CHAPTER - I
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This Chapter deals with the challenges faced in the management of storm water drainage and sewerage systems in cities. It describes the geography and river basin drainage, of the State. It also describes the rainfall, water supply and storm water drainage network, in the Municipal Corporations. Moreover, it discusses the availability and adequacy of the organisational setup for management of storm water drainage and sewerage systems, along with devolution of urban governance and the role of Urban Local Bodies, in storm water drainage and sewerage systems.

1.1 Introduction

'Storm water' is the portion of precipitation that does not naturally percolates into the ground or evaporate, but flows *via* overland flow, interflow and pipes. A storm water drainage system aims to transport and store the storm water, in a defined surface water body, or a constructed infiltration facility[2]. Thus, rather than soaking into the soil and slowly seeping to surface water, runoff is quickly funneled, through storm water drainage systems[3], directly to streams, rivers and lakes. 'Storm water management'[4] is the control and use of storm water runoff[5]. It includes planning for runoff, maintaining storm water systems, and regulating the collection, storage and movement of storm water. While designing cities, 'Storm Water Management' should be considered as a factor in designing the drainage system.

'Sewage'[6] is the single major source of water resource contamination, contributing 80 *per cent*[7] of the pollution load to water bodies. The sewerage system consists of house service connections, sewer lines, lift stations, pumping stations and sewage treatment plants. The objective of the sewerage system is to ensure that the sewage discharged by the community is properly collected, transported and treated to safe levels and disposed of or reused, without causing any health or environmental problem.

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2 An 'Infiltration facility', in a basin, is a facility, constructed within highly permeable soils, that provides temporary storage of storm water runoff

3 A 'storm water drainage system' refers to constructed and natural features which function together, as a system, to collect, convey, channel, hold, inhibit, retain, detain, infiltrate, divert, treat or filter storm water

4 'Storm water Management' refers to the process of controlling the quality and quantity of storm water, to protect the downstream environment

5 'Runoff' refers to the flow of water across the ground or an artificial surface generated by rain falling on it.

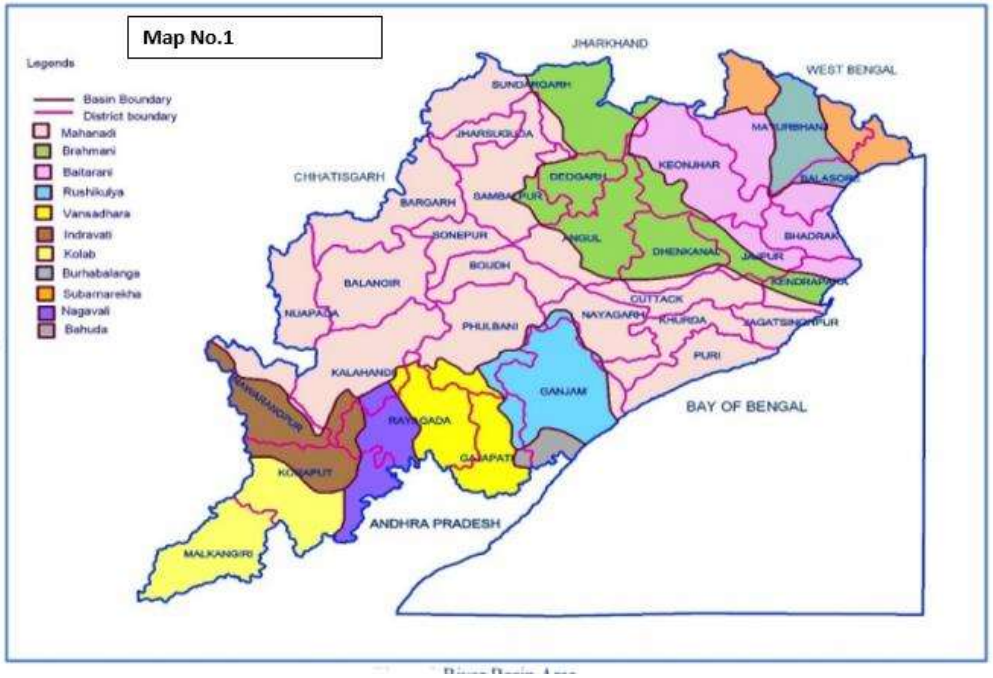
6 'Sewage' refers to the contents of waste closets, latrines, bathrooms, kitchen, stables, cattle-shed and other like places, and includes trade effluent

7 As per National Institution for Transforming India (NITI) Aayog Report 2022 and Sewerage Manual 2013

The management of the storm water drainage and sewerage systems is challenging, as it directly impacts public health, soil, ground water and aquatic life.

1.2 Geography of Odisha

The State of Odisha is spread over an area of 1,55,707 sq. km, in the eastern part of the Indian peninsula and is bounded by 480 km coastline of the Bay of Bengal, to its east. Several rivers, namely the Mahanadi and its tributaries, like Ib, Ong and Tel, Baitarani, Subarnarekha, Brahmani, Budhabalanga *etc*., have their deltas in this region, before their final submergence in Bay of Bengal. The largest coastal lake of India, Chilika, is a brackish[8] lagoon. Rainfall in Odisha, is spread across four months, with 78 *per cent* of the rainfall occuring between the months of June and September. National Compilation on Dynamic Ground Water Resources of India, 2022, published by Central Ground Water Board, Department of Water Resources, River Development and Ganga Rejuvenation, Government of India (GoI), revealed that the requirement of water, for irrigation, domestic and industrial consumption, for Odisha, was about 7.23 bcm[9], *i.e.* 44.25 *per cent* of the total extractable ground water of 16.34 bcm in the State. The river basins drainage of Odisha, is shown in **Map No.1.**



Map No.1: River basins, Odisha (Source: Central Ground Water Year Book 2021-22, Odisha)

1.3 Overview of Municipal Corporations

Details regarding the population, area, drains, annual average of rainfall and water supply per day, in respect of five[10] Municipal Corporations (MCs), in Odisha, are detailed in **Table 1.1**.

[8] Brackish water is the water that is saltier than fresh water, but not as salty as seawater

[9] Billion cubic meter

[10] Bhubaneswar Municipal Corporation (BMC), Cuttack Municipal Corporation (CMC), Berhampur Municipal Corporation (BeMC), Sambalpur Municipal Corporation (SMC) and Rourkela Municipal Corporation (RMC)

Table 1.1: Population, area, drains, annual average rainfall and water supply to MCs

MC	Population *(as of March 2021)*	Area (*in sq. km)*	Drains *(in kms)*	Annual average rainfall *(in mm)*	Water Supply per day (*MLD*[11])
1	*2*	*3*	*4*	*5*	*6*
Bhubaneswar	11,63,000	186.00	541.60	1,705.17	270.64
Cuttack	7,10,323	192.50	707.12	1,565.67	209.00
Sambalpur	3,86,545	303.00	464.22	1,500.73	76.76
Rourkela	5,82,522	200.00	453.09	1,468.20	61.90
Berhampur	4,13,154	86.82	161.94	1,342.87	80.00
Total	**32,55,544**	**968.32**	**2,327.97**	**1,516.53**	**698.30**

Source: *Information furnished by Engineer-in-Chief (EIC), Public Health (Odisha), MCs and Director, Indian Metrological Department*

1.4 Storm water drainage network in Municipal Corporations

The five MCs, mentioned in **Table 1.1**, are spread over an area of 968.32 sq. km and have a total drain network (primary[12] and secondary[13] drains) of 2,327.97 km. They did not, however, have records pertaining to the length of tertiary drains[14], under their jurisdiction. Storm water drainage maps were not made available to Audit, in respect of the Rourkela and Sambalpur MCs. The storm water drainage network of other three MCs is shown in **Map Numbers 2, 3 and 4**.

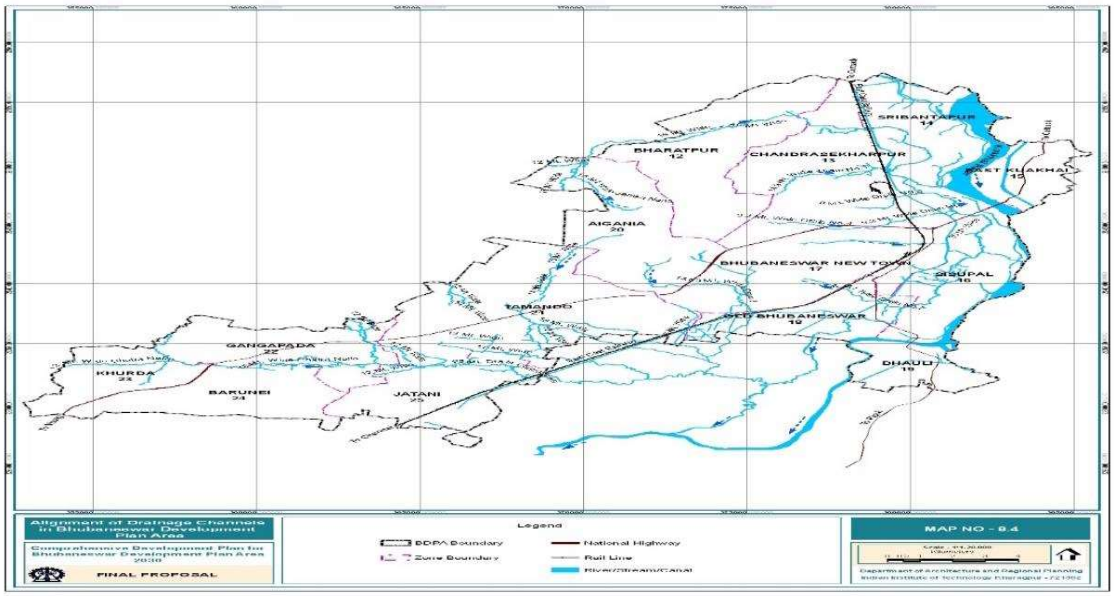
[11] Million liters per day

[12] 'Primary storm water drainage' is the first level of drainage infrastructure, typically consisting of large, open channels or culverts that are designed to convey large volumes of water quickly and safely away from populated areas during heavy rainfall events.

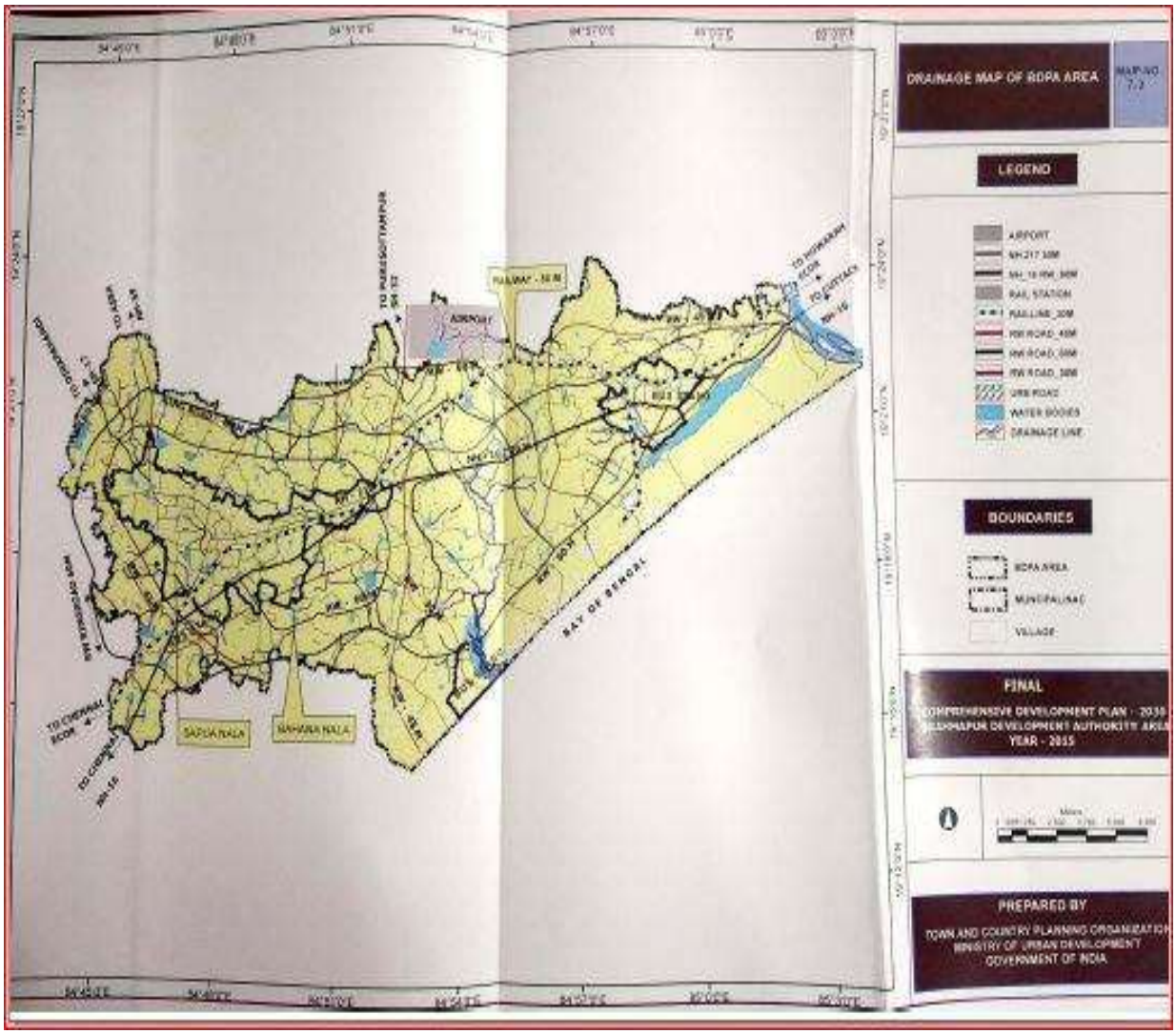
[13] 'Secondary storm water drainage' is the second level of drainage infrastructure, typically consisting of smaller channels or pipes that are designed to convey water from primary drainage systems to specific areas or locations, such as detention ponds or other storm water management facilities.

[14] 'Tertiary storm water drainage' is the third level of drainage infrastructure, typically consisting of small, localised drainage systems such as curb inlets, catch basins and other types of inlets are designed to collect and convey water from streets, sidewalks and other surfaces to primary and secondary drainage system.

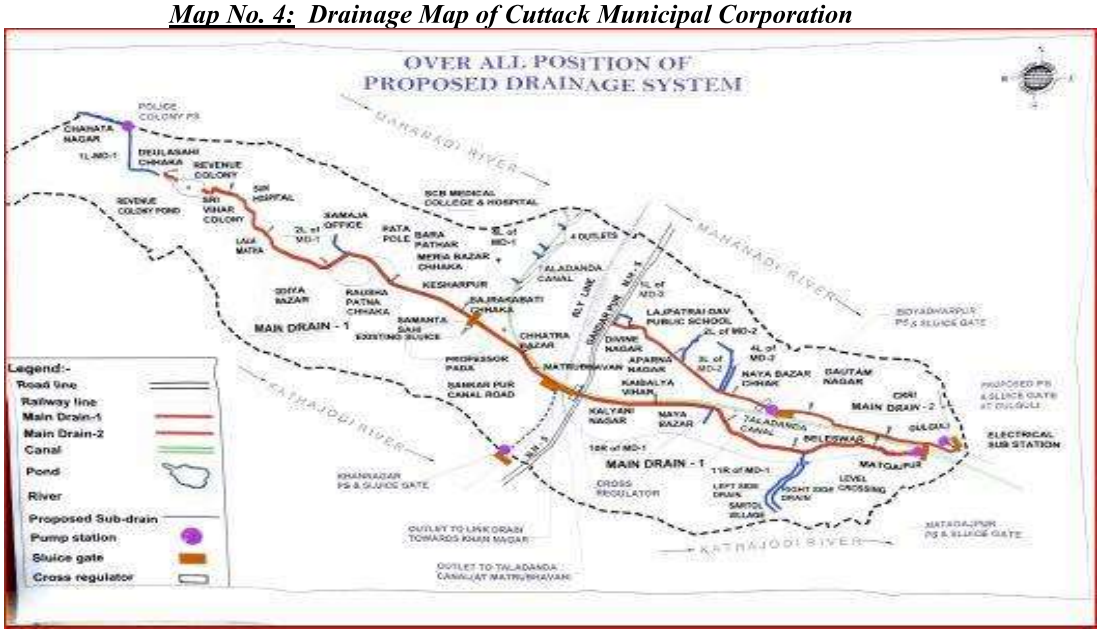
***Map No. 2**: Drainage Map of Bhubaneswar Municipal Corporation*



***Map No. 3:** Drainage map of Berhampur Municipal Corporation*



***Map No. 4:** Drainage Map of Cuttack Municipal Corporation*

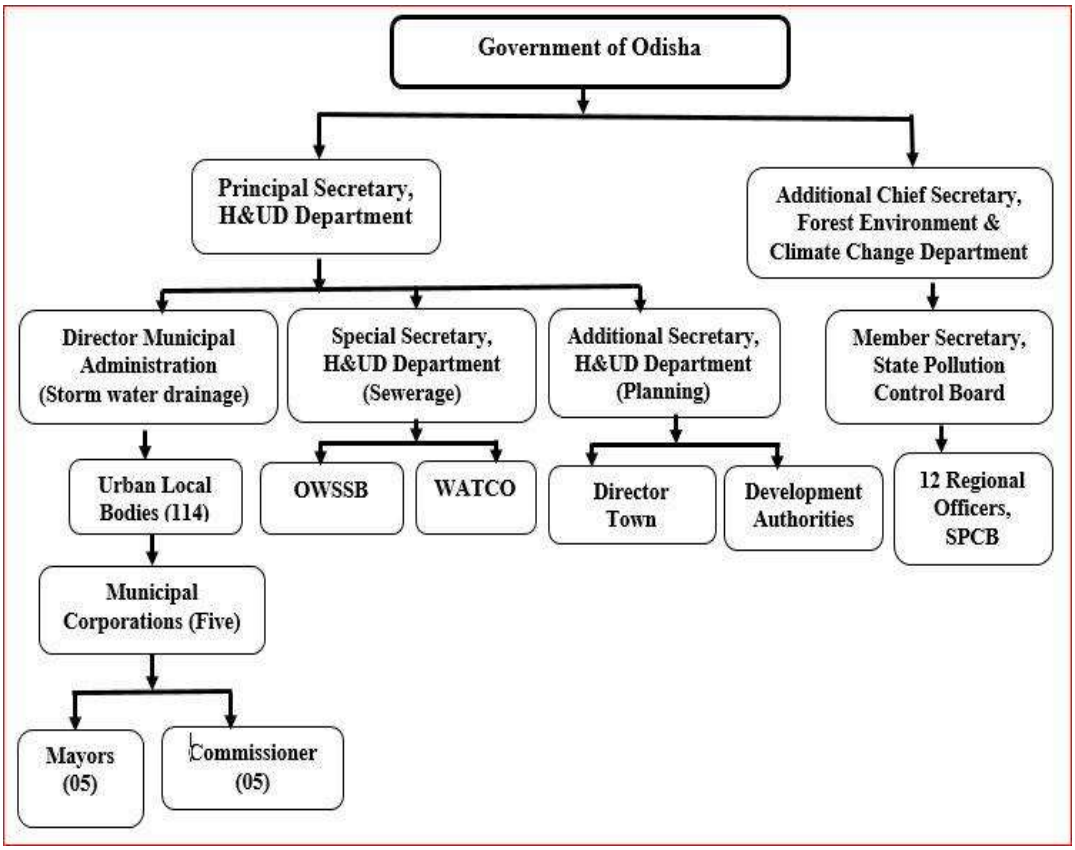


1.5 Organisational setup

The Housing and Urban Development Department (H&UDD), headed by Principal Secretary to Government of Odisha, is the controlling department for all the Urban Local Bodies (ULBs) in the State. The Director of Municipal Administration (DMA) is responsible for enforcing and overseeing the implementation of Storm Water Drainage (SWD) and the Additional Secretary of the Department is responsible for Sewerage Management Systems (SMSs) in urban areas. Out of the 114 ULBs in the State, there are five MCs. The Commissioners of these MCs are responsible for the implementation of SWD. The Engineer-in-Chief (EIC), Odisha Water Supply and Sewerage Board (OWSSB) and Chief Executive Officer (CEO), Water Corporation of Odisha (WATCO), are implementing Sewerage Projects (SPs) in ULBs, at the field level.

The Odisha State Pollution Control Board (SPCB) is the prescribed authority for grant of consent to establishment (CTE) and consent to operate (CTO), for sewerage treatment plants (STPs) by ULBs. It is also entrusted with the responsibility of implementation of Environmental Laws, particularly the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981 and the Environment (Protection) Act, 1986. The organisational setup, with regard to the functioning of SWDs and SPs in the State, is shown in **Chart No.1**.

Chart No.1: Organisational chart



1.6 Devolution of functions to ULBs

The 74th Constitutional Amendment Act, 1992, made provisions for the establishment of ULBs, as the third tier of governance in urban areas. It empowers ULBs to perform functions and implement schemes, in relation to the 18 functions specified in 12th Schedule, which, *inter alia,* include urban planning, roads and bridges, sanitation, conservancy and solid waste management.

1.7 Role of ULBs in storm water drainage and sewerage management

As per Sections 24 (iii) and (iv) of the Odisha Municipal Corporation (OMC) Act, 2003, the Municipal Corporations have to make adequate provisions for the construction, maintenance and cleaning of drains and drainage works, as well as for the collection, removal, treatment and disposal of sewage. ULBs are primarily responsible for setting up of STPs, after obtaining CTO from SPCB and ensuring that adequately treated sewage effluent is discharged, either into water bodies, or on land.