

**ACTION PLAN FOR RIVER PUZHAKKAL,  
THRISSUR – KERALA ((PRIORITY-V)**

**(OA No.673/2018)**

June 2019

## Contents

Executive Summary	3-10
Chapter 1 Introduction	11-12
Chapter 2 Assessment of river water quality	13-16
Chapter 3 Action plan	17-27

## **Executive Summary**

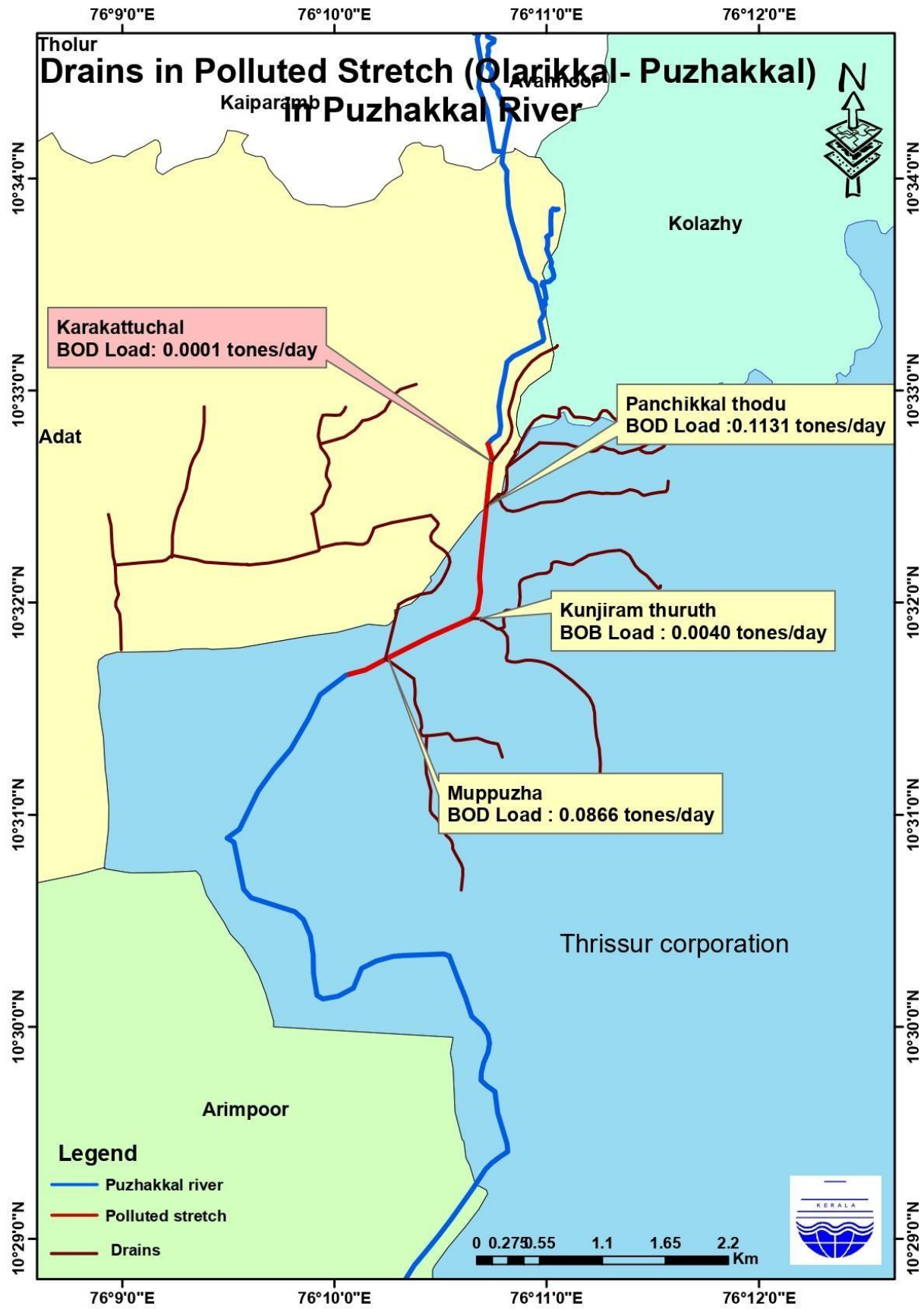
The draft action plan of Puzhakkal River was submitted before Hon'ble NGT earlier on 15-12-2019. The modified action plan is given below.

Puzhakkal River is a westward flowing river in Thrissur District . It originates from Killannoor Hills and empties into Thrissur Kole Wetlands. The total length of the river is 29 kilometres and a total of 234 km<sup>2</sup> drainage area.

Four drains were identified as joining this polluted stretch. The pollution load in terms of BOD was assessed. The map is given below.

### **Pollution load in drains**

	<b>Drain</b>	<b>Pollution load (BOD) TPD</b>
1	Karakattuchal	0.000112
2	Panchikkal thodu	0.1131
3	Kurinjikkal thuruth	0.0040
4	Muppuzha	0.08659



## 1.Short term plan

Sl.No.	Ref para Item No:48 as per NGT Order no.dated 20.09.2018	Activity	Implementing agency	Cost (Rs. Cr)	Source of fund	Time line	Expected outcome
2.1.1	A(b)	Identification of illegal outlets into the Panchikkal thodu and subsidiary drains	Thrissur Corporation	0.005	Own fund	3 months	Awareness about the pollution sources
2.1.2	A(b)	Stoppage of discharge of waste water from the surrounding houses and institutions to the drains which leads to Panchikkal thodu	Thrissur Corporation	0.005	Own fund	6 months	Awareness about the pollution sources
2.1.3.	A(b)	Ensure adequate treatment facility is provided for waste water and solid waste generated from Sri Dharma Sastha temple situated on the banks of the river	Adat Grama Panchayat	Not reported	Not reported	Not reported	Reduced pollution load in Puzhakkal thodu
2.1.4	E	Desilting of Karakattuchal	Irrigation dept.	0.1	SDRF	4 months	Free flow of water
2.1.5	E	Desilting of Panchikkal thodu	Irrigation dept.	0.066	SDRF	4 months	Free flow of water
2.1.6	E	Desilting of Kurinjikkal thuruth	Irrigation dept.	0.048	SDRF	4 months	Free flow of water

2.1.7	E	Desilting of Muppuzha	Irrigation dept.	0.32	SDRF	4 months	Free flow of water
2.1.8	E	Side protection, desilting and deepening work of vanchikulam thodu at pothole of length about 40 km (work in progress).	Thrissur Corporation	46.2	Amrut fund	3 months	Reduced pollution load in Puzhakkal thodu
2.1.9	E	Annual desilting, cleaning of main drains and canals with in the corporation area (work in progress).	Thrissur Corporation	0.78	Own fund	3 months	Reduced pollution load in Puzhakkal thodu

## **2. Monitoring**

<b>Sl.No.</b>	<b>Ref para Item No:48 as per NGT Order no.dated 20.09.2018</b>	<b>Activity</b>	<b>Implementing agency</b>	<b>Cost</b>	<b>Source of fund</b>	<b>Time line</b>	<b>Remarks</b>
3.1	A(a)(iv)	River water quality monitoring	Kerala State Pollution Control Board	11,44000/-	National Water Quality Monitoring Programme (NWMP), CPCB fund	Ongoing; monthly frequency	Monitoring
3.2	A(b)	Inspection & effluent quality monitoring of the Flats, industrial units, service stations, hospitals, hotels etc	Kerala State Pollution Control Board	As per sampling charge- 11,44,000/-		On going	

### **3. Long term Plan**

Sl.No.	Ref para Item No:48 as per NGT Order no.dated 20.09.2018	Long term measures proposed	Implementing agency	Amount Required (Rs.in Crore) and Source of fund	Time line	Remarks
4.1	A(b)	Ensuring installation of treatment facilities for at least 50% of the identified establishments	Thrissur Corporation	0.01 Own fund	18 months	Reduced pollution load in Puzhakkal thodu
4.2	A(b)	100% completion of treatment facilities for targeted institutions/ buildings -	Thrissur Corporation	0.01 Own fund	24 months	Reduced pollution load in Puzhakkal thodu
4.3	A(b)	Construction of a drain 40 km with covering slabs to avoid the direct disposal of waste in to the open drain	Thrissur Corporation	41 .66 Cr. Amrut fund	24 months	Reduced pollution load in Puzhakkal thodu
4.4	A(b)	Construction of a drain 9000 m with covering slabs to avoid the direct disposal of waste in to the open drain	Thrissur Corporation	9 Cr Plan fund/own fund	24 months	Reduced pollution load in Puzhakkal thodu
4.5	A(b)	Construction of sewage treatment plant of 100 KLD and 360 KLD at Ramavarmapuram and District Hospital, Thrissur in Amrut Project	Thrissur Corporation	6.62 Cr Amrut Fund	24 months	Reduced pollution load in Puzhakkal thodu



4.6	A(b)	Constructing decentralised sewerage scheme at Vachikulam which is an innovative project in this sector in Kerala State. TS obtained. 2.5 MLD plant with 28.0 km Pipe line and one' intermediate pumping station. The most populated 7 divisions of Thrissur Corporation and more than 10000 houses &, institution are covered in this project.	Thrissur Corporation	46 Cr	24 months	Reduced pollution load in Puzhakkal thodu
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#### **4. Action Plan by Ground Water Department**

Sl.No	Ref para item no:48 as per NGT Order no.673/2018 dated 20.09.2018	Activity	Ground Water Department
1	B(i)	Ground Water resources and regulation of ground water extraction by industries particularly in over exploited as critical zones/blocks	As per Groundwater resources of Kerala, 2017 estimate a total number of 2 blocks (Puzhakkal and ollukkara) comes under the Puzhakkal river basin. All the blocks in the river stretch are safe with stage of groundwater extraction ranges from 38.2% to 45.56%
2	B(ii)	Ground water recharging / rain water harvesting	The average groundwater level of the area ranges from 5.4mbgl - 9.17 mbgl. Groundwater Department has not implemented recharge structures in the area.
3	B(iii)	Periodic ground waste quality assessment and remedial actions in case of con taminated ground water tube wells/bore wells or hand pumps	Groundwater Department has 1 observation dug well and 6 bore wells in the river stretch.
4	B(iv)	For regulating use of ground water for irrigation purpose, adopting good irrigation practices	The total irrigation draft in the area ranges from 659.56 - 1788.53 ha.m.

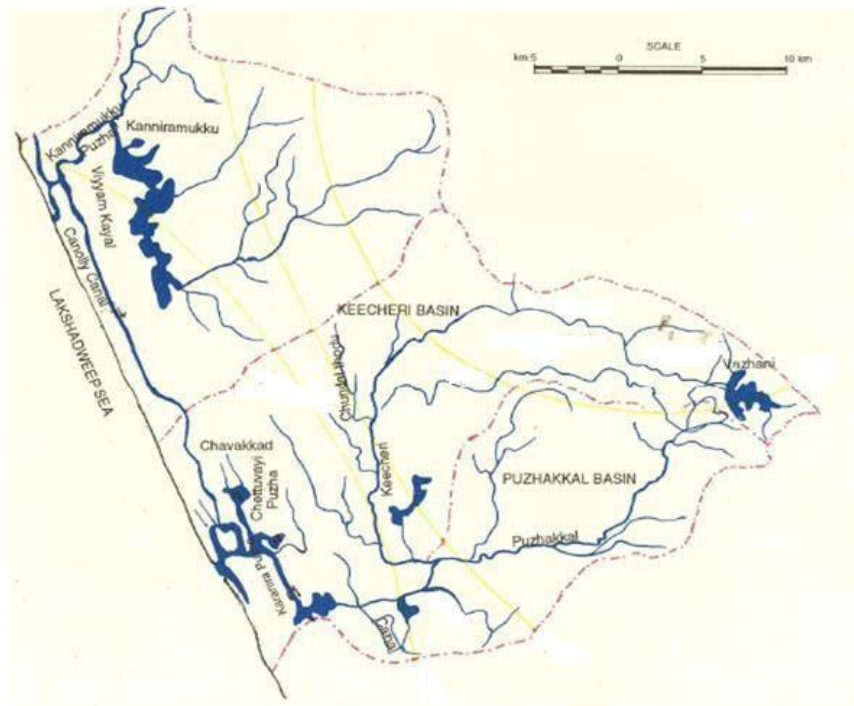
#### 4.ACTION PLAN BY GRAMAPANCHAYATH

No	Name of Grama panchayath	Ref para Item Nos as per NGT Order no :48 673/2018 dated20.9.2018	Activity	Implementing agency	Cost	Source of fund	Time line	Remarks
1	Adat	C	Removing weeds in Puzhakkal River	Gramapanchayat	100,000	OwnFund	31.03.2020	
2	Adat	C(ii)	removing waste from all wards through kudumbasree	KUDUMBASREE		KUDUMBASREE	31.03.2020	
3	Adat	C	water conservation projects-- tree plantation under GA in18 wards 100000/ each	MGNREGS	1,800,000	MGNREG	31.03.2020	
4	Adat	C	ward 14 pachthurthu CONSTRUCTION	Haritha Keralam Mission		Haritha Keralam Mission	31.03.2020	
5	Adat	C	side protection to water bodies coir geo textile works done	MGNREGS	1,200,000	MGNREG	31.03.2020	

# CHAPTER 1

## INTRODUCTION

Puzhakkal River is a westward flowing river in Thrissur District . It originates from Killannoor Hills and empties into Thrissur Kole Wetlands. The total length of the river is 29 kilometres and a total of 234 km<sup>2</sup> drainage area. The main tributaries are Parathodu, Naduthodu, Poomalathadu and Kattachirathodu. The river has a basin area of 234 Km<sup>2</sup> and average annual rain fall of 3000 mm and average annual stream flow 1024 Mm<sup>3</sup>.



**KEECHERI AND PUZHAKKAL RIVER BASINS**

Fig 3.1 Puzhakkal and Kechery river basin

## ACTIVITIES

Puzhakkal, also Puzhakkal Padam, is part of Puzhakkal block of Thrissur. A decade ago, Puzhakkal was a vast paddy field situated in the two sides of State Highway 69 (Kerala) going to Guruvayur. The place is named after Puzhakkal River, which flows through this region. Now, it has become the most developed suburban area of Thrissur city. Many of the major nerve centres of Thrissur City, including the Thrissur Collectorate, Vilangan Hills, Amala Institute of Medical Sciences, Rashtriya Sanskrit Sansthan, Government Law College, Thrissur, Kendriya Vidyalaya, District Industries Centre of Kerala Govt., Ministry of Micro Small and Medium Enterprises under Government of India (MSME) and many more are in the block. Many major automotive companies have commercial spaces here, including Hero Motors, Tata Motors, Fiat, Ford, Nissan, Hyundai, Toyota, Suzuki, Honda and more. A national-level tennis academy is also attracting tennis players here.

Lulu Convention Centre, is situated in Puzhakkal. Sobha Group's Sobha City Mall & Sobha City, Kerala's first and currently biggest integrated township is here with villas and high-rise luxury apartments, the only one of same in state having helipad facilities. Recently boating services for tourism have started across river. KINFRA is setting up an industrial park in Puzhakkal. The park would be set up in 50 acres (200,000 m<sup>2</sup>) and that the Industries Department would retain 10 acres (40,000 m<sup>2</sup>) in it. The enterprises to be set up include units for ornaments, apparels and diamond cutting. West fort Hitech hospital a specialty healthcare center is also in here. A transit terminal Mobility hub also to be set up to reduce traffic congestion was recently approved to be realized soon. Having a railway terminal also at Amala Nagar just 3 km away, the suburb town may have major development scope in near future.

Puzhakkal is also famous for the "Dharmasastha temple" where the presiding deity is Lord Ayyappa. The temple gets a lot of visitors every year during the traditional sabarimala season between October and January. The St Mary's church in puzhakkal is another notable place of worship.

## CHAPTER 2

### ASSESSMENT OF RIVER WATER QUALITY

Details of analysis of water quality monitoring for the past three years with respect to BOD

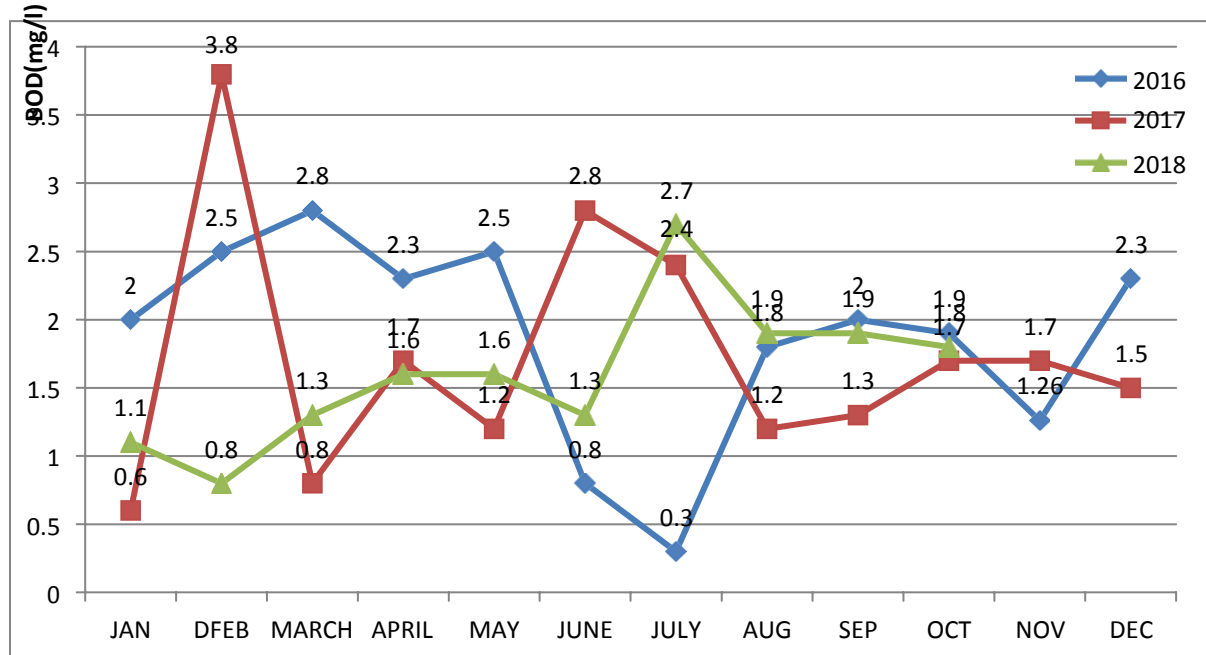


Fig 3.2 BOD graph

Month	2016			2017			2018		
	P <sub>H</sub>	TC	FC	P <sub>H</sub>	TC	FC	P <sub>H</sub>	TC	FC
JAN	8.1	230	100	7.3	450	210	6.7	540	330
FEB	7.6	370	200	7.8	460	250	7.3	700	400
MAR	7.6	350	200	6.6	450	220	6.6	380	100
APR	8.1	170	110	7.7	560	230	7	600	200
MAY	8	200	150	7.3	260	190	7.1	350	100
JUN	6.7	250	110	7	310	160	6.6	130	80
JULY	7.4	360	110	7.3	350	190	6.7	500	300
AUG	8.4	220	140	7.6	210	70	6.6	850	40
SEPT	7.4	410	180	7.1	350	170	6.4	1000	650
OCT	7.3	310	110	7	550	300	6.8	400	200
NOV	6.2	380	200	6.7	670	150	-	-	-

DEC	7.5	500	190	6.9	700	220	-	-	-
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It can be observed from the graph that the value of BOD has not crossed the limit of 3 mg/l in the year 2018

**Study area or identified polluted stretch in the river from Olarikkara to Puzhakkal.**



Fig 3.3 Polluted stretch – Olarikkara to Puzhakkal

The river falls under priority V category. River pollution is mainly due to the drainages from houses, hospitals, residential apartments and automobile service stations upstream in the corporation area. Unscientific disposal of sewage, solid waste and pesticide residue from farmlands have contributed to organic pollution. Samples were collected from the downstream of sobha city, Dharmasastha temple and Cheverlot service station. Except Dharmasastha temple, others have waste water treatment facilities . Direct discharge of untreated waste water and solid waste into river was noticed from Dharmasastha temple.



Fig 3.3 Drain from Sree Sastha temple into the river



Fig 3.4 Sobha City along river



**Results of analysis of samples collected from the d/s of identified pollution sources on 22/11/18**

<b>S No</b>	<b>Parameter</b>	<b>Unit</b>	<b>D/s of Sobha city</b>	<b>D/s of Sree Dharma Sastha Temple</b>	<b>D/s of Chevrolet Showroom and service station</b>
1	p <sup>H</sup>		6.3	6.4	6.7
2	EL.CONDUCTIVITY	μmhos/cm	100	112	155
3	TURBIDITY	NTU,	20.5	27	4.3
4	PHENOL.ALKALINITY	mg/l	BDL	BDL	BDL
5	TOTAL ALKALINITY	mg/l	18	20	26
6	CHLORIDES	mg/l	19	20	22
7	COD	mg/l	4	4	4
8	AMMONIACAL NITROGEN	mg/l	0.63	0.92	0.44
9	HARDNESS AS CaCO <sub>3</sub>	mg/l	26	26	36
10	CALCIUM HARDNESS AS CaCO <sub>3</sub>	mg/l	14	14	24
11	MAGNESIUM HARDNESS AS CaCO <sub>3</sub>	mg/l	12	12	12
12	SULPHATES	mg/l	3.8	3.8	8.3
13	SODIUM	mg/l	4.42	6.0	6.3
14	TOTAL DISSOLVED SOLIDS	mg/l	60.3	56	76
15	TOTAL FIXED SOLIDS	mg/l	22	20	28
16	TOTAL SUSPENDED SOLIDS	mg/l	15	14	14
17	PHOSPHATES	mg/l	4.1	4.5	5.8
18	POTASSIUM	mg/l	0.5	0.64	2.3
19	BOD	mg/l	1.6	4.4	5
20	FLOURIDES	mg/l	BDL	BDL	BDL
21	DISSOLVED OXYGEN	mg/l	5.2	3.9	4.9
22	NITRATE NITROGEN	mg/l	0.21	0.61	0.17
23	TOTAL COLIFORMS	CFU/100ml	200	3000	5000
24	FEACAL COLIFORMS	CFU/100ml	100	500	200

The impact of pollution sources is evident from the results of analysis.

## **CHAPTER 3 ACTION PLAN**

### **Action plan**

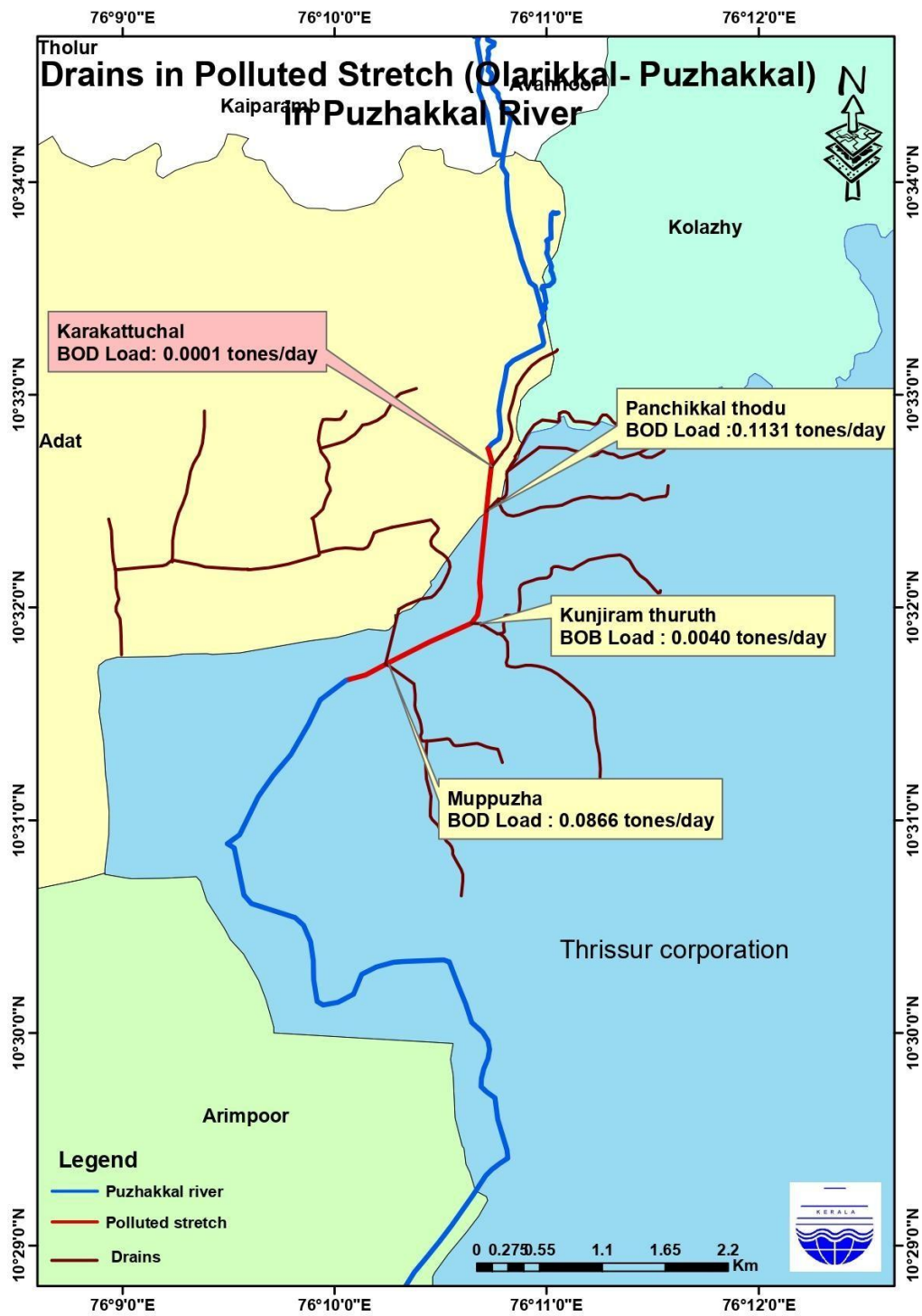
1. Direction to be issued to local bodies in the catchment area, to plan and execute facilities for sewage treatment and solid waste treatment and disposal to prevent dumping of sewage and solid wastes into the river.
2. Direction to be issued to local bodies to make rain water harvesting system mandatory in all residential and commercial buildings.
3. Direction to be issued to local bodies to install CCTV cameras along the river to identify those who dump solid wastes and sewage into the river, and police authorities to strictly monitor and catch the violators.
4. Direction to be issued to local bodies and other concerned departments to remove encroachments and to curb illegal sand mining.
5. Direction to be issued to Dharmasastha temple to stop unauthorised discharge of wastewater and solid waste into the river and to provide adequate treatment and disposal facility.
6. Direction to be issued to all the hospitals, residential and commercial establishments to operate the waste water treatment facility properly and to augment the system to achieve reuse quality.

### **Pollution load in drains**

Joint inspection was conducted by KSPCB, Kerala Irrigation Department, Kerala Water Authority and Suchitwa Mission and identified the drains leading to polluted stretch of Puzhakkal river .

### Pollution load in drains

	<b>Drain</b>	<b>Pollution load (BOD) TPD</b>
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## Short term plan

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2.1.1	A(b)	Identification of illegal outlets into the Panchikkal thodu and subsidiary drains	Thrissur Corporation	0.005	Own fund	3 months	Awareness about the pollution sources
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**monitoring**

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## Long term Plan

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## Action Plan by Ground Water Department

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4	B(iv)	For regulating use of ground water for irrigation purpose, adopting good irrigation practices	The total irrigation draft in the area ranges from 659.56 - 1788.53 ha.m.

#### 4.ACTION PLAN BY GRAMAPANCHAYATH

No	Name of Grama panchayath	Ref para Item No:48 as per NGT Order no 673/2018 dated20.9.2018	Activity	Implementing agency	Cost	Source of fund	Time line	Remarks
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4	Adat	C	ward 14 pachthurthi CONSTRUCTION	Haritha Keralam Mission		Haritha Keralam Mission	31.03.2020	
5	Adat	C	side protection to water bodies coir geo textile works done	MGNREGS	1,200,000	MGNREG	31.03.2020	