

ACTION PLAN FOR TIRUR- PONNANI RIVER



SUBMITTED BY

KERALA STATE POLLUTION CONTROL BOARD

MALAPPURAM DISTRICT OFFICE

JUNE 2019

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Executive summary

Tirur River begins in the Tirur taluk, Athavanad village in Malappuram district of the Kerala state in south India and flows south-west to Thirunnavaya and then north-west to Elamkulam where it turns south-west, joining the Bharathapuzha River, which flows into the Arabian Sea near the coastal town of Ponnani. It is known for its beautiful mangroves and its many varieties of fishes and birds.

KSPCB is regularly conducting water monitoring activity under National Water Quality Monitoring Programme(NWMP) and State Water Quality monitoring Programme (SWMP) at 5 points viz., Koloopalam, Ezhur, Thazhepalam, Thalakkadathur and Mangattiri from upstream to downstream of the Tirur –Ponnani River. Besides , the polluted stretch identified by CPCB to be studied was from Naduvilangadi to Thalakkadatur (at poroor, 2 km away from Naduvilangadi junction). This comes to 3km of the whole river stretch. Based on sampling and monitoring analysis reports action plan has already been submitted for this polluted stretch recently.

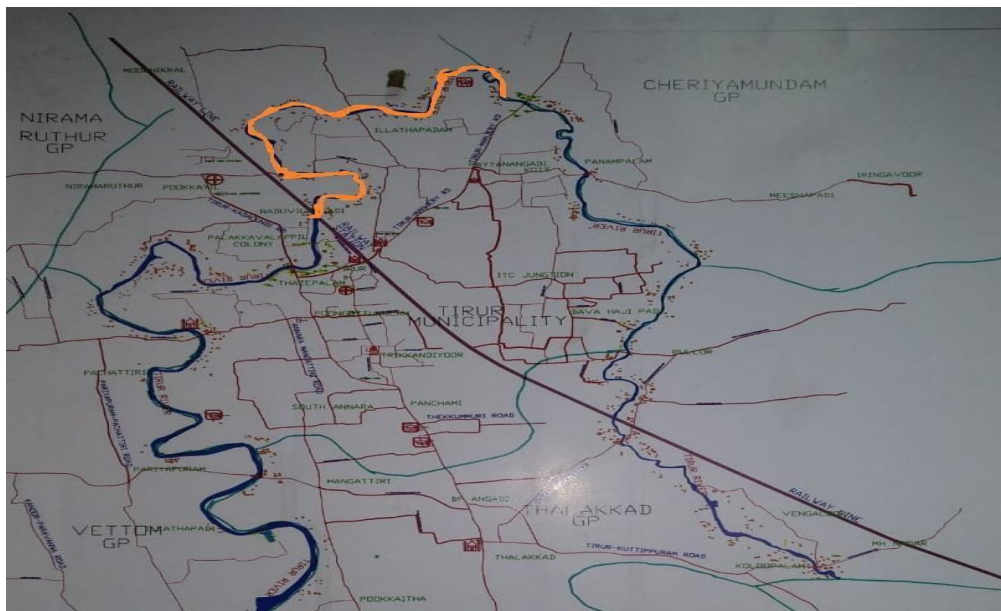


Table 1 Pollution loads in drains

SI No	Drain	Pollution Load BOD in TPD
1	Drain near Tirur Railway station	0.008
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3	Naduvilangadi drain (North annara)	0.031
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10	Epothingal	0.00149
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12	Kandanath kadav	0.00053
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14	Kakadav	0.001226
15	Kanathkadav	0.000627
16	Drain near tirur railway station	0.00106
17	Payyanangadi(kadayithodu)	0.00016

1. Action plans submitted by concerned departments are detailed below:

Irrigation Department

Table 2 Action Plan Submitted by concerned departments

Sl.No.	Activity	Cost in lakhs	Department	Timeline
1.1.1	Strengthening the right side bund of Tirur- Ponnani puzha at Porur, ward no.I tirur Municipality	20	Irrigation	6 Months
1.1.2	Cleaning and development of old Ponnani thodu at Thazhepalam	10	Irrigation	6 Months
1.1.3	Repair and Rehabilitation of Koottayi Regulator cum Bridge across Thirur-Ponnani Puzha in Mangalam Gramapanchayat in Malappuram Dist	904	Irrigation	18 Months
1.1.4	E flow (by microshed management)	200	Irrigation	3 years
1.1.5	E flow (by microshed management)	500	Irrigation	3 years
1.1.6	Flood plane zone(protection and management)	70	Irrigation	3 years

Tirur Municipality

Sl no.	Activity	Work	Unit	Amount in crore	Source of fund	Time for completion
1.2.1	Provide septic tank for nearest houses	Identified 51 houses have no septic tanks.The project is formulated.	51	0.0271983	Suchitwa Mission fund, Plan fund	2019 Dec
1.2.2	Establishment of Solid waste Treatment Plant	ThumboorMozhi Model AerobicBin	32	0.2665	Suchitwa Mission, Plan fund	2020 march
1.2.3	Establishment of Non-Degradable waste treatment Plant	Resource Recovery facility Centre Plastic Shreddeing Unit Segregation shed	1 1 1	0.0278	Suchitwa Mission fund, Plan fund	2020 march
1.2.4	Slaughtering House	Civil work is completed for installing mechanical parts.Another expression of interest was invited		2	Suchitwa Mission fund, Plan fund	2020 Dece
1.2.5	Fencing on Bridgeside	Thalakkadathur Bridge	1	0.095	plan fund	2020 Dece
1.2.6	Installation of CCTV Camera near the river Bank	Thalakkadathur Bridge	1	0.0074	Plan fund	2020 may

1.2.7	Planting of Bamboo seedlings on the river bank (Thazhepalam)	Thazhepalam	1	0.005	planfund	2020 June
1.2.8	Renovation of Effluent treatment plant at fish Market AMC Granted	ETP with Aeorobic System	1	0.01	planfund, public contribution	2019 June
1.2.9	Setting up of STP at Private Bus stand	Work is progressing	1	0.5316712	Plan fund, Public contribution	2020 june
1.2.10	Setting up of a new drain after demolishing the old one. The old one was the hub of the waste water outlet of the shops and other establishments. The proposed drain is constructing in the middle of the road so as to avoid instrusion of pipes from outside	New drain was set up and work is progress	1	0.843	Plan fund, Public contribution	2020 june
1.2.11	Identification of illegal outlets into storm water drains and fine shall be imposed on such units	nil	nil	0.000202 (fine collected)	nil	nil

Cheriyamundam Gramapanchayat

Sl.no	Work	Place	Unit/work	Cost in lakhs	Fund	Completion
1.3.1	Fencing on bridge side	Thalakkadatur	1	2	Plan fund	2020 March

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Kerala Water Authority

Sl.no	Work	Place	Unit/work	Cost in lakhs	Fund	Completion
1.4.1	Provide Sewerage system	Thazhepalam	1	20	Plan fund	2019 December

Thalakkad Gramapanchayat

Sl.no	Work	Place	Unit/work	Cost in lakhs	Fund	Completion
1.5.1	Fencing on bridge side (kooloopalam)	Kooloopalam	1	4	Plan fund	2019 December
1.5.1	Placing CCTV on bridge side	Kooloopalam Kunjilakkadav Mangattiri Kattachira	1	4	Plan fund	2019 December

Revenue Department

Sl.no	Work	Place	Unit/work	Cost in lakhs	Completion
1.6.1	Survey of boundaries of river side	River sides	1	11,18,307	2019 December

INDUSTRIES DEPARTMENT DIC

SL.NO	ACTIVITY
1.7.1	List out industries on the banks of river and to ascertain the waste water & solid waste management systems provided

1.7.2 List of Industrial units located along the banks of river is tabled below:-

Sl.No	Name of Industry	Location
1	Herald Wood Industries,Thazhepalam	Tirur Municipality
2	Metro bakery Products ,Chembra	Tirur Municipality
3	Premier Industries	Thirunavaya Panchayat
4	Bismi Food Processing	Thirunavaya Panchayat
5	Happy Poly Processing	Thirunavaya Panchayat
6	Wood world Wood Industries,Kattachira	Thalakkad Panchayat
7	A.M Motors (Workshop) ,Thalakkadatur	Cheriyamundam Panchayat

1.8.Kerala State Pollution Control Board

Sl.no	Activity	Cost in lakhs	Source of fund	Time line
1.8.1	River water quality Monitoring- Thalakkadathur	1.5	National Water Quality Programme(NWMP),CPCB fund	Ongoing; monthly frequency
1.8.2	River water quality Monitoring		State Water monitoring programme, KSPCB fund	Ongoing; Seasonal frequency
1.8.3	Inspection and effluent quality monitoring of the flats, Industrial units, Service stations, hospitals, auditorium, hotels in Municipal area and industrial unit along the river side.		KSPCB funds	Ongoing; Interval; Red – 1 month, Orange- 3 months, Green- 6 months

1.9 Action Plan by Ground Water Department

Sl.No	Ref para item nos 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 (Tirur and Kuttippuram) comes under the Tirur river basin. These two blocks are semi-critical blocks and the stage of groundwater extraction ranges from 77.75 % to 77.92%
2	B(ii)	Ground water recharging / rain water harvesting	The average pre -monsoon groundwater level ranges from 6.14mbgl - 8.49 mbgl.
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	No observation well along the river stretches
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 49.14 - 870.97 ha.m.

Note:-

Tirur Municipality

	Source control (industrial effluent and domestic sewage)	Tirur Municipality
ii	Treatment and disposal of septage and controlling open defecation	A Septage treatment plant (SPT) having a capacity of 50KLD is under construction in the municipal bus stand. The plant is being constructed in accordance with the DPR prepared by Ram Biologicals. Work will be completed on last week of august 2019. At present, there is no open defecation in municipal area and 51 units of septic tanks were proposed on household level and the activities are in progress.
v	Identification of polluting sources including drains contributing to river pollution, function.	There was a public drain identified as polluting source contributing to river pollution from the municipal market. The drain was closed after identifying the illegal waste water outlets from the shops and establishments nearby. And constructed a new drain assuring the passage of storm water only by the way of constructing the drain through the middle of the road so as to avoid the illegal outlets. The construction is ongoing. The estimate amount is Rs 60,00,000/-

CHAPTER 1

INTRODUCTION

Tirur River begins in the Tirur taluk, Athavanad village in Malappuram district of the Kerala state in south India and flows south-west to Thirunnavaya and then north-west to Elamkulam where it turns south-west, joining the Bharathapuzha River, which flows into the Arabian Sea near the coastal town of Ponnani. It is known for its beautiful mangroves and its many varieties of fishes and birds.

Tirur River, in Malappuram district is navigable and forms part of west coast water transport system. The river now faces significant challenges for its survival. The main objective of the study was the assessment of the water quality of the Tirur River and identified polluted river stretch.

The water Quality Assessment of Tirur River has provided information on the status and magnitude of pollution with respect to desired water quality. The long term trends of water quality assessment have formed the basis for identification of Tirur river as polluted in its entire length.

Municipal sewage generation and treatment

The water quality deterioration was caused by the discharge of various industries like service stations, auditorium, hospitals, hotels, markets etc, situated in the Tirur municipal area along the river stretch. The effluent discharges from vegetable and fish market, bus stand and comfort station of Tirur municipality is also discharged into this drain. The residences located on the banks of the river also contributing their part to aggravate the situation. The various organic matters accumulated in the river caused in tremendous reduction of dissolved oxygen. As per WP(C) 27528/2012 of NGT almost all the Industries, hospitals and auditorium have provided ETP/STP. At present the main source of pollution is the kaithodu; the public drain passes through Tirur Municipality and leads to Tirur River.

Watershed

The main watershed areas in Tirur River are **Mangalam, Purathur, Thripangode and Thalakkad.**

Land use

Broadly, four types of land use can be seen in the district. A large part of the area, especially the coastal tract and the midland areas come under arable land, used for cultivation of different crops, both irrigated and non-irrigated. The coastal tracts are densely inhabited. Forests are seen along the east and north, forming part of tropical evergreen forest supporting a variety of plant and animal life. Cashew and rubber are the main commercial crops of the area. The thick laterite 'duricrust' capping the hillocks generally does not support any vegetation; hence such areas are demarcated as wasteland.

Soil type

On the basis of morphological and physico-chemical properties, the Soil Survey Division of Department of Agriculture, Govt. of Kerala has classified the soils of the district into the following types:

Soils of the low lands (Alluvial soil)

Those are mainly seen along the coastal plains and valleys. The soils range from exclusively drained to moderately/well drained sand to sandy clay in nature.

Soils of Mid/Up lands (Lateritic soil)

These are mostly lateritic soil, and is seen along the mid land portion of the district. These are deep to very deep, well drained, and gravelly to clayey.

Soils of Central Sahyadri (Hydromorphic soil)

These are deep moderate, well drained and clayey soils with high gravel content. Erosion is moderate to severe. Hard laterites with rock out crops are present.

Soils of eastern part of Malappuram (Forest loamy soil)

These soils are deep or very deep and well drained with loamy to clayey textures and having fairly high gravel content.

Human Population

As of 2001 India census Tirur had a population of 101330 and the density of population is 3000/ Km² . (Reference from censusindia.gov.in)

Rainfall and Climate

The district has more or less the same climatic conditions prevalent elsewhere in the State viz. dry season from December to February and hot Season from March to May, The South-West monsoon from June to September and the North-East monsoon from October to December. The normal rainfall of the district is 2793 .3 mm. Out of this major rainfall contribution is from south West monsoon followed by the North East monsoon. The south west monsoon is usually very heavy and nearly 73-75% of the rainfall is received during this Season. North East monsoon contributes nearly 16.4% and March to May - Summer Rain contributes nearly 9.9% and the balance 0.7 % is accounted for during January and February months.

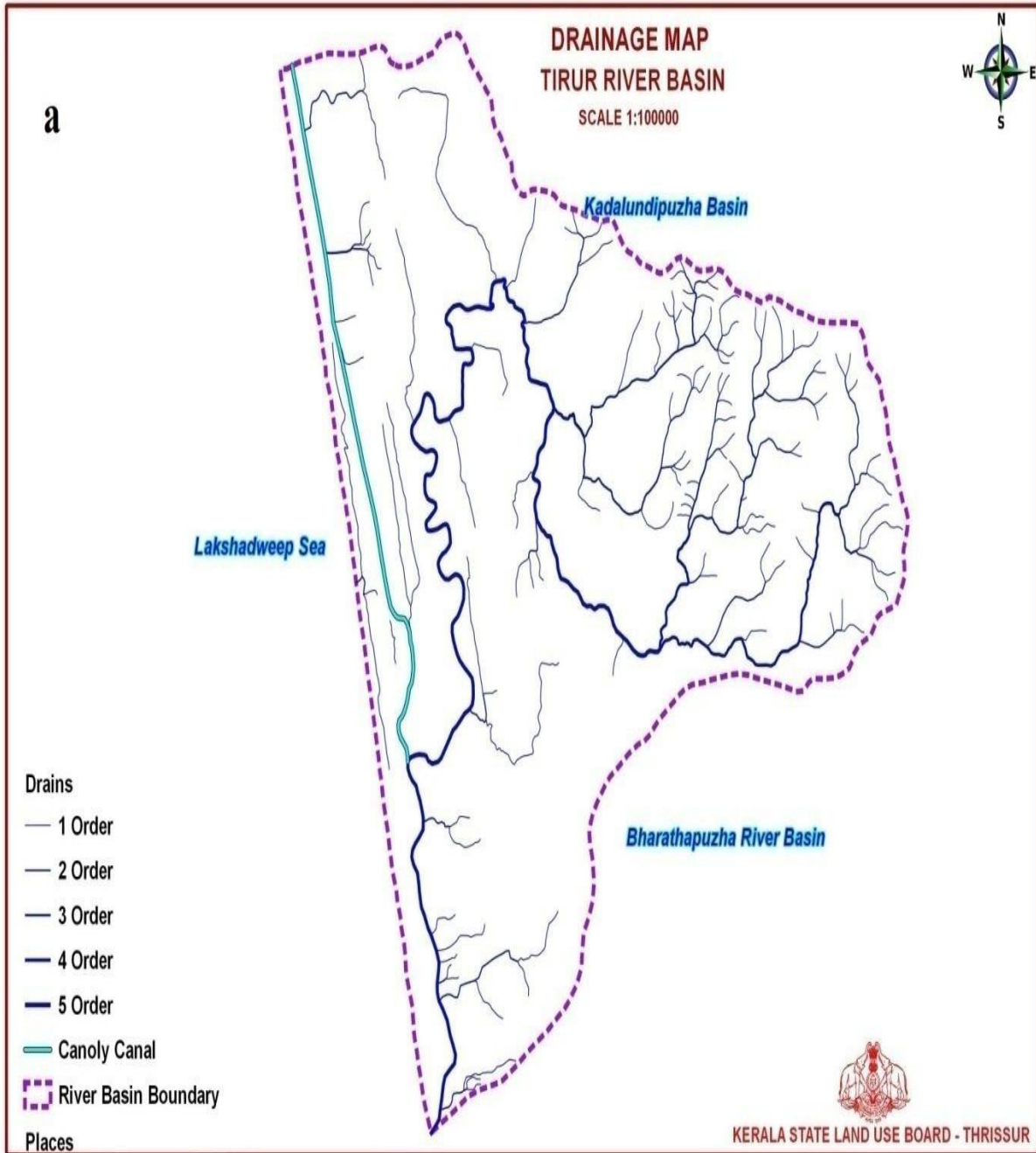
Activities

Agriculture and fishing are the main activities in Tirur River. At present there are no industries along the banks of river directly discharging the effluent into the river The River falls under PRIORITY IV category as per CPCB categorization based on BOD values.

1.8. TIRUR PONNANI RIVER



TIRUR –PONNANI RIVER BASIN - DRAINAGE MAP



CHAPTER II

RIVER WATER QUALITY MONITORING

2. NWMP AND SWMP SAMPLING POINTS IN TIRUR- PONNANI RIVER



SAMPLING POINTS

- 1. KOOLUPALAM**
- 2. EZHUR**
- 3. THALAKADATHUR (NWMP)**
- 4. NADUVILANGADI**
- 5. THAZHEPALAM**
- 6. MANGATIRI**

1.KOOLUPALAM



(It is a water pumping point for Thirunnavaya lift irrigation project)

2.EZHUR



3. THALAKKADATUR (NWMP STATION)



(It is a National Water Monitoring Point station. Also there is KERALA WATER AUTHORITY pumping station)

4. NADUVILANGADI (identified Polluted Stretch by CPCB)



5. THAZHEPALAM

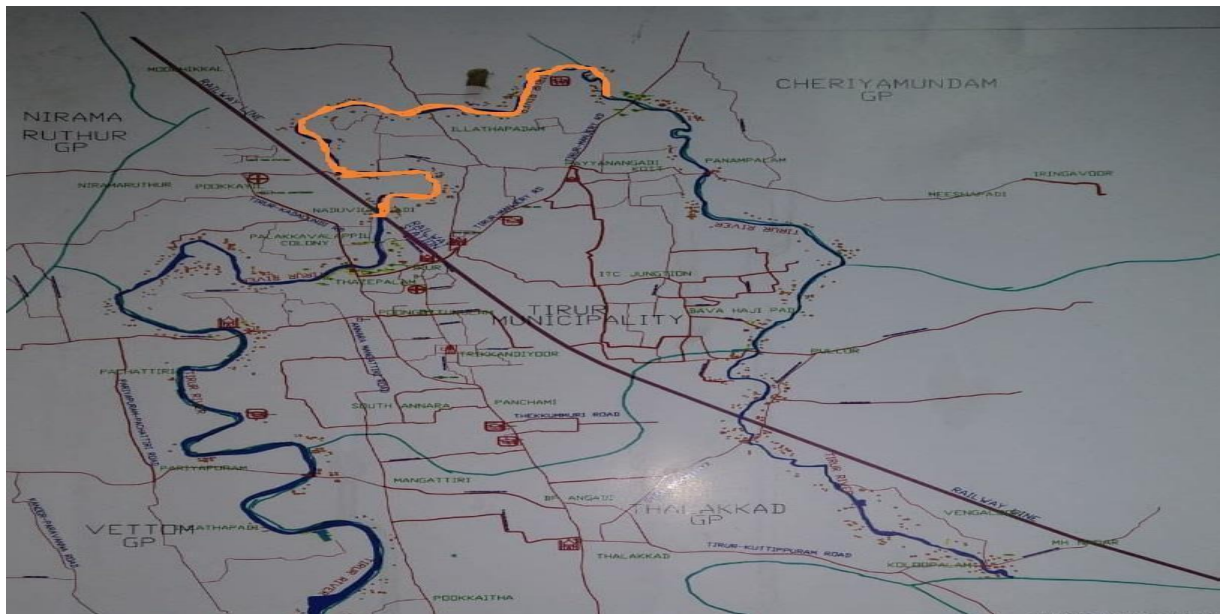


6. MANGATTIRI



2. 2. RESULTS OF RIVER WATER QUALITY

KSPCB is regularly conducting water monitoring activity under National Water Quality Monitoring Programme(NWMP) and State Water Quality monitoring Programme (SWMP) at 5 points viz., Koloopalam, Ezhur, Thazhepalam, Thalakkadathur and Mangattiri from upstream to downstream of the Tirur –Ponnani River. Besides , the polluted stretch identified by CPCB to be studied was from Naduvilangadi to Thalakkadatur (at poroor, 2 km away from Naduvilangadi junction). This comes to 3km of the whole river stretch. Based on sampling and monitoring analysis reports action plan has already been submitted for this polluted stretch recently.



Study area –Identified polluted stretch by CPCB (Naduvilangadi to Thalakkadatur) [Action plan already submitted]

In both upstream and downstream areas, field surveys were conducted. Water samples collecting sites were selected on the basis this preliminary studies and its impact on ecosystem. An interaction with local people living in the surrounding of the sampling sites were also done and gathered information regarding agriculture, water availability, water quality and socio-economic status. The water quality parameters namely **pH, conductivity, total hardness, dissolved oxygen, biochemical oxygen demand (BOD),COD ,Sodium and total coliform** were analyzed as per standard methods .

The water quality of the Tirur River is better during rainy season due to high river flow compared to the summer season .Results of the physicochemical parameters indicate that water in Tirur river is contaminated and not safe for drinking and it is also unhealthy for the aquatic life. The microbiological examination of river water in respect of Total Coliform/100

ml has confirmed that the river water is unfit for direct consumption, bathing or any other domestic use.

The analysis result for the past 4 months at these points is attached as Table.1.

Table.1. Analysis Report of SWMP and NWMP Stations -Tirur River (From Jan 2019 to Apr 2019)

Months	Parameters	Stations					
		Thalakkadatur (NWMP station)	Mangattiri (SWMP)	Koloopalam (SWMP)	Ezhur (SWM P)	Thazhepalam (SWMP)	Naduv ilanga di (recent stretch)
Jan	DO	6.2	5.9	7.4	3.9	7	4
	BOD	1.2	1.1	1.7	1.6	1.5	3.1
Feb	DO	6.4	3.8	8.1	4.1	8.6	5.8
	BOD	3	1.1	2.1	1.	1.3	2.6
Mar	DO	2.1	2.6	Dried	3.8	3.1	4.1
	BOD	1.1	1.4	Dried	1.1	1.1	3.2
Apr	DO	2.3	3	Dried	Dried	2.3	4.2
	BOD	1	2.3	Dried	Dried	1.6	3.4

2.4 Results and Conclusion

The parameters shows seasonal fluctuations and the pollution was more in summer compared to the rainy season. Temperature of environment and river affects the physico-chemical parameters of water. The increase in water temperature leads to the speeding up of chemical reactions in water, reduces the solubility of gases and amplifies the taste and odour. Temperature of Tirur river water ranged from 28.5°C to 32.6°C. The pH range suitable for the existence of most biological life is quite narrow and critical, and is typically 6-9. The pH value of the water varied from 6.4 to 7.5. pH range between 6.5 and 9.5 has been found to be suitable for fish production. The pH values of all the sites during the sampling period were within the prescribed limits (6.5-8.5) as per standards.

The conductivity values in the water samples ranged from 68 to 31000 $\mu\text{S}/\text{cm}$. According to BIS standards, the desired limit of electrical conductivity of river water is 50 to 3000 $\mu\text{S}/\text{cm}$.

From the result of the present study, it is noticed that Electrical conductivity of the water samples at various sites of Tirur river are exceeding the desired limit.

Total hardness in the river vary from 10mg/L to 3200 mg/L. Total hardness of surface water varied according to seasons. The analysis revealed that the total hardness of water exceeded the desirable limit during summer season (as per BIS, desirable limit is 200mg/L and permissible limit is 600mg/L. The increase in hardness may be due to the domestic activities like washing of clothes, animals, vehicles etc. in the river. oxygen concentration ranged from 2.1 to 7 mg/L in the study. The low levels of DO concentration in the fresh water aquatic systems is an indication of high levels of organic pollution . During summer, dissolved oxygen concentration is low in this stretch. From this it is clear that Tirur River water is unfit for the survival of aquatic life in summer season.

As per the analysis report BOD values ranges from 0.2-4.4mg/l. The highest value 4.4 mg/L is obtained in May and October 2018 at THALAKADATHUR

Total Coliform value ranges from 12 to 280 TC/100ml in 2018 .E.coli in fresh water can indicate the presence of pathogens from animal or human feces. The higher value of coliform bacteria and organic pollution is mainly due to discharge of septic waste and wastewater directly through small drains into the river.

Survey conducted in the study area revealed that the main problem in Tirur river is due to the dumping of garbage and solid waste (including poultry waste), direct sewage discharge (from houses, hotels and markets) and discharge from small industries are the main reason for Tirur river pollution. Transformation of paddy lands for various purposes, and filling up of ponds, natural streams and canals in between the dry lands also affected water quality and the flow of Tirur River. Constructed encroachments of urbanization (especially in and around Tirur town) and encroachments by villagers within river corridors and floodplains are frequent in the river bank. The channel of Tirur River is shrinking and vacated land is getting available for human settlements, which are mostly unplanned, and therefore, obstructing the original path of rivers leading to high risk. Encroachment increases impervious cover adjacent to rivers and thereby increasing the rate and volume of runoff, loading of sediment and other pollutants, and temperature of the receiving water.

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CHAPTER 3

IDENTIFICATION OF SOURCE OF POLLUTION

In compliance with the NGT order, besides the existing nine drains along the whole catchment area of the Tirur-Ponnani River, KSPCB has identified 9 extra points and all the same, a sum of total 17 sampling points was uploaded by ENVISAN APP. Out of these the first three drains-namely Drain near Tirur railway Station, Thazhepalam drain North annara drain are coming under the CPCB identified polluted stretch. Whose action plan was already submitted.

As per the order G.O(MS)No.12/2019/WRD dated 30.04.2019, District level Technical Committee has been formed and the first meeting was conducted on 18.05.2019 at KSPCB, DO, Malappuram chaired by the Chief Environmental Engineer, KSPCB, Regional Office, Kozhikode. In the meeting, it was decided to conduct a joint inspection at the polluted stretch. The team comprising of the following officers conducted joint inspection on 20.05.2019

1. Assistant Executive Engineer, Assistant Engineers from Irrigation department, Tirur
2. Program Officer, Suchitwa Mission, Malappuram
3. Secretary, Tirur Municipality
4. Environmental Engineer, Assistant Engineer, Assistant Scientist, Kerala State Pollution Control Board, District office, Malappuram. The team inspected the whole river site and found out the below listed additional points for sampling.

1. Thalakkadathur Bridge

No huge dumping of wastes was seen at the area during inspection. But some plastic covers (waste) were seen deposited on the banks and in the river stretch. Irrigation department informed that it will consume a good amount of time for conducting desilting activities and

hence as an immediate measure, the municipality was instructed to initiate action to hand pick wastes in boats by workers. In order to avoid further dumping, cameras are to be installed and metal fencing to be provided on either side of the bridge. One side comes under the municipal area and the other side under Cheriya mundam grama panchayath. KSPCB has already assessed the waste water treatment systems provided at the nearby industrial units, viz., A.M Motors, Kadeeja Auditorium, Safiya Auditorium, Al Noor Hospital located at Thalakkadathur near banks of the river/near the bridge. A show cause notice has already been issued to M/s Al Noor hospital on account of non-functioning of STP in the unit. KSPCB shall monitor the progress. No open discharge was seen at these points.

2. Old Ponnani thodu (North Annara)

It is also known as old ponnani thodu, comes under Tirur municipal area. During inspection, about 3.8m length stretch of the thodu was seen stagnated with plastic bottles, covers, coconut husk etc. and also the width of the thodu was seen reduced. Irrigation department should take action to preserve the width and the municipality is liable to take action for cleaning this portion. Irrigation department agreed to provide a shutter at the point to avoid further reach of wastes at the old ponnani thodu . No open/direct discharge was seen at this point from any unit.

3. Thazhepalam Railway Bypass road

A drain containing waste water from the waste water treatment of Kerala Water Authority plant is seen joined at Thazhepalam. Notice issued to KWA by KSPCB. At the area plastic bottles, covers, coconut husk were also seen scattered which is to be cleaned by the Tirur municipality.

4. Vanchichal (behind Tirur Railway station)

Vanchichal (behind Tirur Railway station) is identified as the most polluted area in the stretch. Due to the accumulation of waste slurry and silting, water was seen stagnant and infiltration of the same polluted water was found to reach the Titur River stretch. The major

pollution source at this point is from Tirur Railway station. No effective liquid/solid waste treatment system has been provided at the station. KSPCB issued Notice to Tirur Railway station.

5. Tirur Municipality Fish Market

With the great effort of municipality, the issue prevailing before has been solved for the time being. At present the waste water is contained at the market itself and no waste water reaches at the stretch. Effluent Treatment Plant already provided at the market need revamping and it is progressing. At present no discharge was seen flowing outside from the market.

6. Mangattiri bridge

Thalakkad grama panchayath provided net at both sides of the bridge to avoid the reach of solid wastes near the bridge. At present no wastes are seen dumped there.

7. Ettirikkadavu

A drain (storm water) was previously present at this area and the BOD value was analysed and measured as 4.1 mg/l. But the team visited the site and at present, there was no direct discharge seen at the point and no visible drains.

8. Panampalam (in Cheriyamundam Panchayath) Bridge

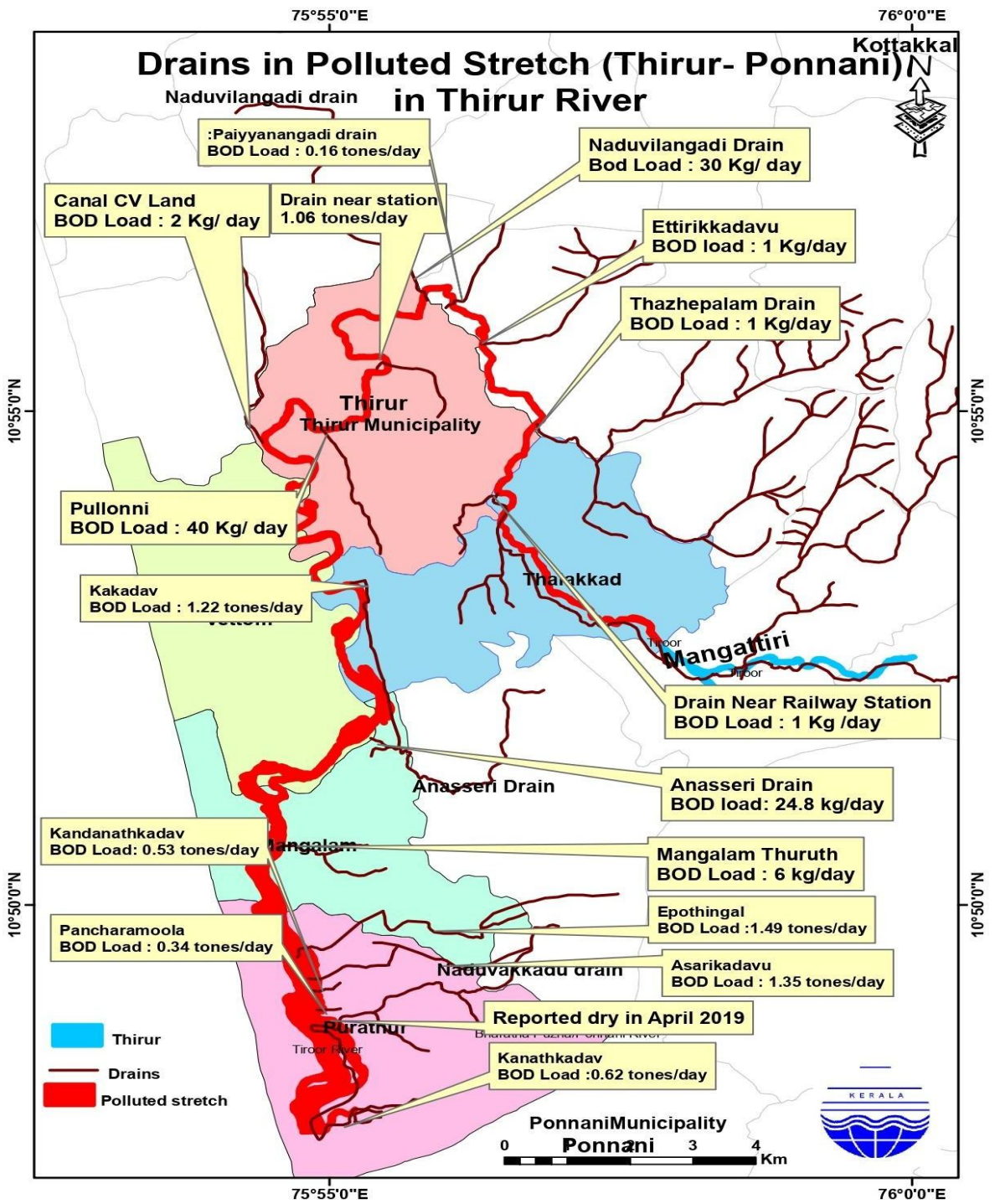
Solid wastes are seen dumped at the site near the Masjid. Camera need to be provided by the Cheriyamundam Panchayath as the area is under their jurisdiction.

The samples were collected from these points and analysed .From these analysis, the pollution load in BOD was assessed and it was tabulated as below.

Table 3.1 Pollution loads in drains

Sl No	Drain	Pollution Load BOD in TPD
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The map showing the drains is attached given below. The location of the drains were identified and marked by ENVISAN app.



CHAPTER 4

ACTION PLAN FOR TIRUR RIVER

The Respective Departments which were included in the committee were entrusted to prepare the action plan according to the decision taken at the meeting held in the Tirur Municipal Chairman's chamber on 11.06.2019.

1. Action plans submitted by concerned departments are detailed below:

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1.2.8	Renovation of Effluent treatment plant at fish Market AMC Granted	ETP with Aeorobic System	1	0.01	planfund, public contribution	2019 June
1.2.9	Setting up of STP at Private Bus stand	Work is progressing	1	0.5316712	Plan fund, Public contribution	2020 june
1.2.10	Setting up of a new drain after demolishing the old one. The old one was the hub of the waste water outlet of the shops and other establishments. The proposed drain is constructing in the middle of the road so as to avoid instrusion of pipes from outside	New drain was set up and work is progress	1	0.843	Plan fund, Public contribution	2020 june
1.2.11	Identification of illegal outlets into storm water drains and fine shall be imposed on such units	nil	nil	0.000202 (fine collected)	nil	nil

Cheriyamundam Gramapanchayat

Sl.no	Work	Place	Unit/work	Cost in lakhs	Fund	Completion
1.3.1	Fencing on bridge side	Thalakkadatur	1	2	Plan fund	2020 March

Kerala Water Authority

Sl.no	Work	Place	Unit/work	Cost in lakhs	Fund	Completion
1.4.1	Provide Sewerage system	Thazhepalam	1	20	Plan fund	2019 December

Thalakkad Gramapanchayat

Sl.no	Work	Place	Unit/work	Cost in lakhs	Fund	Completion
1.5.1	Fencing on bridge side (kooloopalam)	Kooloopalam	1	4	Plan fund	2019 December
1.5.1	Placing CCTV on bridge side	Kooloopalam Kunjilakkadav Mangattiri Kattachira	1	4	Plan fund	2019 December

Revenue Department

Sl.no	Work	Place	Unit/work	Cost in lakhs	Completion
1.6.1	Survey of boundaries of river side	River sides	1	11,18,307	2019 December

INDUSTRIES DEPARTMENT DIC

SL.NO	ACTIVITY
1.7.1	List out industries on the banks Of river and to ascertain the waste water & solid waste management svstems provided

1.7.2 List of Industrial units located along the banks of river is tabled below:-

Sl.No	Name of Industry	Location
1	Herald Wood Industries, Thazhepalam	Tirur Municipality
2	Metro bakery Products ,Chembra	Tirur Municipality
3	Premier Industries	Thirunavaya Panchayat
4	Bismi Food Processing	Thirunavaya Panchayat
5	Happy Poly Processing	Thirunavaya Panchayat
6	Wood world Wood Industries, Kattachira	Thalakkad Panchayat
7	A.M Motors (Workshop) ,Thalakkadatur	Cheriyamundam Panchayat

1.8.Kerala State Pollution Control Board

Sl.no	Activity	Cost in lakhs	Source of fund	Time line
1.8.1	River water quality Monitoring- Thalakkadathur	1.5	National Water Quality Programme(NWMP),CPCB fund	Ongoing; monthly frequency
1.8.2	River water quality Monitoring		State Water monitoring programme, KSPCB fund	Ongoing; Seasonal frequency
1.8.3	Inspection and effluent quality monitoring of the flats, Industrial units, Service stations, hospitals, auditorium, hotels in Municipal area and industrial unit along the river side.		KSPCB funds	Ongoing; Interval; Red – 1 month, Orange- 3 months, Green- 6 months

1.9 Action Plan by Ground Water Department

Sl.No	Ref para item nos as per NGT Order no.673/2018 dated 20.09.2018	Activity	Ground Water Department
1	B(i)	Ground Water resources and	As per Groundwater resources of Kerala, 2017 estimate a total number of 2 blocks

		regulation of ground water extraction by industries particularly in over exploited as critical zones/blocks	(Tirur and Kuttippuram) comes under the Tirur river basin. These two blocks are semi-critical blocks and the stage of groundwater extraction ranges from 77.75 % to 77.92%
2	B(ii)	Ground water recharging / rain water harvesting	The average pre -monsoon groundwater level ranges from 6.14mbgl - 8.49 mbgl.
3	B(iii)	Periodic ground waste quality assessment and remedial actions in case of contaminated ground water tube wells/bore wells or hand pumps	No observation well along the river stretches
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 49.14 - 870.97 ha.m.

Note:-

Tirur Municipality

	Source control (industrial effluent and domestic sewage)	Tirur Municipality
ii	Treatment and disposal	A Septage treatment plant (SPT) having a capacity of 50KLD is under construction in the municipal bus stand. The

	of septage and controlling open defecation	plant is being constructed in accordance with the DPR prepared by Ram Biologicals. Work will be completed on last week of august 2019. At present, there is no open defecation in municipal area and 51 units of septic tanks were proposed on household level and the activities are in progress.
v	Identification of polluting sources including drains contributing to river pollution, function.	There was a public drain identified as polluting source contributing to river pollution from the municipal market. The drain was closed after identifying the illegal waste water outlets from the shops and establishments nearby. And constructed a new drain assuring the passage of storm water only by the way of constructing the drain through the middle of the road so as to avoid the illegal outlets. The construction is ongoing. The estimate amount is Rs 60,00,000/-