

**ACTION PLAN FOR RESTORATION OF STRETCHES OF RIVER
KUAKHAI ALONG BHUBANESWAR UNDER PRIORITY
CATEGORY-IV**

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EXECUTIVE SUMMARY ON PROPOSED ACTION PLANS

Sl. No.	DESCRIPTION OF ITEM	Details
1.	Name of the identified polluted river and its tributaries	: Kuakhai River No tributary
2.	Is river is perennial and total length of the polluted river	: Kuakhai river has been bifurcated from Kathajodi river and the flow in Kuakhai river is regulated through Naraj barrage. The total stretch from its origin from Kathajodi river to its bifurcation into Daya and Kushabhadra is approximately only 18 Km.
3.	No of drains contributing to pollution and names of major drains	: No drains contributing pollution to Kuakhai river
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	: Bhubaneswar (Population : 837,737) as per 2011 census
7.	a. Total no. of existing STPs and the total capacities in MLD	: No wastewater is being discharged to Kuakhai river.
	b. Total MSW generation in TPA	: 520 MT per day (189,800 MT per annum)
	c. Existing treatment and disposal facilities and total capacity	: Total MSW is being disposed in the earmarked dumping yard which is far away from the river course and there is remote chance of contamination.
8.	a. Major industrial estates located with total no. of industries	: No water intensive industry.
	b. No of CETP's and their treatment capacity	: Nil
	c. Gaps in treatment of industrial effluent	: Nil
	d. Existing HW Treatment and Disposal Facilities and total capacity with life span	: Nil

1.0 Background

Water quality assessment of river Kuakhai has been carried out by the State Pollution Control Board, Odisha under the project “National Water Quality Monitoring Programme” at two locations, such as Bhubaneswar Further Upstream (near Mancheswar) and Bhubaneswar upstream (Near Hansapal). The Biochemical Oxygen Demand (BOD) range in this stretch of Kuakhai river during 2017 was observed to be was 0.3-2.9 mg/l. BOD has not exceeded the tolerance limit of 3.0 mg/l in this stretch during the total period of observation and therefore should not be identified as polluted river stretch.

However, the stretch has been categorized as polluted river stretch by Central Pollution Control Board under Priority-IV with the maximum BOD values being within the range 6.7-7.7 mg/l. Whereas, these maximum BOD have been reported by the State Pollution Control Board for Daya river at the downstream of Bhubaneswar city during 2016 (6.7 mg/l) and during 2017 (7.7 mg/l). Daya river is a distributary of Kuakhai river and flows along downstream of Bhubaneswar. The stretch on Daya river has also been identified as polluted river stretch and restoration plan for the stretch been included in the “Action Plan for Restoration of Polluted River Stretch of Gangua nallah-Downstream of Bhubaneswar-Priority-I”.

The river stretches are categorized under five different priorities based on the BOD values as per Central Pollution Control Board (CPCB) classification. Monitoring locations with BOD concentration exceeding 30 mg/l have 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 this classification, the Kuakhai river stretch does not fall under any Priority category provided the BOD value in the stretch during 2017 has been considered as 0.3-2.9 mg/l as reported by the State Pollution Control Board for Kuakhai river.

2.0 Water quality of Kuakhai River

Kuakhai river, a distributary of river Kathajodi, originates near village Mundamuhan, flows along the Bhubaneswar city, the capital city of Odisha state. Kuakhai river branches off into Daya river and Kushabhadra river near Baliana village. The river covers a distance of approximately 18 Km from its origin from Kathajodi river to its bifurcation at Baliana.

Water quality of Kuakhai river is being monitored by the Board on regular basis at two locations, such as Bhubaneswar Further Upstream (FU/s) (near Mancheswar) and Bhubaneswar upstream (U/s) (Near Hansapal). Monthwise water quality data of river Kuakhai with respect to Biochemical Oxygen Demand (BOD) during the year 2016, 2017 and 2018 are given in Table-1.

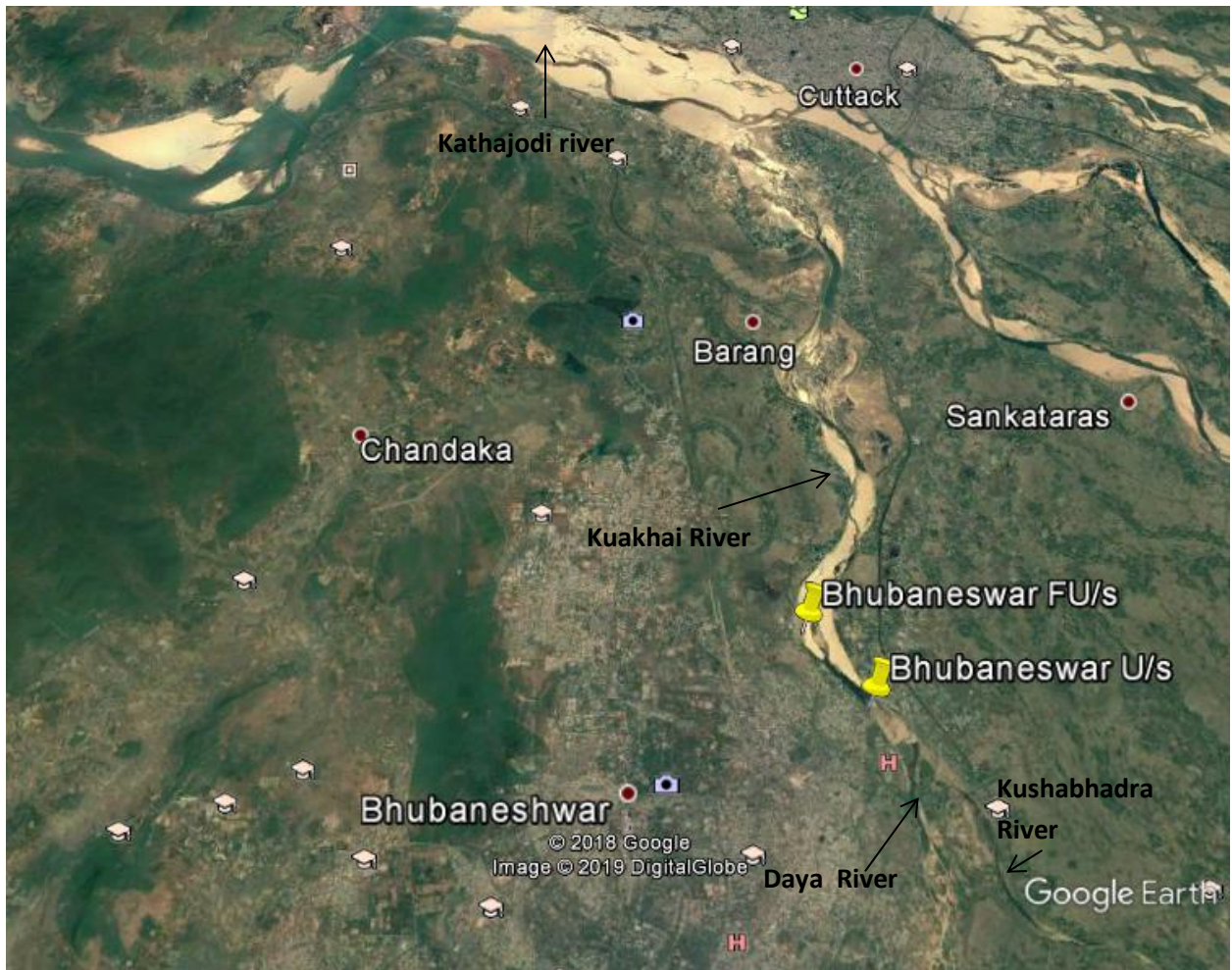


Fig.1. Satellite image of Kuakhai river and Bhubaneswar city

Table-1 Monthwise BOD (mg/l) in Kuakhai river during 2016-2018

Month	BOD, mg/l					
	Bhubaneswar FU/s at Mancheswar			Bhubaneswar U/s at Hansapal		
	2016	2017	2018	2016	2017	2018
January	0.8	0.4	1.0	1.2	0.4	0.9
February	1.7	0.8	1.1	1.8	1.2	1.3
March	0.7	0.6	1.0	0.8	1.0	1.4
April	0.9	0.8	1.5	0.9	0.6	0.9
May	0.7	0.7	1.0	0.7	0.4	1.1
June	0.4	0.5	0.4	0.7	1.0	0.6
July	0.4	1.0	1.0	1.7	0.6	1.2
August	1.5	0.6	1.5	1.7	2.2	1.6
September	1.2	0.4	1.3	1.3	2.9	1.2
October	1.5	0.8	1.0	1.5	0.9	1.1
November	1.2	0.3	0.7	1.1	0.8	0.9
December	0.8	0.6	0.9	0.7	1.1	0.8
Minimum BOD, mg/l	0.4	0.3	0.4	0.7	0.4	0.6
Maximum BOD, mg/l	1.7	1.0	1.5	1.8	2.9	1.6
Average, BOD, mg/l	1.0	0.6	1.0	1.2	1.1	1.1

The data shows that BOD has never exceeded the tolerance limit of 3.0 mg/l at both the monitoring locations. Therefore, the stretch from Bhubaneswar FU/s to Bhubaneswar U/s may not be identified as polluted river stretch.

3.0 Identification of sources of Pollution

Bhubaneswar, the capital city of Odisha, is the only large urban local body situated along Kuakhai river. As per 2011 census, Bhubaneswar had a population of 837,737. However, the topography of the area is such that the wastewater of the city is being discharged into Gangua nallah, a storm water drain, which flows in between the city limits and Kuakhai river. Gangua nallah ultimately discharges into Daya river, a distributary of Kuakhai river. Therefore there is no organized source of municipal or industrial wastewater discharge into Kuakhai river from its origin upto its bifurcation at Baliana to river Daya and river Kushabhadra. Prior to the year 2015, a small seasonal nallah, Budu nallah was discharging its water to Kuakhai river at Mancheswar (upstream of the Bhubaneswar U/s monitoring location). An Interception and Diversion (ID) on Budu nallah has been constructed by the Irrigation Department during the year 2015 to divert the flow of Budu nallah to Gangua nallah instead of discharging into Kuakhai river near Mancheswar. The overflow of the Budu nallah at this ID work during rainy season only find its way to Kuakhai river and therefore has no impact on the quality of the river.

Municipal solid waste

Around 520 MT per day of municipal solid waste is generated in Bhubaneswar city. Solid waste is collected through both door to door collection and collection from secondary and community bins. The collected solid waste are brought to the transfer station located near Sainik School over an area of 25 acre land. From the transfer station, the solid waste is transported to the dumping site at Bhuasuni. The topography of the dumpsite at Bhuasuni is a more of a valley type for which there is advantage of no overflow from the area to contaminate nearby-sites. Therefore, the chances of contamination of Kuakhai river by run-off from solid-waste dumpsite is remote.

Biomedical solid waste

Around 1082 Kg of biomedical waste per day is generated from 126 health care units existing in Bhubaneswar city. The total waste is collected and transported to a Common Biomedical Waste Treatment Facility situated at Tangiapada in Khurdha district which is far away from the city and beyond the catchment area of Kuakhai river. Therefore, there is remote possibility of contamination of Kuakhai river nallah by bio-medical waste generated in the city.

Industrial solid waste

No major water intensive industries are situated in the catchment area of Kuakhai river.

From the foregoing sections it is evident that there is no wastewater discharge from Bhubaneswar city to Kuakhai river. However, in the list of polluted river stretches identified by CPCB, the maximum BOD range in the identified stretch during 2017 has been reported as 6.7-7.7 mg/l and thus identified as polluted river stretch under priority category –IV. Further the polluted river stretch has been identified as Urali to Bhubaneswar, whereas, the monitoring station Urali is located on another river, Kathajodi river. The maximum BOD values 6.7-7.7 mg/l were reported by the Board for Bhubaneswar Downstream station during 2016 and 2017 respectively which is located on Daya river, a distributary of Kuakhai river. Daya river along Bhubaneswar has been identified as Polluted river stretch under Category IV and action Plan for restoration of this polluted river stretch is included in the “Action Plan for restoration of Polluted river stretch of Gangua nallah-Downstream of Bhubaneswar-Priority-I” since Gangua nallah is the major contributing factor for high values of BOD in the river Daya.

4.0 Groundwater quality in the catchment of identified stretch of Kuakhai river

The State Pollution Control Board had monitored the ground water quality in the catchment of identified stretch of Kuakhai river only at one location, that is Chandrasekharpur in Bhubaneswar on half-yearly basis (April and October). Ground water quality at Chandrasekharpur during 2017 and 2018 is given in Table- 2 . The BOD values in ground water indicate no contamination of ground water from any domestic source of pollution.

Table- 2 Ground water quality at Chandrasekharpur during 2017 and 2018

Parameter	2017		2018		IS : 10500 (2012)	
	April	Oct	April	Oct	Acceptable limit	Permissible limit
BOD, mg/l	1.5	0.7	0.6	0.3	-	-
TC, MPN/ 100 ml	79	<1.8	<1.8	<1.8	Absent	No relax
FC, MPN/ 100 ml	23	<1.8	<1.8	<1.8	Absent	No relax

5.0 Actions already taken for maintaining the water quality of Kuakhai river

- Increase in flow of water in Kuakhai river during lean period by diverting water from Puri Main canal to Kuakhai river before Bhubaneswar FU/s monitoring station by constructing a regulated weir near village Kendupatna. Satellite image of diversion of flow from Puri main canal to Kuakhai river is shown in Fig. 2.



Fig.2. Augmentation of flow in Kuakhai river by Puri main canal

- Construction of Interception and Diversion on Budu nallah so as to divert the water of Budu nallah to Gangua nallah instead of flowing into Kuakhai river near Mancheswar. Satellite image of Interception and Diversion on Budu nallah is shown in Fig. 3.



Fig.3. Interception and Diversion on Budu nallah

- Providing subsidy for construction of toilet in the household of the local inhabitants under Open Defecation Free Programme.
- Construction of community toilets/ public toilets to eradicate open defecation.
- Construction of tube wells and/or pipe water supply to the peripheral villages on both the banks of the river to restrict the in-stream activities on the river.
- Providing subsidy for constructing rain water harvesting structure in houses across urban area of Bhubaneswar to recharge ground water.
- Commissioning of a septage treatment plant of 75 KLD capacity at Basuaghai in Bhubaneswar to prevent the discharge of septage into open drains in the city.
- However, the stretch of Kuakhai river from its origin from Kathajodi river to its bifurcation into Daya and Kushabhadra river, is only a few kilometers of length. Therefore, the action plans covering aspects with respect to Flood Plain Zone protection and its management, setting up of Bio-Diversity parks are not feasible in the catchment area.

6.0 Conclusion

The BOD value in the identified stretch always remained within the tolerance limit of 3.0 mg/l during the period 2016-2018 and therefore should not be identified as polluted river stretch. Further, there is no wastewater discharge to the river which may deteriorate the quality of river. The implementation of Swachh Bharat Abhiyan and construction of toilets, provision of water supply has significantly reduced the open defecation practice of the local inhabitants in the stretch.

Therefore, the categorization of the river stretch by CPCB under Priority category –IV with the identified stretch from Urali to Bhubaneswar and maximum BOD values in the range 6.7-7.7 mg/l needs reconsideration on the following grounds.

- Urali is a monitoring station on Kathajodi river not on Kuakhai river.
- The maximum BOD values being within the range 6.7-7.7 mg/l were reported by the State Board for Daya river at the downstream of Bhubaneswar city during 2016 (6.7

mg/l) and during 2017 (7.7 mg/l). Daya river is a distributary of Kuakhai river and flows along downstream of Bhubaneswar.

- The stretch on Daya river has also been identified as polluted river stretch and restoration plan for the stretch been included in the “Action Plan for Restoration of Polluted River Stretch of Gangua nallah-Downstream of Bhubaneswar-Priority-I”.

On the above background, the stretch on Kuakhai river **may be deleted** from the list of polluted river stretch which has been prepared by CPCB only on the basis of deviation of BOD values from the tolerance limit of 3.0 mg/l.
