

ACTION PLAN FOR KOLONG RIVER-PRIORITY V

1. Basic information about the Stretch

The point of origin of the Kolongriver is located in between the hills of Kukurakata and Hatimura which is a distributory of Brahmaputra. The total length of the river is approximately 218.62 kmandflows through the districts of Nagaon, Morigaon and Kamrup metro. The river empties itself to the Brahmaputra again at Kajalimukh near Guwahati in a joint channel with the Kopili River – a major south bank tributary of Brahmaputra that flows into Kolong River near Jagibhakatgaon of Morigaon district. In the district of Nagaon the river Kolong is running a distance of more than 100 (hundred) Kilometers as delivered by Water Resource Department. In Nagaon township area the river is passing almost through the middle of the town dividing the entire town into two east-west parts namely Haibargaon and Nagaon.

The river Kolong is fed with several rivulets namely Diyu, Misha, Diphalu, Haria-Nanoi and Titaimari or Rahasuti. Receiving the water from aforesaid rivulets, the river Kolong become bigger and enters the district of Morigaon passing through the National High Way-37 at Bhatigaon and Mulankota-Manipurup area under Raha circle. In the district of Morigaon, another important river Kapili joins Kolong course at Dukhutimukh of Jagibhakatgaon area.

The whole course of the river basin is basically divided into two natural divisions as Upper Kolong sub-basin and Lower Kolong sub-basin. The upper Kolong sub-basin starts from the point of origin of the river and extended up to Nagaon town, covering an approximate length of 50 km. The lower sub-basin starts from Nagaon town and spreads up to Hilokhunda area of Morigaon district, covering more than 110 km.

The river has gone through a series of hydrological changes with a catchment area of 5218.75 sq kmand the average discharge is 1450 m³/sec volume of water.

1 (i) Polluted river stretch/length

The length of the polluted stretch of Kolong river at d/s ADP bridge is 7.5km (approx.) with an area of 21.4 sq.km. (Fig 1) and the stretch identified as polluted is from Diphalu to Kutayani

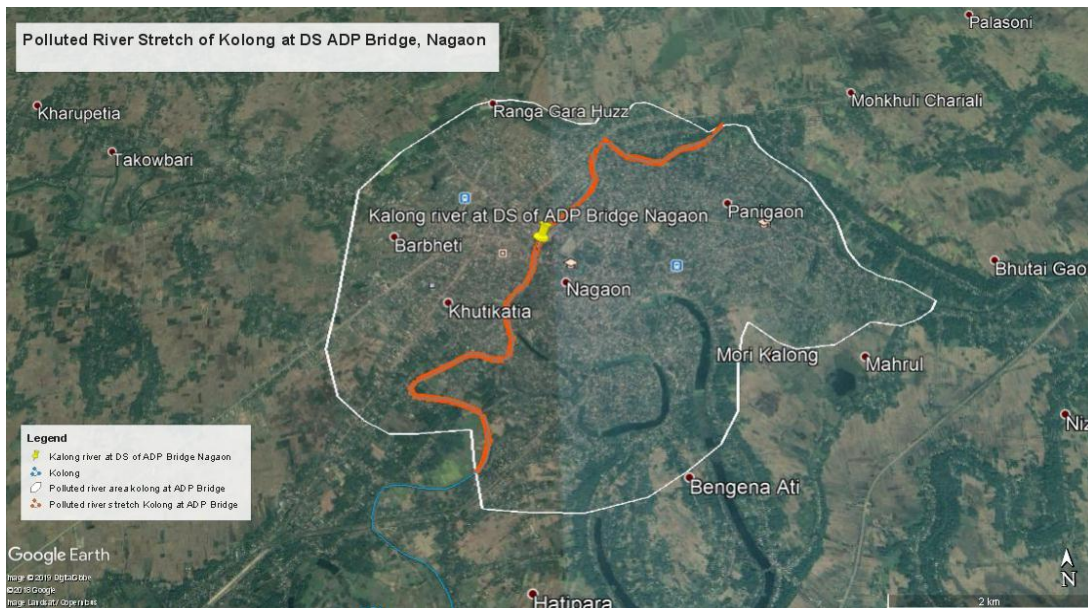


Fig 1: Map showing the polluted river stretch of Kolong river at d/s ADP bridge

The length of the polluted stretch of Kolongriver at Morigaon is about 1.5 km with an area of 2.0 sq.km.(Fig 2) and the identified polluted stretch is from Bangthaigaon road to Baghjap



Fig 2: Map showing the polluted river stretch of Kolongriver at Morigaon

2. Background:

In compliance of the direction of Hon'ble National Green Tribunal, Principal Bench, New Delhi in the matter of news published in 'The Hindu' authored by Jacob Koshy, Titled 'More river stretches are now critically polluted CPCB', Government of Assam constituted River Rejuvenation Committee (RRC) vide memorandum 673/2018 dated

19/12/2018 for effective abatement of pollution, rejuvenation, protection and management of the identified polluted stretches, for bringing the polluted river stretches to be fit at least for bathing purposes within six months

3. Basis of Action Plan for Kolong polluted river stretch

The action plan for rejuvenation, protection and management of the identified polluted river stretch of Assam has been prepared based on the following

- As per direction of Hon'ble National Green Tribunal, Principal Bench, New Delhi in the matter of news published in 'The Hindu' authored by Jacob Koshy, Titled 'More river stretches are now critically polluted CPCB'
- Comprehensive report on Prevention and Control of Pollution in River Hindon: An Action Plan for Rejuvenation' [Submitted in compliance to Hon'ble National Green Tribunal]

4. Components of Action Plan

(a) Industrial Pollution Control

- Inventorisation of industries
- Categories of industry and effluent quality
- Treatment of effluents, compliance with standards and mode of disposal of effluents
- Regulatory regime.

(b) Identification, Channelization, Treatment and Utilization of Treated Domestic Sewage

- Identification of towns in the catchment of river
- Town-wise Estimation of quantity of sewage generated and existing sewage treatment capacities to arrive at the gap between the sewage generation and treatment capacities;
- Identification of towns for installing sewerage system and sewage treatment plants.
- Storm water drains now carrying sewage and sullage joining river and interception and diversion of sewage to STPs,
- Treatment and disposal of septage and controlling open defecation.

(c)River catchment/Basin Management-Controlled ground water extraction and periodic quality assessment

- Periodic assessment of groundwater resources and regulation of ground water extraction by industries particularly in over exploited and critical zones/blocks.
- Ground water re-charging /rain water harvesting
- Periodic ground water quality assessment and remedial actions in case of contaminated groundwater tube wells/bore wells or hand pumps.
- Assessment of the need for regulating use of ground water for irrigation purposes.

(d)Flood Plain Zone

- Regulating activities in flood plain zone.
- Management of Municipal, Plastic, Hazardous, Bio-medical and Electrical and Electronic wastes.
- Greenery development- Plantation plan.

(e)Ecological/Environmental Flow (E-Flow)

- Issues relating to E-Flow
- Irrigation practices

(f)Such other issues which may be found relevant for restoring water quality to the prescribed standards.

5. Action Plan as per direction of Hon'ble NGT

The components to be discussed in the action plan for rejuvenation, protection and management of identified polluted stretch of Kolongriver are as follows

5.1. Industrial Pollution Control

Classified industrial units are observed with infrastructural facilities (ETPs, STPs) in the periphery of the polluted stretch of Kolong river at d/s of ADP bridge, Nagaonalong with few small scale industrial establishments. However, there has been no account of any industrial units in the polluted stretch of Kolongriver at Morigaon district

Further directions were issued by the PCBA to all the industrial units which has failed to comply with the discharged norms. Moreover, the Board has also issued direction to build their own set up in their premises which do not have STP/ETP

The classified industry details situated at the radius of the polluted river stretch is presented at **Table I.**

Following are the suggestions for control of industrial pollution control

- The industry that will extract groundwater for manufacturing process should not operate unless they possess valid permission for groundwater extraction from Central Ground Water Authority.
- No industries should discharge their effluent directly into drains without treatment, rather they should reuse their treated effluent/sewage.
- Direction to be issued to the units which are not complying to the effluent discharge norms as per Section 5 of the Environment (Protection) Act, 1986, by PCBA for ensuring compliance to the discharge norms.

6. Identification, Channelisation, Treatment and Utilization of Treated Domestic Sewage

6.1. Major towns located on the bank

Nagaon is the major town located on the bank of the Kolong river at d/s of ADP bridge polluted stretch. The approximate population of the Nagaon town is 1,48,496 as per Census 2011. The major localities identified in and around the catchment areas of polluted stretch of Kolong river at d/s of ADP bridge are Diphalu, Ratnapur, Anandanagar, Panigaon, Jyotinagar, Kachali number 2, Dimoruguri, Choto Hoibor, Kachalukhuwa, Morikolong, Barbheti, Khutikatia, Sensuwa etc.

Kolong river also enters Morigaon district at Manimurtup, however, the polluted stretch of the river is not identified across the major populated locality of the district i.e. Morigaon town. Bhakatgaon is the only major village located in the bank of the polluted river stretch of Kolong river at Morigaon area. The area is a medium sized locality with a population of around 1780 with 378 households as per Census 2011.

6.2. Town wise estimation of quantity of sewage generated and existing sewage treatment capacities

The major town/village responsible for contribution of sewage in the polluted stretches of Kolong river are Nagaon and Bhakatgaon. The waste generated by Nagaon town is approximately 16037.6 KLD and Bhakatgaon at Morigaon district is around 192.2 KLD.

6.3. Identification of towns for installing sewerage system and sewage treatment plants.

As per the survey done, one (01) number of STP has been proposed at Nagaon town in consultation with the District Administration. However, the sewage generation from the Bhakatgaon village is minimal and hence the untreated sewage can be taken care of by adopting stringent remedial actions.

Table II: Sewage generation and gaps in treatment

S.N	Area	Population as per 2011 census	Water Consumption (KLD) @135lpcd	Sewage Generation (KLD)	No. of STPs proposed	Existing Treatment capacity (KLD)	Gaps in KLD
1	Nagaon	1,48,496	20046.9	16037.6	01	Nil	16037.6
2	Bhakatgaon	1780	240.3	192.2	Nil	Nil	192.2

6.4. Water Quality of the river stretch

There are two (2) sampling locations of Kolong River under NWMP which is presented as below at **Table III**

Table III: Monitoring Location Details

S.No	Sampling Location	Coordinates
1	Kolong river at d/s AnandaramDhekialPhukan bridge	26°21'1.96"N 92°40'51.48"E
2	Kolong river at Morigaon	26°10'40.10"N 92°13'3.00"E

The change in the water quality of Kolong river in terms of BOD value for the period 2016-2019 is presented below in **Table IV and V**

Table IV: BOD value in mg/l of Kolongriver at d/s ADP Bridge for the year January, 2016- April, 2019

Year	BOD Value	Year	BOD Value	Year	BOD Value	Year	BOD Value
Jan-16	1.1	Jan-17	2.2	Jan-18	3.4	Jan-19	2.5
Feb-16	2.1	Feb-17	2.6	Feb-18	3.4	Feb-19	2.2
Mar-16	3.0	Mar-17	1.4	Mar-18	2.4	Mar-19	2.2
Apr-16	3.0	Apr-17	2.0	Apr-18	4.2	Apr-19	3.0
May-16	1.6	May-17	2.8	May-18	3.2		
Jun-16	1.5	Jun-17	2.2	Jun-18	3.2		
Jul-16	1.0	Jul-17	2.8	Jul-18	3.0		
Aug-16	2.8	Aug-17	2.3	Aug-18	2.0		
Sep-16	1.1	Sep-17	2.9	Sep-18	2.6		
Oct-16	2.0	Oct-17	3.2	Oct-18	1.1		
Nov-16	3.7	Nov-17	2.8	Nov-18	2.0		
Dec-16	0.8	Dec-17	2.8	Dec-18	1.3		

The above data indicated that BOD value has increased in only eight (08) occasions out of forty (40) occasions. The increase of BOD load which indicates organic load may be due to draining of storm runoff along with the organic waste originating from domestic household waste into the river through the drains. The marginal increase of BOD level during dry period may probably be due to decomposition and high concentration of organic matter as their rate of dilution is very low due to lean flow of the river. This marginal and occasional exceedance of BOD level does not reflect the extremity of pollution. Hence this can be considered as incidental and can be omitted from the polluted river stretch.

Table V: BOD value in mg/l of Kolong river at Morigaon for the year January, 2016- April, 2019

Year	BOD Value	Year	BOD Value	Year	BOD Value	Year	BOD Value
Jan-16	1.9	Jan-17	2.6	Jan-18	0.8	Jan-19	1.5
Feb-16	1.0	Feb-17	2.4	Feb-18	1.6	Feb-19	1.5
Mar-16	1.1	Mar-17	1.2	Mar-18	1.0	Mar-19	1.4
Apr-16	1.7	Apr-17	2.0	Apr-18	1.4	Apr-19	2.5
May-16	1.8	May-17	2.9	May-18	1.8		
Jun-16	0.6	Jun-17	3.0	Jun-18	1.5		
Jul-16	1.4	Jul-17	1.8	Jul-18	1.4		
Aug-16	1.5	Aug-17	1.4	Aug-18	2.1		
Sep-16	2.4	Sep-17	1.7	Sep-18	2.0		
Oct-16	1.5	Oct-17	1.8	Oct-18	2.2		

Nov-16	4.3	Nov-17	1.7	Nov-18	2.0		
Dec-16	1.9	Dec-17	2.8	Dec-18	1.9		

The data reflected that BOD value has increased in only two (02) occasions out of forty (40) occasions. This incidental increase of BOD level during dry period may be due to decomposition and high concentration of organic matter as their rate of dilution is very low due to lean flow of the river. Moreover, Assam is cursed with the catastrophic flood every year and hence this incidental exceedance of BOD value may be due to additional organic matter introduced in the river as a result of continuous rainfall during this disastrous calamity. However, it is also observed that the BOD load is within the standard criteria towards 2018 and 2019 and hence this marginal and occasional increase do not indicate the extremity of pollution and can be omitted from the polluted stretch criteria.

6.5. Drains contributing to pollution

Three major drains are identified in the Nagaon town, which is responsible for draining off majority of the municipal, industrial and commercial waste from the town to the river. The details of the drains or outfalls that carries majority of the city sewage in Nagaon town is presented in **Table VI**

Table VI: Major channels/drains of Nagaon town contributing to the pollution load of the River

Sl. No	Location
Drain 1	Near ASTC bus stand, Nagaon
Drain 2	Near AnandaramDhekialPhukan bridge, Nagaon
Drain 3	Near Law College, Nagaon

Kuchchanullahs or drains of natural origin exist in the Bhakatgaon village at Morigaon district that evacuate domestic sewage originated from individual households. Moreover most of the households have individual drainage that has been connected to soak pit, kitchen garden and stagnated pool to take care of the waste

6.6. Characteristics of the major drains

The drains mainly carries industrial as well as residential wastes. Direct dumping of residential and commercial garbage into the channel is making

it shallower and heavily silted. As a result, during rainy season water overflows and inundates the areas. It is also observed that the drains of the town are also becoming a regular garbage-dumping site. Moreover, these drains are not planned properly to carry even the regular water.

6.7. Flow details of the major drains contributing to river pollution

Action initiated to measure the flow of various out falling drains.

6.8. Sewage generation from the towns located on the banks of the polluted river

The main contributor of pollution in the river is municipal sewage. There are no treatment systems for the sewage which are dumped in open thereby ultimately finding their way to water bodies without treatment. Moreover, Sewage treatment facility has not been set up yet in Assam.

6.9. Number of Sewage treatment plants present and treatment capacity, and gaps

There is no any sewage treatment plant at present.

6.10. Number of STPs proposed and capacity

As per the survey done, one (01) number of STP has been proposed at Nagaon town with a capacity of 16 MLD in consultation with the District Administration.

6.10. Interception and diversion of drains /in situ treatment given

One (01) number of STP has been proposed along with interceptor drains for in situ treatment before outfall.

6.11. Drainage system/ sewerage network present/proposed

Some natural drainage of local origin are acting as the drainage system to evacuate sewage originating from domestic households, commercial establishments, institutes, industries etc.

There is no sewerage system at present. In this project one (01) number of STP along with interceptor drains for collection of the sewage of the basin has been proposed. All the sewage of the catchment area of the river shall be collected by interceptor drains and shall be treated in the proposed STP before outfall in to the river.

6.12. Treatment and Disposal of Septage and controlling Open Defecation

Some of the households in the towns are equipped with ordinary septic tanks. Under the Swachh Bharat Abhiyan, Public Health Engineering has constructed 5893 numbers of IHHL in the Nagaon district to attain open defecation free status. Moreover, public toilets have also been constructed at the commercial areas.

Moreover, in the Morigaon district, 1118 numbers of IHHL under Swachh Bharat Mission have been constructed to achieve ODF. However, the Bhakatgaon village is still deprived of IHHL scheme and community toilets are also not available.

Following remedial actions will be taken in consideration of treatment and disposal of sewage

- Sewage Treatment plant should be installed for treatment
- The discharge should be trapped by strainers before draining off to the river.
- Every individual households should be connected to sewer lines.
- Every households should be recommended to have individual drainage that should be connected to soak pits or stagnated pool.
- Roadside hotels/restaurants should not be allowed to dispose untreated sewage and solid waste into the nearby drains or rivers. These establishments should be properly regulated by the concerned authority.
- Public awareness to control open defecation and understand the sanitary hygiene.
- Local administration should provide proper pucca toilets for the individuals or at least community toilets through the IHHL scheme under Swachh Bharat Mission.

7. Controlled Ground water Extraction and quality Assessment

The district is potential from ground water point of view as revealed by the studies carried out by CGWB. The stage of ground water development in Nagaon and Morigaon districts are 39% and 41%, which shows under the SAFE category. As long-term water level trend does not show any major change so the whole district may be considered as SAFE

The details of estimated ground water resource in the Nagaon and Morigaon districts are presented below in **Table VII and VII**

Table VII: Estimation of ground water resource in the Nagaon district

Ground water extraction details	Ground water	Irrigation practices	Ground water recharging mechanism	Rain water harvesting
Net Ground Water Availability	184461.71 ham	Minor and medium irrigation schemes such as DTW and STW	Recharging of groundwater are done by creation of Pond/lakes under government schemes.	The roof top rainwater harvesting is practiced.
Gross Ground Water Draft	71932.20 ham			
Stage of Ground Water Development	39%			
Future provision for Domestic & Industrial Use	9056.17 ham			
Future Provision for Irrigation Use	109634.12 ham			

Table VIII: Estimation of ground water resource in the Morigaon district

Ground water extraction details	Ground water	Irrigation practices	Ground water recharging mechanism	Rain water harvesting
Net Ground Water Availability	96106 ham	Minor and medium irrigation schemes such as DTW and STW	Recharging of groundwater are done by creation of Pond/lakes under government schemes.	The roof top rainwater harvesting is practiced.
Gross Ground Water Draft	28189 ham			
Stage of Ground Water Development	41%			
Future provision for Domestic & Industrial Use	2975 ham			
Future Provision for Irrigation Use	39965ham			

7.1. Status of Ground Water

The quality of ground water in the Nagaon district is suitable for both the drinking and irrigation purposes except the high concentration of fluoride (F) with concentration varying between 0.5 to 8 ppm and iron with a concentration varying from 0.14 to 1.29 mg/l in certain areas.

The quality of ground water in the Morigaon district is suitable for both the drinking and irrigation purposes except with higher concentration of iron (Fe) in the range of 0.1 to 2.5 ppm is observed in few pockets in shallow and deep aquifers of the district.

However, the high concentration of iron beyond permissible limit in ground water in some of the areas of Nagaon and Morigaon districts can pose problem, which can be lowered by aeration and filtration method.

7.2. Remedial Actions

The following remedial actions will be taken in consideration of contaminated ground water sources, controlled ground water extraction and periodic quality assessment

- Ground water of deeper aquifers should be analyzed for periodic assessment of element like Arsenic, Fluoride, Iron etc.
- Alternate sources of drinking water should be explored and prioritized.
- Awareness campaigns about health hazards due to intake of excessive Arsenic, Fluoride are the need of the time.
- Role of pesticides used for agricultural activity should be carefully observed.
- Survey should be conducted regarding ground water uses by different categories such as domestic, Industries etc and also to identify the over exploited and critical areas in the river stretches with respect to ground water extraction.
- Effective management of industrial effluent or sewage for preventing contamination of ground water sources.
- The industry that will extract groundwater for manufacturing process should not operate unless they possess valid permission for groundwater extraction from Central Ground Water Authority.
- Strict vigilance and conducting inspection of the industries to rule out any forceful treated effluent injection in to ground water resources.
- Roof top rain water harvesting techniques should be encouraged for industrial, commercial or individual households and community

8. Flood Plain Zone

The following are the identified flood prone area for the polluted river stretch

Sl. No	Name of River	Flood plain areas
1	Kolong river at d/s ADP Bridge	Sensuwa, Bidyatupi, Mahekhusa, Ratnapur and Diphalu
2	Kolong river at Morigaon	Bhakatgaon

8.1. Regulating activities in the Flood Plain Zone

Further following activities need to be regulated in the flood plain zones.

S.No	Action points	Responsible authority
1	Plantation in the flood plain zone	Forest Department
2	Checking Encroachment	Local administration
3	Demarcation of the flood plain zone	Water Resource Department
4	Prohibition of disposal of all kinds of wastes	District Administration

8.2. Waste management status

Table IX: Management of Industrial, Municipal, Biomedical, Plastic and Electronics Waste

Sl. No	Type	Status	Proposed actions	Authority
1	Industrial Waste	<ul style="list-style-type: none"> ➤ No industrial waste dumped on land or discharged into water bodies/river. ➤ Industrial wastes are managed by industries itself ➤ Authorisation have been granted to different industries in line with Water act 1974, Hazardous Waste (Management, Handling and Transboundary Movement) Rule, 2008 as amended. ➤ Regular monitoring by PCBA to ensure that the terms and conditions are strictly adhered in accordance with the prescribed standards. 	Direction issued to the industries to identify the non-point sources and arrest contamination of storm water.	Pollution Control Board Assam

Sl. No	Type	Status	Proposed actions	Authority
2	Municipal waste	<ul style="list-style-type: none"> ➤ Dumping is carried out unscientifically in the open space. ➤ No proper segregation of bio-degradable and non-biodegradable waste ➤ No proper segregation of dry and wet waste ➤ Lack of unscientific disposal facilities/infrastructure technology like decentralized composting or bio-methanation plant, waste to energy plant, solid waste management plant. 	<p>Municipal Body is in process of inducting the following activity</p> <ul style="list-style-type: none"> ➤ Implementation of segregation of waste at source ➤ Door-to-door garbage Collection of waste ➤ Formation of Sanitation task Force ➤ Formation of Neighbourhood Community ➤ Awareness campaigns ➤ Processing and disposal of waste 	Municipal Body
3	Plastic Waste	<ul style="list-style-type: none"> ➤ Dumping is carried out unscientifically in the open space along with the municipal waste. ➤ No proper segregation of bio-degradable and non-biodegradable waste ➤ No proper segregation of dry and wet waste ➤ Lack of unscientific disposal facilities/infrastructure technology like decentralized composting or bio-methanation plant, waste to energy plant, solid waste management plant. 		Municipal Body/Pollution Control Board Assam
4	Hazardous Waste	<ul style="list-style-type: none"> ➤ Hazardous waste are managed by hazardous waste generating industries itself by disposing the same through authorised recycler, secured landfill area, Bio- 		Pollution Control Board Assam

Sl. No	Type	Status	Proposed actions	Authority
		<p>remediation etc.</p> <ul style="list-style-type: none"> ➤ PCBA has engaged collection centre for collection of Hazardous waste ➤ Lack of TSDF facility for commonly utilization by hazardous waste generating industries 		
5	Bio-medical Waste	<ul style="list-style-type: none"> ➤ Segregation at the source under Biomedical waste Management Rules, 1998 as amended ➤ The HCFs have installed ETP for treatment of liquid waste generated 	Direction issued to all HCF unit to implement the BMW Rules, 2016 as amended in all HCF Units. (As per guidelines of CPCB)	HCF units/Pollution Control Board Assam
6	E –waste	<ul style="list-style-type: none"> ➤ Most of the e-waste generator have sent their e-waste to their respective manufacturer. ➤ Annual return in (Form-3) is submitted by E-Waste generating units to PCBA from time to time for onwards transmission to CPCB ➤ There is no authorised recycler, refurbisher, dismantler etc. available to ensure environmentally sound management of E-waste. ➤ There is no “facility” wherein the process of dismantling, recycling, and disposal of e-waste are carried out. <p>Most of the e-waste generator sent their e-waste to their respective manufacturers</p>	Few entrepreneur approached PCBA for registration and authorisation as Recycler	Pollution Control Board Assam

8.3. Gaps identified in waste management

Presently, approximately 149564 Kg/day of gaps has been identified for municipal solid waste management

8.4. Greenery development - Plantation Plan

State Government has initiated afforestation in the degraded forestland, also raising roadside plantation besides creating check dams/embankments in the river catchment areas to combat erosion and soil conservation.

The following remedial actions has to be initiated in consideration of greenery development

- Raise plantation along the river bank to control the flow run off water directly to the river
- Bamboo species to be raised as it is a good soil binder thereby stabilize the banks of the river from erosion

9. Environmental Flow (E-Flow)

9.1. Stretch of river perennial or non- perennial/flow available/water usage in the stretch

The entire river stretch is perennial. The maximum discharge of the polluted stretch at d/s ADP bridge is 27.66 m³/sec and minimum is 7.67 m³/sec. However, the morigaon location is towards the downstream and due to confluence of small rivulets with Kolong, the discharge is observed to be higher with maximum of 555.5 m³/sec and minimum of 399.4 m³/sec.

9.2. Irrigation practices in the river

The high volume of discharge and water level of the river can be of great use for good irrigation practices for the people. Different irrigation activity has been undertaken in the river under government proposed schemes as per the following details.

TableX: Ongoing and proposed Irrigation schemes in the Kolong river

Sl. No.	Name of the Scheme	Activity	Command Area/Created Potential
1	LIS from PuttaKolong near Sivasthan Bazar under Tekeliputta G.P. (3 Pts)	Lift Irrigation	180 ha
2	Borbalitup ELIS from Kolong at Kuhumtoli GP	Lift Irrigation	80 ha
3	LIS from Putakolong in Danduatup village	Lift Irrigation	50 ha
4	RRR at Kolong river from Arikati to Diju river	Surface Irrigation	0 to 19 km Length

10. Identified organisations responsible for preparation and execution of the action plans

Organisations responsible for preparation and execution of the action plans are as follows:

- Secretary to the Govt. of Assam, Environment and Forest department
- Secretary to the Govt. of Assam, Urban Development department
- Commissioner, Industries and Commerce, Assam
- Member Secretary, Pollution Control Board Assam
- Commissioner, Guwahati Municipal Corporation
- Commissioner to the Govt. of Assam, Water Resource Department
- Divisional Forest officer, Social Forestry, Basistha, Guwahati -29

11. Monitoring mechanism proposed for implementation of action plans

The water quality assessment and evaluation of impacts is necessary to understand the river state at various stages of the project implementation and post implementation of the project. Therefore the water quality assessment and evaluation of the project achievements is essential component for the long term benefit of the project. The monitoring and evaluation also indicate for taking corrective measure at appropriate time. The ill effects may be controlled by taking step at right time for right cause. The monitoring and evaluation schedule and plan is proposed, which is under.

11.1 Water Quality Stations (WQS):

The water quality monitoring will include following parameters, which shall be monitored at monthly interval or as and when required. The one complete unit to be purchased and identified parameters to be monitored at defined sampling stations.

The sampling stations are:

- Downstream of river before confluence with Kapili river

The parameters to be monitored are as follows.

- | | | | |
|---|--------------|---|----------------------------------|
| 1 | pH | 6 | Bio-Chemical Oxygen Demand (BOD) |
| 2 | Turbidity | 7 | Faecal coliform |
| 3 | Conductivity | 8 | Total coliform |

- 4 Temperature
- 5 Dissolved Oxygen (DO)

Most of the parameters will be monitored manually and will be incorporated in database.

12. Public Mass awareness etc.

Any river conservation project to be implemented successfully, public awareness is of utmost importance. Unless the public are made aware about the irreversible damage and pollution caused by indiscriminate littering and dumping of waste and garbage in drain and water bodies connected to Kolong River, the project cannot be implemented in true sense of the word to achieve conservation. Some members of the communities are already aware that there is a need for river conservation programme and that they will be benefitted. Hence, it should be ensured with the following points

- The communities are effectively involved in all the stages of the project cycle from conceptualization, to preparation, to finalization, to implementation and finally O & M.
- Public Awareness & Public Participation should be affront-end activity of the project
- The entire programme of conservation should be conceived, formulated, implemented, monitored and evaluated in close consultation with the stake holding communities.
- Therefore, education and awareness programmes are key to the sustainability of the various components implemented as part of the river restoration project.

13. Action Plan

Table XI: Action Points

Type	Action Points	Responsible Authority	Time Targeted
	a) Strict observation/ monitoring of industrial effluent/waste water discharge strictly for compliance. a) Stringent action against non-		

Type	Action Points	Responsible Authority	Time Targeted
Industries	<p>complying industrial units</p> <p>b) No industry should operate or continue manufacturing process unless they possess valid permission for ground water extraction from Central Ground Water Authority (CGWA)</p> <p>c) Small service providing units like street food selling vendors, laundry etc should not be allowed to dispose solid, liquid or semi-liquid wastes directly into the drains or sewers.</p> <p>d) Set up online monitoring system in the major industries.</p> <p>e) To stress all the industrial units to adopt cleaner technology and take appropriate measures for reduction of effluent, recycling and reuse of treated water</p> <p>f) Directions has been issued for Zero Liquid Discharge (ZLD) in the major polluting industrial units</p>	Pollution Control Board Assam	3 Months (June, 2019 To August, 2019)
Interception and treatment of raw sewage	<p>a) The quality of waste water flowing in the drains of identified polluted stretch have to be analysed and studied to assess the drain wise characteristics of waste water.</p> <p>b) Concerned departments should design the installation of Sewage Treatment Plant (STP) based on flow details of the drains and utilization capacity and ensure that each households are connected to</p>	PCBA/ Municipal Corporation/ ULBs/ District Administration/ Water Resource Department	2 Years (June,2019 to May, 2021)

Type	Action Points	Responsible Authority	Time Targeted
	<p>the sewers as applicable.</p> <p>c) Sewage Treatment Plant should also consider treatment and disposal of sewage for river catchment area settlement including discharge from toilets constructed under Swachh Bharat Mission</p> <p>d) To trap the discharge using strainers before falling into river.</p> <p>e) Channelization including diversion of sewage generated from households to sewer lines/interception of all the drains presently carrying sewage and for ensuing proper treatment through the upcoming STPs.</p> <p>f) Local administration should provide pucca latrines to all the households through Individual Households Latrines (IHHL) Scheme under Swachh Bharat Mission.</p>		
<p>Ground Water Assessment</p>	<p>a) Conducting survey regarding ground water usage by category wise such as domestic, community, industries etc. and also identification of over exploited and critical blocks in the river stretches with respect to the ground water extraction.</p> <p>b) Carry out assessment of ground water survey in the catchment area of the identified polluted stretch once in a year to ensure quality.</p> <p>c) All the industries should have valid NOC from CGWA.</p> <p>d) To promote roof top rain water</p>	<p>PCBA/CGWA</p>	<p>Continuous</p> <p>6 Months (February,2020 to</p>
<p>Ground Water Assessment</p>			

Type	Action Points	Responsible Authority	Time Targeted
	<p>harvesting by the industrial, commercial including individual households thereby recharging the ground water.</p> <p>e) Directions to be issued that no industries should inject their treated effluent for ground water recharging.</p>		<p>July, 2020)</p>
<p>Flood Plain Zone</p>	<p>a) Conservation of the river through watershed management.</p> <p>b) Cleaning of the river bed and bank.</p> <p>c) Afforestation on both the banks to prevent soil erosion</p> <p>d) Recreational activities to be promoted.</p> <p>e) Erection of pathway of the river banks.</p> <p>f) Checking encroachment in the flood plain zone of the polluted river stretch</p> <p>g) Prohibition of disposal of municipal, plastic, biomedical and other wastes in the polluted stretch of the river bank</p> <p>h) Demarcation of the flood plain zone.</p>	<p>Soil Conservation Department/Water Resource/ ULBs /Forest Department/ Tourism Department/PWD Assam/District Administration</p>	<p>6 Months (February,2020 to July, 2020)</p>
	<p>The plan for the polluted stretches of the river may be implemented in a time bound manner by fragmenting activities as</p> <p>a) Modification of consent conditions in and around the polluted stretches.</p> <p>b) Surveillance of sources of pollution in contrast to the norms.</p> <p>c) Assessment of water quality of the polluted stretches on</p>	<p>Pollution Control Board Assam</p>	<p>3 Months (June,2019 to August, 2020)</p> <p>c) Monthly Basis</p>

Type	Action Points	Responsible Authority	Time Targeted
	monthly basis has already been commencing d) The monitoring committee may convene meeting of Stakeholder organizations on Quarterly basis with under the chairmanship of Chief Secretary		
Solid Waste	a) Prohibition of direct disposal of solid waste in the river banks. b) Frequent River Surface cleaning by removal of debris, plastics etc.	Municipal Corporation/ Water Resource Department	3 Months (November, 2019 to January, 2020)
Environmental Flow	a) Flow measurement of the river should be carried out by the concerned department and the record has to be maintained b) Fresh water flowing through escape channels/small barrages should be checked. c) The river can be of good potential for irrigation practices and should be carried out by the farmers.	Water Resource Department	Continuous
Public Awareness	a) Awareness programs to highlight the issues related with the direct discharge of solid waste and open defecation. b) Mass awareness to conserve water.	Environment & Forest Department /UDD/GMC	Continuous

14. Budget Estimate

1	No. of STPs	01 No.
2	Capacity of STP	16 MLD
3	Life of STPs	25 years
4	Cost of STPs, Sewerage System, pumping Station & other accessories	Rs. 20.5 crores
7	For Captive power	0.5 Crore
Total Amount		Rs. 21 Crores