



**ACTION PLAN FOR RESTORATION OF POLLUTED STRETCH OF**

- 1. RIVER KATHAJODI ALONG CUTTACK TO URALI  
UNDER PRIORITY CATEGORY-III**
- 2. RIVER SERUA ALONG KHANDAETA TO  
SANKHATRASA UNDER PRIORITY CATEGORY-V**

6.	Major industrial estates located with total no. of industries	:	<table border="1"> <thead> <tr> <th>Industrial Estate</th> <th>No. of Industries</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>No water intensive industry</td> </tr> </tbody> </table>	Industrial Estate	No. of Industries	1	No water intensive industry
Industrial Estate	No. of Industries						
1	No water intensive industry						
7.	Action plan includes mainly covering aspect such as (Proposal for utilisation of sewage, ground water recharging or rain water harvesting, measures for regulating ground water use, protection and management of flood plain zone, maintaining minimum E-flows and water shed management, plantation on both sides of the river, setting up of bio-diversity parks etc., as per Hon'ble NGT Orders dated 20.09.2018 and 19.12.2018)	:	Included in Section 8.0-13.0 of the Report.				
8.	Min. and Max. required time period for implementation of action plans		Min...2.....Years, Max...3..... Years				
9.	Total estimated budget in crores towards implementation of proposed action plans with break-up ( e.g. No. of STPs, capacity, total cost; No of CETPs, total capacity, Cost towards interception and diversion of sewage/effluent to STPs/CETPs etc.,)	:	<ul style="list-style-type: none"> <li>Total requirement of fund for construction of two STPs and renovation of one STP alongwith sewerage network as per agreement value is Rs. 1058 crore.</li> </ul> <p>Expenditure incurred till 31.03.2019 is Rs. 797 Crore</p> <p>The Project is being implemented under Odisha Integrated Sanitation Improvement Project (OISIP) with financial assistance from Japan International Cooperation Agency (JICA)</p> <ul style="list-style-type: none"> <li>Improvements of existing major and minor drains and channels under the project "Construction of Storm water drainage system of Cuttack city". Total fund sanctioned for the project : Rs. 583.91 crore</li> <li>Under AMRUT prgoramme, a Septage Treatment Plant (SeTP) of 60 KLD with total project cost of Rs. 2.28</li> </ul>				

			Crore is being constructed
10.	Responsible Organisation (s) for implementation of proposed action plans (Please enclose details as annexure )	:	Odisha Water Supply and Sewerage Board under Housing and Urban Development Department, Govt. of Odisha
11.	Proposed Mechanism for execution of action plans	:	Construction of STPs and SeTPs for treatment of sewage and septage generated from Cuttack city are being executed by OWSSB, Periodical monitoring of implementation will be done by the Chief Engineer, OWSSB, Principal Secretary to Govt, Housing and Urban Development Dept and River Rejuvenation Committee, Odisha.
12.	Expected deliverables w r to achieving Goals (Please enclose as annexure )	:	<ol style="list-style-type: none"> <li>1. Construction and Commissioning of STPs.</li> <li>2. Construction and Commissioning of SeTPs.</li> <li>3. Treatment of municipal wastewater in STPs before discharge to Kathajodi river.</li> </ol> <p>The water quality of both Kathajodi river and Serua river will be improved and shall meet the bathing water quality for riparian users in the downstream of Kathajodi and Serua rivers.</p>

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## **1.0 Basic information about the stretch**

Kathajodi River, a major distributary of Mahanadi river in Odisha, branches off from the river at Naraj at the upstream of Cuttack city. Kathajodi river is immediately bifurcated near Naranpur village into Kuakhai river and Kathajodi river. The southern branch Kuakhai river flows along the capital city of Odisha, Bhubaneswar, whereas, the northern branch, Kathajodi river flows along Cuttack city. At the downstream of Cuttack city, the river is again bifurcated into the right branch, Serua river and left branch, Kathajodi river. After flowing for a distance of 17 Km, both the rivers again merge and later named as river Devi, which is further bifurcated at Gobindpur, the right branch is known as **Devi** and the left branch as Biluakhai. The major percentage of water originally carried by Kathajodi river is diverted into Devi river and ultimately drains into the Bay of Bengal.

Kathajodi river water is used for various in-stream activities along its course. However, the river is polluted by both point and non-point sources. Water quality deterioration of Kathajodi river has been observed at the downstream of Cuttack city. The major source of pollution of the river is due to discharge of domestic wastewater into the river. Cuttack city is the only urban local body located along the course of flow of Kathajodi river. A large portion of the wastewater of Cuttack city find its way into the river thereby degrading the water quality of the river. The condition deteriorates further due to lack of sufficient dilution capacity of the river during lean period. Keeping in view the large rural population dependent upon the river at its downstream, it is of significance to restore its water quality.

The flow of water in the river is controlled through the Naraj barrage. The river remains almost in dry state during January to June in many parts of its stretch and under flooded conditions during July-October. During the non-monsoon period (October to June), the river flow reduced significantly and some of the stretches of the river become almost dry.

### **1.1 Major towns located on the bank between the stretch including population, water consumption details**

Cuttack, the former capital city of Odisha state, is headquarter of the Cuttack district. It is the major hub for trading and business in and around the city. The topography of the city lies between 20<sup>o</sup> 29' North Latitude and 85<sup>o</sup> 52' East Longitude. The city is surrounded by the Mahanadi River and Kathajodi river. The general topography of Cuttack



city is gentle slope from west to east occupying the delta plains of the Mahanadi river in the east and hilly terrain on the west. Satellite map of Cuttack city is given in Fig.1.

Maximum elevation is 28 meter in the north and minimum elevation is 20 meter in south east. The central part of the city is low with an elevation of 17 meter. Major canal, known as Taldanda Canal starts from Jobra Anicut on the Mahanadi river, runs in southeast direction bisecting the city. The western and southern part of the city is divided by the canal.

The population of the city, as per the Census 2011, is 606,007 (Census of India, 2011) which is 23.14% of the population of Cuttack district and 1.45% of the population of Odisha state. The municipal area comprises of an area of 192.5 sq.km. The gross population density of the city is 7,769 persons per sq.km. Slum population is 223,619, which is 36.9% of the total population Floating population of city is around 30,000 to 40,000 per day. The city has an annual rainfall of 1440 mm.



**Fig. 1** Satellite map of Cuttack city

## **1.2 Water supply**

The Cuttack municipal area has 59 numbers of wards. Drinking water sources of Cuttack Municipal area includes surface sources (rivers) and ground water sources. However, presently the majority of water demand of Cuttack city is being fulfilled by supply of 115 MLD water through 129 numbers of production wells.

## **1.3 Industrial Estates/ areas**

There are only two industrial estates in the city. Madhupatna Industrial Estate is located in the catchment of Kathajodi river, whereas the Jagatpur Industrial estate is located in the catchment of Mahanadi river. Major industries in Cuttack city are located in Jagatpur Industrial Estate. No major water intensive industry have been established in the catchment of Kathajori river. There is practically no industrial wastewater discharge in Madhupatna Industrial Estate to Kathajodi river.

## **1.4 Biomedical waste**

Approximately 2000 Kg of biomedical waste per day is generated from 471 health care units existing in Cuttack Municipal Corporation. Around 760 Kg of biomedical waste are being treated in the common biomedical waste treatment facility installed within SCB Medical, Cuttack. Rest biomedical waste are transported to the common biomedical waste treatment facility at Tangiapada in Khurdha district for disposal. Therefore, there is remote possibility of contamination of Kathajodi river along Cuttack stretch by biomedical waste generated in the city.

## **1.5 Municipal solid waste**

Approximately 230 tonne per day municipal solid waste is being generated in Cuttack Municipal Corporation. Solid waste is collected through both door to door collection and from community bins and then transported to earmarked transfer section at Brajabiharipur near Bidanasi development area and then to the landfill site at Chakradharpur, near Mundali. The dumping site has been chosen for its deep natural depression. Therefore, there is remote chance of contamination of Kathajodi river by municipal solid waste disposal from Cuttack Municipal Corporation.

To summarize, there is no significant impact from industrial wastewater, biomedical waste and municipal solid waste generated from Cuttack Municipal Corporation on the water quality of Kathajodi river along the stretch of Cuttack city.

## **2.0 Water Quality of river stretch**

Water quality monitoring studies in past years has revealed that the polluted stretch of Kathajodi river is along the Cuttack city and the major cause of pollution is due to discharge of domestic waste water into the river. Besides these, rising density of population in the vicinity of the bank of the river, poor sanitation practices of the residents, lack of proper treatment facilities of domestic wastewater are the other causes of pollution along this stretch of the river.

### **(i) Drains contributing pollution to Kathajodi River**

The wastewater generation from the city is 92.5 MLD (80 percent of water supply). The domestic waste water along with storm water are being discharged to Kathajodi river, Mahanadi river and Taladanda canal.

Open surface drains exist in some portion of the town to discharge the storm and wastewater. These drains not only receive sewage from majority of residents but also septic tank effluent containing excreta and rain water runoff. Storm water drain known as Drain No 1 runs from west to east direction and discharges into Kathajodi river while another drain runs from west to east direction and discharges into Mahanadi River. Besides, there are a number of small drains which are intercepted and diverted to the existing two major drains. Drainage map of Cuttack city is shown in Fig. 2. Drains leading to Kathajodi river are discussed in following pages.

There are three identified sources of domestic wastewater pollution on the river Kathajodi along the Cuttack stretch. These are (i) drain near Ajaya Binay Institute of Technology (ii) drain near Khannagar and (iii) drain at Mattagajpur. Since the bed of Kathajodi river during lean period is almost dry, the discharges of these drains excepting the Khan nagar drain, flow through sand bed for almost 500 meter distance before directly mixing with the river water.

**(a) Drain near Ajaya Binay Institute of Technology :** Bidanasi area of Cuttack city is a planned area and have sewerage system. The wastewater from all the sectors of CDA and Bidanasi area were being discharged through Peta Nala to Kathajodi river near Ajay-Binay Institute of Technology (ABIT) (Fig. 3) prior to November, 2018. However, the discharge to the river was being controlled through a sluice gate. After the commissioning of a 36 MLD Sewage Treatment Plant in CDA-Bidanasi area, the treated waste water are now being discharged to Kathajodi river.

**(b) Drain near Khan nagar :** The drain having outfall on Kathajodi river at Khan nagar runs for a length of about 10.47 km. It originates at Srivihar Colony (Hanuman Temple) near Tulasipur which is to the north west of the city and ultimately outfalls into river Kathajodi near Mattagajpur at the city's south east end. Beyond the Mattagajpur sluice, water flows for about 2.25 km parallel to Kathajodi river inside the flood plain before joining the stream. This reach is not having defined drain section. At the origin of the main drain No. 1 a tributary drain also joins the main drain about a km upstream of Srivihar colony. The main drain has been diverted at Samrat Cinema Hall and major portion of the domestic waste water is being directly discharged to Kathajodi river near Khannagar (Fig. 4).

**(c) Drain at Mattagajpur :** A 33 MLD Sewage Treatment Plant (STP) is located at Mattagajpur consisting of the stabilization pond system. It treats the wastewater received through main drain No. 1 and discharges the treated water to Kathajodi river. During the non-operational period of the STP, the untreated waste water is also discharged to Kathajodi River (Fig. 5).

Schematic diagram of these three wastewater outfalls on river Kathajodi is shown in Fig .6.







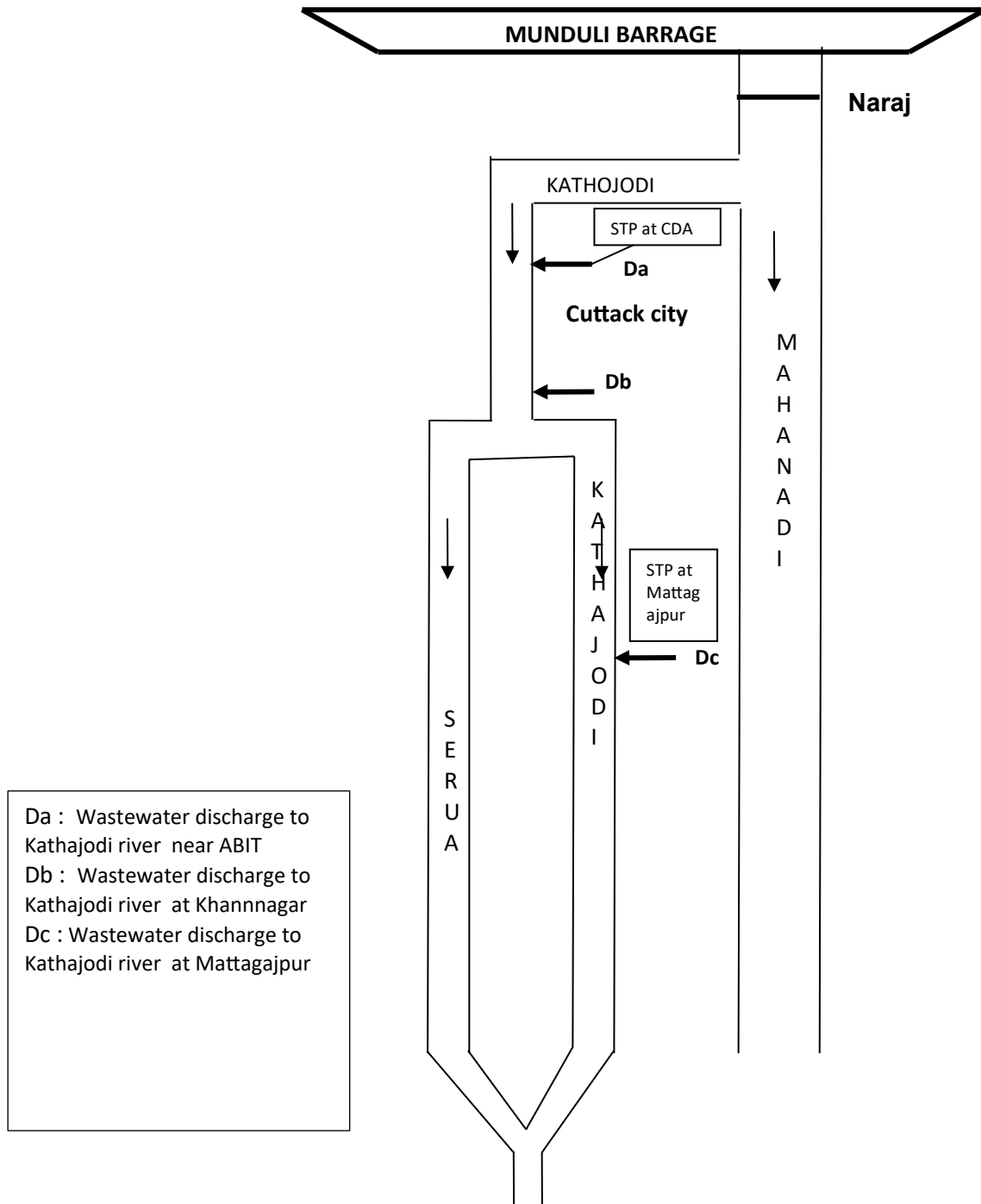
**Fig. 3 Wastewater discharge to Kathajodi river near ABIT**



**Fig. 4 Wastewater discharge to Kathajodi river at Khan nagar**



**Fig. 5 Wastewater discharge to Kathajodi river at Mattagajpur**



**Fig. 6 Schematic Diagram of Wastewater outfalls on River Kathajodi along Cuttack city**



**(ii) Wastewater Quality**

The quality as well as quantity of wastewater is responsible for the degradation of the receiving water bodies. The potential deleterious effects of wastewater on the quality of receiving water bodies are manifold and depend on volume of the discharge as well as on composition of the wastewater and flow available in the receiving water bodies. The wastewater quality are compared with the critical values stipulated by Ministry of Environment and Forests and Climate Change (MoEF & CC) (General standards for discharge of environmental pollutants : Part- A Effluents) to assess its suitability for acceptance in receiving water bodies.

**(a) Wastewater of Cuttack city through sluice gate at ABIT**

The physico-chemical characteristic with respect to pH, BOD, COD and TSS of wastewater from CDA-Bidanasi area discharged to Kathajodi river through the sluice gate near Ajay-Binay Engineering college during the period 2017 and 2018 is given in Table-1.

**Table-1 Wastewater quality near ABIT with respect to pH, TSS, BOD and COD during 2017 and 2018**

Parameter	BOD (mg/l)						Discharge standard
	2017			2018			
	Min	Max	Avg	Min	Max	Avg	
<b>pH</b>	6.8	7.2	6.9	6.7	7.2	6.85	6.5-9.0
<b>TSS, mg/l</b>	16	169	59	7	360	70	100
<b>BOD, mg/l</b>	14	111	64	32	98	60	30
<b>COD, mg/l</b>	50	193	135	79	187	127	-

The organic waste load measured in terms of BOD shows an annual average value of 64 mg/l during the year 2017 and 60 mg/l during the year 2018, which are beyond the prescribed limit of BOD, that is, 30 mg/l. Excepting few occasions (particularly in rainy seasons) , BOD values in the wastewater drain exceeded the permissible limit of 30 mg/l.

However, after the commissioning of a 36 MLD STP at CDA, from December, 2018 wastewater of this drain are being diverted to the STP for treatment. The treated

wastewater of the STP after complying to the discharge limit (30 mg/l) are being discharged to Kathajodi river.

Water quality of treated wastewater of STP at CDA during March- May, 2019 are given in Table-2.

**Table-2 Treated Wastewater quality of STP at CDA with respect to pH, TSS, BOD, and COD during March - May, 2019**

Month	pH	TSS, mg/l	BOD, mg/l	COD, mg/l
March, 2019	7.1	14	8.2	27.0
April, 2019	6.8	5	3.5	20.7
May'2019	6.7	15	4.1	20.9
<b>Discharge Standard</b>	<b>6.5-9.0</b>	<b>100</b>	<b>30</b>	<b>-</b>

**(b) Wastewater of Cuttack city through sluice gate at Khan nagar**

The physico-chemical characteristic with respect to the parameters pH, BOD, COD and TSS, of wastewater drain discharged to Kathajodi river through the sluice gate near Khan nagar during the period 2017-2019 is given in Table-2.

**Table-3 Wastewater quality at Khannagar with respect to pH, TSS, BOD and COD during 2018-2019**

Parameter	BOD (mg/l)									Discharge standard
	2017 (January-December)			2018 (January-December)			2019 (January-May)			
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
<b>pH</b>	6.8	7.2	7.0	6.8	7.1	6.9	6.7	7.2	6.9	6.5-9.0
<b>TSS, mg/l</b>	32	83	50	20	99	65	19	129	87	100
<b>BOD, mg/l</b>	26	80	44	20	93	50	24	59	40	30
<b>COD, mg/l</b>	65	158	99	79	226	123	67	162	116	-

Annual average value for BOD in the (10) during the year 2017 was of 44 mg/l whereas during the year 2018 was 50 mg/l and 40 mg/l during 2019 (January-May) which

are beyond the prescribed limit of BOD, that is, 30 mg/l. Excepting very few occasions (particularly in rainy seasons), BOD values in the wastewater drain exceeded the permissible limit.

**(c) Wastewater of Cuttack city at Mattagajpur**

The physico-chemical characteristic with respect to the parameters pH, BOD, COD and TSS of wastewater drain discharged to Kathajodi river at Mattagajpur during the period 2017-2018 is given in Table-3. This drain carries the outlet discharge of STP at Mattagajpur. During non-functioning period of STP and rainy season, the untreated wastewater of Main drain No.1 is discharged to Kathajodi river through this drain.

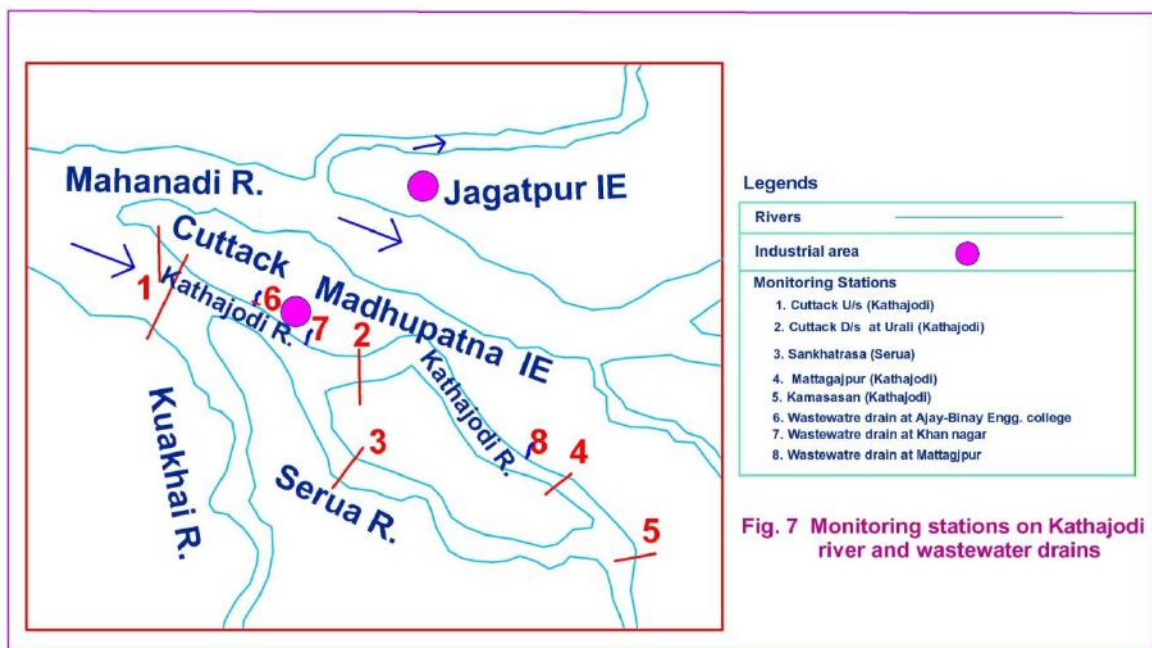
**Table-4 Wastewater quality at Mattagajpur with respect to pH, TSS, BOD and COD during 2017 and 2018**

Parameter	BOD (mg/l)						Discharge standard
	2017			2018			
	Min	Max	Avg	Min	Max	Avg	
<b>pH</b>	6.5	7.8	7.1	No discharge to river because of construction of a new STP and renovation of old STP			5.5-9.0
<b>TSS, mg/l</b>	4	67	24				100
<b>BOD, mg/l</b>	2.8	28.4	11.4				30
<b>COD, mg/l</b>	22.6	76.6	38.1				250

Annual average values of BOD in the wastewater flowing through the drain during the year 2017 was 11.4 mg/l and the monthly variation of BOD values remained always within the prescribed limit of BOD (30 mg/l). During 2018 and 2019, STP at Mattagajpur is under renovation.

(iii) **Water Quality of Kathajodi river along Cuttack stretch**

The State Pollution Control Board, Odisha regularly monitors the water quality of Kathajodi river at the upstream and downstream locations of Cuttack city. At the downstream of Cuttack city, the river bifurcates into Kathajodi river and Serua river. Due to gradient, the major flow of the river is through Serua river. Water quality is also being measured at Sankhatrasa (Cuttack Further Downstream) on Serua river, Mattagajpur (Cuttack Further Downstream) and Kamasasan (Further further downstream) on Kathajodi river. Water quality monitoring stations are shown in Fig. 7



Water quality of Kathajodi river at five locations during the year 2017, 2018 and 2019 are discussed in the following pages. The data are compared with the tolerance limit prescribed for Class C inland surface water bodies by CPCB (Designated Best Use Classification).

**Table-5 Kathajodi River water quality with respect to pH, DO, BOD, COD and TSS, TC and FC during 2017-2019**

Year	Annual average (Range of values)						
	pH	DO , mg/ l	BOD , mg/l	COD , mg/l	TSS, mg/l	TC, MPN/100 ml	FC, MPN/100 ml
<b>Cuttack U/s (Kathajodi river)</b>							
2017	8.0 (7.2-8.4)	7.6 (6.8-9.9)	0.8 (0.5-1.4)	9.3 (5.0-11.0)	42 (4-124)	1223 (40-3300)	423 (20-2100)
2018	7.7 (6.5-8.1)	7.7 (6.9-8.4)	0.7 (0.4-1.4)	8.6 (6.4-11.8)	60 (3-136)	1703 (140-5400)	857 (45-3500)
2019*	7.6 (7.2-8.4)	8.1 (6.7-8.8)	0.6 (0.4-0.8)	7.2 (5.2-11.6)	17 (8-37)	1620 (490-3500)	715 (140-1700)
<b>Cuttack D/s (Kathajodi river)</b>							
2017	7.9 (7.0-8.4)	6.7 (5.4-9.8)	3.2 (1.3-5.4)	23.2 (10.7-38.0)	37 (4-90)	68000 (1100-160000)	61840 (180-160000)
2018	7.7 (6.8-8.4)	6.4 (4.6-8.4)	2.8 (0.7-5.7)	21.0 (10.0-29.7)	40 (6-191)	46758 (790-160000)	28411 (330-92000)
2019*	7.5 (7.2-8.0)	6.6 (4.9-7.6)	2.8 (1.8-3.9)	19.8 (16.2-21.2)	5 (1-10)	87250 (13000-160000)	85975 (7900-160000)
<b>Cuttack FD/s at Mattagajpur (Kathajodi river)</b>							
2017	7.8 (7.0-8.5)	6.0 (3.3-14.1)	6.3 (1.2-11.2)	42.4 (12.2-99.6)	89 (2-262)	11673 (780-35000)	5727 (20-17000)
2018	7.8 (6.9-8.5)	6.7 (4.2-9.2)	2.6 (0.8-3.9)	17.8 (8.4-26.6)	31 (1-108)	23416 (790-92000)	12436 (330-54000)
2019*	7.7 (6.6-8.4)	7.6 (6.1-8.6)	2.4 (1.8-3.4)	12.8 (10.3-17.1)	27 (2-84)	41108 (140-160000)	14419 (45-54000)
<b>Sankhatrasa (Cuttack FD/s) ( Serua river)</b>							
2017	7.9 (7.3-8.4)	6.3 (4.4-7.7)	2.3 (0.6-4.4)	16.7 (6.7-30.8)	46 (8-122)	75478 (130-160000)	65682 (78-160000)
2018	7.7 (7.1-8.5)	6.9 (5.6-7.8)	2.4 (0.6-5.5)	17.2 (8.2-29.7)	62 (3-462)	25494 (230-160000)	13206 (78-92000)
2019*	7.4 (6.8-7.7)	7.3 (6.4-8.6)	2.0 (1.3-2.8)	14.7 (12.1-17.1)	19 (4-44)	18025 (2200-54000)	10100 (400-350000)
<b>Cuttack FFD/s at Kamasasan (Kathajodi river)</b>							
2017	7.9 (7.4-8.4)	6.9 (6.3-7.7)	1.6 (0.9-2.5)	12.9 (9.2-18.4)	50 (4-126)	6671 (<1.8-16000)	4206 (<1.8-16000)
2018	7.7 (7.2-8.1)	7.5 (6.6-8.6)	1.2 (0.5-2.6)	10.0 (6.2-15.8)	42 (2-200)	1532 (78-4900)	526 (20-1700)
2019*	7.5 (6.6-8.1)	7.8 (7.5-8.1)	1.0 (0.6-1.3)	9.3 (4.0-11.6)	12 (6-18)	665 (20-2400)	213 (20-790)
<b>Tolerance limit for Class C rivers</b>	<b>6.5-8.5</b>	<b>4.0, minimum</b>	<b>3.0, maximum</b>	<b>-</b>	<b>-</b>	<b>5000, max</b>	<b>Should not be more than 40% of TC values</b>

\* January-April, 2019

As revealed from the data, pH at all stations remained within the tolerance limit, that is, 6.5-8.5.

Dissolved oxygen content at Cuttack U/s varied within 6.8-9.9 mg/l during the period 2017-2019. High values of DO are due to the eutrophication condition and collection of water samples during day time. At the downstream station, DO varied within 4.6-9.8 mg/l during the period. At the further downstream stations, DO values are sometimes observed to be below the tolerance limit of 4.0 mg/l which may be attributed to the deteriorating condition of river water. The depletion of DO values is much more pronounced in Cuttack FD/s station at Mattagajpur (Kathajodi river) rather than at Sankhatrasa (Serua river). However, at Kamasasan (downstream of confluence of Kathajodi river and Serua river, DO level in river water remained within the permissible limit.

The average value of BOD at Cuttack U/s varied within 0.4 – 1.4 mg/l during the period 2017-2019 and remained always within the tolerance limit of 3.0 mg/l. However, at the Cuttack D/s station, frequent exceedance of BOD from the tolerance limit has been observed. Maximum value of BOD during 2017 was 5.4 mg/l, during 2018 was 5.7 mg/l and during 2019, it was 3.9 mg/l .

At Mattagajpur (Further downstream station of Cuttack on Kathajodi river), maximum value of BOD was observed to be 11.2 mg/l during 2017, 3.9 mg/l during 2018 and 3.4 mg/l during 2019. During 2018, the STP at Mattagajpur is under renovation for which the wastewater discharge through drain at Mattagajpur to the Kathajodi river was minimal. Therefore, decrease in BOD values in the river at Mattagajpur during 2018 and 2019 was observed. As the major flow of Kathajodi river after bifurcation is towards Serua river, sufficient dilution in Kathajodi river at Mattagajpur is not available and therefore, BOD at Mattagajpur always observed to exceed the tolerance limit.

However, at Sankhatrasa (Further downstream station of Cuttack on Serua river), the maximum BOD value during 2017 was 4.4 mg/l, during 2018 was 5.5 mg/l and during 2019 it was 2.8 mg/l. During 2017 and 2018, frequent exceedance of BOD values from the tolerance limit has also been observed at Sankhatrasa.

At Kamasasan, the BOD values always remained within the tolerance limit. This indicates that the river has restored to its Class C river water quality at Kamasasan.

The total suspended solids in river water exhibits a wide range of fluctuation, with the maximum being during rainy season due to mixing of turbid surface run-off water. During the entire period of study, COD values at Mattagajpur are comparatively higher than those at other stations.

Water quality of the river at Cuttack D/s is mainly influenced by the discharge of wastewater at Khan nagar. As the major flow of the river is through Serua river, deterioration of water quality at Sankhatrasa is also observed which is evidenced by the BOD, COD, TC and FC values.

The coliform population in the water is significantly high at the downstream stations and exceeds the tolerance limit (maximum 5000 MPN/ 100 ml for total coliform). The non-conformance of TC values at Cuttack U/s is due to in-stream activities by the local people.

The fecal coliform values most of the time has been observed to exceed 40% of the corresponding TC values, therefore not conforming to the stipulated criteria for FC. Further, fecal coliform values at the downstream stations mostly exceed the tolerance limit of 2500 MPN/100 ml for Bathing water prescribed under E (P) Rule, 1986.

From the above water quality results, it is observed that the water quality of Kathajodi river has been deteriorated along the Cuttack stretch due to wastewater discharge of Cuttack city. However, the river has rejuvenated itself at Kamasasan as there is no other wastewater discharge after Mattagajpur. The polluted stretch of Kathajodi river along Cuttack city is approximately 12 Km.

#### **(iv) Categorization of Kathajodi river along Cuttack stretch**

The critical parameters for maintenance of water quality with respect to public health are organic matter and coliform group of bacteria. Thus the organic matter in terms of Biochemical Oxygen Demand is the most critical parameter representing municipal sewage pollution. Based on BOD concentrations, CPCB has categorised the river stretches under five priorities. Monitoring locations with BOD concentration exceeding 30 mg/l has been categorized as Priority-I. Monitoring locations with BOD concentrations in the range 20-30 mg/l, 10-20 mg/l, 6-10 mg/l and 3-6 mg/l are categorized as Priority-II, Priority-III, Priority-IV and Priority-V respectively.

Based on the water quality studies during the period 2017-2018, water quality of Kathajodi river along Cuttack stretch have been identified by CPCB as Polluted river

stretch under Priority-III category with the maximum BOD values in the range 3.4-11.2 mg/l. Serua river along Cuttack stretch have been identified by CPCB as Polluted river stretch under Priority-V category with the maximum BOD values in the range 4.4-5.5 mg/l.

### 3.0 Ground water quality in the catchment of polluted river stretch

State Pollution Control Board, Odisha monitors the ground water quality at five locations of Cuttack city in the month of April and October of each year. Ground water quality data during the year 2017 and 2018 are given in Table-6. The water quality data show that parameter like BOD in the ground water remained much below the tolerance limit of 3.0 mg/l. This clearly indicates that the ground water has not been contaminated by the polluted river stretch of Kathajodi river.

**Table- 6 Ground water quality of Cuttack city**

#### (a) During 2017

Station Name →	Jagatpur		Mangalabag		Madhupatna-Kalyan Nagar Area		Badambadi Area		Bidanasi-Tulsipur Area		Drinking water specification (IS : 10500 (2012))	
	A	O	A	O	A	O	A	O	A	O	Acceptable Limit	Permissible limit
pH	7.8	8.4	8.3	8.3	7.1	7.9	7.6	8.4	7.7	8.3	6.5-8.5	No relax
BOD, mg/l	0.4	0.5	0.1	0.4	0.1	0.6	0.7	1.3	0.2	0.5	-	-
TC, MPN/100 ml	<1.8	<1.8	4	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	Absent	No relax
FC, MPN/100 ml	<1.8	<1.8	4	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8		

A : April, O : October



**(b) During 2018**

Station Name →	Jagatpur		Mangala bag		Madhupatna-Kalyan Nagar Area		Badambadi Area		Bidanasi-Tulsipur Area		Drinking water specification (IS : 10500 (2012))	
	A	O	A	O	A	O	A	O	A	O	Acceptable Limit	Permissible limit
pH	8.2	8.0	8.4	7.8	8.0	8.2	8.4	7.7	7.9	8.0	6.5-8.5	No relax
BOD, mg/l	0.2	0.3	0.3	0.6	0.3	0.4	0.6	0.7	0.6	0.4	-	-
TC, MPN/100 ml	<1.8	<1.8	4.5	33	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	Absent	No relax
FC, MPN/100 ml	<1.8	<1.8	<1.8	6.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8		

A : April, O : October

**4.0 Sewage generation from Cuttack town located on the bank of the polluted river stretch**

Cuttack city is the only urban local body situated on the bank of Kathajodi river. Water supply to the city is 115 MLD. Assuming 80% of the water supply as the waste water generation, approximately 92.5 MLD wastewater is generated from the city. A large fraction of this wastewater flows through main drain No. 1 and ultimately find its way to Kathajodi river. Rest portion of wastewater flows through Main Drain No.2 and outfalls in Mahanadi river. The wastewater includes overflows from septic tanks in the absence of soak pits, black water from toilets directly connected to drains and wastewater from sewerage network conveyed through the storm water drains in absence of separate sewer lines. Greywater is entirely conveyed through the drains.

Waste water from CDA – Bidanasi area flow through Peta nala and are being treated in the STP at CDA prior to discharge to Kathajodi river.

**5.0 Action Plan For Restoration Of Polluted River Stretch**

Studies in the foregoing sections have revealed that the stretch of Kathajodi river along the Cuttack city is polluted due to the discharge of domestic wastewater. The quality of wastewater discharged near ABIT and Khan nagar are more or less similar.

However, the impact of former is less in comparison to the later one. In the former case, the waste water passes through a large stretch of sand bed before mixing with the flowing stream of the river as the river bed is almost dry during the lean period. At Khan nagar, the wastewater directly mixes with the river water thereby degrading its quality. As the major flow of the river is through Serua river, a distributary of Kathajodi river, the deterioration of water quality is also observed at Sankhatrasa and falls under priority category V.

The STP at Mattagajpur with 33 MLD capacity had been installed in the year 2001 with the projected population upto 2010. Wastewater flowing through Main Drain No.1 were to be pumped at Khan nagar Pump House to the STP at Mattagajpur thereby ensuring Zero discharge of wastewater through Khan nagar sluice gate to Kathajodi river. In the mean time, the population has been increased manifold with the simultaneous increase in wastewater generation load. Further, though the BOD value of the wastewater drain falling on Kathajodi river at Mattagajpur remains mostly within the discharge limit of 30 mg/l, due to lack of sufficient flow in the river at this location the wastewater could not be diluted. Therefore, the maximum BOD value in the river at Mattagajpur during 2017-18 was observed to be 11.2 mg/l and falls under priority category III.

River restoration is necessary where river systems have degraded to the point where they can no longer provide the services required of them. Growing concern for maintenance of water quality in Kathajodi river along Cuttack stretch has been discussed at several forums including the legislative assembly of the Odisha Government. Also the Hon'ble High Court of Odisha has taken cognizance of this issue of pollution due to discharge of untreated sewage of Cuttack city and urged to take necessary restoration plans.

Therefore there is an urgent need to prepare strategic action plans for restoration of the polluted river stretch with the following objectives.

- to improve aesthetics of the area along the river bed and its embankment
- to treat the wastewater outfall into the river
- to maintain sufficient flow in the river during lean period
- to restore the quality of the river to meet its designated best use
- to establish institutional arrangements with the mandated and accountability for restoration, and to coordinate between the stakeholders.

## **6.0 Action Plans Suggested**

1. The city should have a well- planned sewerage system and a separate storm water drain system with appropriate management and maintenance
2. Proper functioning of sluice gate at Khan nagar to ensure Zero discharge to Kathajodi river during the lean period.
3. Proper functioning of the STP at Mattagajpur.
4. River front beautification activities and rainwater harvesting project along the stretch of the river. Rainwater harvesting can help in attaining the minimum flow in the river water for scouring the sediments and dilution water availability.
5. Sulabh Shauchalays should be created in the slums and urban fringe areas to avoid open defecation practices by the local inhabitants.
6. Explore possibility to create storages in the water shed of River for release of water during non-monsoon period.

**(Action: Cuttack Municipal Commission)**

7. Since a large patch of Agricultural land exists near Mattagajpur area, provision may be made for reusing the treated wastewater of the STP at Mattagajpur for irrigation purpose instead of discharging into the river.

**(Action: Irrigation Department)**

8. The Gram Panchayats of the villages on the bank of the river has to pass a resolution not to allow sewage / sullage from their respective villages to enter the river. Further they should also be provided with community sanitation facilities in villages to avoid open defecation. Awareness programmes should be made in this regard.

**(Action : Panchayati Raj and Drinking Water Department)**

9. Review the consent conditions of Cuttack Municipal Corporations in compliance to Water (PCP) Act,1976 and Municipal Solid Waste (Handling and Management) Rule, 2016.
10. Review the consent conditions of the STP in compliance to the outlet water quality requirement such as. discharge of BOD not more than 30 mg/l and Suspended solids not more than 100 mg/l.

## 7.0 Actions already initiated

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(1) The Housing and Urban Development Department in Govt. of Odisha is implementing the project “Integrated sewerage and drainage system in Cuttack City” with financial assistance from Japan International Cooperation Agency (JICA) under Odisha Integrated Sanitation Improvement Project (OISIP). The Odisha Water Supply and Sewerage Board (OWSSB) is the implementing agency of the Project. The salient features of the project are as follows.

- A 36 MLD capacity STP based on Activated sludge process at CDA-Bidanasi area **has been made operational with effect from 26.11.2018.**
- Construction of a 16 MLD capacity STP at Mattagajpur to treat waste water based on Activated Sludge process prior to discharge into Kathajodi river. **72% of the construction work has already been completed.**
- The existing 33 MLD STP waste stabilization pond constructed to treat drain water at Mattagajpur will be renovated to treat the wastewater before discharging to the river.
- Out of 360 Km of laying sewerage network, work for 280 Km (77%) has already been completed. **The scheduled date of completion of the work is Oct, 2020.**
- Out of 36 sewage pumping stations (11 numbers for STP at CDA (36 MLD) and 24 Nos. for STP at Mattagajpur (16 MLD) ), 5 Numbers of Pumping stations for STP at CDA has already been commissioned. Remaining pumping stations are in various stages of completion. **The scheduled date of completion of the work is September, 2019.**

**Out of total construction contract cost of Rs. 1058 crores for the sewerage scheme , as on 31.03.2019, around Rs. 797 crores (76%) expenditure has already been incurred.**

Map of Cuttack Sewerage scheme proposed under this project is shown in Fig. 8. The Cuttack city has been divided into three sewerage districts depending on the contour map (Fig. 9). Schematic diagram of STPs to be constructed in the Sewerage District-I and Sewerage District-II are shown in Fig. 10 and 11 respectively. Both the STP are based on Activated sludge process treatment. Unit

process interface of the STP is shown in Fig. 12. Schematic process flow diagram of the STP is shown in Fig. 13.

- Construction of 12 numbers of Low cost sanitation units to prevent open defecation practices of the local communities completed. Construction of 42 additional community / public toilets are being constructed under the project in the public places and slum areas within the city.
- Improvements of existing major and minor drains and channels under the project “Construction of Storm water drainage system of Cuttack city”. Under this, reconstruction/ widening of major drains for enhanced hydraulic capacity and construction of new sub-drains connecting to the main drains. will also be done.  
**The scheduled date of completion of the work is July, 2021. A total cost of Rs. 583.91 crore has been sanctioned for the project.**

(2) Under AMRUT programme, a Septage Treatment Plant (SeTP) of 60 KLD with **total project cost of Rs. 2.28 Crore is** under construction at Mattagajpur for treatment of septage generated in the city which will reduce pollution of river Kathajodi. The Project will be **completed by the end of year 2019**. The Odisha Water Supply and Sewerage Board (OWSSB) is the implementing agency of the Project. After the commissioning of the SeTP disposal of fecal sludge in SeTP will be made mandatory. In the SeTP, liquid part of the septage will be treated using DEWATS technology.

## **8.0 Public Awareness**

Under Swachh Bharat Mission open defecation is being discouraged and public/community toilets have been constructed. Awareness is generated amongst slum dwellers to use public/community toilets instead of open defecation. Construction of public/community toilet blocks for use in public places, slum areas and by group of households of low-wage income and provision of water supply has reduced the practice of open defecation in Cuttack city.

Efforts are being made

- To generate public awareness about fecal sludge and septage management and its linkage with public health as well as environmental health.

- To promote mechanism for sustaining behavioural changes aimed at adoption of healthy sanitation design and practices.
- To regulate the private cesspool owners to dispose the fecal sludge at the recently commissioned SeTP.
- To discourage people throwing garbages on the river bank.

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## **9.0 Flood Plain Zone protection and its management**

Cuttack city is situated on the delta of Mahanadi river and is bounded by Kathajodi river and Mahanadi river. Due to the saucer-like land profile of the city, most of the areas remain inundated in flood water during monsoons. During recession of the flood, the flood water carries the waste load of the land and discharge into Kathajodi river. To minimize this, actions taken for Flood Plain Zone protection are as follows.

- Renovation of ponds and conversion of low lying areas into ponds for storage of water. In addition to hold the flood water, such systems will recharge the ground water of the city.
- Periodical cleaning of storm water drains to facilitate the flow of flood water.
- No dumping of municipal garbage on river side.

**(Actions : Cuttack Municipal Corporation)**

## **10.0 Maintaining E-flow of Kathajodi river**

During lean period, the river gets dry. To maintain E-flow of Kathajodi water, more water needs to be discharged from Mahanadi river through barrage at Munduli and Naraj.

**(Action : Water Resource Department)**

## **11.0 Actions for Rain water harvesting and Ground water recharge**

State Government is providing subsidy for construction of rain water harvesting structure in houses across urban area of Bhubaneswar to recharge ground water.

**(Action : Water Resource Department)**

The Revenue Divisional Commissioner (Central) has imposed a ban in the year 2013 on selling portions of "jalasaya land" including ponds, tanks and water bodies in the Cuttack city. The ban is expected to help the government in taking steps to tackle waterlogging in the city during heavy rain as well as ground water recharge of the city.

## **12.0 Plantation programme**

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Forest Department in Govt. of Odisha and Bhubaneswar Development Authority are taking adequate steps for plantation programme in Cuttack city under Urban Plantation Programme.

**(Action : Forest Department)**

## **13.0 Removal of encroachment on Drains in Cuttack city**

Cuttack Municipal Commission is taking strong action for removal of encroachments on drains in Cuttack city to facilitate the natural flow of drains and to prohibit flood condition in the city during rainy season.

**(Action : Cuttack Municipal Commission)**

## **14.0 Monitoring of the implementation**

Since OWSSB is the executing agency for construction and commissioning of STP, Chief Engineer OWSSB shall review the progress every fortnight and shall report to H&UD Deptt. Principal Secretary, H&UD Deptt. may review the progress of construction of STP every month.

Cuttack Municipal Corporation and Forest Department will review the actions suggested in every month.

River Rejuvenation Committee (RRC) will review the progress of implementation of Action Plan every two months.

## **15.0 Conclusion**

Keeping in view the reduction of water pollution in Kathajodi river along Cuttack stretch, detailed strategies have been identified to indicate the nature and scope of action needed for effective reduction to make the impact visible.

This action plan has integrated and built on the on-going actions of the State Government in city level waste water treatment for control of water pollution that are already underway. The action plan has been developed keeping in view the needs of the protection of riparian rights of the people living downstream of Cuttack city.

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This plan has identified the agencies responsible for implementation of each action point and has also indicated the time line for implementation. This can be monitored for reporting and compliance.

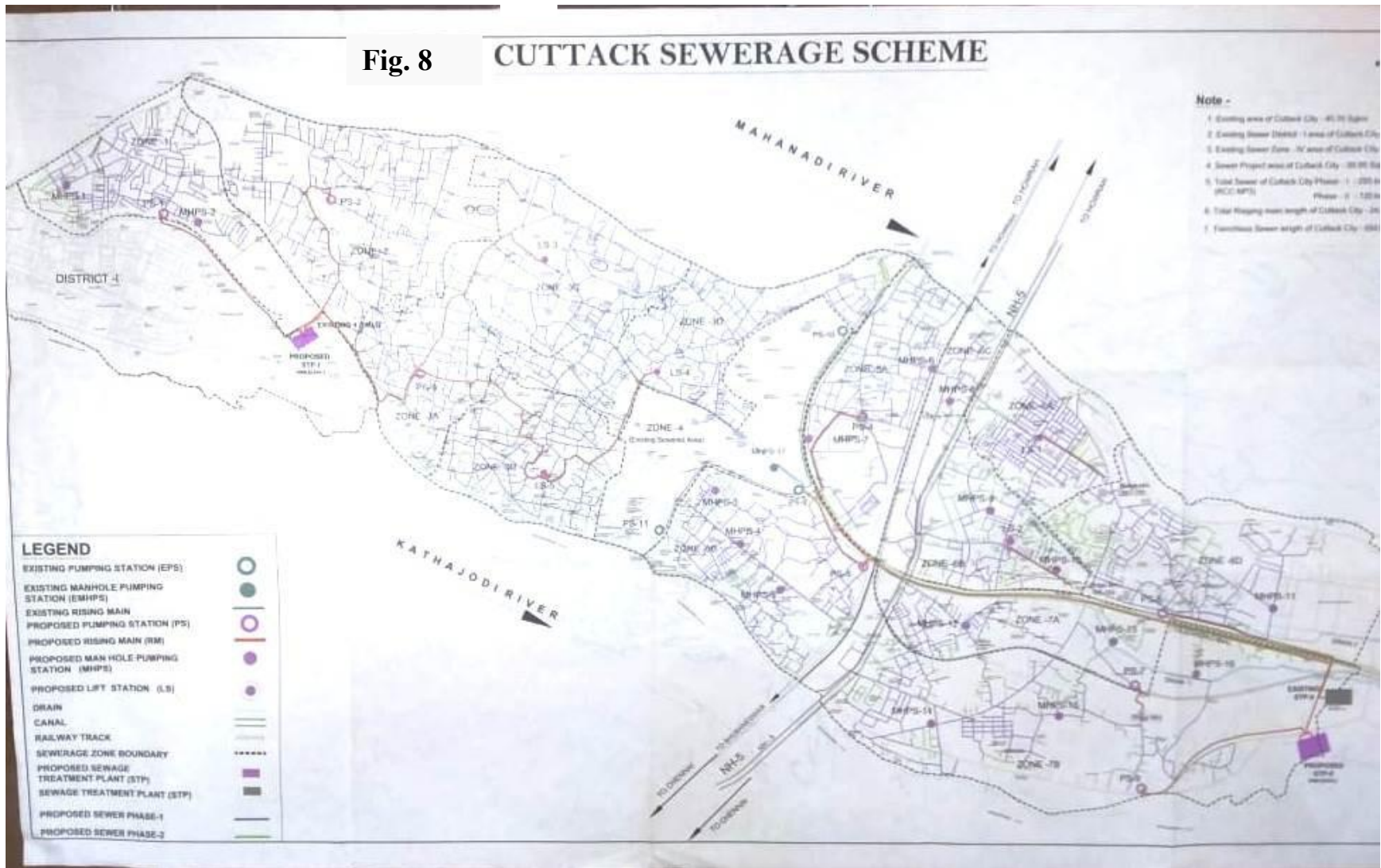
The implementation of Action Plans will definitely improve the water quality of Kathajodi river and Serua River.

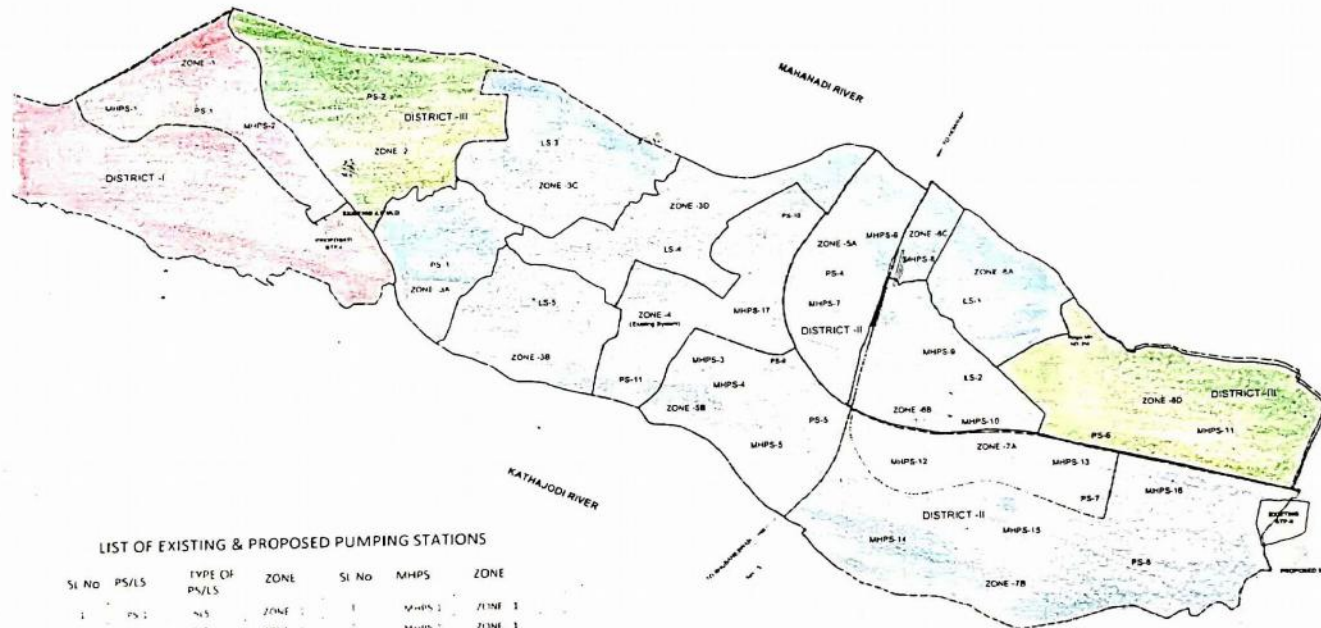
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Fig. 8

# CUTTACK SEWERAGE SCHEME





LIST OF EXISTING & PROPOSED PUMPING STATIONS

Sl No	PS/LS	TYPE OF PN/LS	ZONE	Sl No	MHPS	ZONE
1	PS-1	N/S	ZONE 1	1	MHPS-1	ZONE 1
2	PS-2	N/S	ZONE 2	2	MHPS-2	ZONE 1
3	PS-2	LS	ZONE 3A	4	MHPS-4	ZONE 5B
4	PS-4	N/S	ZONE 3A	4	MHPS-4	ZONE 5B
5	PS-5	LS	ZONE 3B	5	MHPS-5	ZONE 5B
6	PS-6	LS	ZONE 3C	6	MHPS-6	ZONE 5A
7	PS-7	N/S	ZONE 3A	7	MHPS-7	ZONE 5A
8	PS-8	N/S	ZONE 3B	8	MHPS-8	ZONE 6B
9	PS-9	N/S	ZONE 4	9	MHPS-9	ZONE 6B
10	PS-10	N/S	ZONE 4	10	MHPS-10	ZONE 6B
11	PS-11	N/S	ZONE 4	11	MHPS-11	ZONE 6D
12	PS-12	N/S	ZONE 6A	12	MHPS-12	ZONE 7A
13	PS-13	LS	ZONE 6B	13	MHPS-13	ZONE 7A
14	PS-14	LS	ZONE 3B	14	MHPS-14	ZONE 7B
15	PS-15	LS	ZONE 3C	15	MHPS-15	ZONE 7B
16	PS-16	LS	ZONE 4B	16	MHPS-16	ZONE 7B
17				17	MHPS-17	ZONE 4

NOTES:  
 1. PS-9, 10, 11 are Existing Pump Stations  
 2. MHPS-17 is an Existing Manhole Pumping Station

LEGEND

- Sewerage Zone Boundary
- Sewer District-I
- Sewer District-II
- Sewer District-III
- Sewer District-IIII
- Sewage Treatment Plant (STP)
- Pumping Station (PS)
- LHM Station (LS)
- Manhole P.B. (MHPS)
- Existing Pumping Station (EPS)
- Existing Manhole Pumping Station (EMHPS)

Rev.	Revision Description	Drawn	Date	Checked	Auth'd
Project: JICA Assisted Odisha Integrated Sanitation Improvement Project					
Client: ODISHA WATER SUPPLY & SEWERAGE BOARD					
Consultant: ENGINEERING & PROJECT MANAGEMENT CONSULTANTS					
(Consortium of Topo Engineering Consultants Co. Ltd Topo Tech Inc. and Epa Insoon International)					
Plot No. 65, 11, 8th Floor, Plot No. 1331-B, Sector-4, CDIA (Kharagpur Road, Bhubaneswar - 751013) Cuttack - 753014, Orissa Orissa. India. Tel: +91 674 2308011-7 Fax: +91 674 2047171-8					
Title: CUTTACK SEWERAGE DISTRICTS LOCATION OF STP & SEWERAGE PUMPING STATIONS					
Original Scale	Drawn	Checked	Authorised	S. N. S.	
	Date: 12/11	Date:	Date:	A3	





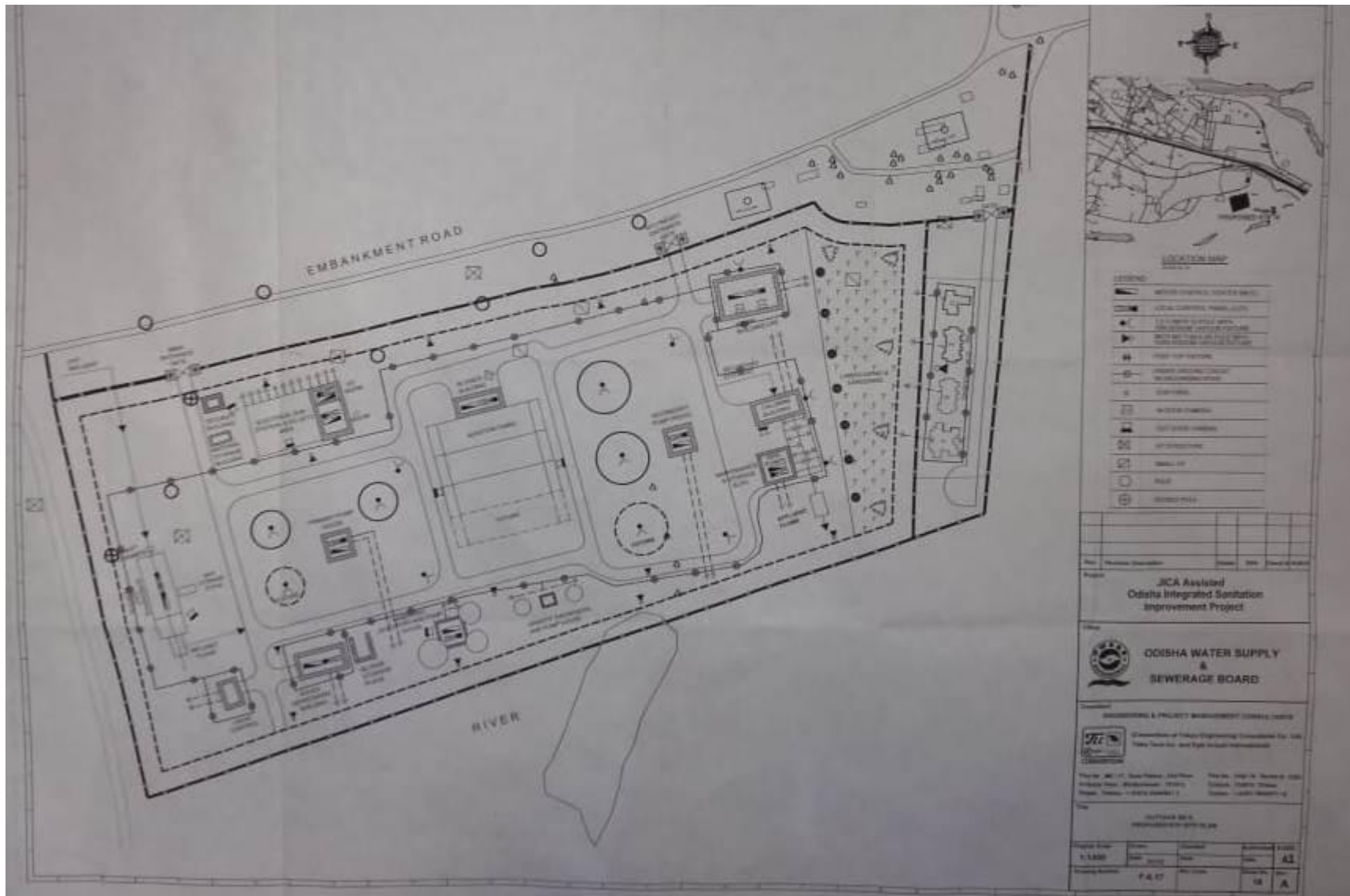


Fig. 11 Schematic diagram of STP to be constructed in Sewerage District-II of Cuttack city





