.

Achivement During 2019-20

The following activities have been performed during 2019-20.

A) Basin Planning of 11 river basins of Odisha.

i) Hydrological data collection like rain fall in 314 blocks of Odisha, and gauge discharge data of all rivers and their tributaries since inception from different sources.

(ii) Rain fall analysis.

(iii) Analysis for water availability study.

(iv) Annual & quarterly Basin Management Report of all river basins and consolidated report for submission to DoWR.

B) (i) Feed back for CWC law frame work.

(ii) Views and suggestions submitted before the revision amendment committee for National Water Policy-2012 for submission of New National Water Policy.

C) Water availability study at different locations of rivers and tributaries for allocation of water to different industries and public water supply.

D) Correspondence on inter /intra basin related issues etc.

E) Preparation of Report for TAC.

Programme for Basin Planning of 11 River basins of Odisha for 2020-21

A) Basin planning of 11 river basins of Odisha

i) Collection of Data like Rain fall of all blocks in a basin and GD flow of all rivers and their tributaries for analysis for water availability study.

(ii) Preparation of Annual Basin Management Report of all river basins and consolidated report.

(iii) Suggestions on Draft law/act/policy as required time to time by CWC.

B) Finalization of Draft State Water Policy-2020.

C) Flow analysis at different rivers and tributaries for upcoming Industrial Allocation as and when required.

D) 16th State Water Resources Board meeting (SWRB).

E) Correspondence on Inter /intra basin related issues etc.

F) Preparation of source of identification for water availability for irrigated in 35% less irrigated blocks of Odisha.

G) Programme for planning of water resources projects from topo based planning to GIS based planning.

H) Finalization of Report on river system of 11 river basins of Odisha required for the preparation of River Basin Master Plan.

I) Finalization of In-stream storage structure proposal of Daringbadi block of Kandhamal

district, Rushikulya basin after receipt of suggestion from Chief Engineer & Basin Manager, RVN basin.

(J) Finalization of executive summary of Brahmani basin with In-stream storage structure proposal.

GIS in Basin Planning

Geographic information system (GIS) is a computer based application of technology involving spatial and attributes by capturing, storing, integrating, manipulating, organizing, analyzing, and displaying geographically referenced information (i.e data located to their location) to act as decision support tool. It keeps information in different layers and generates various combinations pertaining to the requirement of the decision making.

In-line with India-WRIS, developed jointly by CWC, NRSC and ISRO for the development of web-GIS Water Resources Information System of India, it has been planned to develop the GIS data base for all the eleven river basins in Odisha in the GIS cell. River basin has been considered as the basic hydrological units for Water Resources Planning and management.

GIS data base report includes the major, medium water resources projects, Hydro-metrological observation sites, topo graphic characteristics, climatic variability, land use land cover pattern, National water way etc. These reports has been prepared on 20-24 thematic layers and it has been contemplated to available latest information of the basin from all aspect of water resources which will be useful as base line information for the irrigation officials, Hydrologists, Agriculturist, conservationist and research organizations. The draft reports have already been prepared to different thematic layers for all the 11 river basins. After verification of the reports by the concerned C.Es & B.M, an Altas of Odisha river basin will be prepared.

Preparation of different thematic maps of Mahanadi Basin related to Mahanadi Water Dispute Tribunal (MWDT) matter is being prepared like drainage system of entire Mahanadi including Chhatisgarh using both topographic and satellite image, C.A delineation by Arc GIS using Aster DEM for independent tributaries of upper, middle and lower Mahanadi. Demarcation of gross ayacut area for Completed, Ongoing and Future irrigation projects. Catchment area demarcation, thiessen polygon with weightage using ArcGIS at CWC GD site in upper Mahandi Basin, Annual, Monsoon and Non-Monsoon Isohyets of flood and drought period of entire Mahanadi for hydrological analysis meant forTribunal cases.

Geo-tagging of all the Industries classified by Water Services for different categories i.e Operational, Closed, Not Grounded and Recommended coming under 11 River Basins has been completed and shared with Project Planning unit for identification of Instream Storage Structures (ISS) for better management of water availability.

Ayacut sanitization prepared by ORSAC using the Web ODIIS will be verified and updated in GIS cell in due course.

Climate Change and its mitigation in Odisha State

The statistical distribution of weather pattern is called climate change. Now world is increasingly confronted with amounting evidence of significant alterations in climate patterns due to anthropogenically generated green house emission. Its effect creates

i. Rising of sea level due to melting of glacier, lead submergence of coastal area and its erosion.

ii. Occurrence of extreme events of floods and droughts causing habitant destruction.

iii. Increase disease transmission.

iv. Changes in water availability.

v. Changes in agricultural productivity.

On June 2008, Hon'ble Prime Minister of India released country's first National Action Plan on Climat Change (NAPCC), outlining existing & future policies & programmes addressing climate mitigation and adaptation. The 8 National Missions

form the core of the National Action plan for Climate Change (NAPCC). National Water Mission (NWM) is one of them. The main objective of the NWM is conservation of water; minimize wastage, ensuring equitable distribution both across and within the state through its five goals.

I. Comprehensive water data base in public domain and assessment of the impact of climate change on water resources.
II. Promotion of citizen and state actions for water conservation, augumentation & preservation.
III. Focused attention to vulnerable areas including over-exploited areas.
IV. Increasing water use efficiency by 20%.
V. Promotion of basin level integrated water resources management.

Odisha Climate Change Action Plan had been formulated in line with National Action Plan on Climate Change (NAPCC). The Department of Water Resources had identified four priorities, such as

i. To increase water use efficiency.
ii. Conservation of water resources.
iii. Flood Control, river training, drainage improvement and arresting saline ingress.
iv. Assessment of impact of climate change on water resources of the State.

The State Specific Action Plan (SSAP) for the state of Odisha under National Water Mission is under prepration by Odisha Construction Corporation Limited. The SSAP would essentially consist of:

i) Present situation of water resources development and management, water governance, institutional management, water related policies, cross boundary issue, agreements etc. This would constitute the status report on the State/ Union Territory. The documents should also define problems/ issues related to all the aspects of water resource specific to the state.

ii) Identifying a set of probable solutions to address the issues/problems areas giving pros and cons of the solutions including assessment of impact of climate change on the Water Resources sector in the state/ basin shall be made for next 30 years from year 2015.

iii) Preparation of detail action plan for each of the strategy/activities identified in the NWM to be implemented by the state.

iv) Necessary MoU was signed; Agreement has been drawn between OCCL (the Nodal Agency from DoWR of GoO) and NERIWALM (the nodal Agency from National Water Mission) on 03.06.2016. SSAP in Ist stage was done and submitted to NWM. But the said ToR has been changed. New templates were framed for SSAP. Odisha is in favour of a simple SSAP. For which new formats were developed for preparation of State Specific Action Plan for water sector of Odisha.

v) Draft Status Report on State Specific Action Plan (SSAP) on water sector of Odisha has been prepared by M/s OCC Ltd. and submitted to NERIWALM on 21.01.2017.

vi) Quarterly progress report on Climate Change basing on monthly programme expenditure report of DoWR are being submitted to GOVT.

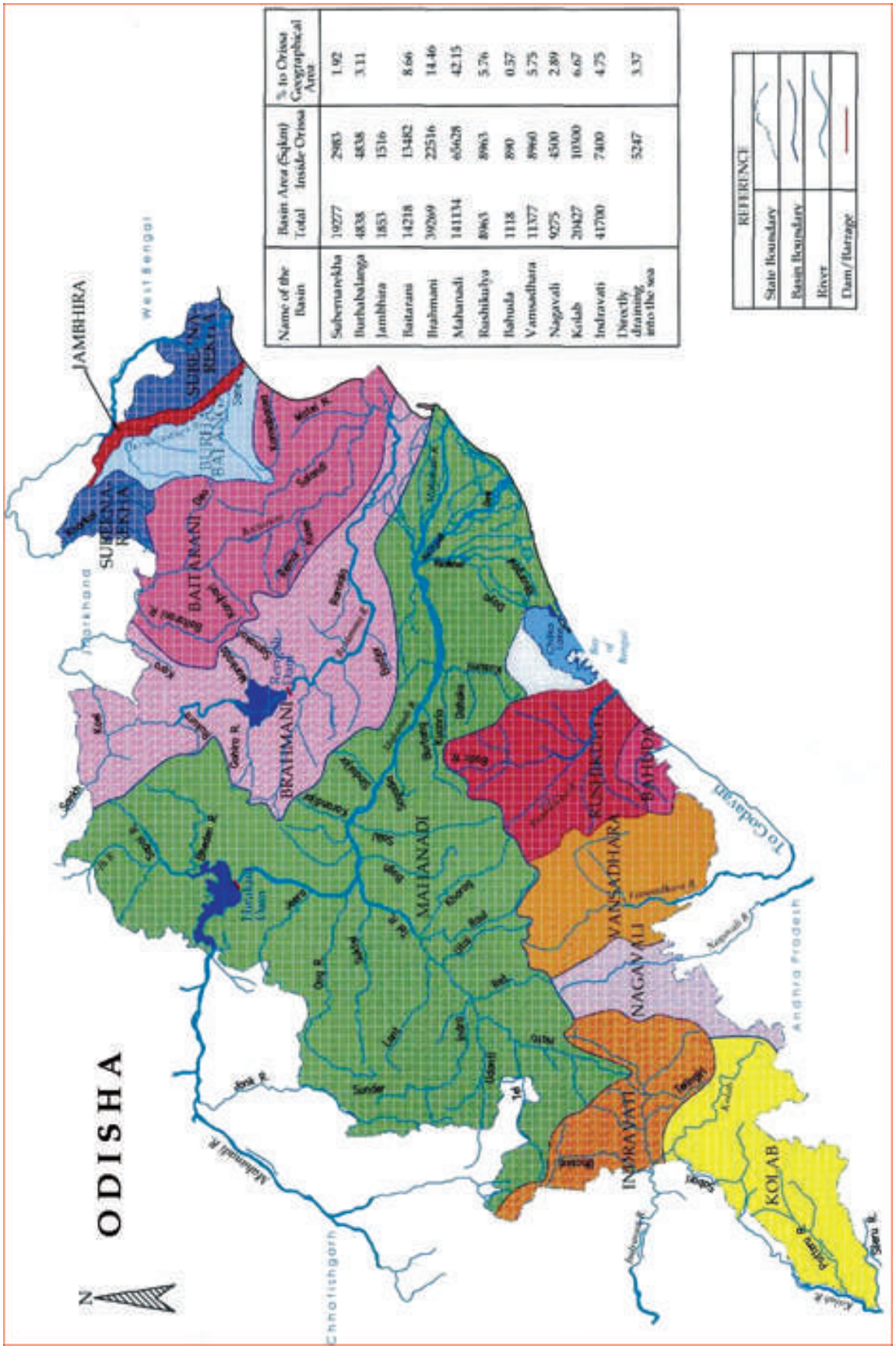
vii) Correspondence on NGT cases regarding preparation of Action Plan for polluted river stretches, polluted water bodies (lakes and ponds) has been made with F & E Dept. Monthly Progress Report on NGT cases are being submitted to F & E Deptt.

State Action Plan on Climate Change-II (2021-30)

Forest & Environment Dept., Govt of Odisha, is the nodal Dept. for preparation of State Action Plan on Climate Change. The proposed budget amounting to ₹1,02,584.57 crore for the period 2021-30 has been prepared and submitted to the Forest & Environment Dept., Govt. of Odisha.

Table - 3.1
Basin Details of Odisha

Name of the Basin	Total Catchment Area (in Sq.Km)	Catchment Area within Odisha (in Sq.Km)	Catchment Area Outside Odisha (in Sq.Km)	% of Geographical Area of State	Major Tributaries
Bahuda	1118	890	228	0.57	Poichandia, Boginadi, Batruda Nalla
Baitarani	14218	13482	736	8.66	Deo, Kanjhari, Kusei, Salandi
Brahmani	39269	22516	16753	14.46	Sankh, Koel, Gohira, Tikira, Samakoi, Ramiala
Budhabalanga	4838	4838	0	4.08	Sunei, Kalo, Katra, Sana N.
Indravati	41700	7400	34300	4.75	Kapur, Muran, Telengiri, Joura, Turi, Bhaskel
Kolab	20427	10300	10127	6.61	Karandi N., Potteru R., Sileru R., Machhkund R.
Mahanadi	141134	65628	75506	42.15	Ib, Jeera, Ong, Tel, Brutang, Manjore Karandijore, Hariharjore, Surubalijore
Nagavali	9275	4500	4775	2.89	Jhanjabati, Sananadi, Barha Nadi, Situguda N.
Rushikulya	8963	8963	0	5.76	Badanadi, Dhanei, Ghodahado, Padma, Baghua
Subernarekha	19277	2983	16294	1.92	Kharkhai R.
Vansadhara	11377	8960	2417	5.75	Badanalla, Harbhangi Mahendratanaya, Sananadi.
Total	**313296**	**155707**	**157589**	**100**	



Name of the Basin	Basin Area (Sqkm) Total	Inside Orissa	% to Orissa Geographical Area
Subernarekha	19277	2983	1.92
Burhabalanga	4838	4838	3.11
Jambhira	1853	1516	
Baitarani	14218	13482	8.66
Brahmani	39269	22516	14.46
Mahanadi	141134	65628	42.15
Rushikulya	8963	8963	5.76
Bahuda	1118	890	0.57
Vamsadhara	11577	8960	5.75
Nagavali	9275	4500	2.89
Kolab	20827	10300	6.67
Indravati	41700	7400	4.75
Directly draining into the sea		5247	3.37