

MANIMALAYAR RIVER WATER QUALITY STUDY REPORT 2019-2023



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Based on water quality analysis studies on samples collected from Manimalayar river, from its origin to estuary, conducted by TIES.

Samples tested at TIES Water Testing Laboratory (Grade I Laboratory; approved by Kerala State Pollution Control Board)



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Affiliated Research Centre of Mahatma Gandhi University, Kottayam
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MANIMALAYAR RIVER WATER QUALITY STUDY REPORT 2019-2023

മണിമലയാറ്റിലെ പച്ചനിറം രാസജൈവ മാലിന്യങ്ങൾ മൂലം

കോട്ടയം. മണിമലയാറ്റിൽ ദുർഗന്ധപുരിതവും പച്ചനിറവുമുള്ള വെള്ളമുണ്ടായത് സെപ്റ്റിക് വ്യവസായ മാലിന്യങ്ങളുടെ സാന്നിധ്യം മൂലമാണെന്ന് പഠനഫലം. ഒന്നര മാസങ്ങൾക്ക് മുമ്പ് കരിമ്പുകയം ചെക്ക് ഡാം മുതൽ താഴേക്ക് ചെറുവള്ളി പള്ളിപ്പടി വരെയുള്ള ഏകദേശം 5 കി. മീ. ദൂരത്താണ് പൊടുന്നനെ ഒരു ദിവസം വെള്ളം മലിനമായത്. ട്രേപ്പിക്കൽ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ് ഇക്കോളജിക്കൽ സയൻസസ് നടത്തിയ പഠനമാണ്, സാമ്പിൾ ശേഖരിച്ച മണലാലിന് മുകളിൽ മുകൾ ഭാഗത്ത് പുഴയിലേക്ക് വ്യവസായ സെപ്റ്റിക് മാലിന്യങ്ങൾ അമിതമായ തോതിൽ, ദിവസങ്ങൾക്ക് മുമ്പ് കലർത്തപ്പെട്ടതായി സൂചന ലഭിച്ചത്. കരിമ്പുകയത്തിന് താഴെ മണലാൽ തായിക്കയം, ചെറുവള്ളി പള്ളിപ്പടി എന്നിവിടങ്ങളിൽ നിന്നാണ് ജലസാമ്പിളുകൾ ശേഖരിച്ചത്. എല്ലാസാമ്പിളുകളിലും ഇ. കോളി ഉൾപ്പെടെയുള്ള കോളിഫോം ബാക്ടീരിയകളുടെ സാന്നിധ്യം ഗുരുതരമായ തോതിൽ കണ്ടതാണ് സെപ്റ്റിക് മാലിന്യങ്ങൾ കലർന്നുവെന്ന് വ്യക്തമായത്. ഓയിൽ അഥവാ ഗ്രീസ് (37 – 147 മി. ഗ്രാം; അനുവദനീയം 0.5 മി. ഗ്രാം./ലി.), ഇരുമ്പ് (0.09 1.4 മി. ഗ്രാം.; അനുവദനീയം 0.3 മി. ഗ്രാം./ലി.), ഫ്ലൂറൈഡ് (1.21.8 മി. ഗ്രാം. അനുവദനീയം 1.0 മി. ഗ്രാം./ലി.), ഫോസ്ഫേറ്റ് (0.011.0 മി. ഗ്രാം. അനുവദനീയം 0.1 മി. ഗ്രാം./ലി.), കാർബൺ (7.37 12.42 മി. ഗ്രാം. അനുവദനീയം 4 മി. ഗ്രാം./ലി.), ബയോളജിക്കൽ ഓക്സിജൻ ഡിമാൻഡ് (0.00212.5 മി. ഗ്രാം. അനുവദനീയം 3.0 മി. ഗ്രാം./ലി.), കോളിഫോം ബാക്ടീരിയ (2400+. അനുവദനീയം 0/100 മി.ലി.), ഫീക്കൽ കോളിഫോം ബാക്ടീരിയ (1100 അനുവദനീയം 0/100 മി.ലി.). മേൽപ്പറഞ്ഞ ഘടകങ്ങളുടെ ഉൾന്ന സാന്നിധ്യം റബ്ബറധിഷ്ടിത മാലിന്യങ്ങൾ കലർന്നാൽ ഉണ്ടാകാനിടയുണ്ട്. കാർബൺ, ഓയിൽ എന്നിവ ഉയർന്ന സാന്ദ്രത ഉള്ളതിനാൽ ഒഴിക്കിന്റെ ദിശയിൽ താഴേക്ക് പോകും തോറും കൂടുന്നതായും ബാക്കിയുള്ളവ കുറയുന്നതായും കാണപ്പെടുന്നു. എന്നാൽ, ബാക്ടീരിയയുടെ അളവ് എല്ലായിടത്തും തുല്യമായി നിലനിൽക്കുന്നു. ഇത് ഒറ്റത്തവണ മാലിന്യങ്ങൾ ഒരുസ്ഥലത്ത് കലർത്തിയതിന്റെ ഫലമാണ്. ഡോ. പുനൻ കുര്യൻ, റോഷ്നി സുസൻ ഏലിയാസ്, ടിന അന്ന തോമസ് എന്നിവരുടെ നേതൃത്വത്തിലാണ് പഠനംനടത്തിയത്.



MANIMALA RIVER WATER QUALITY ANALYSIS

Sample Collected on 16.05.2023

SL.1	LOCATION	SAMPLE CODE	pH	COND.	TDS	SALL	CHLO.	ACIDITY	ALKA.	TH	Ca	Mg	F-	SO ₄	Cl-	PO ₄	MPN	FC	EC	DO	BOD	OC	IRON	OC
		Desirable Limits	6.5 - 8.5	1476 µs	500 mg/L	3 ppt	250 mg/l as CaCO ₃	200 mg/l as CaCO ₃	200 mg/l as CaCO ₃	300 mg/l as CaCO ₃	75 mg/l as Ca ⁺	80 mg/l as Mg ⁺	1 mg/l as F	200 mg/l as SO ₄	250 mg/l as Cl	0.1 mg/l	0/100ml	0/100ml	0/100ml	5.0 mg/l	3.0 mg/l	0.5 mg/l	0.3 mg/l as Fe	4.0 mg/l
1	MALLAPALLY	IA	7.01	72.2	46.9	54	99.9	20	36	12	4	8	0.03	0	26	0.5	2400	1100	Present	0.4	8	0	0	14.7
2	MALLAPALLY	IB	6.81	48.1	31.3	36.1	66.78	20	20	6	2	4	0.01	0	30	0.6	2400	1100	Present	NIL	NIL	0	0	5.76
3	KOMALALAM	IIA	6.67	48.9	31.7	36.7	67.89	10	18	6	4	2	0.04	0	30	0	2400	1100	Present	0.8	16	0	0	6.36
4	NIL	IIB	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
5	KULATHUMUZHY	IIIA	6.63	48.4	30.4	35.1	64.93	10	20	4	4	0	0.05	0	26	0.14	2400	1100	Present	0.8	8	0	0	6.3
6	KULATHUMUZHY	IIIB	6.75	47.3	30.7	35.3	65.3	10	26	6	4	2	0.02	10	24	0.2	2400	1100	Present	NIL	NIL	0	0	5.76
7	PUTHOORPADI	IVA	6.78	48.3	31.2	36	66.6	8	16	6	4	2	0.02	10	28	0.13	2400	1100	Present	0.8	8	0	0	6.3
8	PUTHOORPADI	IVB	6.8	48.9	32.3	36.2	66.97	8	18	4	4	0	0.03	10	24	0	2400	1100	Present	0.4	9.6	0	0	12
9	MANIMALAKAVU	VA	6.59	53.2	34.7	39.8	73.63	14	22	8	4	4	0.06	10	25	0.29	2400	1100	Present	0.8	12.5	0	0	5.6
10	MANIMALAKAVU	VB	6.71	49.9	42.6	32.3	68.26	10	20	6	4	2	0.06	10	28	0.26	2400	1100	Present	0.8	12	0	0	6.5
11	MOONANI	VIA	7.01	48.8	35.9	31.9	66.6	8	22	4	4	0	0.02	10	8	0.03	2400	1100	Present	NIL	NIL	0	0	6.8
12	MOONANI	VIB	6.76	31	31	35.8	66.23	10	20	4	4	0	0.04	10	10	0.03	1100	1100	Present	0.4	11.6	0	0	5.67
13	CHERUVALLY	VIIA	6.79	32	32.2	37.6	69.56	8	16	4	4	2	0.06	10	7	0.3	2400	1100	Present	0.8	24	0	0	5.4
14	CHERUVALLY	VIIIB	6.92	32.2	35.3	31.6	67.52	10	12	4	2	0	0.02	10	5	0.3	2400	1100	Present	NIL	NIL	0	0	5.3
15	PAZHAYIDAM	VIIIA	6.71	32.3	32.3	37.3	39.96	22	10	2	2	0	0.05	10	5	0.4	2400	1100	Present	0.8	16	0	0	5.76
16	PAZHAYIDAM	VIIIB	6.2	21.3	21.3	21.6	62.9	10	12	4	4	0	0.04	20	5	0.8	2400	1100	Present	0.8	12	0	0	6.57
17	ERUMELI KORATTI	IXA	6.57	29.6	29.6	34	66.04	12	12	6	4	0	0.05	10	4	0.5	2400	1100	Present	0.8	12	0	0	5.49
18	ERUMELI KORATTI	IXB	6.59	30.9	30.9	35.7	60.6	12	16	4	4	0	0.01	10	3	0.4	2400	1100	Present	0.8	12	0	0	6.12
19	MUNDAKAYAM	XA	6.79	33.1	33.1	32.8	63.27	10	18	6	4	2	0.05	10	4	0.7	2400	1100	Present	0.8	12	0	0	6.12
20	MUNDAKAYAM	XB	6.76	33.2	35.6	31.9	60.12	10	12	4	2	2	0.04	10	4	0.7	2400	1100	Present	NIL	NIL	0	0	5.9
21	VELANILAM	XIA	6.87	30.2	30.2	34.2	50.32	6	14	4	2	2	0.06	10	4	0.6	2400	1100	Present	0.8	16	0	0	5.8
22	VELANILAM	XIB	6.63	23.1	23.1	27.2	44.4	4	16	4	2	2	0.04	0	4	0.3	2400	1100	Present	NIL	NIL	0	0	5.31
23	KOOTIKAL	XIIA	6.83	22.1	22.1	24	49	8	22	8	4	4	0.04	10	4	0.8	2400	1100	Present	0.8	16	0	0	5.76
24	KOOTIKAL	XIIB	6.83	22.7	22.7	26.5	67.3	10	18	8	4	4	0.04	20	4	0.3	2400	1100	Present	NIL	NIL	0	0	6.21
25	KANJIRAPALLY	XIIIA	6.93	32	32	36.4	66.6	12	14	10	4	6	0.03	20	3	0.9	2400	1100	Present	0.8	14.2	0	0	6.6

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WATER QUALITY ANALYSIS REPORT ON MANIMALA RIVER

(Samples collected on 19.03.2022)

SAMPLE LOCATIONS ➔		Mallappally	Keezhvaipur	Manimala	Karimbu-kayam	Erumeli - Kuruvamozhi
Sr. No.	Parameter	Sample Value	Sample value	Sample value	Sample Value	Sample Value
1	pH	6.9	6.7	7.5	6.8	6.5
2	Conductivity	67.83	71.1	81.6	79.2	61.2
3	TDS	43.7	45.8	60.1	48.5	44.9
4	Salinity	0.05	0.05	0.06	0.06	0.05
5	Acidity	6.0	2.0	5.3	13.3	22.0
6	Alkalinity	2.0	2.0	2.7	2.0	2.0
7	Chlorinity	92.5	92.5	123.3	104.8	17.7
8	Total Hardness	8.0	5.5	10.7	10.7	8.0
9	Ca ⁺ ions	4.0	3.0	2.0	2.7	3.5
10	Mg ⁺ ions	4.0	2.5	8.7	10.6	4.5
11	Fe ⁺ ions	0.07	0.07	0.2	0.1	0.3
12	Fluoride	0	0.06	40.0	0	40
13	Sulphate	0	0	0	0	0
14	Nitrate	1.1	1.3	1.8	1.1	1.0
15	Chloride	6.0	6.0	4.0	5.3	5.5
16	Phosphate	1.9	0	0	3.5	0.4
17	Organic carbon	20.5	20.3	15.6	51.4	22.7
18	Oil content	16.3	20	31.7	20.0	21.3
19	DO	1.6	1.4	1.5	1.5	0.8
20	BOD	5.4	3.6	3.0	20.2	1.2
21	MPN Count	702.5	2400	545	1750	2400
22	<i>E. coli</i>	Absent	Absent	Absent	Present	Absent
23	<i>Pseudomonas sp.</i>	Present	Present	Present	Present	Present
24	<i>Salmonella sp.</i>	Present	Present	Present	Present	Present
25	<i>Vibrio sp.</i>	Present	Present	Present	Present	Present

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WATER QUALITY ANALYSIS REPORT ON MANIMALA RIVER

(Samples collected on 19.03.2022)

SAMPLE LOCATIONS ➔		Erumeli - Koratti	Mundak-kayam	Koottickal	Factory	
Sr. No.	Parameter	Sample Value	Sample Value	Sample Value	Sample Value	Desirable limits as per IS:10500-2012
1	pH	7.1	6.8	7.4	6.8	6.5 - 8.5
2	Conductivity	74.6	91.7	74.1	704.0	1476 μ S
3	TDS	56.2	52.8	42.3	451.0	500 mg/L
4	Salinity	0.05	0.05	0.06	0.5	3 ppt
5	Acidity	10.0	6.0	12.0	190.0	200 mg/l as CaCO ₃
6	Alkalinity	2.0	2.0	2.0	10.0	200 mg/l as CaCO ₃
7	Chlorinity	92.5	98.7	111.0	980.5	250 mg/l as CaCO ₃
8	Total Hardness	16.0	18.0	12.0	8.0	300 mg/l as CaCO ₃
9	Ca ⁺ ions	6	3.3	4.0	2.0	75 mg/l as Ca ⁺
10	Mg ⁺ ions	10.0	8.7	2.0	6.0	80 mg/l as Mg ⁺
11	Fe ⁺ ions	0.2	0.4	0.4	0.6	0.3 mg/l as Fe
12	Fluoride	40	2.5	0.9	0	1 mg/l as F
13	Sulphate	0	0	0	0	200 mg/l as SO ₄
14	Nitrate	2.4	0	1.1	2.6	45mg/l as NO ₃
15	Chloride	6.0	9.3	6.0	22.0	250 mg/l as Cl
16	Phosphate	0	5.6	0.8	0.8	0.1 mg/l
17	Organic carbon	21.4	20.5	97.4	32.1	4.0 mg/l
18	Oil content	0	16.7	10	745	0.5 mg/l
19	DO	2.2	1.6	1.9	12.6	5.0 mg/l
20	BOD	9.0	3.9	2.4	43.5	3.0 mg/l
21	MPN Count	210	1100	75	2400	0/100ml
22	<i>E. coli</i>	Absent	Absent	Absent	Absent	Absent
23	<i>Pseudomonas sp.</i>	Absent	Present	Present	Absent	Absent
24	<i>Salmonella sp.</i>	Present	Present	Present	Present	Absent
25	<i>Vibrio sp.</i>	Absent	Absent	Present	Absent	Absent

MANIMALAYAR RIVER WATER QUALITY STUDY REPORT 2019-2023

Manimala River at its Extremity of Pollution

Unabated pollution again made the Manimala River in news. Suspected pollution from a nearby rubber factory created panic among the riverine community. TIES as part of its conservation efforts tested water samples from 5 (Irukudil- Chenapady; open well; Koyikkall Kadavu; Pazhayidam Checkdam; Poothakuzhy Checkdam; Kanjirappally - Parathodu) locations at Manimala River and the parameters such as pH, conductivity, total dissolved solvents, salinity, acidity, alkalinity, chlorinity, total hardness, calcium ions, magnesium ions, total iron, sulphate, nitrate, chloride were found within the permissible limit in all the collected water samples. Fluoride content was found above the permissible limit in all the collected samples. It may be due to the leaching of fluoride ions from fluoride containing rocks or soil into the river. But the Phosphate content was found above the permissible limit in the samples collected from Koyikkall Kadavu (Upstream of Karimpukayam Check Dam) and 26th mile bridge, Kanjirapally. It may be due to natural decomposition or from industrial discharge to the river. A rubber factory is working at Irukudil Close to Karimpukayam. Water samples were collected from both upstream as well as downstream to find out the extent of pollution and it is shocking that the oil content was found above the permissible limit in all the collected samples and may be due to waste oil disposal or leakage from oil sources.

The Dissolved oxygen level is below the permissible limit at Koyikkal kadavu, Pazhayidam Check dam, Poothakuzhy check dam and in 26th mile bridge. The decline is due to the overconsumption of oxygen than it is produced, which indicates that the pollution level is high and is highly life-threatening for the life underwater. BOD level was found to be very high in all the collected samples. BOD directly affects the amount of dissolved oxygen in rivers and streams. The greater the BOD, the more rapidly oxygen is depleted in the stream. This means less oxygen is available to higher forms of aquatic life. The consequences of the high BOD are the same as those for low dissolved oxygen: aquatic organisms become stressed, suffocate, and die. Sources of BOD include leaves and woody debris; dead plants and animals; animal manure; effluents from pulp and paper mills, wastewater treatment plants, feedlots, and food-processing plants; failing septic systems; and urban stormwater runoff. The organic carbon count is also high at Kanjirapally -Parathodu region and it may be due to the effluents from the nearby workshops.

Rather than industrial and other anthropogenic reasons, faecal (human or animal excreta) contamination is also posing threat to river health. Total coliform count, faecal coliform count and *E. coli* were found above the permissible limit in all the collected samples. Even though India is declared as Open Defecation Free (ODF) the situation is certainly not. The lack of safer toilet technologies and faecal sludge management is the main reason for this. Faecal matter is received from nearby houses and hotels (which is constructed on the KK Road (Kottayam-Kumly Highway) side). This has resulted in the blooming of aquatic weeds like *Pistia* (Water lettuce) and *Eichhornia* (Water hyacinth).

The residents are worried that the continued contamination of the river could expose them to communicable diseases.



17	Organic carbon	3.18	2.04	2.7	1.92	3.42	6.9	4.0 mg/l
18	Oil content	16.0	40.0	11.0	75.0	70.0	160.0	0.5 mg/l
19	DO	8.0	8.0	4.0	4.8	2.4	1.6	>5.0 mg/l
20	BOD	280.0	280.0	40.0	80.0	120.0	80.0	<1.0 mg/l
21	MPN Count	2400+	2400+	2400+	2400+	2400+	2400+	0/100ml
22	FC Count	1100	1100	1100	1100	1100	1100	0/100ml
23	<i>E. coli</i>	13	11	7	12	13	9	0/1ml

- The parameters such as pH, Conductivity, total dissolved solvents, salinity, acidity, alkalinity, chlorinity, total hardness, calcium ions, magnesium ions, total iron, sulphate, nitrate, chloride were found within the permissible limit in all the collected water samples.
- Fluoride content was found above the permissible limit in all the collected samples. It may be due to the leaching of fluoride ions from fluoride containing rocks or soil into the river.
- Phosphate content was found above the permissible limit in the samples collected from Koyikkall Kadavu and sample 6. It may be due to natural decomposition or from industrial discharge to the river.
- Organic carbon content was found above the permissible limit only in the sample collected from sample 6. Comes from decaying natural organic matter.
- Oil content was found above the permissible limit in all the collected samples. Due to waste oil disposal or leakage from oil sources.
- Dissolved oxygen is below the permissible limit in the samples collected from Koyikkal kadavu, Pazhayidam Checkdam, Poothakuzhy checkdam and in sample 6. If more oxygen is consumed than it is produced, dissolved oxygen levels decline.
- BOD was found to be very high in all the collected samples. BOD directly affects the amount of dissolved oxygen in rivers and streams. The greater the BOD, the more rapidly oxygen is depleted in the stream. This means less oxygen is available to higher forms of aquatic life. The consequences of high BOD are the same as those for low dissolved oxygen: aquatic organisms become stressed, suffocate, and die. Sources of BOD include leaves and woody debris; dead plants and animals; animal manure; effluents from pulp and paper mills, wastewater treatment plants, feedlots, and food-processing plants; failing septic systems; and urban storm water runoff.
- Total coliform count, fecal coliform count and *E. coli* were found above the permissible limit in all the collected samples. Due to contamination with human or animal excreta.

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WATER ANALYSIS REPORT FOR MANIMALA

(Samples col

lected on 05.03.2021)

SAMPLE LOCATIONS →		Irukudil- Chenapady Close to Karimpukayam Check Dam. Effluent source point of Rubber mark Crump Rubber Factory. Irukudil is the point where Chittarpuzha meets Manimalayar	Open well Thankachan, Palakkal, Chenapdy P.O., Ph: 9744238358	Koyikkall Kadavu Chenapady Upstream of Karimpukayam Check Dam	Pazhayidam Checkdam. Point. Downstream from sample	Poothakuzhy Checkdam On padappady thodi (Kanjirappally) Main tributary of chittar Thodu.	Kanjirappally - Parathodu	
Sr. No.	Parameter	1	2	3	4	5	6	Desirable limits as per IS:10500-2012
1	pH	7.3	7.6	7.3	7.1	7.0	7.3	6.5 – 8.5
2	Conductivity	71.0	57.0	78.0	62.0	0.0	113.0	1476 µS
3	Total Dissolved Solids	79.0	67.0	83.0	68.0	97.0	127.0	500 mg/L
4	Salinity	0.061	0.052	0.066	0.053	0.076	0.095	3 ppt
5	Acidity	8.0	10.0	12.0	14.0	16.0	14.0	200 mg/l as CaCO ₃
6	Alkalinity	20.0	20.0	32.0	20.0	48.0	46.0	200 mg/l as CaCO ₃
7	Chlorinity	112.85	96.2	122.1	98.05	140.6	175.75	250 mg/l as CaCO ₃
8	Total Hardness	48.0	0	36.0	40.0	62.0	74.0	300 mg/l as CaCO ₃
9	Ca ⁺ ions	26.0	0	16.0	28.0	22.0	22.0	75 mg/l as Ca ⁺
10	Mg ⁺ ions	22.0	0	20.0	12.0	40.0	52.0	80 mg/l as Mg ⁺
11	Fe ⁺ ions	0.01	0	0.01	0.03	0.02	0.04	0.3 mg/l as Fe
12	Fluoride	1.8	1.7	1.4	1.75	1.81	1.4	1 mg/l as F
13	Sulphate	11.7	0	0	0	0	0	200 mg/l as SO ₄
14	Nitrate	0	0	0.01	0	0.0	0.02	45mg/l as NO ₃
15	Chloride	6.59	3.29	6.59	3.29	4.94	4.94	250 mg/l as Cl
16	Phosphate	0	0	1.9	0	0	3.1	0.1 mg/l

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WATER ANALYSIS REPORT FOR MADAMMAKKULAM- UPPUKULAM STREAMS (AMRUTHAMEDU)

(Samples collected on 19.07.2020)

Sl. No	Sample Code	Samples	Parameters tested				
			pH	Conductivity	MPN Count	FC Count	<i>E. coli</i>
1	4	Pig Farm Pond Bison Valley Animal Farm (Starting)	6.7	16.0	1100	1100	9
2	3	Pig Farm (Treatment plant)	6.8	716.0	2400+	2400+	11
3	6	Front of Pig Farm- Pond at Right Side Water flowing to	5.4	136.0	1100	1100	8
4	7	Pig Farm- Flowing from So Called Treatment farm- covered with soil	6.2	17.0	2400+	1100	9
5	5	Madhammakulam upstream (After cascade)	6.5	18.0	1100	460	6
6	10	Bisonvalley Border - Dumping Yard of Peermedu Panchayath	5.5	15.0	2400+	1100	9
7	8	Madhammakulam (Near to second cascade)	6.1	15.0	1100	460	7
8	9	Madhammakulam (Near to cascade)	6.3	17.0	1100	460	6
9	1	Madhammakulam upstream (Before cascade)	6.1	15.0	1100	1100	7
10	2	Madhammakulam (Near to second cascade)	6.8	762.0	2400+	1100	7
Desirable limits as per IS:10500-2012			6.5 - 8.5	1476 μS	0/100ml	0/100ml	0/1 ml



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WATER ANALYSIS REPORT FOR MANIMAL RIVER

(Samples collected on 17.5.19; on request of Dr.N.Jayaraj MLA with community support)

SAMPLE LOCATIONS ➡		MANALALIL (upstream; 2.5 KM. downstream from Karimpukayam check dam)			THAYIKKAYAM (1 KM. Downstream)	CHERUVALLI PALLIPADY (2KM. Downstream)	WELL WATER (From a house nearby Cheruvalli Pallipady; pumps from the river)	Desirable limits as per IS:10500-2012
		Sample value Center	Sample value Right side	Sample value Left side	Sample Value	Sample value	Sample value	
1	pH	7.01	7.41	7.48	7.46	7.82	7.36	6.5 – 8.5
2	Conductivity	282.0	116.0	177.0	110.0	115.0	66.0	1476 μ S
3	Total Dissolved Solids	0.38	0.32	0.30	0.3	0.3	0.3	500 mg/L
4	Salinity	0.198	0.090	0.15	0.103	0.093	0.05	3 ppt
5	Acidity	10.0	46.0	82.0	6.0	4.0	16.0	200 mg/l as CaCO ₃
6	Alkalinity	44.0	44.0	50.0	46.0	64.0	28.0	200 mg/l as CaCO ₃
7	Chlorinity	0.366	0.167	0.278	0.191	0.172	0.093	250 mg/l as CaCO ₃
8	Total Hardness	22.0	20.0	78.0	165.0	132.0	96.0	300 mg/l as CaCO ₃
9	Ca ⁺ ions	20.0	16.0	64.0	134.0	96.0	49.0	75 mg/l as Ca ⁺
10	Mg ⁺ ions	2.0	4.0	14.0	31.0	36.0	47.0	80 mg/l as Mg ⁺
11	Fe ⁺ ions	1.2	0.9	1.4	0.09	0	0	0.3 mg/l as Fe
12	Fluoride	1.6	1.8	1.4	1.4	0	1.2	1 mg/l as F
13	Sulphate	180.0	110.0	100.0	0.0	0	0	200 mg/l as SO ₄
14	Nitrate	2.7	2.2	1.3	0.3	0.9	0.3	45mg/l as NO ₃
15	Chloride	20.0	30.0	20.0	20.0	18.0	22.0	250 mg/l as Cl
16	Phosphate	1.0	0.1	0.45	0.18	0.01	0.21	0.1 mg/l
17	Organic carbon	8.736	7.917	7.371	12.42	9.828	8.736	4.0 mg/l
18	Oil content	28.87	30.36	51.87	94.29	147.08	0.557	0.5 mg/l
19	DO	0.5	0.3	0.2	0.7	0.5	0.8	5.0 mg/l
20	BOD	12.5	9.6	11.2	9.0	3.5	0.002	3.0 mg/l
21	MPN Count	2400+	2400+	2400+	2400+	2400+	2400+	0/100ml
22	FC Count	1100	1100	1100	1100	1100	1100	0/100ml
23	<i>E. coli</i>	Present	Present	Present	Present	Present	Present	Absent
Mean values								

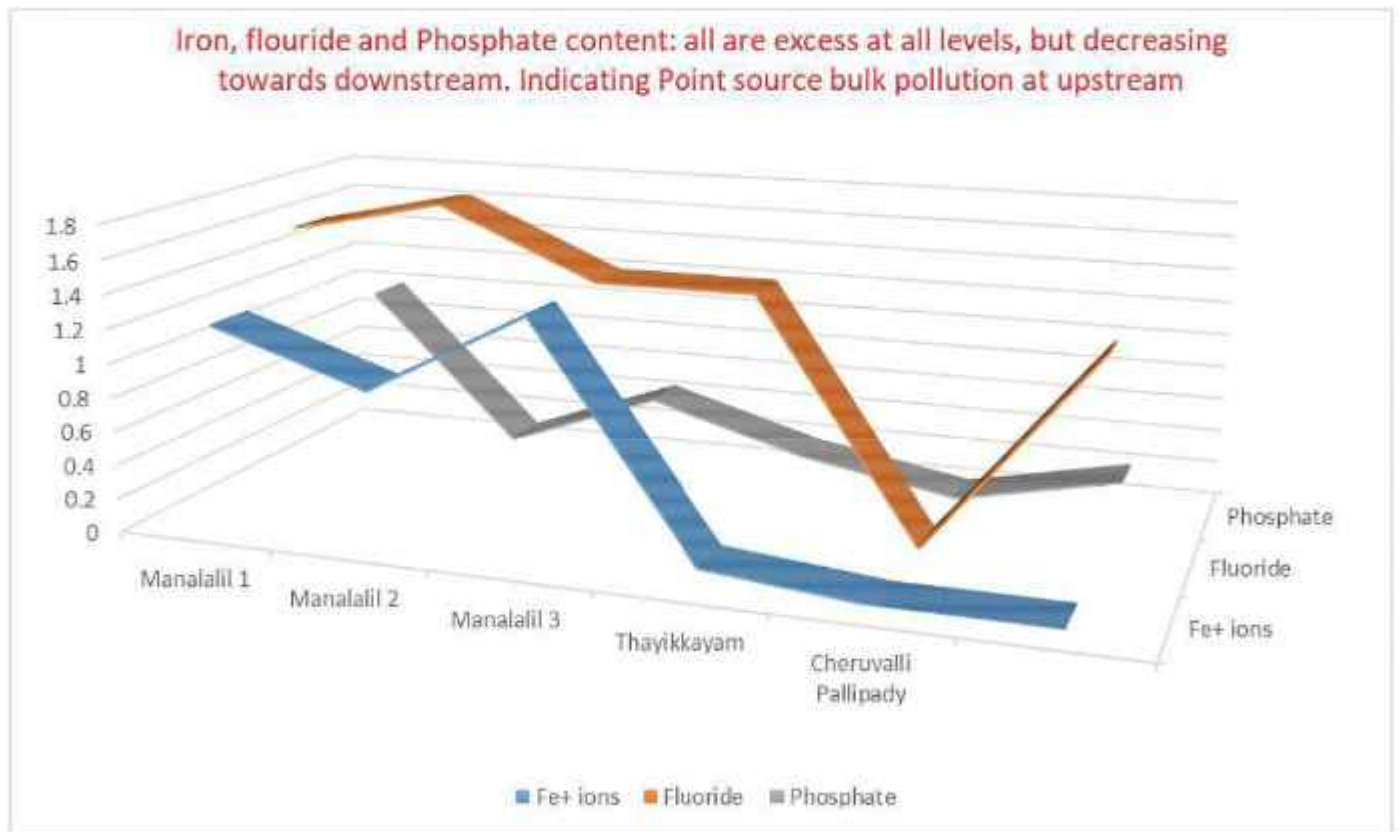


Fig. 1. Major Chemical contents of water samples tested from Manimala river

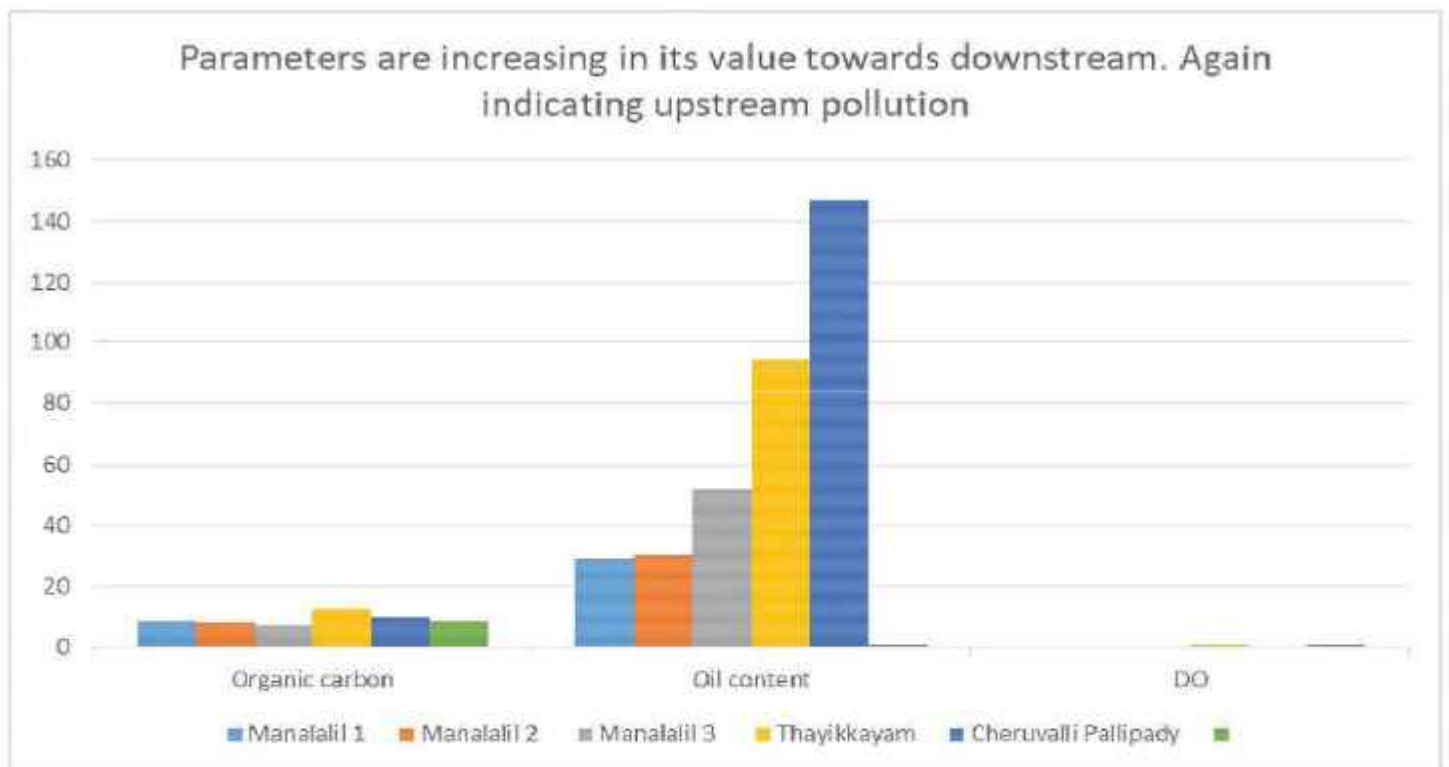


Fig. 2. Major Chemical contents of water samples tested from Manimala river

SUMMARY OF FINDINGS

- Coliform bacteria including *E.coli* found in extensive high level (MPN Value 2400+) .This shows contaminations from septic waste or sludge from latex based units
- Oil and grease is found in high level in almost all sample (37mg/L – 147 mg/L)
- Phosphate, Fluoride and Iron also found in very excess than the desirable limits
- Extremely low dissolved oxygen and high BOD which will negatively impact aquatic fauna
- Organic carbon is found in high levels.
- These are all indicating pollution from point sources like some industries (sludge)
- Through the downstream the amount of chemical components like phosphate, Fluoride and Iron is found decreasing. Ironically oil and carbon found increasing towards downstream. This is a clear indication of point source pollution at upstream of the sampling point.
- NOTE: Samples where collected from Manalalil (2.5 km downstream from Karimbukayyam Check dam), Thayyikkayyam (1 km downstream form Manalalil), Cheruvalli Pallipady(2km downstream from Thayikkayam). Samples are taken on 17/05/2019, almost 40 days after the incident of point source pollution

MANIMALAYAR RIVER WATER QUALITY STUDY REPORT 2019-2023





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