

ACTION PLAN FOR RESTORATION OF POLLUTED STRETCH OF

**1. RIVER BRAHMANI ALONG ROURKELA STRETCH
UNDER PRIORITY CATEGORY-IV**

**2. GURADIH NALLAH ALONG ROURKELA
UNDER PRIORITY CATEGORY-III**

EXECUTIVE SUMMARY ON PROPOSED ACTION PLANS

Sl. No.	DESCRIPTION OF ITEM	Details
1.	Name of the identified polluted river and its tributaries	: Brahmani River Major Tributaries : Sankh, Koel
2.	Is river is perennial and total length of the polluted river	: Perennial river. Total length of river is 461 Km.
3.	No of drains contributing to pollution and names of major drains	: Guradih nallah along Rourkela stretch
4.	Whether 'River Rejuvenation Committee (RRC) constituted by the State Govt./UT Administration and If so, Date of constitution of 'RRC'	: Yes. Constituted by the State Government vide letter No. 24426 dated 12.11.2018
5.	Whether 'River Rejuvenation Committee (RRC) have approved the Action Plan :	Yes. RRC have approved the Action Plan in its 3 rd meeting held on 04.06.2018.
6.	Major Towns on the banks of the river with population	: Rourkela Municipal Commission Population : 552,970 (as per 2011 census)
7.	a. Total no. of existing STPs and the total capacities in MLD	: No STP has been established.
	b. Total MSW generation in TPA	: 150 TPD (54,750 TPA)
	c. Existing treatment and disposal facilities and total capacity	: Total MSW is being disposed in the earmarked dumping yard.
8.	a. Major industrial estates located with total no. of industries	: One Industrial Estate With three large water intensive industries
	b. No of CETP's and their treatment capacity	: Nil
	c. Gaps in treatment of industrial effluent	: Industrial effluent are being treated in captive ETPs.
	d. Existing HW Treatment and Disposal Facilities and total capacity with life span	: Hazardous waste are either sold to authorized hazardous waste processor units or disposed in Hazardous waste pit or recycled/reused inside the industrial premises.

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1.0 Background

Water quality assessment of major rivers carried out by the State Pollution Control Board, Odisha under the project “National Water Quality Monitoring Programme” forms the basis for identification of polluted river stretches in the State of Odisha. The polluted river stretches are categorized under different priorities based on the BOD values as per Central Pollution Control Board (CPCB) classification. 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.

CPCB has identified the Rourkela stretch along Brahmani river is one of the polluted river stretch under priority category IV.

The State Pollution Control Board, Odisha has been monitoring the water quality of Brahmani river from its origin in Odisha at Vedvyas to Pottamundai, before it joins with river Baitarani and named as Dhamra river. Based on the BOD values during the period 2009-2017, Brahmani river has been observed to be polluted along the Rourkela stretch under priority category IV.

2.0 Rourkela city

Rourkela city is located at 84.54⁰E longitude and 22.12⁰N latitude in Sundargarh district of Odisha. The city is established on the bank of river Brahmani and river Koel. It is the third largest urban agglomeration in the state. It is situated about 340 kilometres north of the state capital Bhubaneswar. The city is also known as Ispat Nagar because of the establishment Rourkela Steel Plant, one of the largest steel plants of Steel Authority of India Limited (SAIL). The Koel river and Sankh river flowing from Jharkhnad state meet at Vedavyas near Rourkela and flow as Brahmani river. The total area of Rourkela Municipal Corporation is 53.29 sq km and has 40 wards. Rourkela city map is shown in Figure-1.

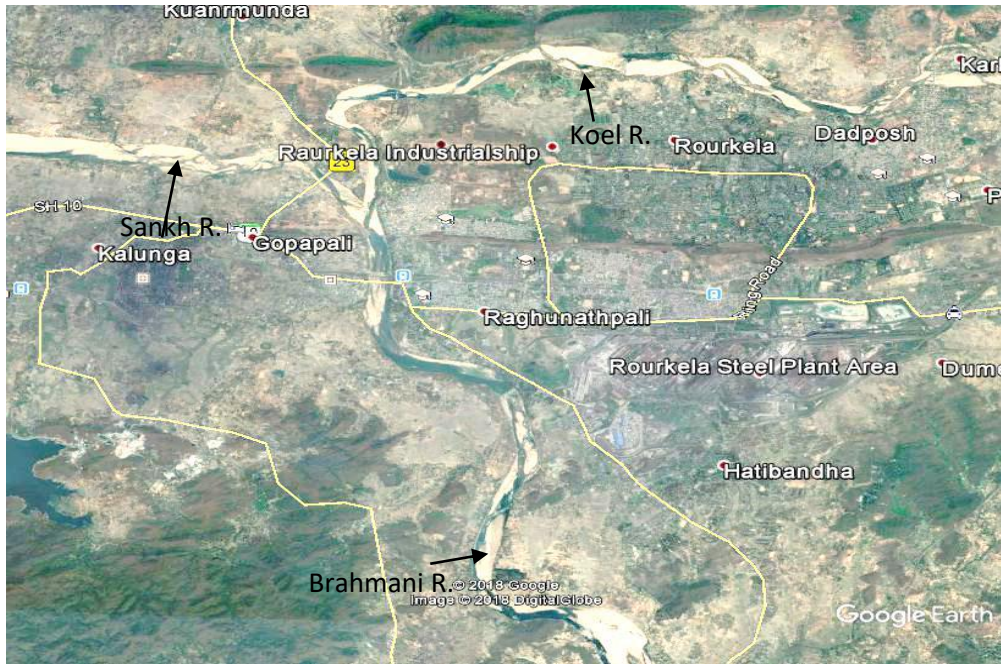


Fig. 1 Satellite image of Rourkela city along Brahmani River

Population of Rourkela city

The Rourkela township is divided into two separate townships under Census of India as Steel township and Civil township. As of 2011 census, Rourkela had a population of 552,970 of which 210,412 are in steel township and 273,217 are in civil township. Due to its importance of industrial and trading activity, there are good number of floating population in the town.

Water supply

Water from Brahmani river and Koel river is supplied after treatment for domestic use. The existing water supply is from surface source with 77.8 MLD water treatment plant capacity. As the city is situated amidst a hilly region, the fluctuation of ground water table is very high and the yield is very poor. The water table normally is 6-7m below ground level (bgl) and fall as low as 20m during non-monsoon season. The open wells and majority of hand pumps, tube wells dry up during monsoon. The yield of deep bore well is also quite low. Therefore, Rourkela city mainly depends upon river water for the domestic as well as industrial purposes.

3.0 Water Quality of rivers along Rourkela stretch

The State Pollution Control Board, Odisha monitors the water quality of river Brahmani at five stations and of its tributaries, that is, Sankh and Koel river at one station on each river. Details of water quality monitoring stations are given in Table-1 and are shown in Fig.2.

Table-1 Details of water quality monitoring stations on Sank, Koel and Brahmani rivers

Sl. No.	River	Water quality Monitoring station	Justification of the Water quality Monitoring station	Longitude	Latitude
1	Sankh	Sankha U/s	Downstream of Mandira dam and before confluence with river Koel	84°44'59.66"E	22°14'58.08"N
2	Koel	Koel U/s	Before confluence with River Sankh and after wastewater discharge of Koel nagar	84°50'27.99"E	22°16'27.78"N
3	Brahmani	Panposh U/s at Vedavyas	Water quality before Industrial activity after confluence of Sankh and Koel	84°47'57.19"E	22°14'12.24"N
4	Brahmani	Panposh D/s at Deogan	Impact of industrial activities like Rourkela Steel Plant and domestic wastewater discharge from Rourkela city	84°49'43.44"E	22°12'04.98"N
5	Brahmani	Rourkela D/s at Jalda	To assess water quality improvement at further downstream of Rourkela city and identification of polluted stretch	84°49'41.06"E	22°10'54.96"N
6	Brahmani	Rourkela FD/s at Attaghat	-do-	84°51'19.24"E	22°09'02.82"N
7	Brahmani	Rourkela FD/s at Biritola	-do-	84°53'52.10"E	22°04'28.70"N

Status of water quality of the river has been assessed with respect to the criteria parameter Biochemical Oxygen Demand (BOD) and by comparing the value with the tolerance limit laid down by CPCB for designated best use of surface water bodies. Based on the best use of the river stretch, these monitoring stations have been designated as Class C (drinking water source after conventional treatment followed by disinfection). Tolerance limit of BOD for class C is 3.0 mg/l or less.

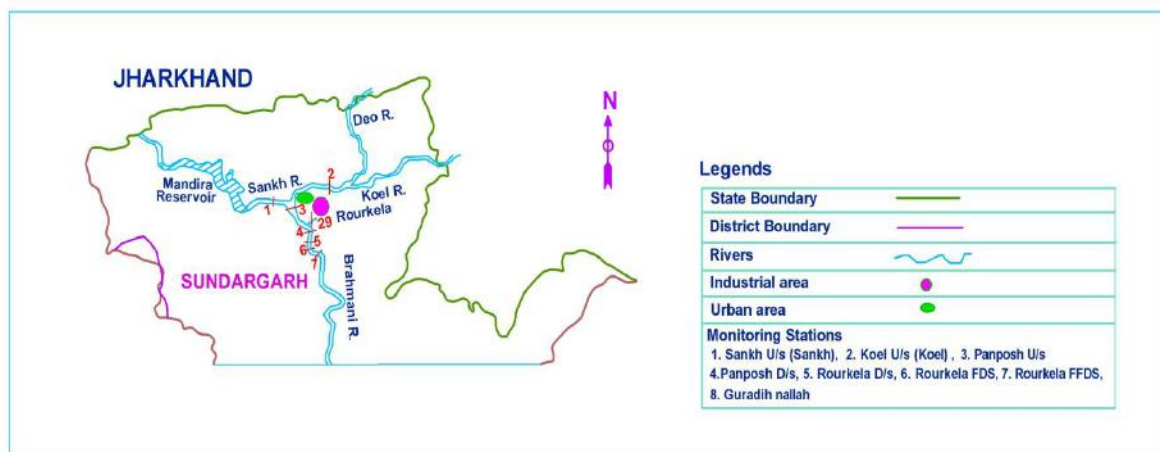


Fig. 2 Water quality monitoring stations on Sankh, Koel and Brahmani river and Guradih nallah

Maximum BOD values in a year at these monitoring stations during the period 2017 and 2018 are presented in Table-2.

Table-2 Water quality of Sankh, Koel and Brahmani river with respect to BOD (mg/l) during the period 2017 and 2018

Monitoring station	Maximum BOD (mg/l) value in a year	
	2017	2018
Sankh U/s	2.1	1.8
Koel U/s	1.7	2.5
Panposh U/s at Vedavyas	1.5	2.0
Panposh D/s at Deogaon	5.8	7.6
Rourkela D/s at Jalda	4.8	6.5
Rourkela FD/s at Attaghat	3.2	5.4
Rourkela FD/s at Biritola	2.7	2.8

From the data, it is revealed that the water quality of Sankh river and Koel River conforms to Class- C. Water quality at Panposh U/s (Vedvyasa) on Brahmani river after the confluence of Sankh and Koel river has been observed to conform Class C. However, the water quality deteriorates at Panposh D/s and Rourkela D/s. Maximum BOD range during the period 2017-18 has been observed to be 5.8-7.6 mg/l at Panposh D/s and 4.8 – 6.5 mg/l at Rourkela D/s. Maximum BOD at Further downstream of Rourkela at Attaghat during 2017-18 varied within 3.2-5.4 mg/l. However, at Biritola, the river quality conform to Class C

with respect to BOD. This indicates that, as there is no further source of pollution after Rourkela, the river rejuvenates itself and conforms to the designated class. Therefore, the polluted stretch of Brahmani along Rourkela is from Panposh D/s to Rourkela Further downstream at Attaghat which is only 14 Km from Panposh U/s monitoring station. Based on the BOD values, the polluted stretch is identified under priority category IV.

Water quality data of Sankh river, Koel river and Brahmani river along Rourkela stretch with respect to pH, DO, BOD, COD, Total coliform and fecal coliform during the period 2017-2018 are given in Table-3.

Table-3 Status of water quality of River Sankh, Koel and Brahmani during the period 2017 and 2018

Year	Location	pH		DO (mg/l)		BOD (mg/l)		COD (mg/l)		TC (MPN/100 ml)		FC (MPN/100 ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2017	Sankh U/s	7.6	8.1	5.9	8.6	0.4	2.1	7.5	14.0	23	16000	<1.8	16000
2018		6.7	8.1	4.8	8.2	0.4	1.8	5.5	14.4	330	16000	130	16000
2017	Koel U/s	7.3	8.5	5.8	9.7	0.6	1.7	2.9	19.9	1600	16000	490	16000
2018		6.7	8.3	4.5	8.0	0.4	2.5	5.0	17.8	67	>16000	20	16000
2017	Panposh U/s	7.5	8.4	5.4	8.8	0.4	1.5	4.3	14.1	1300	16000	230	16000
2018		6.8	8.3	5.6	9.0	0.5	2.0	5.0	19.8	580	16000	170	9200
2017	Panposh D/s	6.5	7.9	4.4	7.5	1.5	5.8	11.5	44.6	7900	160000	1100	160000
2018		6.6	8.2	3.5	7.4	1.5	7.6	15.8	48.0	5400	92000	1700	49000
2017	Rourkela D/s	6.8	8.1	4.9	8.5	1.2	4.8	11.5	38.0	4900	160000	200	160000
2018		6.6	8.2	3.7	7.8	1.3	6.5	13.8	44.2	1300	92000	490	35000
2017	Rourkela FD/s (Attaghat)	7.2	8.1	5.4	9.8	0.7	3.2	7.3	22.1	20	16000	<1.8	16000
2018		6.9	8.2	4.6	8.6	0.6	5.4	11.2	40.3	92	24000	20	13000
2017	Rourkela FD/s (Biritola)	7.3	8.2	5.5	9.6	0.4	2.7	5.6	18.4	230	16000	130	16000
2018		6.7	8.2	5.2	8.2	0.4	2.8	5.0	28.8	45	9200	20	5400

4.0 Sources of Pollution

Industrial Wastewater

M/s Rourkela Steel Plant is the major industrial unit situated in Rourkela near Brahmani river. The industry discharges its treated wastewater to Brahmani river through Guardih nallah. The nallah is a natural rivulet originating from the Durgapur hill Range of Rourkela, and flows on the northern side of the hill. The Nallah flows through the boundary of the Steel Plant. At one extreme and outside of the plant a lagoon has been built across

the nallah to provide storage facility of wastewater and is known as the “Oxidation lagoon”. The effluents from the sewage treatment plant (located inside the Steel Plant) are also being discharged into the Guradih nallah. An embankment with sluice gate has been made near the outlet of the Lagoon. The overflow from the lagoon falls into the river Brahmani after flowing a distance of only 0.5 km away from the outlet of the Lagoon.

Quality of Guradih nallah with respect to BOD during 2017 and 2018 is given in Table-4.

Table-4 : BOD in Guradih nallah during 2017 and 2018

Monitoring station	BOD (mg/l)					
	2017			2018		
	Minimum	Maximum	Average	Minimum	Maximum	Average
Guradih nallah	2.7	11.3	6.5	3.3	10.1	7.0

Guradih nallah serves as a drain for discharge of the treated wastewater from Rourkela Steel Plant to Brahmani river.

Municipal Wastewater

Municipal wastewater of Rourkela city is also discharged to Guradih nallah which ultimately outfalls into Brahmani river. Besides these, there are small unorganized drains carrying wastewater from different sectors of the City, discharge to Koel river.

Biomedical waste

Approximately 200 Kg of biomedical waste per day is generated from the health care units existing in Puri Municipality. The biomedical waste are being treated in the common biomedical waste treatment facility installed at District Head Quarter Hospital, Puri town.

Municipal solid waste

Approximately 150 tonne per day municipal solid waste is being generated in Rourkela Municipal Corporation. Solid waste is collected through both door to door collection and from community bins and then transported to earmarked landfill site at Baliapanda. The dumping site has been chosen for its deep natural depression. Therefore, there is remote chance of contamination of Mangala river by municipal solid waste disposal from Puri Municipality. Besides these, a municipal

solid waste treatment Plant of 100 TPD capacity has been established at Baliapanda of Puri to convert the biodegradable municipal waste into compost.

To summarize, there is no source of pollution of Mcontribution

5.0 Action Plan for Restoration of Water quality

To restore the water quality of Brahmani river along Rourkela stretch, interventions through treatment of municipal wastewater as well as industrial wastewater of Rourkela is necessary. The increasing population in the city with the growing demand on water supply for domestic purpose as well as industrial purpose has put pressure on the restoration of water quality.

Steps already taken for improvement of water quality are as follows.

- Directions issued to Rourkela Municipal Corporation under section 5 of the Environment (Protection) Act, 1986 for planning and execution of facilities by the Municipal authorities to develop infrastructure for sewage treatment.
- Directions issued for setting up of online monitoring system on Brahmani river at the downstream of Rourkela.
- Directions issued to M/s Rourkela Steel Plant under Section 25/26 of Water (Prevention and Control of Pollution) Act, 1974 to treat the wastewater so as to meet the prescribed standards prior to discharge into Guradih nallah.
- Odisha Water Supply and Sewerage Board (OWSSB) have taken steps for construction of three numbers of STPs of capacities 7.0 MLD, 5.0 MLD and 53 MLD at Rourkela to treat the municipal wastewater prior to discharge Brahmani river. **The Project cost for the total sewerage network for Rourkela City is Rs. 630.40 crores and the scheduled date of completion of the work is 08.01.2020.**
- Land acquisition / alienation work by OWSSB are also in progress for execution of a 40 KLD Septage Management project under AMRUT programme. **The Project cost for the Septage Treatment Plant is Rs. 2.25 crore and the scheduled date of completion of the work is 2019.**

6.0 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 Rourkela 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.

7.0 Flood Plain Zone protection and its management

Actions taken for Flood Plain Zone protection in Brahmani river along Rourkela 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 : Rourkela Municipal Corporation)

8.0 Maintaining E-flow of Brahmani river

During lean period, the river gets dry. To maintain E-flow of Brahmani river, State Pollution Control Board, Odisha has instructed M/s Rourkela Steel Plant to discharge more water from Mandira Dam to Sankh river so as to increase the flow in Brahmani river.

(Action : M/s Rourkela Steel Plant)

9.0 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 Rourkela to recharge ground water.

(Action : Water Resource Department)

Rain water harvesting structures are also being constructed by M/s Rourkela Steel Plant as CSR activity.

10.0 Plantation programme

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Forest Department in Govt. of Odisha and Rourkela Municipal Corporation are taking adequate steps for plantation programme in Cuttack city under Urban Plantation Programme. Besides these, Forest Department will take the plantation programme in 1-2 Km of river bank of Brahmani river from 2020.

(Action : Forest Department)

11.0 Removal of encroachment on Drains in Rourkela city

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

(Action : Rourkela Municipal Commission)

12.0 Monitoring of the implementation

Since OWSSB is the executing agency for construction and commissioning of three STPs, septage treatment plant, 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.

Rourkela 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.

13.0 Conclusion

Keeping in view the reduction of water pollution in Brahmani river along Rourkela 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 Rourkela 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 Brahmani river along Rourkela stretch.

From the discussions in Section-4.0, it may be concluded that Guradih nallah serves as a drain for discharging the treated wastewater from the Rourkela Steel Plant to Brahmani river. Therefore, BOD of Guradih nallah, may not be treated as a stream and the BOD value of Guradih nallah should not be compared with the tolerance limit of 3.0 mg/l. With this background, **Guradih nallah may be deleted from the list of the identified polluted river stretch in the State of Odisha.**
