

**ACTION PLAN**

**KUPPAM RIVER**

**(PRIORITY-V)**

**DISTRICT LEVEL TECHNICAL COMMITTEE**

**Kerala State Pollution Control Board**

**Irrigation Department**

**Kerala Water Authority**

**Suchithwa Mission**

**Revenue Department**

**Thalipparamba Municipality**

**PariyaramPanchayath**

**PattuvamPanchayath**

**MadayiPanchayath**

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# Chapter 1

## INTRODUCTION

### 1.1.General

#### Background

Water is essential for thriving of people, it is needed for domestic purposes, agricultural, industrial and energy production and these uses are highly inter-linked and sometimes in competition to each other use. Water consumption pattern in India is around 90% in agriculture, 6% in domestic and 4% for industrial use. Usage of water by industrial and domestic purposes generates wastewater that may cause pollution, however agriculture usage largely remains consumptive.

The key challenges to better management of the water quality in India are temporal and spatial variation of rainfall, improper management of surface runoff, uneven geographic distribution of surface water resources, persistent droughts, overuse of ground water and contamination, drainage & salinization and water quality problems due to treated, partially treated and untreated wastewater discharge from urban settlements, industrial establishments and runoff from irrigation sector besides poor management of municipal solid waste and animal dung in rural areas.

India, being an economy in transition from developing to developed nation, is faced with two problems. On one side, lack of infrastructure and on the other, an ever-increasing urban population. The urban population in India was about 387 million in 2011 and rose to about 420 million by 2017. This has thrown up two self-perpetuating problems viz. shortage of water and sewage overload. It is estimated that by 2050, more than 50% of the country's population estimated as 1000 million will live in cities and towns and thus the likely demand for infrastructure facilities including fresh water for drinking and resultant wastewater discharges are expected to rise sharply posing a challenge to urban planners, policy makers, environmental regulators and managers.

Public services could not keep pace with rapid urbanization. Water supply, sanitation measure, management of sewage and solid wastes could cover a fraction of total urban population. The majority of towns and cities have no sewerage and sewage treatment services. Many cities have expanded beyond municipalities, but the new urban agglomerations remain

under rural administrations, which do not have capacity to handle the sewage. The sewage is either directly dumped into rivers or lakes or in the open field.

### **Availability of Water**

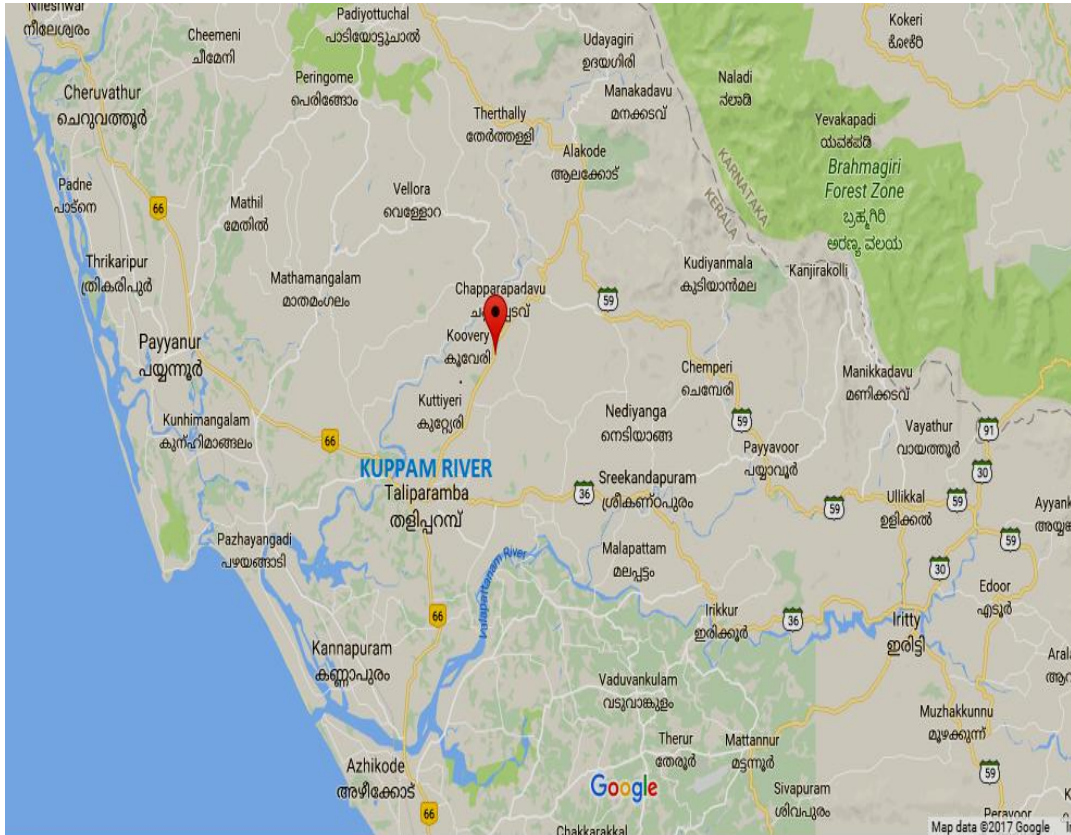
The fresh water resources forming rivers, lakes and enriching aquifer through inflow from water sheds. Water shed retain the rain water through trees, bushes and grass land which infiltrate to subsurface and the surface water flow from the land mass by gravity action. Degradation of water shed in terms of tree cutting, cattle grazing etc. is leading to less infiltration of rain water and abstraction of surface and ground water in excess to the infiltration is reducing outflow from the water shed that ultimately reduce perennial flow in the rivers and streams in plains.

Water that supports productive activities such as; agriculture, generation of hydro power, municipal drinking water supply, industrial consumptive and non-consumptive use etc. have competitive demand that leads to no flow or very meagre flow in the rivers and streams for sustaining environmental concerns.

### **Pattern of Precipitation & Lean Flows**

The rain fall pattern in the sub-continent of India varies widely from West to East and the average rain fall days are forty in a year. This rain fall pattern leads to flooding during monsoon season in the rivers and streams whereas lean flow period remains for nine to ten months. The lean flow period is unable to sustain the competing uses on one hand and leading to pollution in the rivers and streams on the other hand due to lack of infrastructure for handling/treating municipal as well as industrialeffluents.

In view of wide variability in rain fall pattern and few rain fall days in a year, conservation of water by application of water shed management practices will improve water retention capacity as soil moisture in the root zone of trees and grass land by building bunds across gullies and furrows to retain rain water. The water retention structures will increase infiltration, water holding capacity and prevent soil erosion. In this way an appreciable amount of precipitation which is generally lost as a surface flow, can be harvested and stored in the water shed for beneficial purposes during non- monsoonmonths.



**Fig1: Kuppam River Map**

### **River and its Tributaries**

Kuppam River originates from PadinalkadGhat reserve forest in Coorgu district of Karnataka state. It has a total length of 82 km and in Kerala it flows through Therandy, Cheriyoor, Pachheni, Iringal, Kuppam, Pattuvam, Payangadi and Matool in Kannur district. The river flows almost parallel to the Valapattanamriver and later joins together at Mattul. The river touches Taliparamba town at Kuppam. The main tributaries are Alakuttathodu, Kuttikolpuzha, Mukkuttathodu and cheruthodu and there are some more minor tributaries meeting the river including for storm water discharge in each local body through which river is passing. Kuttikolpuzha is the major tributary which joins the Kuppam river at KavinMunambu@ Cherukunnu GP which then merges with Valapattanam river and then in to Arabian Sea.

Main tributory of Kuppam River is KuttikkolPuzha which is flowing in Thalipparamba Municipality and meeting to Kuppam River at KavinMunambu in CherukunnuGramapanchayath. KuttikkolPuzha meets Kuppam River in a wide area as per the photograph attached. In the visibility there is no pollution. But the people living on the bank of the river at kavinMunambu told that sometimes there were slaughter wastes in the river which will come near the bank during high tide.

## 1.2. Physiography of the Basin

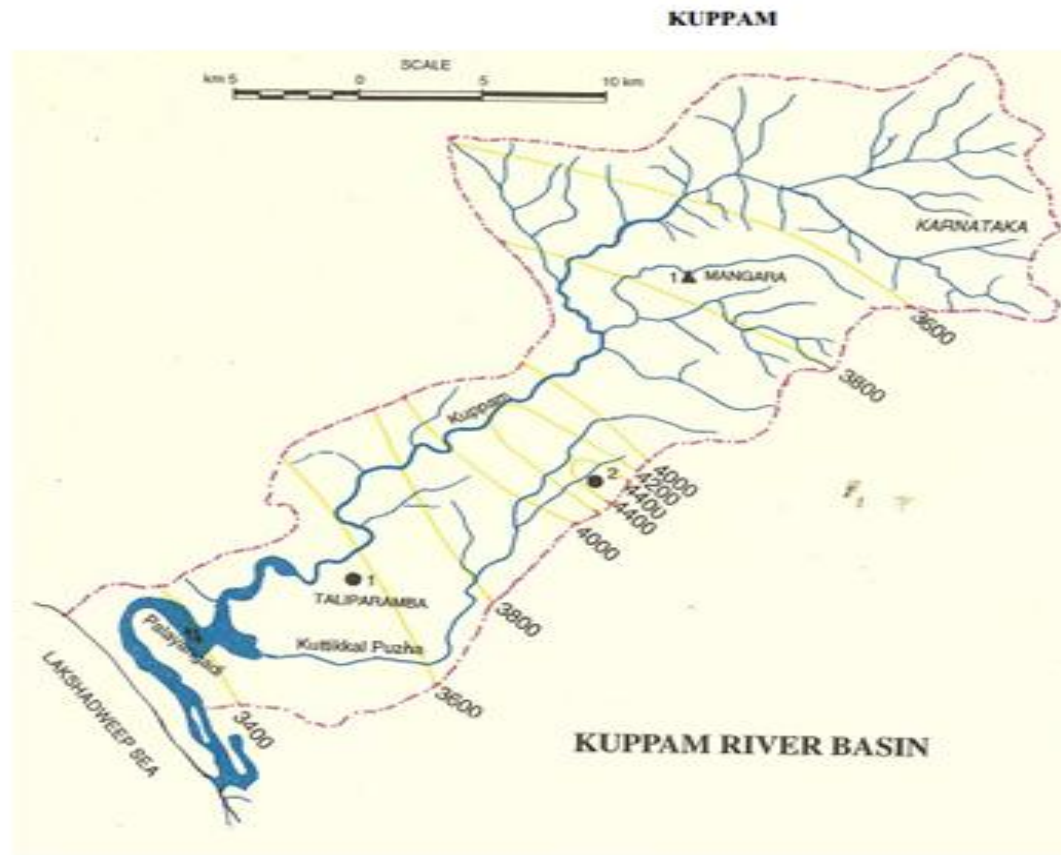
The river Kuppam is the second largest river in district with a length of 82kms and forms the lifeline of people residing from Coorg in Karnataka to Mattul in Kannur district. Kuppam river lies between 11<sup>0</sup>.57'N and 75<sup>0</sup>.22'E and has an area of 539 sq.km. The basin area in Kerala state is 469sq.km. It originates from Padinalkadughats in Coorg district of Karnataka at a MSL of 1630m ( table 1 ).The river has a steep course in its initial reaches in Karnataka state for a distance of 12 km and when it enters Kerala state its bed level falls to +115m. The western slopes of the Western Ghats have tropical and subtropical moist broadleaf forests marked predominantly by Rosewood, Mahogany, Cedar etc. These slopes appear green in almost all parts of the year.

In earlier days the river served as an important means of transport. There was passenger boat service from Kooveri to Payangadi and to Parassinikadavu through Valapattanam. Kuppam was a big market for cash crops and ferry commodities like cashew, pepper, areca nuts etc. The city of Kuppam was an important centre of business and big boats were constructed from Kuppam. Presently it has a navigation length of 24 km. Saline water intrusion occurs up to a length of 25km upwards from sea mouth.

Basin area, Km <sup>2</sup>	539
Basin area in Kerala State, Km <sup>2</sup>	469
Basin area in neighbouring State, km <sup>2</sup>	70 (Karnataka)
District of Kerala in which basin are located	Kannur
Origin of River	Padinalkad Elevation. m : 1630
Length of main stream, km	82
Main tributaries	Pakkattupoya, Alakuttathode, Kuttikkolpuzha, Mukkuttathodu, Chiriyathodu
Important raingauge stations marked on the map (with code numbers)	1. Taliparamba A.R.S (1) 2. Panniyur (2)
Average annual stream flow (computed), Mm	1516
Average annual rainfall, mm	3800
Navigate length of river, km	24

*Courtesy: enviscentre:Kerala*

**Table1:**Kuppam River Basin



**Fig 2:**Kuppam River basin

### **1.3 Land Use Pattern**

A majority of the population of Kannur depends on agriculture, fisheries and other related industries for their livelihood. Paddy, coconut, pepper, cashew, tapioca and Arecanut are cultivated in the district. Plantation crops like rubber can also be seen. With a coastline which sprawls over 82 km, the district also has an important place in the fisheries map of Kerala. Textiles, beedi and coir are the traditional industries here.

### **1.4 Climate and Rain Fall**

Kannur experiences humid tropical monsoon climate in the district. Relative humidity is more during south west monsoon season from period of June to September. It is more during morning hours and is less during evening hours. Evaporation is more during summer months of March to May and low during the months of June to November. Rain fall is the only source of fresh water and it records wide spatio-temporal variations in its availability. Once the rain water reaches surface of the earth and start flowing either as surface run off or infiltrates to recharge ground water the entire process is subject to land and land use management. Based on rainfall



and clouding characteristics four seasons can be identified in Kerala, the South- West monsoon (June to September), North-East monsoon (October and November), Winter (December-February) and Pre-monsoon (March-May). Kannur district receives a total annual rainfall of 3438 mm. District experiences heavy rainfall during the South West monsoon season followed by North East monsoon. South West monsoon during June to September contributes 70 % of the total rainfall of the year. The northeast monsoon contributes only about 30%.

## Chapter 2

# The Study Area of Kuppam River

### 2.1 Study Area

The 12 km stretch of the river from Taliparamba to Velichankeel is identified as polluted included in the category of priority V, ie; with BOD value in between 3-6mg/L. The nearby towns listed are Marathakad and Kuttiyeri. There is a bridge at Kuppam and NH 17 passes through this bridge. The identified stretch is the downstream Kuppam River. There are several small drains which enter into the river from nearby locality. Wastes of all types are seen dumping into these drains as well as into the main river. River bank in the northern side of the identified stretch belongs to Pariyaramgrama panchayat and southern side is in Taliparamba Municipality. Mainly both sides of river are occupied with agro farms, fish farms and wood industries. Soaking of woods in the river are seen in the river along the stretch.

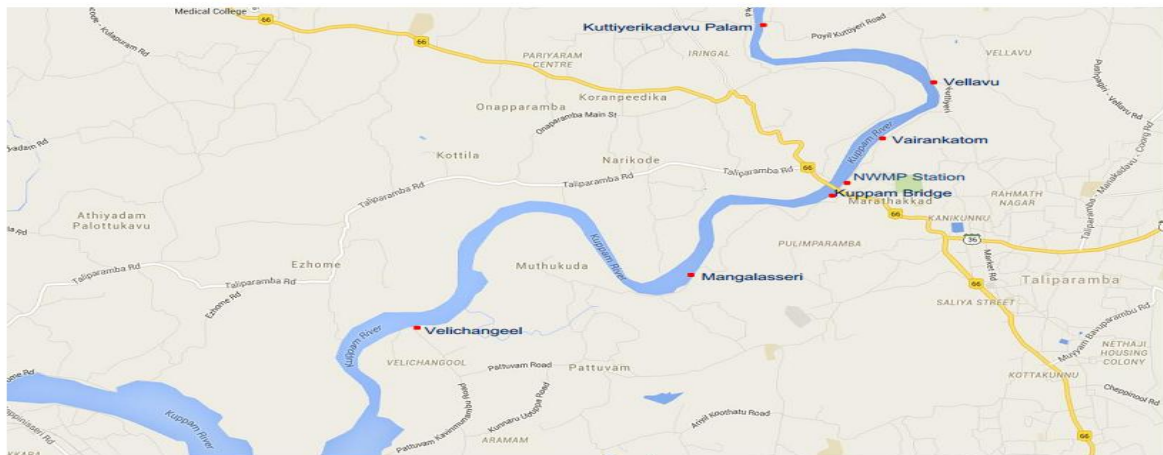


**Fig3** : Satellite view of the sampling stations in the polluted stretch



**Fig 4: Water Shed Map**

Water Quality of Kuppam river is monitored monthly under the NWMP scheme at two locations, Kuppam Bridge(Stationcode:1569)and Rayarom ( StationCode:2298)for years. The station Kuppam Bridge is in Taliparamba municipality and Rayarom in Alakode Panchayath. Rayarom is in the upper stretch and is classified into Class “B” as per the Designated Best Use (DBU) classification of the CPCB.



**Fig 5: Map of the polluted stretch indicating sampling stations**

## **2.2 Identified points of Pollution**

The district has a total number of 4707 industries functioning in it. This includes micro, small scale and large industries. Hospitals, hotels, multi storied housing apartments, commercial establishments, birds-animals-farms etc are included. These are classified into red, orange and green categories, red being highly polluting, orange is medium level pollution and green category units are less polluting sources. Dye houses, quarries, stone crushers, hospitals etc are categorized as red. Plywood industries, other wood industries, chicken- pig- goat- cattle farms, cements products, engineering workshops etc are included in green category. Only medium scale industries are functioning in this district. All these are bound to follow guidelines to lessen water pollution by providing pollution control measures of their own. The river passes through areas administered by three distinct governing systems. The upper reaches is under forest department, the land surrounding the middle and lower segment of the river are privately owned and governed by Revenue department, and the tidal influenced section falling under coastal zone is subject to Coastal Regulation Zone(CRZ)rules. The river from its headwaters to its mouth is an integrated system and must be treated as such. It receives water, sediment, organic matter and nutrients from the catchment area. The changes in the catchment area can bring alterations in the river conditions. Generally the main pollution sources of concern can be grouped into industrial, municipal solid waste, biomedical wastes, e-waste, and domestic wastes. Polluting sources of industrial origin are meager in the Kuppam river basin. KINFRA Apparel Park at Nadukani is the main industrial plot in the basin. The Industrial plot at Mangattuparamba is situated in the basin area of the tributary of Kuppam River, ie, the Kuttikol River. These industrial locations are far away from the river. The industries functioning in the industrial plot are provided with pollution control measures stipulated by the Kerala State Pollution Control Board. Small scale industries of different types like service stations, crusher units, rice and flour mills, oil mills, dairy farms, chicken farms etc are functioning in the basin area. Most of them are having the control measures insisted by the Kerala State Pollution Control Board and are having valid consent. Direct discharges of industrial effluents into the river are not detected anywhere. Townships in the panchayath as well as in municipality area are having hotels, fish markets, meat stalls etc and are seen discharging sewages into the nearby drains which ultimately reach the main river. Crops of paddy, coconut, pepper, cashew, tapioca and arecanut are cultivated in the district. Plantation crops like rubber are also cultivated. The coastal plain and the adjoining low lands are dominated by coconut and rice. The laterite terrain hosts crops like coconut, varieties of fruit trees, rubber, cashew, tapioca, pepper etc. Changes in land use like changes in cropping pattern, diversion of low lands, land shaping, and occupancy of floodplains have serious implications on water quality. For enhancing the productivity in the agricultural sector proper irrigation and fertilizer application are employed. The existing cropping patterns and farming practices are not encouraging judicious use of water. The common practice of wasteful flood irrigation requires using up of water heavily for irrigation and has to be replaced by adopting more optimal practices such as sprinkler and drip irrigation. The quantity of irrigation water can be reduced to a considerable extent by practicing optimized irrigation and farming

practices. Water quality is further affected by the overuse of chemical fertilizers and pesticides. Deterioration of water quality, both surface and ground water is a major issue. Discharges from nearby towns, households etc reach the small drains, or streams which enter the water body are the major sources of pollution identified in the river. In addition to this plastics and other solid wastes are seen littered in river and along the river banks. River side adjacent to towns in the entire area is heavily polluted with dumping of wastes of all sorts. Waste dumping in the main river as well as in its tributaries, small streams and creeks reaching the river ultimately pollute the parent river, adversely affecting its water quality. Wastes from townships, meat and fish stalls, etc are seen reaching the river. Plastic wastes are also seen littered in and around the water bodies. Excessive in-stream sand-and-gravel mining causes the degradation of the river. In-stream mining lowers the stream bottom, which may lead to bank erosion. Depletion of sand in the streambed and along coastal areas causes the deepening of rivers and estuaries, and the enlargement of river mouths and coastal inlets. It may also lead to saline-water intrusion from the nearby sea. The effect of mining is compounded by the effect of sea level rise. Illegal and extensive sand mining and new construction activities cause damage to the aquatic environment which leads to salinity intrusion to the upstream stretches and habitat loss to the avian population. Demolishing hills for construction and other activities, laterite and granite stone quarrying in the up lands leads to reduction in flow of water and causes drought. Encroachment of river banks and destruction of vegetation leads to land sliding. Thus it is identified that domestic pollution is the main source of contaminants in the entire riverine stretches. Throwing of all kinds of waste materials, bio degradable or others into the water bodies affect the quality of water. Though the district is declared as open defecation free in 2016 itself and each household is having sanitation facilities it understood that the sanitation systems are not proper. Most of the latrines are having single pits instead of septic tanks. There are also incidents reported at different parts of the area against the pumping out of sewages from tanker Lorries directly into water bodies. Increased bacterial population in all the stations including the saline area may be due to these types of malpractices. Water pollution and lack of public hygiene may be the main reason for the outburst of the so called eradicated diseases. The main source for virus and bacteria induced diseases is consumption of polluted water.



*Kuttikkol River @ Kavinmunambu*



However it is noted that sources of pollution are more at downstream portion of the river especially in tributaries coming under Madayi Panchayat. The names of the drains are SulthanThodu, ManjaThodu and cheriyaThodu which are directly connecting to the river at various points. In the visibility itself the drains are highly polluted and the water in them are having bad smell. Above specified drains are flowing through Madayi and Pazhayangadi town before reaching the river and almost all the wastes from the town are disposing in to the drains as local body said. Also there is a case registered at Pazhayangadi Police station regarding the direct disposal of slaughter waste in to the river (Crime No.174/19 under 269/IPC, 120 e of KP Act)



SulthanThodu @ Madayi GP



ManjaThodu @ MadayiGp



Cheriyathodu @ Madayi GP

Another tributary was MukkadaThodu which is in UdayagirigramaPanchayath which was completely dry since it is summer. Local body informed that there are no such pollution identified in the river.





Sewage disposal from nearby house to the river @ Pariyaram GP



Drain of Chapparappadavu River



House Boat in Kuppam River @ Pariyaram GP





Hospital on the bank of the river (Alakkodu GP)



*Parappathodu @Alakkodu GP*

## 2.3 Causes of Pollution

Improper disposal of various types of solid wastes from the river bank is one of the reasons. In some market area wastes from slaughter houses and hotels is another cause of pollution. It is also identified that some of the houses on the bank of the river are not having proper sanitation facility.

## 2.4 Sanitation survey of downstream of Kuppam River( Polluted Stretch)

Based on the survey, following recommendations were made.

### A. Short term recommendations to control pollution of Kuppam River

#### Providing household latrines

1. Single pit conversion to bio toilet
2. New bio toilets for no latrine households and those which are directly connected to water body



### **Community latrines**

1. Maintenance of existing community toilet and construction of modern septic tank
2. Construction of new community toilet

### **Solid waste management**

Decentralized solid waste management is the best option for solid waste management and action has taken in almost all local bodies for disposal of biodegradable wastes from its origin itself through bio bins, aero bins, biogas plants etc. In PariyaramPanchayathThumboormozhi type treatment facility is provided for bio degradable waste disposal.

### **Non-Biodegradable waste management**

Material Collection Facility is provided with bailing facility for the management of non-biodegradable waste in all local bodies. All the bio degradable wastes are collected by Harithakarmasena in almost all local body and they segregate the waste and send to MCF and Clean Kerala Company.

### **Awareness programme**

1. Awareness for residence association :Suchitwa mission/LSGD/Municipality
2. SWM training to children, youth, Asha workers and other stakeholders
3. Follow up systems: Capacity building of community groups, monitoring system and active involvement of residence association is necessary.

### **B. Long term Recommendations**

To prevent pollution of canal through waste dumping, strict enforcement of rules is required Corporation has to identify space for treatment systems in decentralized ward wise arrangements and scale up promotion of agriculture, successfully implemented in some wards. Decentralized systems in SW with active participation of the community and ensure proper SWM systems for houses on the banks of the canal. Innovative pilot projects with stakeholder participation to prevent pollution of water bodies are necessary. The role resident's association is crucial in monitoring the pollution

## **Chapter 3**

# **Sample Analysis and results**

### **3.1. Restoration Plan: - Statutory Intervention**

Water quality management through setting up of standards for discharge of municipal wastewater and industrial effluents are enforced through the consent to establish and consent to operate require a fresh look in view of ambient water quality requirements of aquatic resources. The prevailing standards prescribed in the consent to industrial sector and general discharge standards adopted for sewage treatment require change in approach from consumption to disposal to treat, recycle, reuse and discharge to aquatic system if matches with the norms of water quality of aquatic resources.

Polluted river stretches have been targeted for restoration of water quality through identification of sources of pollution and interventions through treatment for the municipal as well as industrial effluents.

### **3.2 Monitoring conducted by the Kerala State Pollution Control Board**

The tributaries coming under Alakode GP and Madayi GP are major causes to the polluted river identified through National Water Quality Monitoring Programme and the reconnaissance survey for river restoration. Most of the drains connecting to the Kuppam River are completely dry since it is summer season. Only from drains with flow were able to check the flow rate and take the sample. Samples were collected from available drains and tested in the lab.

### **3.3 Test Results**

Test results obtained from KSPCB Lab were tabulated as below

**Table 1BOD LOAD CALCULATED**

Name of drain	BOD (mg/ l)	Flow rate (m3/day)	BOD Load ( kg/ day)	Remarks
<b>Karuvanchal</b>	1.00	NIL	-	One of the drains @ U/S of river but there is no flow to main river
<b>Karthikapuram</b>	1.70	NIL	-	Drain is not flowing now. Some pooling of water is here and there.
<b>Near Udayagiri Bridge</b>	0.70	NIL	-	Drain is not flowing now.
<b>MukkadaThodu</b>	0.13	NIL	-	Drain is not flowing now. Some pooling of water is here and there.
<b>MoonamkunnuThodu</b>	-	NIL	-	Completely dry
<b>Kuttaparamba- NeduvoduThodu</b>	-	NIL	-	Completely Dry
<b>D/S of Alakode Hospital</b>	1.80	NIL	-	Drain is not flowing now. Some pooling of water is here and there.
<b>Pathayachira</b>	0.10	NIL	-	Drain is not flowing
<b>Near the houses on bank of main River ( @ Pariyaram GP)</b>	3.1	44928	139.3	Since the source is on bank of kuppam river itself flow rate is calculated for a length of 10 km of river along U/S and d/s of the source.
<b>Near House Boat @ Pariyaram GP</b>	4.1	30772.6	126.17	Since the source is on bank of kuppam river itself flow rate is calculated for a length of 18 km of river along U/S and d/s of the source.
<b>Kavinmunambu</b>	3.64	728.64	2.65	Source is the public drain meeting river
<b>ManjaThodu</b>	3.74	1200.53	4.49	Heavily polluted due to manmade sources
<b>SulthanThodu</b>	3.14	1340.76	4.21	Heavily polluted due to manmade sources
<b>Cheruthodu</b>	4.5	903	4.06	Heavily polluted due to manmade sources

PH	6.5	6.8	7.3	7.1	7.13	7.08	7.44	7.62	7.82	7.9	7.12	7.09	8.17
Conductivity (µmhos/cm)	102.3	134.2	77.3	132.1	21700	31600	42800	36600	28800	42700	32700	37300	136
Turbidity (NTU)	0.7	0.4	1.8	0.6	1.5	0.2	0.7	0.4	1.5	1.6	0.7	0.5	1.9
Colour (Hazen)	5	5	5	5	5	5	5	5	5	5	5	5	5
Odour	Appreciable	Appreciable	Appreciable	Appreciable	Appreciable	Appreciable	Appreciable	Appreciable	Appreciable	Appreciable	Appreciable	Appreciable	Appreciable
Temperature (°C)	26	27	28	26	28	28	27	28	28	26	27	28	26
DO (mg/l)	7.00	7.8	8.4	8.00	4.4	6.5	6.11	6	6.2	10.6	6.7	6.00	8.6
BOD(mg/l)	1.00	1.70	0.70	1.80	0.1	<u>3.1</u>	<u>3.64</u>	<u>3.74</u>	<u>3.14</u>	<u>4.5</u>	<u>4.1</u>	<u>3.47</u>	0.13
Total coli (CFU/100 ml)	400	350	420	380	400	450	425	600	560	550	380	440	430
Fecal coli (CFU/100ml)	120	80	90	100	150	170	100	200	220	170	70	140	160

# Chapter 4

## Action Plan

### 4.1 Action Plan of Local Body

Sl No	Local body	Ref para No 48 as per NGT Order no 673/2018 dated 20.9.2018	Activity	Implementing Agency	Unit	Fund and cost	Time of Completion
1	Udaya giri GP	A (b)	Sanitation Facility	Local Body	Scientific Septic Tank (Approx. 100 Nos)	NREGS Fund (Cost can be specified only after Board Approval)	03/2020
		C (ii)	Bio degradable waste disposal	Local Body	Bio bins, Pit Compost, Bio gas Plant ( As per the application from each ward)	NREGS Fund	Ongoing project
		C (ii)	Non bio degradable Waste Disposal	Clean kerala Kerala Company	MCF	Plan fund	Ongoing project
		E	Awareness	youth, Asha workers and other stakeholders	Mainly Gramasabha	Plan fund	Ongoing project
		C (ii)	Bio degradable waste disposal	Local Body	Bio bins, Pit Compost, Bio gas Plant		

2	Chapp arappa dav GP	A (b)	Sanitatio n Facility	Local Body	Scientific Septic Tank and Soak pit	2.2 Lakhs	06/2019
		C (ii)	Bio degrada ble waste disposal	IRTC Palakkad	Bio bins, Pit Compost, Bio gas Plant	2.00 Lakhs	12/2019
		C (ii)	Non bio degrada ble Waste Disposal	Local body(Harith a Karma Sena)	MCF	Developme nt Fund(3.00 Lakhs)	03/2020
		E	Awaren ess	youth, Asha workers and other stake holders	Mainly through Gramasabha	Plan Fund	03/2020  (Will extend if necessary)
3	Pariya ram GP	A (b)	Sanitatio n Facility	Loacal body	Scientific Septic Tank and Soak pit  (Around 20 Nos)	Total Sanitation Fund,Own Fund, Beneficiary Fund( 30.00 Lakhs)	03/2020
		C (ii)	Bio degrada ble waste disposal		Ring compost, Pipe Compost, Dung Pits (10050 Nos) , ThumboorMo zhi (2 Nos)	Total Sanitation Fund, Own Fund, Beneficiary Fund (30.00 Lakhs)	03/2022
		C (ii)	Non bio degrada ble Waste	Local Body	Clean Kerala Company,MC F and RRF	Levying RS.40 per each collection	On going project

			Disposal			point	
		E	Awareness	youth, Asha workers and other stakeholders	Gramasabha and Other classes	Total Sanitation Fund, Development fund, Own fund (1.25 Lakhs)	Whenever necessary
		A (b)	Identification of illegal outlets in to drains and stoppage of the same	Local Body	Soak pit (10 Nos)	Total Sanitation Fund, Development fund, Own fund (1.25 Lakhs)	09/2019
4	Madayi GP	A (b)	Sanitation Facility	Local Body	Scientific Septic Tank and Soak pit for 22 Houses	Plan fund (SC) 4.4 lakhs	2022
		C (ii)	Bio degradable waste disposal	Ward Sanitation Committee of Local Body	Bio bins, Pit Compost (100 Nos)	Total Sanitation Fund, Own Fund, Beneficiary Contribution (10.00 Lakhs)	2022
					ThumboorMozhi (10 Nos)		
			Non bio degradable	Haritha Karma sena	MCF and RRF	Levying RS.30 per	Ongoing Project

		C (ii)	ble Waste Disposal			each collection point	
		A (b)	Identification of illegal outlets in to drains and stoppage of the same	Local Body	Soak pit (34 Nos)	Beneficiary contribution (3.40 Lakhs)	2022
		E	Awareness	youth, Asha workers and other stake holders	Gramasabha	Beneficiary Contribution	On going project
6	Thaliparamba Municipality	A (b)	Sanitation Facility	Municipality	Scientific Septic Tank and Soak pit (60 Nos)	Estimation in progress	
		C (ii)	Bio degradable waste disposal		Bio bins, Pit Compost, Bio gas Plant		
		C (ii)	Non bio degradable Waste Disposal	Haritha Karma Sena	MCF		
		E	Awareness	youth, Asha workers and other stake holders		Plan fund	Once in a month
7	Pattuvam GP	E	Awareness program	youth, Asha workers and other stake holders	Grama Sabha	Own fund	Whenever needed



		C (ii)	Removal of plastic wastes from the river bank			Doing as an association	
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## 4.2 Action Plan by Irrigation Department

Sl no	Activity	Implementing Agency	unit	No of units	Cost in crores	Source of fund	Time for completion
1	Providing fencing on Kuppam bridge (NH) across Kuppam river at Thalipparamba in Thalipparamba Municipality	Irrigation department	1	1	0.32	Plan Fund	2021
2	Providing Fencing on Pazhayangadi Bridge across Kuppam River at Pazhayangadi	Irrigation Department	1	1	0.32	Plan fund	2021
3	Regualting activites in flood plain zone, protection and management of flood plain zone	Irrigation Department	-	-	Protection and management of flood plane zone for a period of 3 years with a fund of 0.65 crores	-	3 years
4	Greenery development- Plantation plan. Plantation on both sides of the river, setting up biodiversity parks on flood plains by removing encroachment	Irrigation Department	-	-	Planting trees on the bank of the river will be completed within 3 years from the commencement of works with a fund of 0.50 crores	-	3 years

5	Issues relating to E-flow, maintaining minimum environmental flow of river(by having watershed management provisions)	Irrigation Department	-	-	By Micro watershed management for a period of 3 years with a fund of 1.00 Crore from the available fund	-	3 years
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### 4.3 Combined Action Plan

Sl no	Project	Proposed action	Agency	Remarks
	<b>Pollution</b>			
1	Sanitation	Providing of toilets to residences With treatment and disposal system for sewage and sullage	Local Body	As there are residences with single pit toilet and local bodies identified direct disposal of waste water in to the drains
2	Community Toilet	Construction of new community toilets with treatment system	All local bodies Suchitwa Mission, Revenue department	Proposed Construction Of new community Toilet at satellite points on the bank of river
3	Rain water recharge	Entry of rain water and rain water recharging to all thodu and drain	All local bodies , Kerala Water Authority,	Drains are inspected before rain and all thodu , stream are cleaned once in a year
4	Solid waste	Sanitary facility In hotels (around 7) one hospital,	Pollution Control	Check they have

	management	establishmentssituated inthe wardforthe segregation,treatmentand disposal of solidwastesasperSolidWastesManagementRules,2016	Board ,Health authority	board consent and sanitation facility is provided
5	Household waste	AdequatenumeroofKitchenbins shallbe provided	Municipalities and local bodies	One project year
6	Market	Providing proper wastehandlingfacility forwastewater Andsolidwastes	Local Bodies	One project year
7	Rendering plant	Rendering plant forpoultry wastes	Local body	As per their project and fund availability
8	Slaughter house	Slaughter house waste disposal facility	Local body	One common slaughter house for 3 to 4 local body
9	Establishment like service station and workshops	Strict monitoringof disposal of waste(sewage, sullage,degradable waste, non-biodegradablewaste) surveyed area and alsoin the catchment of theriver  1. Verify whether consent tooperate of the Board exists	PollutionControl Board	Six months
10	Sanitation survey should be done	Sanitation survey is to be conductedforon eithersidesof the other parts of polluted stretch if anylocatednearby	PollutionControl Board	Six months

11	Awareness	Awareness for residence association:	Suchitwamission/LSGD/Corporation	Once in a month

Other than these following are some more suggestions from the part of pollution control Board.

#### **4.4 Action Plan by Ground Water Department**

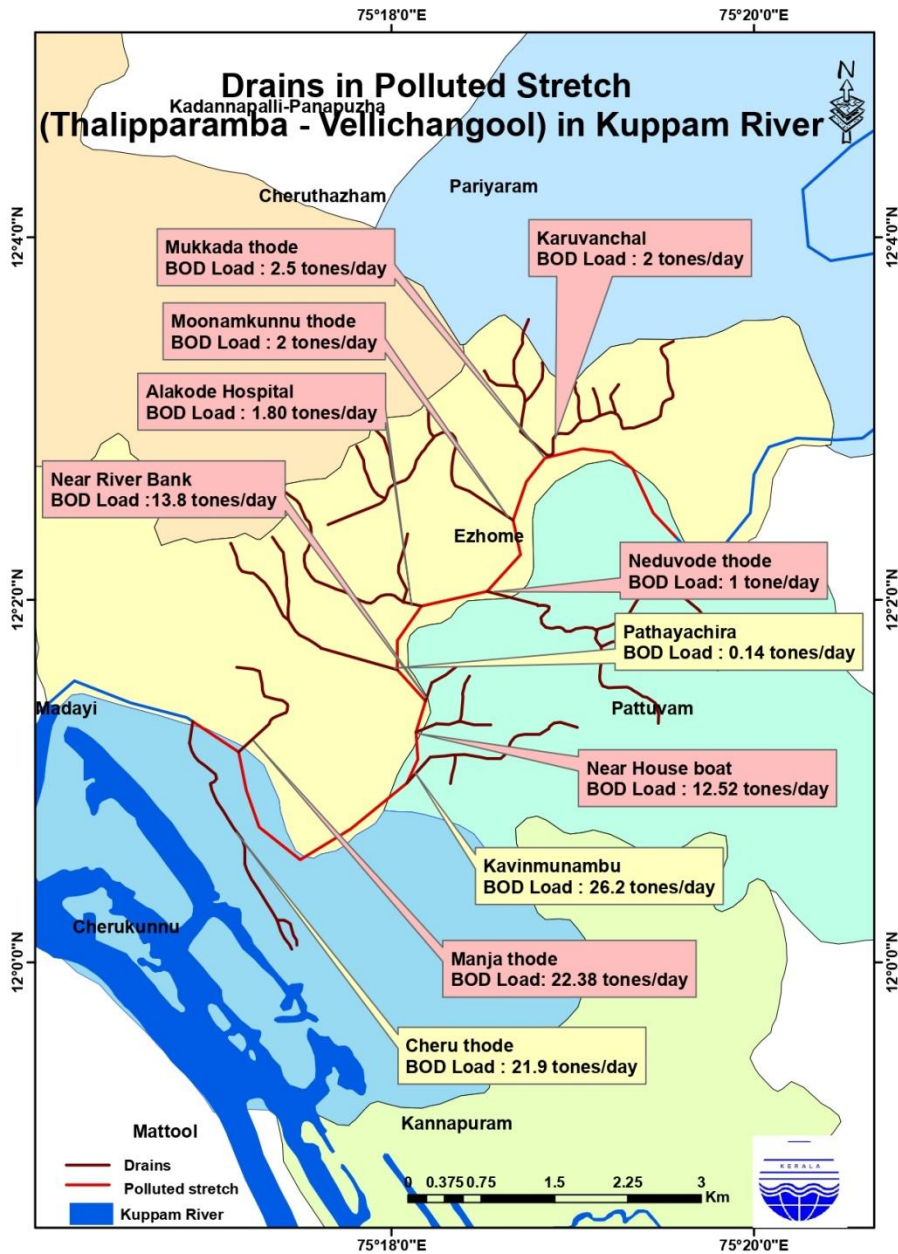
Sl.No	Ref para item nos as per NGT Order no.673/2018 dated 20.09.2018	Activity	Ground Water Department
1	B(i)	Ground Water resources and regulation of ground water extraction by industries particularly in over exploited as critical zones/blocks	As per Groundwater resources of Kerala, 2017 estimate a total number of 2 blocks (thaliparambu and payyannur) comes under the Kuppam river basin. All the blocks in the river stretch are safe with stage of groundwater extraction ranges from 34.85 to 36.47%
2	B(ii)	Ground water recharging / rain water harvesting	The average pre -monsoon groundwater level ranges from 8.81mbgl - 12.03 mbgl. One recharge pit scheme at Thaliparambu block
3	B(iii)	Periodic ground water quality assessment and remedial actions in case of contaminated ground water tube wells/bore wells or hand pumps	Groundwater Department has 3 observation dug wells and 1 bore well 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 695.64-936.49 ha.m.

#### 4.5 POLLUTION LOAD

SL.NO	DRAINS	BOD	FLOW RATE	Pollution load BOD in Tpd
1	KARUVANCHAL	1	2	2
2	KARTHIKAPURAM	1.67	1	1.67
3	NEAR UDAYAGIRI BRIDGE	0.67	1	0.67
4	MUKKADA THODU	2.5	1	2.5
5	MOONAMKUNNU THODU	1	2	2
6	KUTTAPARAMBA-NEDUVODU THODU	1	1	1
7	D/S OF ALAKODE HOSPITAL	1.80	1	1.80
8	PATHAYACHIRA	0.07	2	0.14
9	NEAR THE HOUSES ON BANK OF MAIN RIVER ( @ PARIYARAM GP)	3.07	4.4928	13.7928
10	NEAR HOUSE BOAT @ PARIYARAM GP	4.07	3.0772	12.5242
11	KAVINMUNAMBU	3.6	7.28	26.20
12	MANJA THODU	3.73	6	22.38

13	SULTHAN THODU	3.13	7	21.91
14	CHERU THODU	3.13	9.03	28.26





#### **4.6 Other issues which may be found relevant for restoring water quality to the prescribed standards**

1. Proper awareness among the inhabitants in the area is to be given for protecting the water bodies. Basic training for the people at the grass root level is to be provided for river management. All efforts for maintaining the quality of water bodies may be done by the Panchayat/Municipal authorities only with people's participation.
2. The nearby gramapanchayath and municipalities are mainly responsible for not providing municipal waste collection and treatment facilities in the locality. So they must be instructed to provide the required facility for scientific disposal of municipal solid waste as per the MSW rules 2016. The citizens as well as the municipal/gramapanchayath authorities need to be aware of the importance of scientific disposal of waste generated. Their attitude towards handling waste has to be changed. Reducing waste, recovering recyclable materials, return of nutrients to the eco system as well as generation of energy from waste are to be practised. There has to be a valid scheme for collection, segregation, transportation, processing and safe disposal of waste by the authorities. For this affordable and viable waste to energy conversion technologies apart from conventional composting is to be implemented by the municipalities seeking technical expertise.
3. Propagation of vegetative cover in water shed will reduce soil erosion and enhance percolation of rain water into the sub surface. In downstream stretches where the river is saline, propagation of mangroves are essential.
4. Strict monitoring from the part of implementing as well as monitoring agencies is required for effective functioning of waste treatment facilities in waste generating units.
5. The practice of waste dumping into the river is to be prevented legally and strict action against this practice is to be adopted at panchayath and municipality level.
6. Re-survey of the river boundaries throughout the entire stretch is to be done urgently so as to prevent encroachment of the river.
7. The municipalities as well as the panchayaths are to be directed to provide proper waste management facilities of their own. All towns and cities must have Sewage Treatment Plants (STPs) that clean up the sewage. Facility for collection, segregation, transport, processing

and scientific disposal of waste generated are to be provided by the local authorities in strict adherence to the Municipal Solid Waste Management Rules, 2016. For this, affordable and viable waste to energy conservation technologies apart from conventional composting is to be implemented seeking technical expertise.

8. Strict monitoring from the part of implementing as well as monitoring agencies is required for effective functioning of waste treatment facilities in waste generating units. The riverine stretches are to be monitored periodically at identified locations for water quality assessment.
9. Modern agricultural practices and technologies introduce the use of inorganic fertilizers with Nitrogen, Phosphorous, Potash and inorganic pesticides in farm lands and play important role in the river pollution. These may concentrate into the water body through run off causing algal blooms by which whole stretch of water become choked. Fertilizers and chemicals application in agricultural lands are to be strictly under technical expertise.
10. Rain water recharging measures must be adopted.
11. Eco tourism and water tourism projects are to be designed giving due importance for protecting the environment. The activities are to be organized in such ways which do not induce any types of pollution to the water body. Strict monitoring from the concerned authorities are recommended in functioning of the tourism projects.
12. Implement Green Protocol effectively in local self governments. Prohibit littering of plastics in the area. Plastic wastes shall be handled as per the provisions of Plastic Waste (Management and Handling) Rules, 2018.
13. The existing waste water treatment facilities of Taliparamba Municipality shall be augmented in such a way so as to operate round the year.
14. Actions shall be taken by the local bodies to clean the storm water drains. Rejuvenation of small streams, creeks leading into the river is to be done.
15. Round the clock patrolling shall be provided so as to prevent waste dumping on public places.

