

**ACTION PLAN FOR THE
REJUVENATION OF POLLUTED RIVER
STRETCH**

**BHAVANI RIVER AT ELECHIVAZHI
PRIORITY V**

**Submitted by District Level Technical Committee (Palakkad
District)**

Before the River Rejuvenation Committee

As per G.O (Ms) No.12/2019/WRD Dated 30.04.2019

As per G.O (Ms) No.12/2019/WRD Dated 30.04.2019 , A District Level Technical Committee (Palakkad District) was constituted for preparing Draft Action Plan for the Rejuvenation of polluted river stretches. One of the polluted river stretches in the district was River Bhavani at Elechivazhi , The members of the committee are as follows:

1. The Superintending Engineer, Irrigation Department : Chairperson
2. The Superintending Engineer, Kerala Water Authority : Member
3. The Environmental Engineer, District Office, Kerala state Pollution Control

Board : Member & Convenor

4. The District Co- ordinator, District SuchitwaMission : Member
5. The General Manager, Industries Department : Member
6. Deputy Collector, LR Palakkad ,Senior officer representing the Revenue Department and nominated by District Collector : Member
7. The Secretary ,Pattambi Municipality : Member
8. The Secretary ,Pudur Grama Panchayath : Member

The action plan for Bhavani river at Elechivazhi was prepared after several deliberations.

The committee hereby submits the draft action plan before the River Rejuvenation committee constituted by the Govt. of Kerala.

Dated this the 19.07.2019.

Member and Convener
Environmental Engineer
Kerala State Pollution Control Board
Palakkad

Chairperson
Superintending Engineer
Minor Irrigation Central Circle
Ernakulam

1. INTRODUCTION

Central Pollution Control board (CPCB) is monitoring the water quality of aquatic resources all over the country at 3500 locations in 29 States and 6 Union Territories under National Water Monitoring Programme. The present monitoring network covers 2541 locations on the surface water and 989 on Wells (ground water). Water samples are being analyzed for 28 parameters consisting of physicochemical and bacteriological parameters for ambient water samples apart from the field observations. Besides this, 9 trace metals and 15 pesticides are analyzed in selected samples. Bio-monitoring is also carried out on specific locations.

1.1 OBJECTIVES OF WATER QUALITY MONITORING UNDER NWMP

- ❖ Rational planning of pollution control strategies and their prioritization;
- ❖ To assess nature and extent of pollution control needed in different water bodies or their part;
- ❖ Assimilative capacity of a water body thereby reducing cost on pollution control;
- ❖ The fitness of water for different uses;
- ❖ To evaluate effectiveness of pollution control measures already in existence;
- ❖ Water quality trend over a period of time;
- ❖ To understand the environmental fate of different pollutants

The water quality monitoring results obtained during the years indicate that the organic and bacterial contamination continue to be critical in water bodies. This is mainly due to discharge of domestic wastewater mostly in untreated form from the urban centres of the country. The municipal corporations and other urban local bodies at large are not able to treat increasing load of municipal sewage flowing into water bodies without treatment. Secondly the receiving water bodies also do not have adequate water for dilution. Therefore, the oxygen demand and bacterial pollution is increasing day by day. This is mainly responsible for water borne diseases. The water quality monitoring results were analysed with respect to indicator of oxygen consuming substances (Bio-chemical demand or BOD) and indicator of pathogenic bacteria (total coliform and faecal coliform).

1.2 IDENTIFICATION OF POLLUTED RIVER STRETCHES

The water quality data under National Water Quality Monitoring Programme for the year 2016 and 2017 is analysed statistically and monitoring locations exceeding the water quality criteria are identified as polluted. The polluted locations in a continuous sequence are defined as polluted river stretches and categorised in five priority classes based on BOD concentration exceeding to BOD levels >30 mg/l, BOD between 20&30 mg/l, BOD between 10&20mg/l, BOD between 6-10 mg/l and BOD between 3& 6 mg/l.

1.3 NGT ORDER ABOUT RIVER POLLUTED STRETCH

The National Green Tribunal (NGT) passed a landmark order on 20 September 2018 pertaining to increasing polluted river stretches in the country (NGT 2018). It ordered all states and union territories to prepare action plans within two months to improve the quality of polluted river stretches to “at least bathing purpose” within six months of the finalisation of the plans. The NGT observed that the State Pollution Control Boards (SPCBs) have failed to check pollution. The tribunal distinctly stated that the chief secretary of each state and the administrator of each union territory will be responsible for preparation of the action plan.

The NGT took *suo-moto* cognizance of a report published in the *Hindu* on 17 September 2018. The report was based on a study done by the Central Pollution Control Board (CPCB) for identifying polluted river stretches in the country (CPCB 2018). Similar studies were conducted by the CPCB in 2012 and 2015 (CPCB 2012, 2015). The 2018 study observed that the number of polluted stretches in the country was 351, an increase from 302 in 2015 and 150 in 2012. The 2018 data highlights that there are 45 river stretches attracting Priority I (Biochemical Oxygen Demand (BOD) value ≥ 30 mg/l) for restoration. Out these, five are in Gujarat, nine in Maharashtra and four in Tamil Nadu—the three most industrialised states in the country.

2. BHAVANI AT ELECHIVAZHI

Attapadi block is a valley below the Nilgiri hills of the Western Ghat in Palakkad district. It includes an area of around 750 sq km and act as a buffering zone to the Silent valley National park.. The area lies 750 meters above sea level and the main river in the area is Bhavani river which is the one of the four river flowing from Kerala towards Tamilnadu. The area is shared by three panchayats- Sholayur, Pudhur and Agali Although the area is known to be one of the tribal heartland in Kerala, major proportion of the population today is

constituted by the settlers from other parts of Kerala and Tamilnadu. The population of tribal folks or adivasi has been declining over the years. The area dwells 3 tribal community- Mudugars, Irulars and Kurumbars. Of these Kurumbars is the most remote and leads a primitive life in comparison to others. The total population of all these tribal is around 30000 as per 2001 census. There are a total of 192 tribal hamlets or ooru in the area. Through efforts under various schemes and projects many of these hamlets had undergone transformation from their traditional mud houses in forest to concrete houses in plain. Effort through Attapadi Hill Development project alone had led to constructed around 2000 houses for tribals in the area.

River basin and tributaries

Attapadi block is a valley below the Nilgiri hills of the western ghat in Palakkad district. Mainly two river basin Bhavania and Siruvani. It includes an area of around 750 sq Km and act as a buffering zone to the Silent valley national park.. The area lies 750 meters above sea level and the main river in the area is Bhavani river which is the one of the four river flowing from Kerala towards Tamilnadu. The area is shared by three Panchayats- Sholayur, Pudur and Agali . Bhavani river originates from Nilgiri hills of the Western Ghats, enters the Silent Valley National Park in Kerala and flows back towards Tamil Nadu. The Bhavani is a 217-kilometre (135 mi) long perennial river fed mostly by the southwest monsoon and supplemented by the northeast monsoon.

Reason of pollution

Bhavani river and its tributary Shiruvani flow through either forest land or sparsely populated rural region for most of their stretches in Kerala. Hence man-made pollution is minimal. The flow in the river becomes very low in the non-monsoon months resulting in stagnant pools of water in the river bed. Natural organic sources like fallen leaves and animal matter can make water in such pools polluted.

As per the list of polluted stretched submitted by CPCB in September, 2018, Bhavani river at Elechivazhi has been identified as one polluted stretch. It has been categorised as Priority V polluted stretch since BOD value crossed 3.0 mg/litre on a few occasions during 2017.

Bhavani riverr passing through Thavalam to Elechivazhi stretch is sharing boundary with Pudu Grama Panchayath in Palakkad district and Tamilnadu.

As per 2011 Census of India, total population of Pudur Grama Panchayath was 12170.
Population density of the area is 43.27 only..

2.1 WATER QUALITY DATA OF STATION AT ELECHIVAZHI UNDER NWMP

BHAVANI@ELACHIVAZHI for the year of 2017												
Parameter	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Temp	28	25	29	28	26	28	29	28	27	29	28	27
pH	7.9	7.8	8	8.3	7.4	7.3	7.3	7.4	7.9	6.4	8.5	8.6
EC	229	235	295	290	418	57	57	41	93	111	121	140
Turbidity	BDL	BDL	BDL	BDL	BDL	BDL	2	8	2	10	4	5
Alkalinity	67	70	99	150	164	7	14	7	28	42	27	37
Chloride	27	29	37	25	45	9	9	6	15	12	21	24
COD	9.6	8	4	16	4	4	4	4	4	8	4	4
TKN	NIL	NIL	NIL	NIL	NIL	0.19	0.17	0.18	0.19	0.12	0.13	0.12
Amm.N	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
T.hardness	95	93	100	90	150	9	15	10	30	46	40	54
Ca.hardness	71	69	65	83	98	6	9	7	18	27	34	30
Mg.hardness	24	24	35	7	52	3	6	3	12	13	6	24
Sulphate	0.372	0.381	0.496	BDL	1.737	3	0.5	BDL	BDL	0.49	5.2	0.621
Sodium	13.5	13.4	24	14	29	7	6	3	9	6.56	6.56	8.96
TSS	BDL	BDL	BDL	BDL	BDL	2	6	5	5	12	6	6
TDS	137	139	184	200	231	35	32	23	55	64	68	77
FDS	123	124	160	175	205	32	23	18	50	56	61	62
Phosphate	BDL	BDL	BDL	BDL	BDL	0.02	0.03	0.02	0.02	0.03	0.016	BDL
Boron	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Potassium	1.8	1.8	4	5	4	2	0.9	0.3	0.8	0.81	0.81	1.93
BOD	1.8	5.4	5.3	5.5	5.5	1.6	1.1	1	0.5	0.4	0.9	2.3
Fluoride	0.102	0.102	0.228	0.682	0.657	0.112	0.32	0.6	0.76	0.38	0.112	0.22
DO	8.9	10.4	7.6	7.6	10.4	8.3	6	8.2	7.8	7.1	9.4	8.6
Nitrate-N	0.081	0.259	0.697	0.502	BDL	0.907	0.292	0.296	0.325	0.24	0.35	0.356
TC	20	NIL	60	60	NIL	NIL	120	120	NIL	200	100	60
FC	NIL	NIL	45	44	NIL	NIL	80	80	NIL	80	60	20

Station: BHAVANI @ Elachivazhi 2018													2019		
Parameter	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March
Temp	26	28	29	28	30	29.5	29	24	27	26	27	25	25	26	29.5
pH	8.4	8.3	8.3	7.4	6.3	7.7	7.3	7.6	7.7	7.5	7.7	7.7	7.8	7.8	8.3
EC	213	200	266	230	283	127	91	98	137	90	211	224	250	230.8	260
Turbidity	5	4	3	2	3	2	2	5	BDL	8	NIL	2	3	2	1
Alkalinity	68	60	78	58	104	48	22	15	26	9	404	90	102	102	99
Chloride	25	26	28	38	30	13	14	16	16	6	8	8	6	5	10
COD	4	4	4	4	4	4	4	4	4	12	8	3.2	4	4	4
TKN	0.1	0.06	0.12	0.11	0.1	0.1	0.13	0.19	0.1	0.11	0.1	0.1	0.1	0.18	0.01
Amm.N	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Thardness	78	70	90	70	104	42	24	20	40	33	105	104	108	112	120
Ca.hardness	50	52	62	60	64	28	8	16	30	20	78	52	58	60	62
Mg.hardness	28	18	28	10	40	14	16	4	10	13	27	52	50	52	58
Sulphate	BDL	0.121	1.2	0.87	1.61	2.85	0.6	BDL	3.2	14	BDL	BDL	1	7.69	9.18
Sodium	13.56	12	14	20	19	8	8	9	9	3	4	1	2	2	4
TSS	6	5	8	10	8	4	1	1	2	4	BDL	BDL	2	2	BDL
TDS	117	110	147	127	156	70	50	54	75	50	125	130	160	138.4	156.3
FDS	100	95	132	120	138	60	45	44	68	45	110	117	144	124.5	140
Phosphate	0.146	0.142	0.14	0.09	0.036	0.03	0.01	0.02	0.02	0.03	0.05	0.05	0.01	0.02	0.12
Boron	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Potassium	1.72	1.63	1.2	3.5	1.2	1.1	1.2	2.8	2	1.3	0.5	0.5	1	1	1.1
BOD	0.3	0.3	0.8	0.7	0.6	0.6	0.4	1.0	0.8	0.87	0.6	0.69	0.96	1.6	0.6
Fluoride	0.01	0.009	0.009	0.009	0.3	0.4	0.09	0.03	0.72	0.72	0.1	0.8	0.4	0.2	0.26
DO	8.2	8.5	8.1	8.2	8	7	8.3	8.7	8.3	6.8	7.2	7	7.04	7.23	7.7
Nitrate-N	0.511	0.601	0.61	0.583	1.26	0.13	0.3	0.47	1.7	2.5	0.146	0.79	0.502	0.469	0.65
TC	180	100	160	60	100	180	260	580	420	20	300	120	60	240	NIL
FC	NIL	NIL	NIL	20	40	NIL	100	220	160	NIL	NIL	100	20	Nil	NIL

3. DISTRICT LEVEL TECHNICAL COMMITTEE FOR REJUVENATION OF POLLUTED STRETCHES

Based on the orders of the Hon'ble national Green tribunal (NGT) and other related documents, Government of Kerala, vide G.O.(Ms) No.12/2019/WRD dated 30-04-2019, constituted a District Level Committee for preparing an action plan for rejuvenation of polluted stretches in each district. The Committee in Palakkad district is constituted as follows.

1. The Superintending Engineer, Irrigation Department : Chairperson
2. The Superintending Engineer, Kerala Water Authority : Member
3. The Environmental Engineer, District Office, Kerala State Pollution Control

Board : Member & Convenor

4. The District Co-ordinator, District Suchitwa Mission : Member
5. The General Manager, Industries Department : Member
6. Deputy Collector, LR Palakkad ,Senior officer representing the Revenue Department and nominated by District Collector : Member
7. The Secretary ,Pattambi Municipality : Member
8. The Secretary ,Pudur Grama Panchayath : Member

3.1 FIELD VISIT TO BHAVANI RIVER AT ELECHIVAZHI AND FINDINGS

The major sources of pollution of the river at Elechivazhi were found out as follows.

1. No drains from in and around Elechivazhi area. Elechivazhi sampling point situated in non-residential area.
2. Bathing and cattle washing occasionally.
3. Thick vegetation in banks of river. Possibility of fallen leaves and animal matter in river contributing to high organic load.

4. Water intake for Irrigation and drinking water purposes
5. Storm water drains from upstream of Elechivazhi are dry.

3.2 FLOW IN BHAVANI RIVER

In the stretch of Bhavani river flowing through Kerala there is no sufficient flow of water in the river throughout the year since the Upper Bhavani dam constructed in the upstream portion of the river which is at Tamil Nadu. Water released from this reservoir is lifted again to Tamil Nadu. Hence minimum flow required for the self-cleansing of the river cannot be ensured. Releasing of sufficient quantity of water from upper Bhavani throughout the year is essential to ensure the minimum flow. As Bhavani is an interstate river national level intervention is required in this matter.

To retain water in the Kerala stretch portion of the Bhavani river 26 places were identified and were proposed to construct check dams at these locations under 'Bandhara Scheme'.

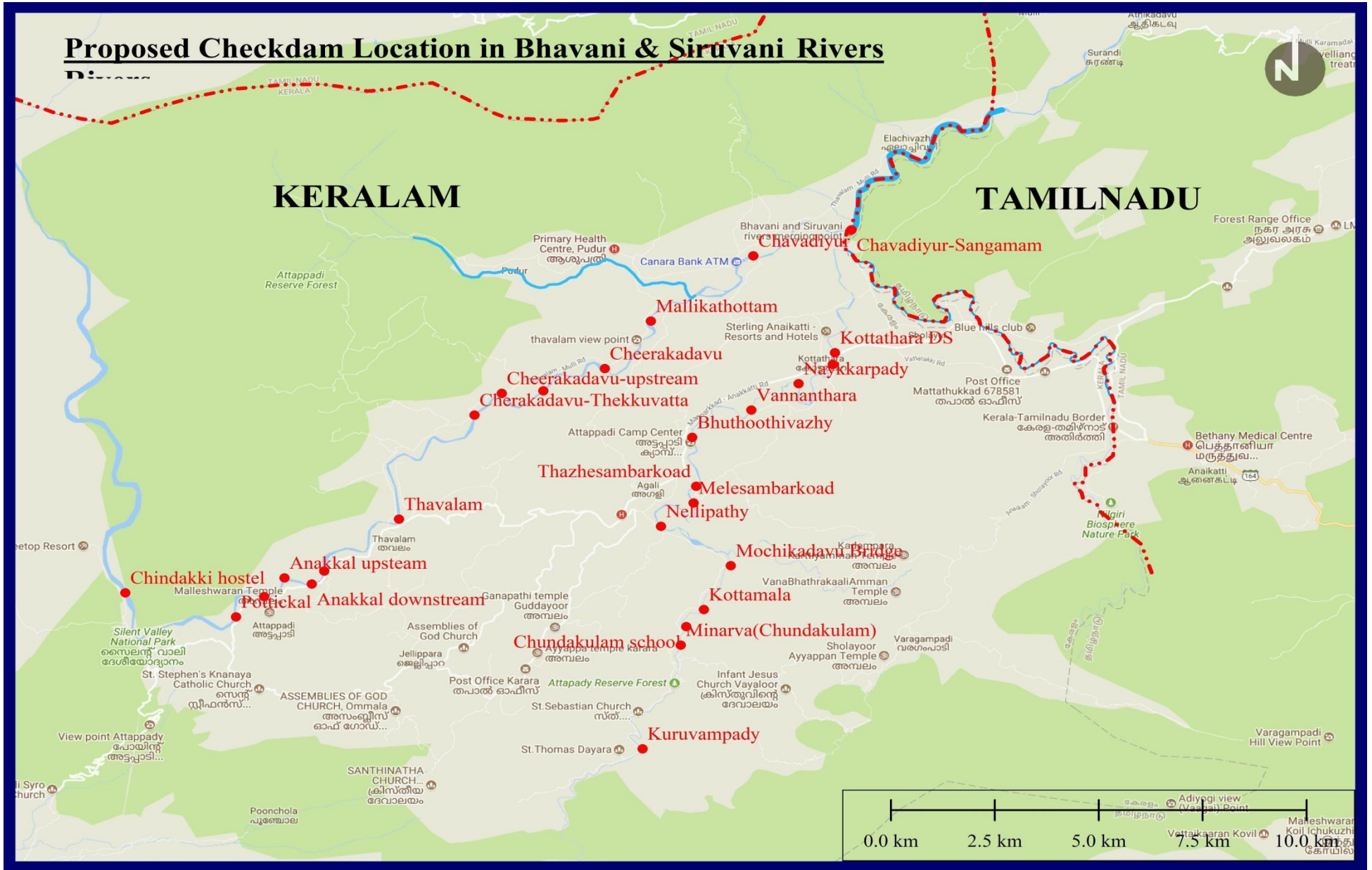
The proposed locations of check dams in Bhavani basin.

Sl No	Latitude	Longitude	Name of Location	River	Width (m)	Panchayath	Benefited Area (Hectares)	Remarks.
1	11.07657	76.53396	Chindekki Hostel	Bhavani	100	Pudur_Agali	250	
2	11.07082	76.55792	Pottickal	Bhavani	120	Pudur_Agali	150	
3	11.07568	76.56402	Chemmannur	Bhavani	100	Pudur_Agali	200	
4	11.08012	76.56844	Anakkal upstream	Bhavani	80	Pudur_Agali	190	
5	11.07867	76.57434	Anakkal downstream	Bhavani	100	Pudur_Agali	190	
6	11.08173	76.57705	Pakkulam	Bhavani	70	Pudur_Agali	180	
7	11.09412	76.59321	Thavalam	Bhavani	80	Pudur_Agali	205	

8	11.11888	76.60957	Cheerakkadavu - Thekkuvatta	Bhavani	120	Pudur_Agali	190	
9	11.012406	76.61548	Cheerakkadavu - Upstream	Bhavani	120	Pudur_Agali	210	
10	11.12469	76.62448	Cheerakkadavu - Temple	Bhavani	100	Pudur_Agali	200	
11	11.12998	76.63778	Cheerakkadavu	Bhavani	140	Pudur_Agali	260	
12	11.14130	76.64773	Mallikathottam	Bhavani	120	Pudur_Agali	220	
13	11.15683	76.66994	Chavadiyoor	Bhavani	140	Pudur_Agali	500	
14	11.16301	76.69121	Chavadiyoor - Sangamam	Bhavani	120	Pudur_Sholayur	250	
15	11.03942	76.64597	Kuruvampady	Siruvani	50	Agali_Sholayur	40	Would Submerge on the Execution of AVIP
16	11.06410	76.65421	Minarva(Chundakkulam)	Siruvani	80	Agali_Sholayur	80	
17	11.06853	76.65543	Chundakkulam School	Siruvani	80	Agali_Sholayur	75	
18	11.07259	76.65922	Kottamala	Siruvani	80	Agali_Sholayur	70	
19	11.08301	76.66504	Mochikkadavu Bridge	Siruvani	50	Agali_Sholayur	60	
20	11.09242	76.64995	Nellipathy	Siruvani	80	Agali_Sholayur	80	
21	11.09797	76.65699	Melesambarkoad	Siruvani	50	Agali_Sholayur	80	
22	11.10196	76.65756	Thazhe Samabarkoad	Siruvani	50	Agali_Sholayur	70	
23	11.12010	76.66949	Vannanthara	Siruvani	50	Agali_Sholayur	80	
24	11.12638	76.67972	Naykkarpady	Siruvani	50	Agali_Sholayur	45	

25	11.13099	76.68714	Kottathara	Siruvani	60	Agali_Sholayur	55	
26	11.13373	76.68760	Kottathara DS	Siruvani	60	Agali_Sholayur	65	

Proposed Checkdam Location in Bhavani & Siruvani Rivers



4. ACTION PLAN

It is reported based on the input from Kerala Water Authority that there is no scope for any sewage treatment plant or sewerage system in the regions around the polluted stretch as the population is very rural and pollution of river due to sewage does not exist.

It is reported based on the input from Industries Department that there are no industries in the regions around polluted stretch. Hence industrial sources of pollution of river do not exist.

GROUNDWATER SCENARIO IN THE RIVER BASIN AROUND THE POLLUTED STRETCH

The Groundwater Department reports that there is only one observational well in the polluted stretch basin, which is located at Thavalam, which is considered the starting point of the polluted stretch in the studies. This is an open well located 1 kilometre away from the river. On scrutiny of the 'depth to water level' in the well for the last ten years, it is seen that the least value was 1.4 metres in 2010. The highest value was 5.49 metres in 2017. Increase in 'depth to water level' implies lowering of groundwater level. This implies that the groundwater level in the region is decreasing over the years. The decrease in flow in the river over the years has led to this effect. Hence the proposal of check dams by the Irrigation Department to ensure water in the river get increased significance. It is also reported that both river water and groundwater from open wells are widely used in the region for domestic and agricultural uses.

Sl. No	Ref para no.48 Item Nos as per NGT Order no 673/2018 dated 20.09.2018	Activity	Implementing agency	Estimated Expenditure in Lakhs	Source of Fund	Time line	Expected out come
1	C(ii)	Establishment of MSW treatment Plant (Solid Waste Management)	Pudur Grama Panchayath	12.0	Own	2019-2020	Better Solid Waste Management (SWM) reduce the river pollution due to solid waste dumping
2	C(ii)	Material collection Facility (Solid Waste Management)	Pudur Grama Panchayath	12.00	Own	2019-2020	Better Solid Waste Management (SWM) reduce the river pollution due to solid waste dumping
3	C(ii)	Construction of Compound wall Material collection Facility Plant	Pudur Grama Panchayath	15.21	Plan/ centre/ State	2019-2020	Better Solid Waste Management (SWM) reduce the river pollution due to solid waste dumping
4	C(ii)	Installing of waste Bin in Colonies	Pudur Grama Panchayath	15.0	Plan	2019-2020	Better Solid Waste Management (SWM) reduce the river pollution due to solid waste dumping

5	C(ii)	Preliminary expenses met for "harithakarmasena"	Pudur Grama Panchayath	3.013	Plan	2019-2020	Better Solid Waste Management (SWM) reduce the river pollution due to solid waste dumping
6	A(b)	Construction of Community Toilets	Pudur Grama Panchayath	1.2	Own	2019-2020	Reduce the open defecation in river basin
7	A(b)	Repair of Community toilets	Pudur Grama Panchayath	2.5	Own	2019-2020	Reduce the open defecation in river basin
8	C(i)	Construction of wall with fencing	Irrigation department	120.00	To be found	Tentatively 2020-21	Protection of river bank and prevention of river pollution and to reduce the tendency of people to throw waste in to the river
9	C(i)	Seasonal clearance of jungle and muddies from river courses	Irrigation department	50.00	To be found	Tentatively 2020-21	Maintain better flow of river self-cleansing
10	D	Construction of Check dams at the identified locations	Irrigation department	3420	State and Central fund	Tentatively 2020-21	Retention of sufficient water in the river throughout the year thus benefiting 3995 Hectares of land.
11	D	Issues relating to E-flow, maintaining minimum environmental flow of river(by having	Irrigation department	10.00	State fund	Tentatively 2020-21	Government constituted a river basin conservation and

		watershed management provisions)					management authority and a committee constituted for drafting river basin conservation act
12	E	Information Education and Communication (IEC)	Pudur Grama panchayth	1.0	SBM (G) & Performance	2019-2020	Awareness of statutory provision as deterrent to pollution and Behavioral changes
13	A(a)	Monitoring of river water quality by sampling	Kerala State Pollution Control Board	12.16 (Rs. 3000 per sample)	KSPCB Own fund	2019-2020	Periodical water quality assessment
14	C	Side Protection	Agali Grama Panchayat	6	Development fund (5,9.136/-), own fund 9,864/-	2019-2020	DPC & AS sanctioned

4.1 POLICY LEVEL ACTION:

In the stretch of Bhavani river flowing through Kerala there is no sufficient flow of water in the river throughout the year since the Upper Bhavani dam constructed in the upstream portion of the river which is at Tamil Nadu. Water released from this reservoir is lifted again to Tamil Nadu. Hence minimum flow required for the self-cleansing of the river cannot be ensured. Releasing of sufficient quantity of water from upper Bhavani throughout the year is essential to ensure the minimum flow. As Bhavani is an interstate river national level intervention is required in this matter.

