

**REPORT ON RESTORATION OF
POLLUTED RIVER STRETCHES
DRAFT ACTION PLAN OF
RIVER KUTTIYADI (PRIORITY V)**



**SUBMITTED BY
KOZHIKODE DISTRICT LEVEL TECHNICAL COMMITTEE**

CHAPTER 1

INTRODUCTION

1.1GENERAL

The quest of man to conquer nature had led to cover increasing degradation of the environment than envisaged. Scientists and environmentalists now appear to be strongly committed in finding long term solutions to these vexing environmental and resource problems. The far reaching consequence of the problem can only be solved by making the people environmental conscious and thereby achieving a transition into a sustainable society. Rapid rate of urbanization has imposed great strain on man and ecosystem. Population explosion compounded with pollution from anthropogenic activities has affected aquatic and terrestrial ecosystem, threatening human life and generating massive economic loss. Thus multifaceted activities like rapid industrialization, expanding population and agricultural activities have severely affected the aquatic ecosystem of Kerala.

Water is one of the abundantly available substances in nature. It covers about 70 to 75% of earth crust. It is one of the most important commodities that have been exploited by man than any other natural resources. This is because water is one of the prime necessities of life since its development in earth. Water is distributed in nature in different forms such as rain water, river water, spring water, sea water, glaciers etc. Rain water is the purest form of naturally occurring water. Most of the demands of water of mankind are fulfilled by rain water, which gets deposited in earth surface as ground water resource.

The total quantity of water on earth remains constant, with the endless movement from soil to atmosphere and back through the hydrologic cycle controlled by two natural processes viz. evaporation and precipitation. As the quantity of water remains the same, we reuse it and hence it becomes easily polluted. Out of the total quantity of water available in the universe only 3% is only fresh water and the remaining saline water. Of the total fresh water quantity 70% are in the form of glaciers, ice caps etc, 20% as ground water 6% in the form of surface water and

4% various other sources. Thus from the above data it is clear that only 0.1% of the total water balance is considered as fresh water and is available for drinking purpose.

Water is the most important natural resource not only of a state or a country, but of the entire humanity. The prosperity of a nation depends primarily upon the judicious exploitation of this resource. Thus, it can be stated that the primary wealth of a nation is water, which flows in rivers and streams. This itself establishes the importance of rivers, and no other explanation is required to stress their importance. River basin, as a domain for planning and management has been accepted the world over, as water does not recognize political boundaries. Among the most distinctive features of India are its rivers which hold high religious importance among its people. Covering the vast geographical area of 329 million hectares, Indian rivers have been an important reason for the rural prosperity of India. Being of wider importance in cultural, economical, geographical as well as religious development, its numerous rivers are of great value to India. The rivers in India are considered as Gods and Goddesses, and are even worshiped by the Hindus. They provide tourists a wonderful insight into the historical, cultural and traditional aspects of India. Among various types of inland fresh water bodies, the riverine system is a unique type of ecosystem. The size of the drainage basin, the amount of water moving through the system, the proportion of natural versus settled areas, and man's direct impacts are all key factors determining the quality and characteristics of each watershed

1.2 NEED FOR THE STUDY

Water quality problems in India the shortage of water in the country has started affecting the lives of people as well as the Environment around them. Some of the major issues that need urgent attention are: As a result of excessive extraction of ground water to meet agriculture, industrial and domestic demands, drinking water is not available during the critical summer months in many parts of the country. About 10 per cent of the rural and urban populations do not have access to regular safe drinking water and many more are threatened. Most of them depend on unsafe water Sources to meet their daily needs. Moreover, water shortages in cities and villages have led to large volumes of water being collected and transported over great distances by tankers and pipelines.

With over extraction of groundwater the concentration of dissolved constituents/ionic concentrations is increasing regularly. Ingress of seawater into coastal aquifers as a result of over extraction of ground water has made water supplies more saline, unsuitable for drinking and irrigation. Pollution of surface and groundwater from agro-chemicals (Fertilizers and Pesticides) and from industry poses a major environmental health hazard, with potentially significant costs to the country. In recent times, the demand for water has increased many folds due to increased domestic and industrial needs. The development of water resources in a river basin is not a goal by itself, but a means to reach the socio-economic objectives of production, income, employment and quality of life. Therefore, water resources development should be considered in the wider context of regional planning. Such a plan needs a systematic study in the basin to know the spatial distribution of water quality so that any sustainable approach could be implemented in the river basin. Thus, in order to meet society's need for water, preventive measures must be taken to ensure the sustainability of the water resources.

A general statistical study and analysis on the bio-physico and chemical parameters of the basin's surface water quality have been carried out to find the interrelationship among them and also to know the water quality trends in the basin. The management of river water quality is a major environmental challenge. Monitoring different sources of pollutant load contribution to the river basin is quite a difficult, laborious and expensive process which sometimes leads to analytical errors also. The main objective of the present study is to provide an overview of the water quality of the **Kuttiyadi River** and if needed, to develop an action plan to boost up the water quality of the polluted river stretches identified.

1.3 GENERAL PHYSIOGRAPHY OF KOZHIODE DISTRICT.

Topographically the district has three distinct regions - the sandy coastal region including sand bars and marshes, the rocky highlands formed by the hilly portion of the Western Ghats and lateritic midland with undulating topography. From the total area of 2344 sq.kms, the sandy coastal belt contributes about 15.5 per cent, lateritic midlands about 57.3 per cent and rocky highlands about 27.2 per cent.

The District of Kozhikode comprises of three taluks viz. Kozhikode, Vadakara and Quilandy which are subdivided into 12 blocks and 77 panchayats. The Headquarters of the district, viz. Kozhikode city is one among the three city corporations in the state. Kozhikode coast is 72.5 km. long and it stretches from Kadalundikadavu in south to Aliyur in the north near Mahi covering an area of 91 sq.km excluding the backwater areas (Fig. 2.1). This area is bounded between the sea and the laterite formations. Vadakara, QuiIandy, Kozhikode, Beypore and Kadalundi are some of the important towns in the coastal tract.

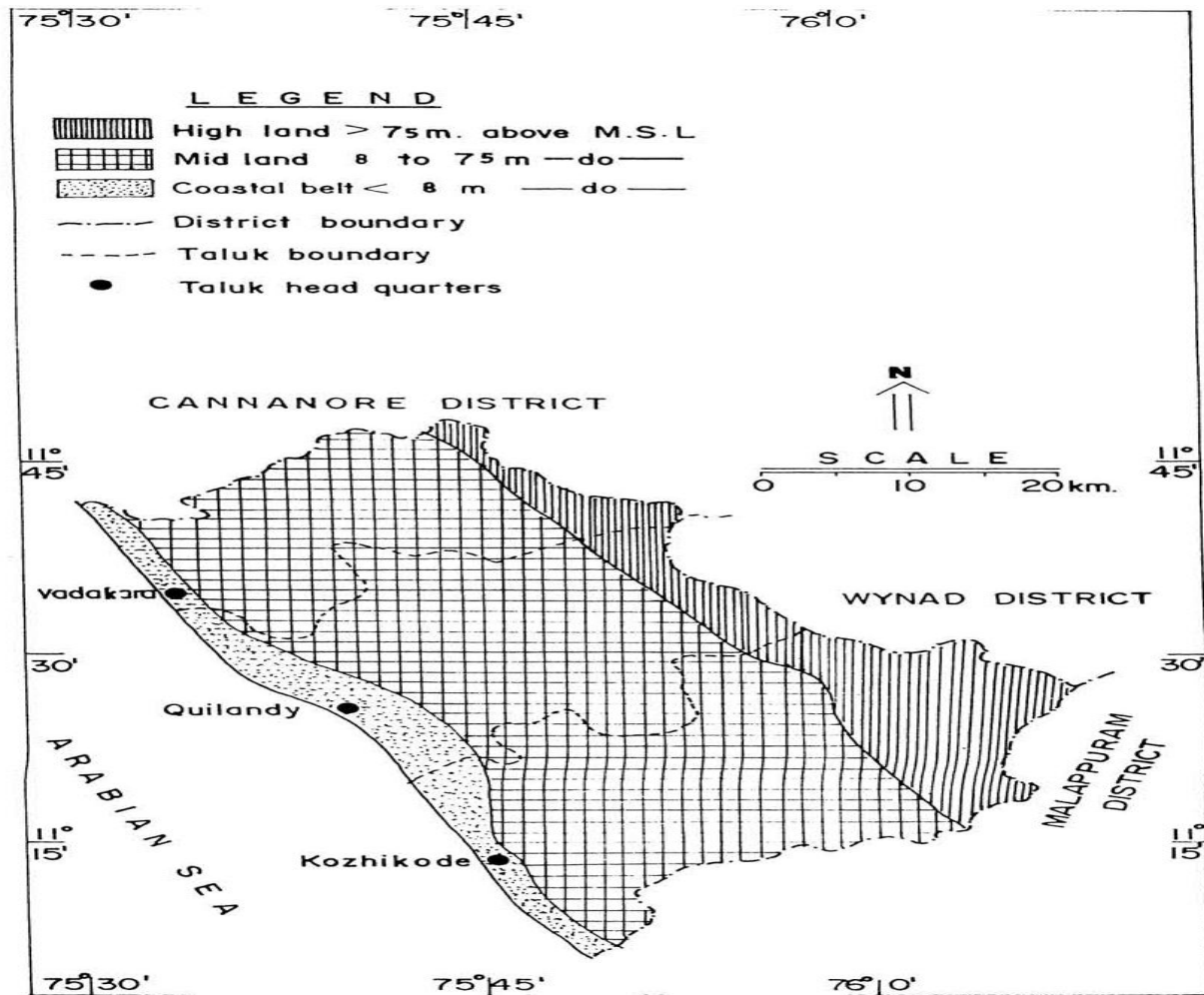


FIG. 2.1 MAP OF KOZHIKODE DISTRICT IN KERALA STATE

Fig. 1. Map of Kozhikode district

1.4. CLIMATE AND METEREEOLOGY

The district has a generally tropical humid climate with a very hot season extending from March to May and wet season or rainy season from June to September, October to November & December to January. Humidity is very high all along the coastal region. According to the Koppen's climate classification it comes under tropical monsoon climate. During December to march, practically no rain is received, and from October onwards the temperature gradually increases to reach the maximum in May, which is the hottest month of the year. The highest maximum temperature recorded at Kozhikode was 39.4 °C during the month of March 1975 and lowest temperature was 14 °C recorded on 26th December 1975. The hot season extends from March to May without rain except a short spell of pre-monsoon Mango Showers.

The rainy season is the South West Monsoon, which sets in the first week of June and extends up to September and the rain receives from the south west monsoon which accounts for about 62% of rainfall received by the region. . The North East Monsoon extends from the second half of October through November. It accounts for 14% of rainfall and the rest of rain fall occur in winter season from December to January. The average annual rainfall is 3,266 mm. Winters are seldom cold and skies are clear and air is crisp. The nearness to sea not allows much variation in temperature and the average temperature is about 28°C. The highest temperature ever recorded in the area was 39.4°C in March 1975. The lowest was 14°C recorded on 26 December 1975.

1.5. GENERAL LAND USE PATTERN AND POPULATION

The latest data on land use pattern in Kozhikode district is given below (Kerala state Land Use Board 2010)

Table 1.Land use pattern in Kozhikode district

TYPE OF LAND	AREA IN HECTARES
Total geographical area	2,33,330
Forest	41,386
Land put to non-agricultural use	16,351
Barren and uncultivable land	2262

Permanent pastures and grazing land	122
Land under miscellaneous tree crops	2652
Cultivable waste	2288
Fallow (other than current fallow)	1293
Current fallow	2282
Net area sown	1,64,694
Area sown more than once	35,060
Total cropped area	19,954

Being thickly populated, a substantial portion of Kozhikode coastal belt is utilized for residential purposes and in the remaining areas, the crops grown are coconut, tapioca, banana and vegetables.

According to the 2011 census Kozhikode district have a population of 3,089,543, and population density of 1,318 inhabitants per square kilometer, sex ratio of 1097, and literacy rate of 95.24%. Its population growth rate over the decade 2001-2011 was 7.31 %.

1.6. GENERAL GEOLOGY AND SOIL CHARACTERISTICS.

A general geological map of Kozhikode Corporation is prepared based on the available maps of geological survey of India [GSI].The coastal region of the area is bounded between sea and laterite formations.The geological feature of this coastal belt mainly consists of sand dunes, sand stones and clays.According to the soil survey report of Department of Agriculture (1978), Kozhikode District has basically six types of soils e.g. coastal alluvium,riverinealluvium, brown hydramorphic laterites, forest loam and grayish onattukara.

Spatial Distribution of Soils in Kozhikode District: [Source: Department of Agriculture]

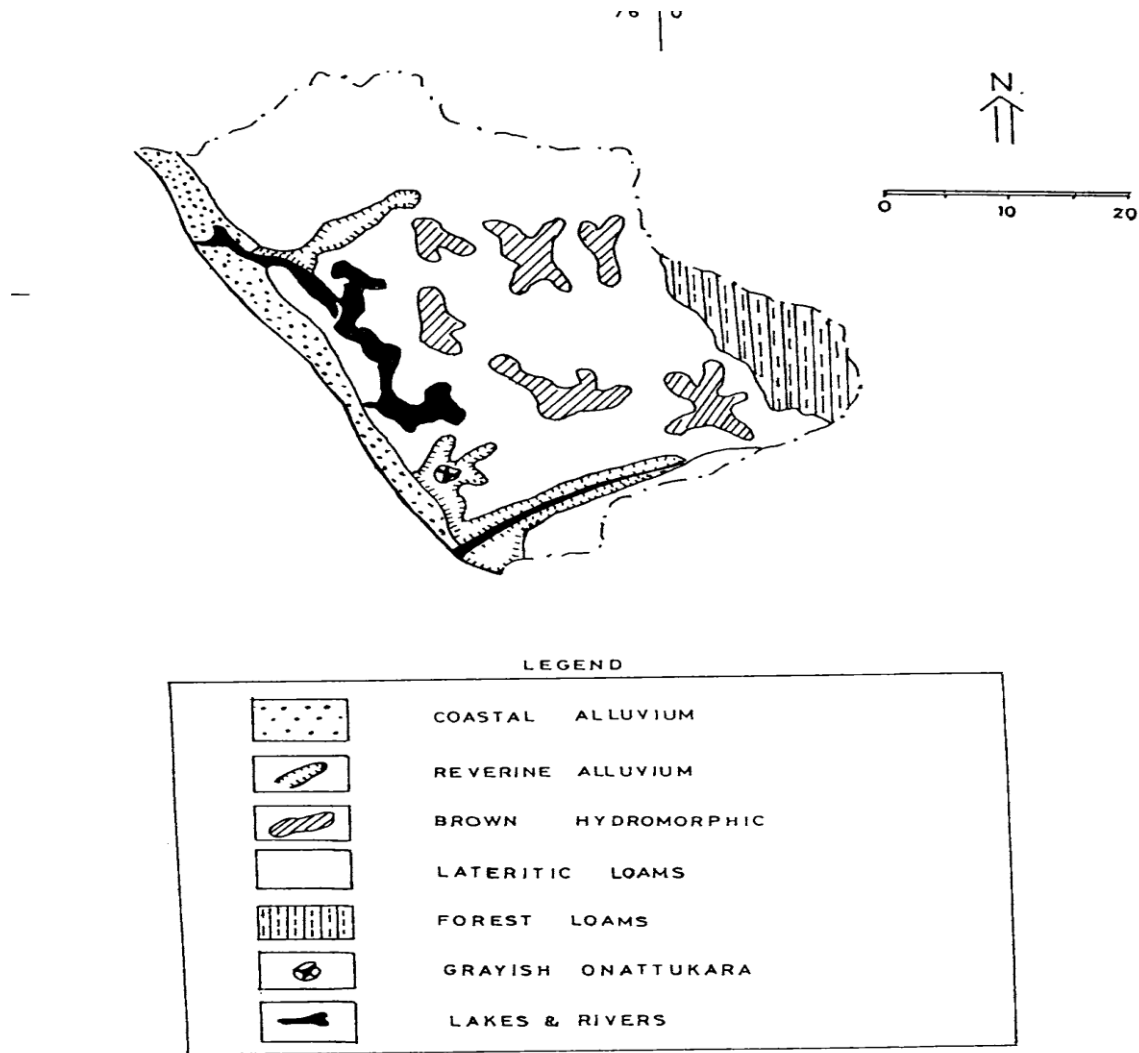


Fig.2. Spatial Distribution of Soils in Kozhikode District

The coastal alluvium is distributed all along the coast. The low clay content and organic matter has been responsible for low cation exchange capacity. The crops irrigated in it include coconut, tapioca, paddy and fruits. The riverine alluvium composed of moderately well-drained soils distributed mainly on the banks of rivers and tributaries. They occur on flat to gently sloping lands. They are light to medium textured with good physical properties and good productivity. The usual crops cultivated in it are coconut, arecanut, banana, vegetables and fruits.

1.7. GEO MORPHOLOGY

The shoreline of Kozhikode coast generally is with minor undulations at Kadalur near Quilandy. The shoreline is seen more or less straight from Kadalur to Beypore. The various major geomorphic units identified from the coastal areas include beach, sand bars, shore platforms, lateritic hills, and valleys. (Ahmed 1973) Naduvattam Panniyankara area in Kozhikode represents a typical sand bar, with small valleys. Paddy is cultivated in these valleys. 19 Two major types of shore-lines are identified in Kozhikode coast, namely cliffed and neutral shoreline (Nair, 1987). In cliffed shoreline the cliffs are bordered by platforms with gentle slopes extending across the shore. These are developed obviously due to cliff recession by wave attack. They extent from high tide level at the base of receding cliffs, to the low tide level ~nthe nearshore zone and are intertidal shore platforms. Such platforms are found developed on laterites around Quilandy west and Aliyur near Mahe. The shoreline between Elathur and Beypore falls under the neutral category. These shorelines are found more or less straight. 20

1.8. RAINFALL AND TEMPERATURE

The coastal area in Kozhikode district enjoys a humid tropical climate with an average rainfall of about 3000 mm, whereas the average rainfall for the whole district is about 3424 mm. Kozhikode coast experiences two monsoons. The southwest monsoon enters the coast in June and lasts till September and is the main cause of rainfall. About 20% to 25% of the annual rainfall is recorded in the month of November and December due to northeast monsoon. The minimum and maximum temperatures are around 23.5 C and o 34 C.

1.9. RIVERS AND BACKWATERS

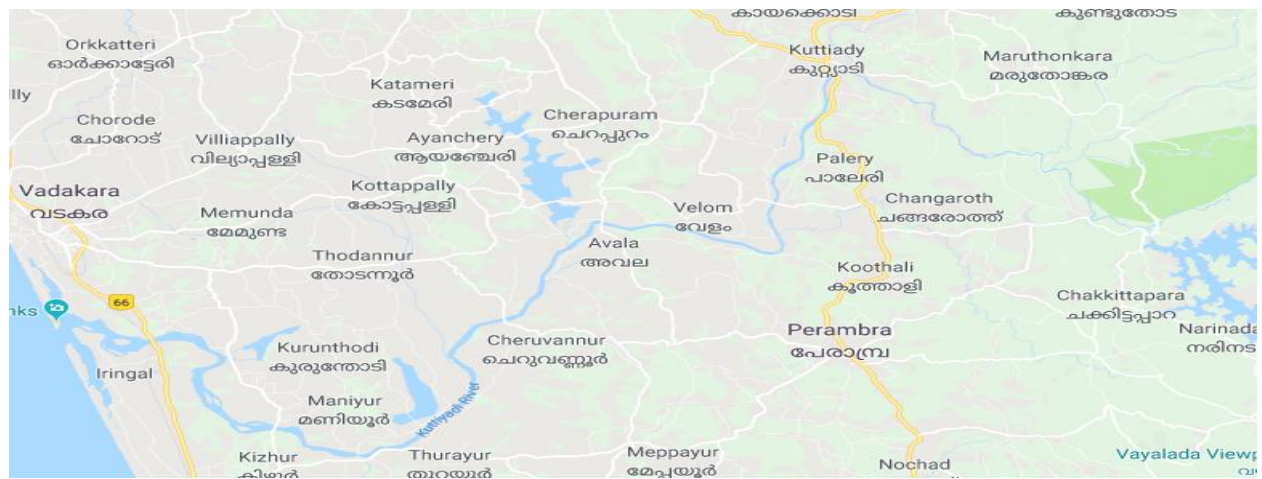
Kozhikode District has 4 major rivers. All are west-flowing and drain into Arabian Sea. The largest river is Kuttiyadi River. The major features of the rivers are tabulated below.

Table.2. Characteristics of rivers in Kozhikode

Sl.no	Name of River	Length ,[KM]	Catchment Area [SQ.KM]	Annual discharge [MCM]
1	Kuttiyadi river [Moorad river]	74	583	1224.3
2	Kallayi river	22	96	201.6
3	Chaliyar river	169	2535	5323.5
4	Kadalundi river	130	1099	2307.4

Among the rivers, annual discharge of Kuttiyadi is maximum. Chaliyar is having more catchment areabut 17% only falls in Kozhikode. Kallayi is the only river draining fully in Kozhikode. Kozhikode District has a large backwater body, fanned by the confluence of Agalapuzha with the Poonarpuzha. It meets the sea at Elathur. Based on GTS maps thereal extent of this backwater body of Elathur is about 33.36 sq.km. If 3 m is taken as average16 depth then total water stored in this backwater body works out to be 100.68 MQ1.

1.10. RIVER KUTTIYADI.



1.10. 1. PHYSIOGRAPHY OF KUTTIYADI PPUZHA BASIN.

Basin area, km ²	:	583	
Basin area in Kerala State, km ²	:	583	
District of Kerala in which basin are located	:	Kozhikode	
Origin of River	:	Narikota Elevation. m : 1220	
Length of main stream, km	:	74	
Main tributaries	:	Onipuzha, Thottilpalampuzha, Kadiyangadupuzha, Mannathilpuzha, Madappalipuzha	
Important rain gauge stations marked on the map (with code numbers)	:	1. Peruvannamuzhi (1) 2. Kuttiyadi E. (2) 3. Kakkayam (3) 4. Kottakkal (4) 5. Arur (5) 6. Changaroth E.(6) 7. Kallanode(7)	
Average annual stream flow (computed), Mm	:	1273.5	
Average annual rainfall, mm	:	4500	
Important discharge stations marked on the map (with code numbers)	:	1. Peruvannamuzhi (1)	
Water requirement for wetland for three crops, Mm ³	:	240	
Water requirement for gardenland, Mm ³	:	112	
Water requirement for domestic use (2021 AD), Mm ³	:	58.8	
Water requirement for industrial use (2021 AD), Mm ³	:	45	
Existing major/medium irrigation project (commissioned/partially commissioned)	:	Kuttiyadi	
Existing hydroelectric project	:	Kuttiyadi	
Navigate length of river, km	:	9.6	

The Kuttiyadi River originates from Naripatta ranges of the Western Slopes of Wayanad below the Banasura peak and flows for 74km before joining Arabian sea near Kottackal. Kuttiyadi River flows through Vatakara, Koyilandy and Kozhikode Taluks. The river is also known as the Moorad River. The major tributaries of the river are the Onipuzha, the Thottilpalampuzha, the Kadiyangadupuzha, Thevannathilpuzha and the Madappalipuzha. It falls into the Arabian Sea at Kottakkal 7 km and along with its tributaries it drains in area of 583 sq. km. The river passes

through OorakuzhiKuttiadi. Traverses Muyipot, Maniyur and Karuvacheri. The historical Kottakkal Forest is situated at the mouth of the river.

1.10. 2. ACTIVITIES OF RIVER.

The river flows through evergreen forests in the upper catchment, and heavily populated midlands and plains with rubber, coconut, rice farming as the main agricultural systems. Kuttiyadi irrigation project (Peruvannamuzhi dam) in the upstream catchment provides the drinking water needs of Kozhikode Corporation and surrounding villages.

1.10. 3. GEOLOGY AND SOIL CHARACTERISTICS OF KUTTIYADI BASIN

The Geographical outlook of River bank area and surrounding areas are almost similar to the other parts of the district comprising coastal and midland zones in the typical classification of land in Kerala as low, mid and high lands. The coastal plains exhibit more or less flat, narrow terrain with landforms such as beach ridges, sandbars, backwater marshes, etc. The lowland is often subjected to salinity intrusion. Moving from the sea to the east, the surface amass into slopes and clustered and isolated hills with numerous valleys in between them formed due to floods and sediment transportation especially by fluvial cycle. The soil conditions and climate are typical for cultivation of different spices, coconut and areca nut and normal for other crops like vegetables and flowers. Garden lands form major share of land used for cultivation with cash crops and oil crops.

The Soil group of the area can be divided into 4 major types – The coastal alluvial soil along the coastal plain and in low lying areas, Riverine alluvial soil along the River banks, Red loam soil and brown hydromorphic soil. The coastal zone is covered by Cenozoic alluvium sediments of recent age at few places the crystalline rocks are cross-cutter by basic dykes, comprises mainly of charnockites with enclaves of mafic granulites belongs to Lower Precambrian age. In the midlands at places, these rocks are covered by laterites. The Soil conditions are very good for cultivation of spices and coconut especially and normal for other crops. Garden lands form major share of land used for cultivation.

1.10. 4. SOURCES OF POLLUTION.

Kuttiyadi River is not much polluted with human external interventions or any type of industrial activities so far. Chances of Biological pollution of water due to the presence of pathogenic bacteria protozoa, virus, parasitic worms etc, from solid excreta of warm blooded mammals, decomposable organic matter, occasionally somewhere sometimes on the river stretch, where cattle breeding and bathing is common.

Agricultural Wastes like Fertilizers, pesticides, insecticides, herbicides, processing wastes etc, if constantly added to soil leaches from agriculture land. Most of these moves down percolating with water and join the aquifers below, posing danger to the ground water. Throwing rubbish and other unwanted things into the water will also cause water pollution.

As Kuttiyadi River is providing the drinking water needs and irrigation needs of Kozhikode Corporation and surrounding villages, it is most important to keep the quality of river water always at consumable standards.

1.10. 5. ACTUAL DESIGNATED USE OF THE RIVER.

Kuttiyadi irrigation project (Peruvannamuzhi dam) in the upstream catchment provides the drinking water needs of Kozhikode corporation and surrounding villages. At Gulikapuzha, in the downstream of the river, water is taken for the drinking purpose of Vadakara municipality and surrounding villages.

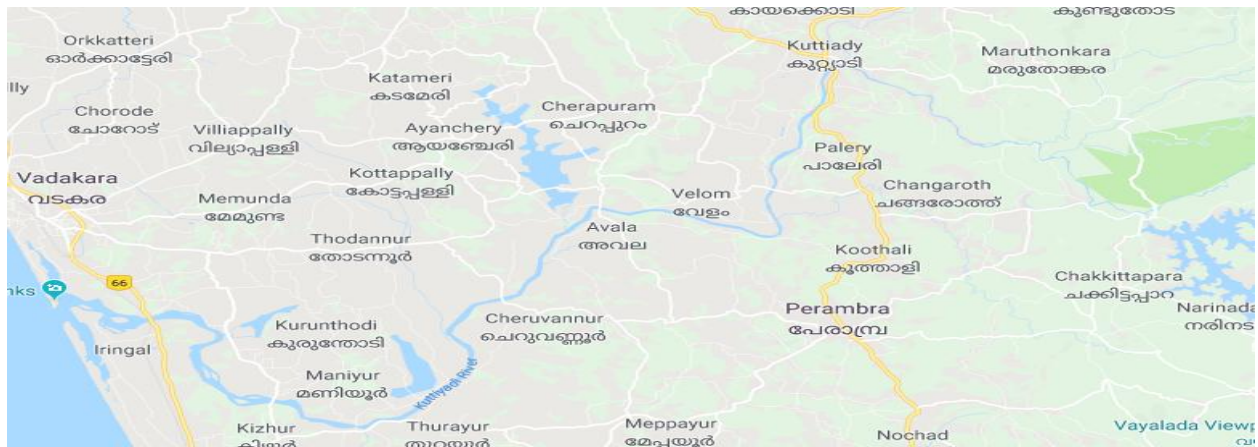
CHAPTER 2

2.1. STUDY AREA

The river stretches identified for study by the Central Pollution Control Board for river Kuttiyadi is along Kuttiyadi.

2.2. RIVER KUTTIYADI

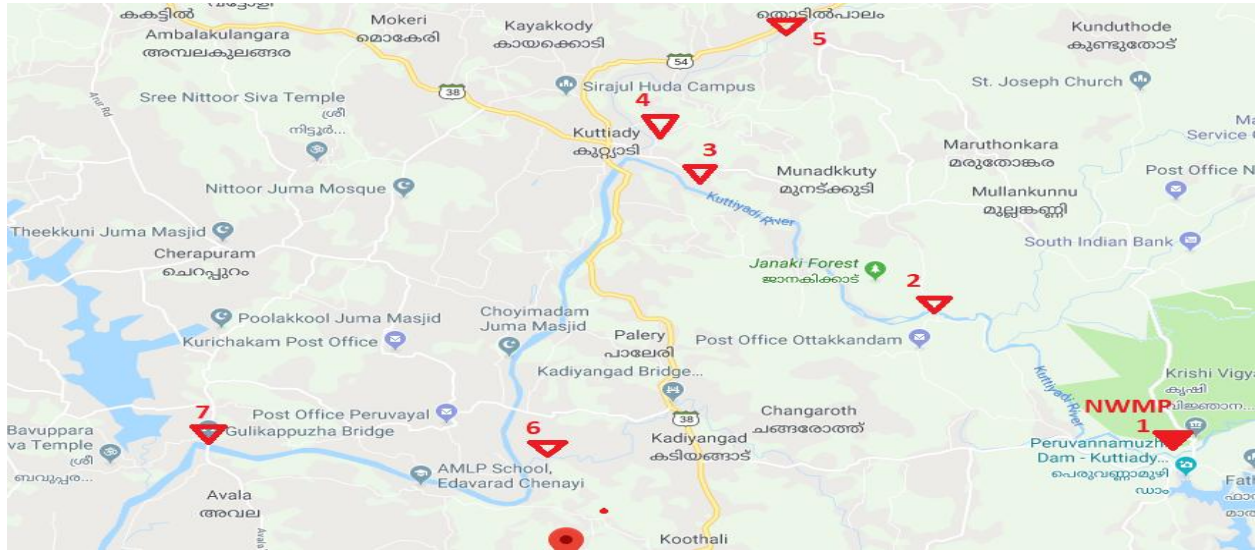
A Google map location of the area allotted study by CPCB is shown in figure below



Since our NWMP sampling station is at Peruvannamuzhi dam, which is the upstream catchment area of the Kuttiyadi river from which water is being supplied for irrigation of the whole district, it is selected as the first sampling point. CPCB had directed to study water quality of the river along Kuttiyadi. So more sampling stations were selected on a priority basis of activities carried out in the nearby areas of river basin at each location.

2.3. SELECTION OF SAMPLING POINTS.

Google map showing location of sampling points along Kuttiyadi River stretch.



All the sampling points are located along the main river stretch. Pictures of the seven sampling points and a brief description on its significance are given below.

Sampling points:

1. Near Peruvannamuzhi Dam: [NWMP sampling station]



Fig.3 Peruvannamuzhi dam

In this station no drains found, no industrial out flows and no pollution sources found near this sampling location.

2. Janaki forest:



Fig.4 Janaki Forest

It is a tourist location. No sources of pollution observed.

3. Near Puzhayoram hotel:



Fig 5. Near Puzhayoram hotel

Main restaurant along the river stretch. Only storm water drainage openings found.

Plastic litter found along this area of river stretch.

4. Behind KSRTC Depot, Thottilppalam

As the bus depot is present, there might be regular oil servicing of KSRTC vehicles. No water servicing.



Fig.6 Thottilpalam area

5. Near park residency hotel

Hotel having full-fledged STP. Unauthorised discharge of untreated waste water not observed. Storm water drainage opens into river. Plastic litter found along river stretch.



Fig.7 Near park residency hotel

Kadiyangad river(puthanthode)



Fig.8 Kadiyangad river

Kadiyangad River passes through Perambra market and joins to Kuttiyadi River at this point at puthanthode.

6. At Gulikapuzha bridge



Fig.9 gulikapuzha Bridge

Sump well located at this point for water distribution to Vadakara municipality. This is located in Velom Grama Panchayath. Opposite side of the bridge is Cheruvannur Grama Panchayath.

Water Analysis data of the NWMP station at Kuttiyadi River for the year -2016

MONTHS	PH	BOD mg/L	COD mg/L	NITRATE mg/L	TOTAL COLIFORM MPN/100ml	TDS mg/L
Jan	7.10	0.80	8.00	0.11	120.00	15.00
Feb	6.90	0.70	8.00	0.04	400.00	14.00
Mar	6.70	0.00	8.00	BDL	150.00	17.00
Apr	6.80	0.80	8.00	BDL	44.00	14.00
May	6.50	BDL	8.00	0.012	110.00	15.00
Jun	6.90	BDL	8.00	BDL	8.00	14.00
Jul	6.10	BDL	8.00	BDL	10.00	15.00
Aug	6.70	BDL	8.00	0.007	160.00	16.00
Sep	6.60	0.80	8.00	0.01	110.00	14.00
Oct	7.30	1.00	16.00	BDL	120.00	15.00
Nov	6.70	BDL	BDL	BDL	140.00	15.00
Dec	6.50	BDL	8.00	0.029	64.00	16.00

Table 3. Water Analysis data of the NWMP station at Kuttiyadi River for the year -2016

Water Analysis data of the NWMP station at Kuttiyadi River for the year -2017

MONTHS	PH	BOD mg/L	COD mg/L	NITRATE mg/L	TOTAL COLIFORM MPN/100ml	TDS mg/L
Jan	7.00	0.80	8.00	0.17	30.00	14.00
Feb	6.90	BDL	8.00	BDL	138.00	14.00

Mar	6.50	BDL	8.00	0.08	20.00	14.00
Apr	6.60	BDL	8.00	BDL	76.00	20.00
May	6.70	0.80	8.00	BDL	50.00	14.00
Jun	6.70	BDL	8.00	BDL	NIL	13.00
Jul	6.70	BDL	8.00	BDL	32.00	17.00
Aug	6.80	BDL	8.00	BDL	360.00	14.00
Sep	7.00	BDL	8.00	BDL	270.00	14.00
Oct	7.30	0.30	8.00	0.08	400.00	14.00
Nov	6.87	0.60	8.00	0.02	140.00	13.00
Dec	7.01	0.60	8.00	0.03	180.00	13.00

Table 4. Water Analysis data of the NWMP station at Kuttiyadi River for the year -2017

Water Analysis data of the NWMP station at Kuttiyadi River for the year January-2018 to June 2019.

MONTHS	PH	BOD mg/L	COD mg/L	NITRATE mg/L	TOTAL COLIFORM MPN/100ml	TDS mg/L
Jan 2018	6.83	BDL	8.00	BDL	1300.00	14.00
Feb 2018	6.83	0.70	8.00	BDL	400.00	15.00
Mar 2018	7.56	0.60	8.00	BDL	390.00	21.00
Apr 2018	7.86	0.70	8.00	BDL	50.00	15.00
May 2018	7.77	BDL	8.00	BDL	500.00	14.00
Jun 2018	6.38	BDL	8.00	0.12	350.00	18.00
Jul 2018	6.05	BDL	7.00	0.30	700.00	16.00
Aug 2018	6.30	BDL	BDL	0.22	540.00	20.00
Sep 2018	7.12	BDL	6.00	0.60	500.00	24.00

Oct 2018	6.76	0.633	8.00	0.03	100.00	13.24
Nov 2018	6.83	BDL	8.00	BDL	1300.00	14.00
Dec 2018	6.5	BDL	BDL	0.2	970	27
Jan 2019	6.9	BDL	7	0.08	300	16
Feb 2019	7.31	0.87	6	0.012	90	15
Mar 2019	6.9	BDL	8	0.33	80	14
Apr 2019	6.68	1.47	10	0.08	70	20
May 2019	6.59	1.06	8	0.003	250	200
Jun 2019	7.65	0.53	10	0.503	400	18

Table 5. Water Analysis data of the NWMP station at Kuttiyadi River for the year -2018

The variation of various parameters like pH BOD, COD nitrate concentration, concentration of total coliforms, and total dissolved solids present in the samples collected during the years 2016,2017& 2018 for the NMP sampling station at Kuttiyadi River is plotted in the following graphs.

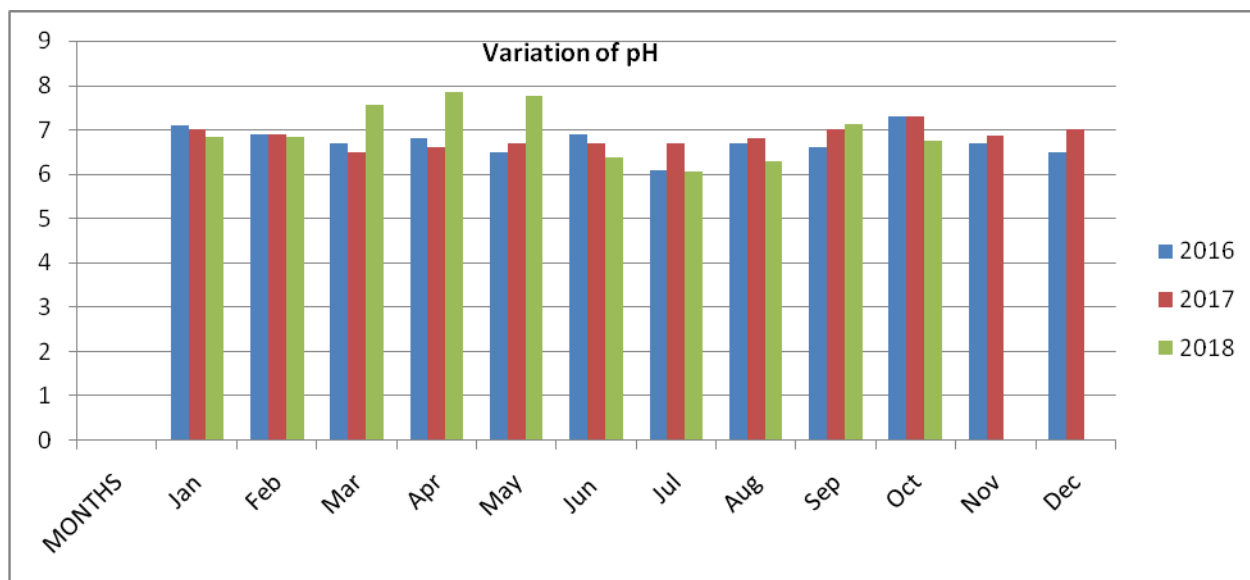


Fig 10. Variation of pH.

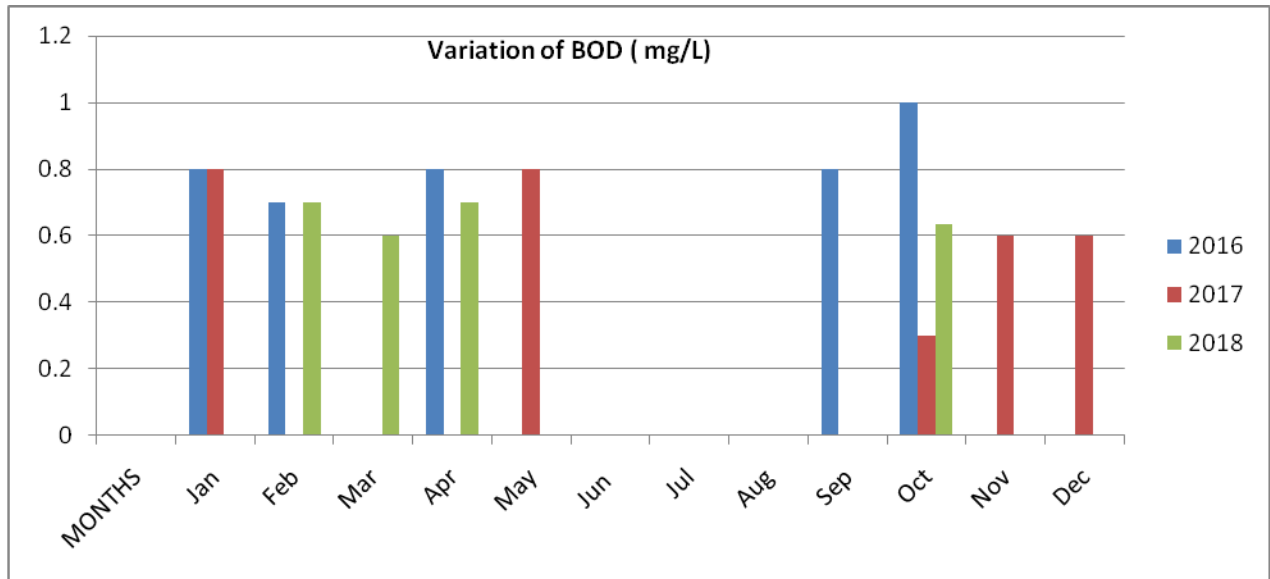


Fig 11. Variation of BOD(mg/L).

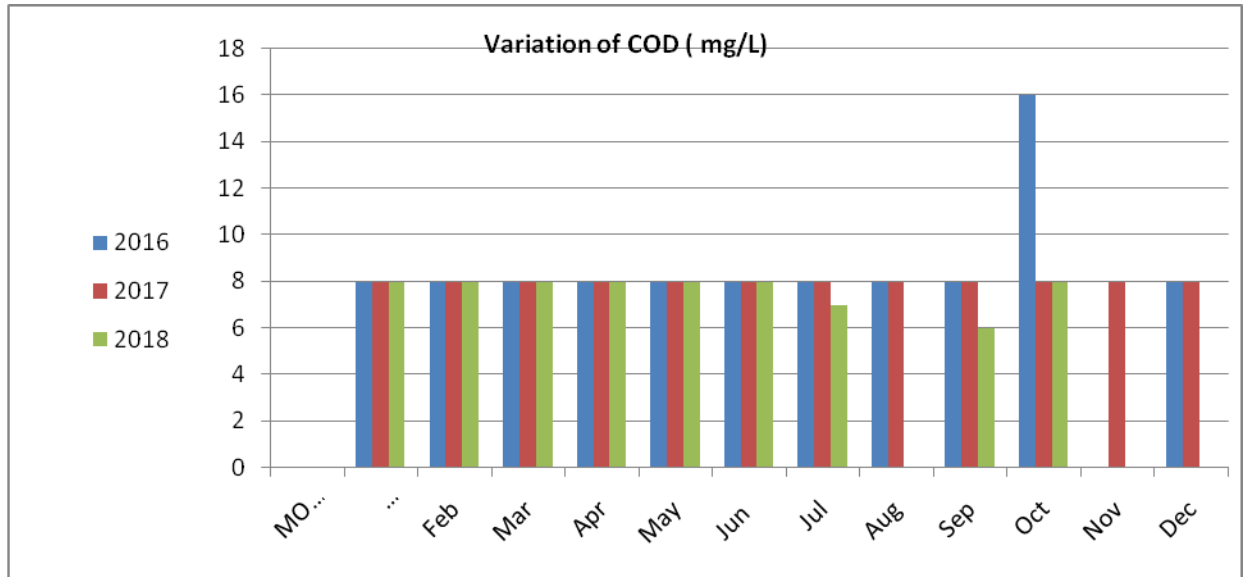


Fig 12. Variation of COD(mg/L).

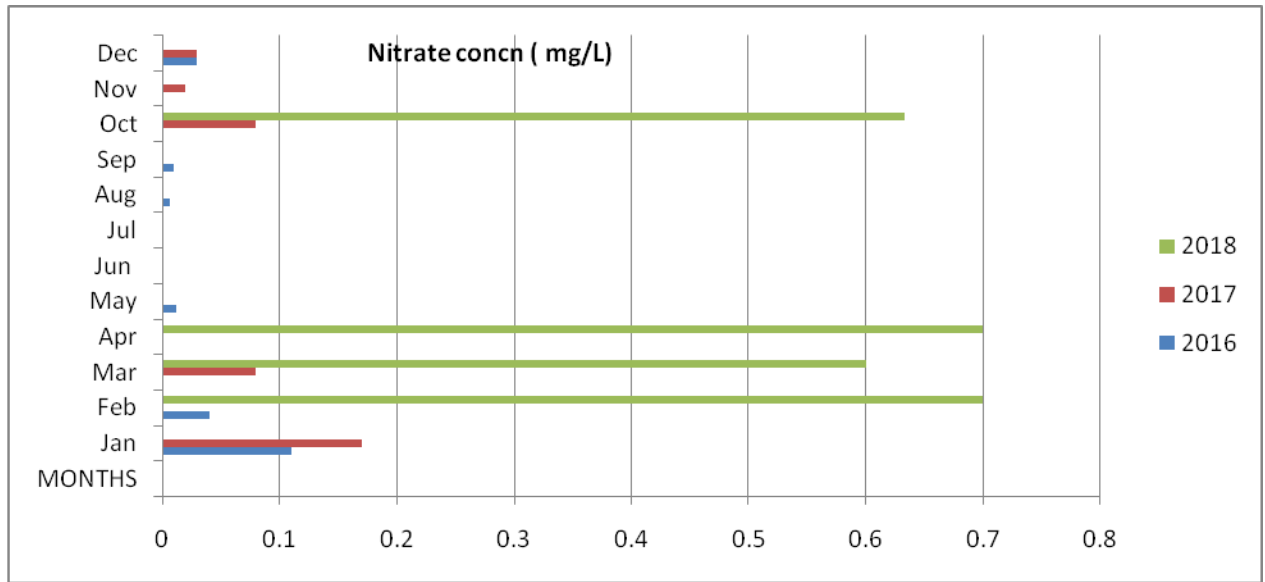


Fig 13. Variation of Nitrate concn(mg/L).

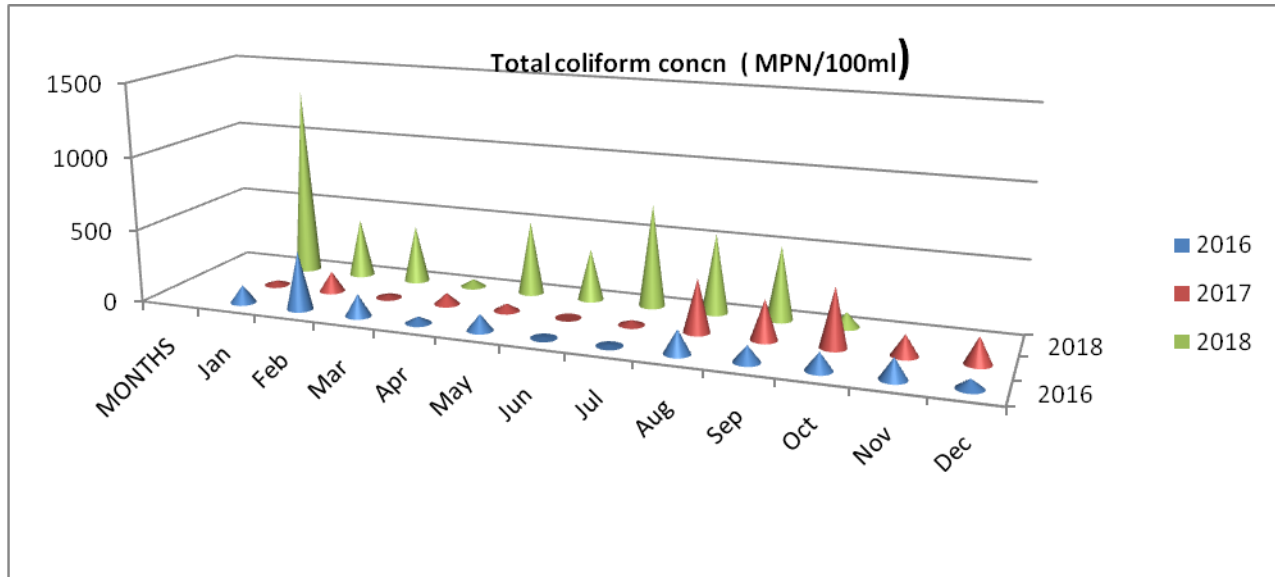


Fig 14. Variation of Total coliform(MPN/100 ml).

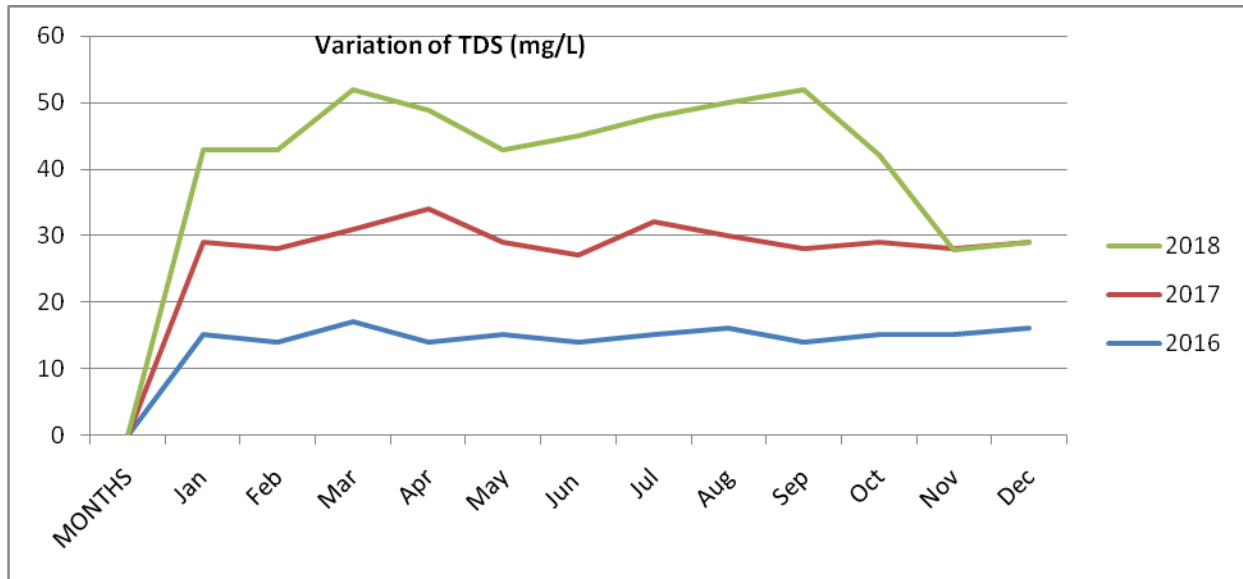


Fig 15. Variation of TDS(mg/L).

Water Analysis data: Kuttiyadi – Along the River Stretch.

Values of parameters obtained for samples taken from the new sampling points are as tabulated below

SAMPLING POINTS	PH	BOD mg/L	COD mg/L	NITRATE mg/L	TOTAL COLIFORM MPN/100ml	TDS mg/L
K1	6.89	0.8	6	0.0536	200	25
K2	7.16	2	11	0.025	840	17
K3	6.66	0.5	7	0.0426	860	19
K4	6.48	BDL	9	0.1242	1080	26
K5	6.53	BDL	7	0.006	980	23
K6	6.45	BDL	BDL	0.068	870	20

Table 6. Water Analysis data: Kuttiyadi – Along the River Stretch.

- K1- Peruvannamuzhi dam
- K2- Janaki forest
- K3- Near puzhayoram hotel
- K4- Thottilpalam KSRTC bus stand
- K5- Park residency
- K6- Gulikapuzha bridge

From the periodical monitoring data over the years 2016 to 2018 for the NWMP station at Kuttiyadi River, it can be observed that, the BOD values are well within limits over the entire period and never exceeded the allowable limits. The noticeable decrease in potable quality of river water arises due to presence of coli forms which indicate chances of pollution due to fecal contamination. This is not a permanent problem, and may be time specific, which can be easily eliminated.

It can be observed and concluded from the sampling results of Kuttiyadi River, that a comprehensive action plan is not required here, since any such noticeable contamination and deterioration in water quality is not at all arising here. Almost all portions along this river are pollution free and amenable to use.

The District level Technical Committee has been formed and the first meeting was conducted on 15.05.2019 at Kerala State Pollution Control Board Regional office Kozhikode, chaired by Chief Environmental Engineer, KSPCB, RO, Kozhikode. The committee members discussed the matter and gave a representation to the Chairman, Kerala State Pollution Control Board to exempt the River Kuttiyadi from the list of polluted river stretches.

Later NGT refused the request and directed to submit the action plan at the earliest. Hence the Sampling was again conducted on 15.07.2019 and the 2 more drain (Odangad fish market side drain and Gulikapuzha bridge (drain)) leading to the river was also identified and the sample was collected and analysed at the Regional lab.

1. Odangad fish market side drain



Fig 16. Odangad fish market side drain

2. Drain near Gulikapuzha bridge



Fig.17. Gulikapuzha drain

SAMPLING POINTS SELECTED FOR THE PREPARATION OF ACTION PLAN OF RIVER KUTTYADI ARE AS FOLLOWS:

1. Peruvannamuzhi dam
2. Janaki forest
3. Near puzhayoram hotel
4. Odangad fish market side
5. Park residency
6. Kadiyangad(kallur)
7. Gulikapuzha bridge
8. Thottilpalam KSRTC bus stand

Water Analysis data: Kuttiyadi – Along the River Stretch.

Values of parameters obtained for samples taken from the new sampling points are as tabulated below

SAMPLING POINTS	pH	CONDUCTIVITY	BOD mg/L	TOTAL COLIFORM MPN/100ml	FECAL COLIFORM MPN/100ml	TEMPERATURE
Peruvannamuzhi dam-DS5	6.58	27.74	0.8	600	360	29
Janaki forest-DS4	6.43	25.04	0.13	968	888	28
Near puzhayoram hotel-DS2	6.33	27.74	0.26	1192	1112	29
Odangad market side drain-DS1	6.52	42.64	0.6	24	16	28
Park residency-DS3	6.36	31.77	0.66	1240	1088	29
Kadiyangad (kallur)-DS7	6.3	47.78	0.06	1272	1048	29
Gulikapuzha bridge-DS6	5.95	74.64	1.6	1208	960	29
Thottilpalam ksrtc bus stand-DS8	6.53	29.78	0.26	1560	1120	28

Table 7. Water Analysis data: Kuttiyadi – Along the River Stretch 2019

As per the analysis report BOD of all the sampling points are within the limit(BOD less than 3 mg/L). But Faecal coliform bacteria less than 500MPN/100ml at Peruvannamuzhi dam and Odangad market side drain only. Other stations are exceeding the limit (Faecal coliform bacteria less than 500MPN/100ml). This may be due to raising of water table and surface water runoff during the rainy season.

Drains identified are at Odangad fish market side and Gulikapuzha bridge.

Details of the sampling points of 2 drains and the river stretches selected and pollution load calculations are given below in Table.

Sl. No	LOCATION	WIDTH (meter)	WATER DEPTH OF DRAIN (meter)	AREA (m ²)	VELOCITY (m/s)	DISCHARGE (m ³ /s)	BOD (mg/L)	Pollution LOAD in (kg/day)
1	PERUVANNAMUZHI DAM	50	2.5	125	0.0001	0.0125	0.8	1.728
2	JANAKI FOREST	50	2.5	125	0.182	22.725	0.13	255.2472
3	NEAR PUZHAYORAM HOTEL	20	2	40	0.142	5.68	0.26	127.60
4	ODANGAD MARKET SIDE Drain	1.2	0.3	0.36	0.25	0.09	0.06	0.47
5	PARK RESIDENCY	22	3	66	0.142	9.372	0.66	534.43
6	KADIYANGAD (KALLUR)	15	5	75	0.143	10.725	0.06	0.74
7	GULIKAPUZHA BRIDGE Drain	1.2	0.3	0.36	0.25	0.09	1.6	34.56
8	THOTTILPALAM KSRTC BUS STAND	12	2.7	32.4	0.25	8.1	0.26	181.96

Table 8.Details of sampling points at Kuttyadi river

Table .Pollution load in drains and River Kuttyadi

Sl. No	NAME OF DRAIN	LATITUDE LONGITUDE	FLOW RATE (m ³ /sec)	POLLUTION LOAD IN TERMS OF BOD (kg/day)
1	PERUVANNAMUZHI DAM	11 ⁰ 35'57.8" N 75 ⁰ 50'10.4" E	0.0125	1.728

2	JANAKI FOREST	11° 37' 31.11" N 75° 47' 36.3" E	22.725	255.2472
3	NEAR PUZHAYORAM HOTEL	11° 39' 3.8" N 75° 45' 30.4" E	5.68	127.60
4	ODANGAD MARKET SIDE Drain	11° 40' 32.3" N 75° 46' 45.4" E	0.09	0.47
5	PARK RESIDENCY	11° 39' 9.6" N 75° 45' 22.3" E	9.372	534.43
6	KADIYANGAD (KALLUR)	11° 35' 56.06" N 75° 44' 39.8" E	10.725	0.74
7	GULIKAPUZHA BRIDGE Drain	11° 36' 10.3" N 75° 42' 20.9" E	0.09	34.56
8	THOTTILPALAM KSRTC BUS STAND	11° 40' 40.6" N 75° 46' 57.3" E	8.1	181.96

Table 9. Pollution load in drains and River Kuttiyadi

SAMPLE CALCULATION OF ODANGAD MARKET SIDE DRAIN

Width of drain=1.2m, Depth =0.3m, Area=0.36 m², Velocity of drain = 0.25m/sec

Discharge in (m³/s) = Area(0.36 m²) X Velocity of drain (0.25m/sec) = 0.095m³/s

Discharge in (L/day) = 0.095625 X 8640000 =7776000 L/day

BOD load in Kg/day = 0.6 x 7776000 / 1000000 = 0.47 Kg/day .

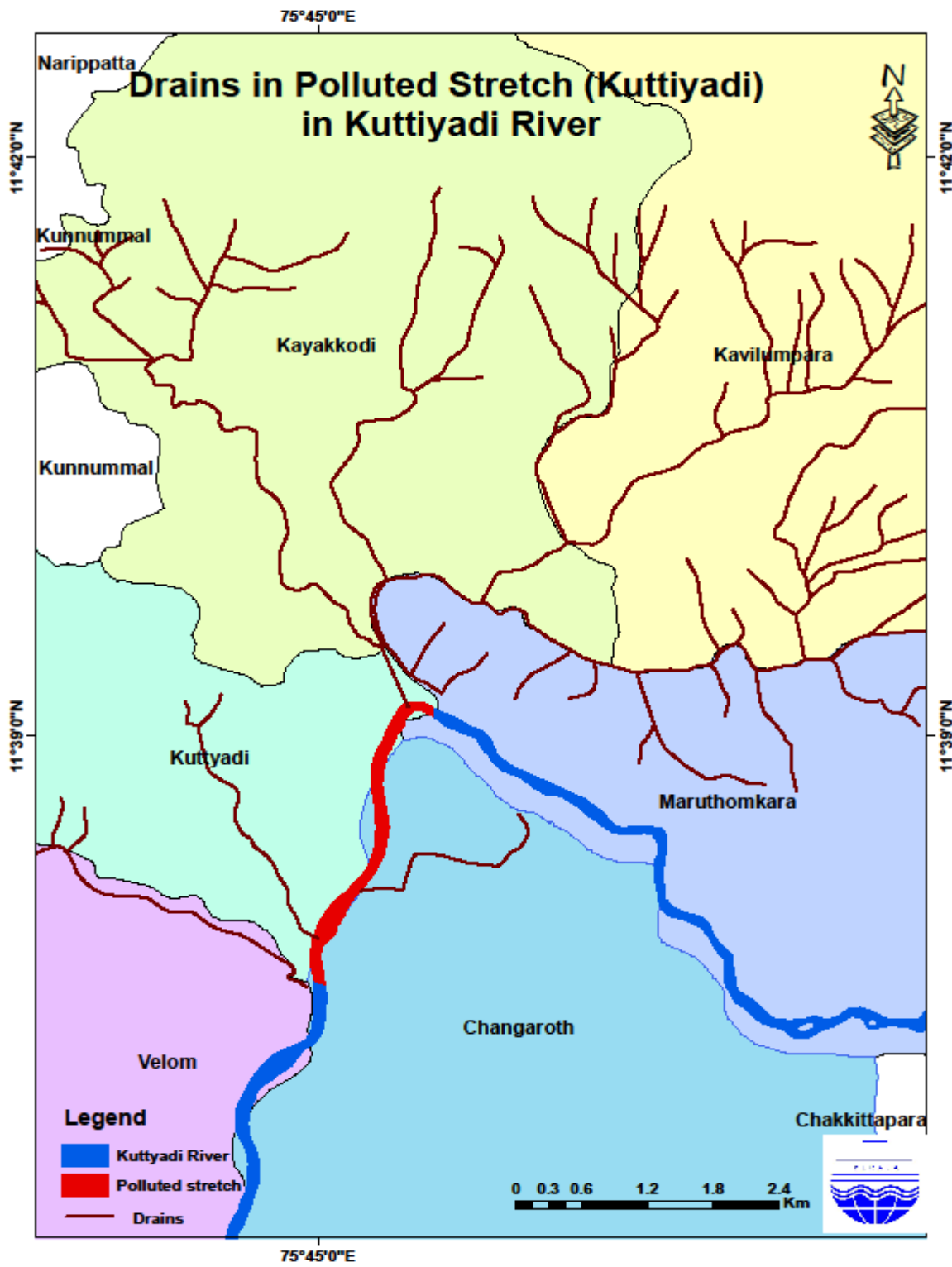


Fig.18 Drains in polluted stretch as plotted by the ENVISAN

CHAPTER 3

ACTION PLAN

The following mitigation measures are suggested to improve the water quality of River Kuttiyadi through a well-defined action plan.

1. Identification of sources of pollution and gathering of information on the identified polluted stretch.
2. Discuss with district authorities to take actions to reduce encroachment near river banks.
3. The Local Bodies also need to provide common septage treatment facilities to collect, treat and dispose sewage .
4. Direct Panchayath / Municipal/ Corporation authorities to augment river flow Wherever Possible.
5. The drains shall discharge sufficiently treated effluent in proportion to self-cleaning Capacity of rivers.
6. De Silting and removal of the large amount of clay deposited in the river, to augment its natural flow properties.
7. Drains of the cities shall be cleaned before monsoon and sludge needs to be disposed in eco-friendly manner.
8. District administration along with the co ordination of Kozhikode Corporation, and other local bodies, Suchithwa Mission, Haritha Kerala Mission, along with Pollution Control Board shall initiate necessary steps to clean the polluted stretch and to ensure that no further discharges make its way to public drains and rivers.
9. Plastics of all types (including thermocol) shall not find its way to river through drains.
10. The existing and new township under-development should be segregated and for new township urban laws should take care of proper treatments of effluent discharge and its reuse should be considered.
11. Solid waste management should also be clearly supported through policy initiatives and state of art technology for converting solid waste into useful resources.

Action plan proposal by Irrigation Department

Kuttiady River – Scope of Irrigation Structures to Control Pollution

Kuttiady River originates from Narikkotta in the Western Ghat region and flows through Vadakara, Koyilandi and Kozhikode Taluks in Kozhikode district. The river is 74 km long. It joins the Arabian Sea at Moorad located 6 km from Vadakara. Main tributaries of Kuttiady River are Kadiangad, Thottipalam Cherupuzha, Neduvalpuzha, Kadavantharapuzha and Onipuzha.

Due to excessive sand mining the river bed has been lowered considerably. As a result, salt water intrusion is severe. Salinity is observed in places even up to 35 km u/s of Moorad. Hence, it is seen that Kuttiady River is mainly polluted by sea (tidal).

This report focuses on the possibilities of mitigating pollution by creating irrigation infrastructures.

Structures across Kuttiady River

Peruvannamoozhi and Kakkayam Dams:

Peruvannamoozhi dam of Kuttiady Irrigation Project and Kakkayam dam of Kuttiady Hydro Electric project are located in the upper reaches of the river. Peruvannamoozhi dam is located on the Kuttiady River at Peruvannamoozhi in Chakittattara Grama Panchayat, near Kuttiady. Tailrace waters from Kakkayam dam reach Peruvannamoozhi dam.

Kuttiady Irrigation Project has canals of about 600 Km length.

Proposed RCB at Perincherikkadavu:

This project aims at preventing saline water intrusion from Arabian Sea and thereby providing drinking water to nearby places apart from storing water for Irrigation purpose. There are three main pumping stations of Kerala Water Authority located on the u/s side of this proposed RCB. This project is sanctioned in principle under KIIFB. The Project cost is 72 Crores.

Navigation lock at Payyoli and Moozhikkal

Payyoli canal 1.20 km long is a part of west coast canal of Inland navigation. This canal connects Akalapuzha on the south and KuttiadiRiver on the north ends. Moozhikal, the south end of VatakaraMahe canal lies about 5 km East of these canal along Kuttiadiriver. This 5 Km stretch of river-from Payyoli Lock to Moozhikkal Lock- is part of Inland Navigation route. A 6 m wide lock gate exists at the mouth of Payyoli canal where it meets KuttiadiRiver. This Lock was constructed in British era. This Lock has to be reconstructed according to Inland Waterways standards since it is situated in the Inland Navigation route. A proposal for reconstruction or Irrigation lock at Payyoli is prepared and investigation for the same is completed. Lock at Moozhikkal is also being reconstructed.

Thus it can be seen that Kuttiady River forms part of a system of rivers connected through artificial canal made for inland navigation purpose. Towards South from Thurayoorth the river is connected to Korapuzha back water. From the right bank of river VadakaraMahe canal begins which connects MaheRiver about 18 km North.

Both the sides of the river has a network of Irrigation canals of Kuttiady Irrigation Project. This system of canals on the right and left side of river recharges ground water during Irrigation season, and the seepage water ultimately seeps in to the river. Major paddy fields resembling Kol land are located on both banks of the river namely Karuvottumchira, Avalapandy and CherandthurChira.

Fencing the sides of Bridges

To prevent throwing of garbage and other wastes to the rivers from bridges, it is proposed to fence the both sides of bridges of rivers. After taking inspection it is recommended to do the fencing at five places of Kuttiady River and its tributary. Dumping of wastes through bridges into rivers may be reduced after the execution of the same. The places are shown below.

1. Providing Fencing on Kadiyangad Bridge across KadiyangadCherupuzha in Changaroth Panchayath
2. Providing Fencing on Gulikapuzha Bridge across Kuttiadypuzha in Velam Panchayath.
3. Providing Fencing on Thekkedathukadavu Bridge across Kuttiadypuzha on Peruvayal-Kadiyangad road.
4. Providing Fencing on Kuttiady Bridge across Kuttiadypuzha on Kuttiady- Perambra road.
5. Providing Fencing on Maruthongara Bridge across ThottilpalamCherupuzha on Kuttiady-Maruthongara road.

Pollution

The river is polluted in some places due to dumping of solid and liquid wastes. This will contaminate the river even if it is made salinity free. Revenue department will have to take care of issue related to encroachments if any, and the local bodies to take appropriate measures to check or minimize river pollution.

CHAPTER 4

MICRO ACTION PLAN

As per the order G.O(MS)No.12/2019/WRD dated of the Water Resource Department 30.04.2019, District level Technical Committee has been formed and the first meeting was conducted on 15.05.2019 at Kerala State Pollution Control Board Regional office Kozhikode, chaired by Chief Environmental Engineer, KSPCB, RO, Kozhikode. The committee members comprises of Superintending Engineer, Irrigation Department North Circle, The Deputy Collector (Senior officer from the Revenue Department nominated by District Collector), Environmental engineer, Kerala State Pollution Control Board, District Office, Kozhikode, Secretary Kozhikode Corporation, Superintending Engineer, Kerala water Authority, District Co-coordinator, District Suchitwa mission, General Manager, District Industries department.

Later District level Technical Committee was reconstituted with Grama Panchayath secretaries of Velom, Kuttiyadi, Changaroth and Maruthamkara for the preparation of action plan for the rejuvenation of River Kuttiyadi . Meeting was conducted on 19.07.2019 at the chamber of Environmental Engineer, Kerala State Pollution Control Board ,District office, Kozhikode. Grama Panchayath secretaries of Velom, Kuttiyadi, Changaroth and Maruthamkara. It was reported by the Grama Panchayath secretaries that the River Kuttiyadi is also polluted by the nearby Grama Panchayath of Kavilampara, Perambra and Cheruvannur. Hence the action plan was also collected from these Grama Panchayath secretaries and compiled. It was also reported by the Grama Panchayath secretaries that there were no industries located in this area and no chances of major pollution from this areas. Direction was given to the secretaries of all the Grama Panchayath to take immediate action to stop all the discharge of waste water from house hold , industrial and commercial activities in to the drains and rivers in the jurisdiction of their the Grama Panchayath and to report the same. Direction was given to the Thottilpalam KSRTC bus stand to stop all the discharge of waste water from in to the drains and rivers from the unit and to provide adequate effluent treatment facilities.

4.1 Combined Action plan

4.1.1 Kuttyadi Grama panchayath

Sl. no	Ref para no.48 Item Nos as per NGT Order no 673/2018 dated 20.09.2018	Action proposed	Action taken	Implementing agency	Estimated Expenditure	Funding agency	Time limit	Expected outcome
1	D	Geo textiles at river bed	completed	MGNREGS	3 lakhs	MGNREGS	31.03.2018	Prevented soil erosion
2	E	Haritha sahaya stapana agreement	Agreement signed with IRTC Mundoor	Local body, Kuttyadi Grama Panchayath	1.96 lakhs	Kuttyadi Grama Panchayath	31.03.2020	Awareness campaigning total households and institutions
3	C(ii)	Removal of Non bio degradable waste	Collect all solid waste	Kuttyadi Grama Panchayath	4 lakhs	Kuttyadi Grama Panchayath	31.03.2020	Remove all the solid waste and keep the surroundings clean
4	C(ii)	Clean green kuttyadi	Project prepared and project is ongoing	Kuttyadi Grama Panchayath	15 lakh	Kuttyadi Grama Panchayath	31.03.2020	Collection, segregation and disposal of waste from 15.22 km square of panchayath
5	A(b)	Community toilet	Project prepared and estimation prepared	Suchitwa mission	10 lakh	Kuttyadi Grama Panchayath	31.03.2020	Establish community latrines at public places
6	C(ii)	MRF	80% completed	Block panchayath	57.5 lakhs	Kuttyadi Grama Panchayath	31.03.2020	Block level MRF for 7 Grama

								panchayat in the block
7	C(ii)	MCF	Work on progress	Kuttyadi Grama Panchayat	5 lakh	Suchitwa mission	31.03.2019	Arrange space to store the collected waste
8	A(b)	Sanitary latrine	Beneficiaries selected	Kuttyadi Grama Panchayat	5.54 lakhs	CFC	31.03.2019	Remove all pit latrines and make all latrines as septic
9	B(ii)	Well recharging	Project prepared	MGNREG	10 lakhs	MGNREG	31.03.2019	Recharge 100 wells
10	E	Camera surveillance	Camera fitted	Kuttyadi Grama Panchayat	2 lakhs	sponsorship	completed	Cover kuttyadi town under surveillance
11	E	Rejuvenation of Kuttyadi Puzha		MGNREGS	5 lakhs	MGNREGS	31.03.2020	Reduction of river pollution
12	C(ii)	Disposal of non degradable bio waste		GP	2,46,190/-	Own fund	31.03.2020	Reduction of river pollution
13	E	Clean Village		GP	15,00,450	Pland Fund	31.03.2020	Reduction of river pollution
14	C(ii)	MRF		Block Panchayat	10,50,000	Block Fund	31.03.2020	Reduction of river pollution
15	C(ii)	MCF		GP	5,00,00	Suchitwa Mission	31.03.2020	Reduction of river pollution
16	C(ii)	Retrofitting		GP	5,54,400	PLAN FUND & Suchitwa Mission	31.03.2020	Reduction of river pollution

4.1.2 Changaroth Grama Panchayath

Sl. no	Ref para no.48 Item Nos as per NGT Order no 673/2018 dated 20.09.2018	Action proposed	Action taken	Implementing agency	Estimated Expenditure	Funding agency	Time limit	Expected outcome
1	C(ii)	Setting up of MCF	Project approved. Site to be fixed soon	Grama Panchayath	3 lakhs	Grama Panchayath	September 2019	Waste free houses and water bodies
2	C(ii)	Collection of non bio degradable waste	As per the directions of Suchitwa mission	Haritha karma sena	Voluntary	User fee Rs 30/-per house	Throughout the year	Waste free houses and water bodies
3	C(ii)	Bio gas plants for household	Project approved	Grama panchayath	2 lakhs	Grama panchayath	November 2019	Waste free houses and water bodies
4	C(ii)	Ring compost unit	Project approved	Grama panchayath	2 lakhs	Grama panchayath	December 2019	Waste free houses and water bodies

5	C(ii)	Plastic shredding unit	New proposal	Grama panchayath	5 lakhs	Grama panchayath	March 2020	Waste free houses and water bodies
6	A(b)	House hold sanitary units	Project approved	Grama panchayath	5 lakhs	Grama panchayath	January 2020	Waste free houses and water bodies
7	C(ii)	Transportation of waste material to refinement unit	Project approved	Grama panchayath	1.5 lakhs	Grama panchayath	September 2019	Waste free houses and water bodies
8	C(iii)	Bamboo Cultivation on river banks		MGNREGS	2,00,000	MGNREGS	31.03.2020	Reduction in river pollution

4.1.3 Velam Grama Panchayath

Sl. no	Ref para no.48 Item Nos as per NGT Order no 673/2018 dated 20.09.2018	Action proposed	Action taken	Implementing agency	Estimated Expenditure	Funding agency	Time limit	Expected outcome
1	C(ii)	Govardhan Biogas plant	Work already completed	Grama panchayath	15 lakhs	Suchitwa mission	31.03.2020	700 litre capacity

2	C(ii)	MCF	Work already completed	Suchitwa mission	15 lakhs	Suchitwa mission	31.03.2020	collection of Plastic and non bio degradable waste
3	C(ii)	Biogas plant 50 No.s	Work started	Suchitwa mission	5 lakhs	Suchitwa mission	31.03.2020	1000 litre capacity
4	B(ii)	Well recharge 1500 houses	Work started	MGNREGS	80 lakhs	MGNREGS	31.03.2020	1500 well recharge
5	C(ii)	Installation of Biogas plant for individual beneficiaries		Socio Economic unit Foundation	72,000	PLAN FUND	31.12.2019	Reduction in river pollution
6	C(ii)	Installation of Ring compost		Socio Economic unit Foundation	1,30,000	PLAN FUND	31.12.2019	Reduction in river pollution
7	C(ii)	Making compost pit		MGNREGS	25,50,000	MGNREGS	31.03.2020	Reduction in river pollution

4.1.4 Maruthomkara Grama Panchayath

Sl. no	Ref para no.48 Item Nos as per NGT Order no 673/2018 dated 20.09.2018	Action proposed	Action taken	Implementing agency	Estimated Expenditure	Funding agency	Time limit	Expected outcome
1	C(ii)	MRF	Work started	Block panchayath	12 lakhs	10 lakh Suchitwa mission + 2 lakh plant fund	2019-2020	To prevent pollution of Kuttyadi river
2	C(ii)	Biogas plant	Work started	Grama panchayath	5 lakhs	Plan fund	2019-2020	To prevent pollution of Kuttyadi river
3	B(ii)	Well recharge	Action plan and TS approved	Grama panchayath	40 lakhs	MGNREG A	2019-2020	To prevent pollution of Kuttyadi river
4	A(b)	Sanitary complex	Work started	Grama panchayath	6 lakhs	Plan fund	2019-2020	To prevent pollution of Kuttyadi river
5	E	Haritha saha ya stha pana agreement	Agreement signed	Grama panchayath	2.5 lakhs	Plan fund	2019-2020	To prevent pollution of Kuttyadi river

6	C(ii)	Biogas plant		GP	5 lakhs	Plan fund & Suchitwa Mission	31.03.2020	Reduction in river pollution
7	A(b)	Sanitary Complex		GP	6 lakhs	Plan fund	31.03.2020	Reduction in river pollution

4.1.5 Perambra Grama Panchayath

Sl. no	Ref para no.48 Item Nos as per NGT Order no 673/2018 dated 20.09.2018	Action proposed	Action taken	Implementing agency	Estimated Expenditure	Funding agency	Time limit	Expected outcome
1	E	Haritha saha ya sthapan agreement	Agreement signed with Niravu vengery	Perambra grama panchayath	3.5 lakhs	Perambra grama panchayath fund	31.03.2020	Total sanitation
2	C(ii)	Solid waste removal	Collect all solid waste with the help of haritha karma sena	Perambra grama panchayath	10 lakhs	Perambra grama panchayath	31.03.2020	Total sanitation
3	C(ii)	Zero waste pera	Collect all solid waste with the help of haritha	Perambra grama panchayath	5 lakhs	Perambra grama panchayath	31.03.2020	Total sanitation

		mbra	karma sena					
4	A(b)	Public toilet	Constructed public toilets in bus stand and taxi stand	Perambra grama panchayath	16 lakhs	Perambra grama panchayath & Suchitw a mission	31.07.2019	Total sanitation
5	C(ii)	MCF	80% completed	Perambra grama panchayath	18 lakhs	Perambra grama panchayath & Suchitw a mission	31.10.2019	Total sanitation
6	C(ii)	Fish market construction	90% completed	Perambra grama panchayath	55 lakhs	Perambra grama panchayath	31.10.2019	Total sanitation

4.1.6 Kavilumpara Grama Panchayath

Sl. no	Ref para no.48 Item Nos as per NGT Order no 673/2018 dated 20.09.2018	Action proposed	Action taken	Implementing agency	Estimated Expenditure	Funding agency	Time limit	Expected outcome
1	E	Haritha Sahaya Sthapana agree	Agreement signed with IRTC Mundoor	Grama panchayath	2.9 lakhs	Grama panchayath	31.03.2020	Awareness campaign to all households and

		ment						Institutions
2	C(ii)	Collection of non bio degradable waste	Collect all solid waste	Grama panchayath	1 lakh	Grama panchayath	31.03.2020	Remove all solid waste surrounding s clean
3	C(ii)	MCF	Project implemented	Grama panchayath		Grama panchayath	31.03.2020	MCF is functioning
4	B(ii)	Well recharge	Project prepared	MGNREGS	5 lakhs	MGNREGA	31.03.2020	160 well recharge
5	D	River cleaning	Volunteer work	Grama panchayath	Nil	Grama panchayath	31.03.2020	Cleaning of Thottilpalam River

4.1.7 Cheruvannur Grama Panchayath

Sl. no	Ref para no.48 Item Nos as per NGT Order no 673/2018 dated 20.09.2018	Action proposed	Action taken	Implementing agency	Estimated Expenditure	Funding agency	Time limit	Expected outcome
1	E	Haritha Sahaya Sthapan a agreement	Agreement signed with Niravu Vengeri	Grama panchayath	3.4 lakhs	Grama panchayath	31.03.2020	Awareness campaign to all households and Institutions
2	C(ii)	Collection of plastic waste	Collected plastic waste from all house holds & institutions through Haritha karma sena- Project completed	Grama panchayath	3.5 lakh	Grama panchayath	31.03.2019	Collecting plastic waste from all households & institutions and handing over to tendered agency Greenworm, Calicut. Thus creates PLASTIC WASTE FREE CHERUVANNUR
3	A(b)	Repairing of households	Project prepared	Grama panchayath	3 lakhs	Grama panchayath	31.03.2020	Repairing household toilets that have poor

		toilets						sanitation facilities
4	A(b)	Construction of Community toilet at Nirappam Stadium	Project prepared	Grama panchayath	6 lakhs	Grama panchayath	31.03.2020	Community Toilet Complex at public places
5	B(ii)	Well recharging	Project completed	Grama panchayath & MGNREGS	10 lakhs	Grama panchayath & MGNREGS	31.03.2019	Recharged 100 wells
6	A(b)	Latrine Construction	Project completed	Grama panchayath & MGNREGS	1.08 lakhs	Grama panchayath & MGNREGS	31.03.2019	9 Latrine constructed

4.1.7 Irrigation Department

Sl. No	Ref para no.48 Item Nos as per NGT Order no 673/2018 dated 20.09.2018	Action Proposed	Action Taken	Implementing Agency	Estimated expenditure in Lakhs	Fund approved	Funding Agency	Time line	Expected outcome
1	E	Salt water Extrusion - Construction of RCB upstream of Perincheri kadavu across Kuttiady river (Gulikapuzha) in Kozhikode District	DR submitted to KIIDC	Irrigation Dept	7200	Sanctioned in principle under KIIFB. Fund not approved	KIIFB	2022 July 31	Preventing saline water intrusion from Arabian Sea and thereby to protect the agricultural land and storing water for irrigation purpose. This project can be made use of providing drinking water without salinity in Vatakara Municipality and adjoining panchyath

2	C(ii)	Fencing the sides of Bridges to prevent dumping of wastes- 5 nos	Propo sals under pre paration	Irrigation Dept	85	To be proposed	Revenue Non plan	2021 July 31	Dumping of wastes through bridges into rivers may be reduced
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Sl. No	Name of Work	Amount in Lakhs
1	Providing Fencing on Puthiyapalam Bridge across EK canal at Kozhikode	6.20
2	Providing Fencing on Mooriyad Road Bridge at Kozhikode	7.60
3	Providing Fencing on both sides of Chamundi Bridge at Kozhikode	3.60
4	Providing Fencing on both sides of Kothi Bridge at Kozhikode	23.00
5	Providing Fencing on both sides of Ibrahim Bridge at Kozhikode	1.60
	Total	42.00

Chairperson, D.L.T.C
&
Superintending Engineer
Irrigation Department, Kozhikode

Convener, D.L.T.C
&
Environmental Engineer
Kerala State Pollution Control Board
District Office, Kozhikode

Member, D.L.T.C
&
Superintending Engineer
Kerala Water Authority , Kozhikode

Member, D.L.T.C
&
District Coordinator
District Suchitwa Mission

Member, D.L.T.C
&
General Manager
Industries Department , Kozhikode

Member, D.L.T.C
&
Senior Officer nominated by
District Collector, Revenue Department

Member, D.L.T.C
&
Secretary
Kuttyadi Grama Panchayath

Member, D.L.T.C
&
Secretary
Velom Grama Panchayath

Member, D.L.T.C
&
Secretary
Changarothe Grama Panchayath

Member, D.L.T.C
&
Secretary
Maruthomkara Grama Panchayath

Member, D.L.T.C
&
Secretary
Perambra Grama Panchayath

Member, D.L.T.C
&
Secretary
Kavilumpara Grama Panchayath

Member, D.L.T.C
&
Secretary
Cheruvannur Grama Panchayath