

# Quality Analysis of Water Resources in Chengannur Municipality

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**Abstract** – The flood happened at Chengannur municipality caused the contamination of all the water resources within the area. The present study examines the extent of contamination caused to these water resources. Water samples for analysis were collected from 20 spots within the flood affected area of the municipality. 9 quality parameters were tested to determine the quality of water.

**Key Words:** Contamination, Quality parameters, Flood affected area, Water quality

## 1. INTRODUCTION

The rapid industrialization and associated activities causes excess contamination of the water resources. Due to its contamination the water becomes unsuitable for the human use. The contamination of a water resource in a particular area becomes the reason for the contamination of the entire water resource in that locality. The main water resource in the selected municipality region is the Pamba river. Due to the flood that happened in the municipality, all the water resources were mixed with the flood water.

This study was done to find the contamination range of well water in the flood affected area of Chengannur municipality.

### 1.1. Water contamination due to the flood

The flood in the Chengannur region is the major reason for the wide range of contamination of water. Almost all the water resources were polluted during this flood. In August 2018, due to heavy rains, the state of Kerala faced severe flood condition. Potable water which is an essential element for sustaining life got contaminated during this flood. The water quality takes time to recover after such a critical situation depending on the circumstances.

The present study focuses on well water resources. If the well head has submerged even for a short period, then the surface water and potential contaminants would enter the well. Thus causing the well water to be contaminated and it becomes unfit for domestic use.

### 1.2. Other sources of contamination

The solid waste disposal at the centre portion of the municipality is also a reason for the water contamination. During the flood the improper solid waste management accelerated the contamination rate. The leaches from the solid waste are the main cause for the ground water contamination.

There are several other driving forces of water contamination in the municipality region, all of which can be attributed towards the increased rate of industrialization.

## 2. STUDY AREA

The study area selected is the flood affected zones of Chengannur municipality (Fig-1) in Alappuzha district, Kerala. It is located at 7m above sea level with latitude of 9°19'6.54" N, and longitude of 76°36'50.46". The population of Chengannur as per 2011 census is 23456 and the density is 3594.9/sq m (1387.99/km<sup>2</sup>). The average annual high temperature of this area is 30.8°C. The main water resource in the region is Pamba River. Also Varatar, Adi Pamba, (branches of Pamba river) are flowing through this region.

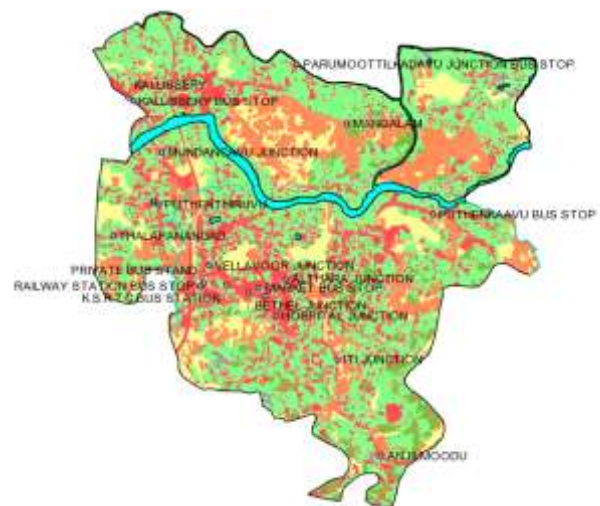


Fig - 1: Map Of Chengannur Municipality

### 2.1. Sample Locations

GPS was used to find the location details of all the sample points. The major flood affected area selected is within a buffer zone of 2 km around the river basin. 20 samples from well water resources were collected from the affected area. Table-1 below shows the location details of samples.

**Table -1:** Location Of Samples

Sample no	Latitude	Longitude
S1	9.33829	76.624773
S2	9.32422	76.60624
S3	9.337853	76.628808
S4	9.324402	76.62679
S5	9.341369	76.636757
S6	9.33677	76.628743
S7	9.3421	76.628331
S8	9.32648	76.62462
S9	9.3263	76.62831
S10	9.31391	76.6371
S11	9.32561	76.63806
S12	9.32471	76.63714
S13	9.33526	76.63169
S14	9.306225	76.627049
S15	9.316583	76.61495
S16	9.319865	76.619668
S17	9.32671	76.628567
S18	9.337262	76.639934
S19	9.336913	76.639312
S20	9.3296	76.63377

### 3. WATER QUALITY PARAMETERS

The physical and chemical parameters of all the collected water samples were tested. The pH, TDS, chloride, alkalinity, dissolved oxygen, total hardness, are the tested parameters.

#### 3.1. pH

The hydrogen ion concentration is referred as the pH value. The standard range of pH as per ISO 10500 is 6.5-8.5. The acidic and basic behavior of the water sample can be determined by checking the pH of the water sample.

#### 3.2. TDS

It is the amount of total dissolved solid in the water. Gravimetric method is used for the testing of total dissolved solids. The standard limit of total dissolved solid is 250mg/l, as per Indian Standards (IS10500).

#### 3.3. Dissolved Oxygen

DO is the amount of dissolved oxygen range of the water sample. Dissolved oxygen is one of the most important parameter. The standard limit of dissolved oxygen is 4mg/l, as per Indian Standards. As dissolved oxygen increases, the value of BOD (Biological Oxygen Demand) decreases. Azide

modification is the method used for the evaluation of dissolved oxygen.

#### 3.5. Chloride

Chlorine as Cl<sub>2</sub> in the water is very toxic; it is used as a disinfectant. The combination of gas chlorine and metal in the water is the main reason for the chloride content. The standard limit of chloride is 250 mg/l as per Indian Standards.

#### 3.6. Alkalinity

Alkalinity is the indication of the presence of dissolved inorganic carbon. All the water sources will have some amount of degree of alkalinity. The standard of alkalinity is 250 mg/l.

#### 3.6. Iron

Iron is a secondary or aesthetic contaminant. Iron will dissolve completely in water. Presence of iron will affect both the ground and surface water.

#### 3.7. Nitrate

It is the presence of salts and anions of nitrous acids. Also fertilizers are other reason for the nitrate content in water. High nitrate content can change hemoglobin and movement of oxygen in human body

#### 3.8. Acidity

Strong and weak mineral acids are the reason for the acidity in water. It is the amount of acid needed to neutralize the water. Dissolved carbon dioxide is the acidic component in water.

**Table-2: Permissible Limit Of Quality Parameters**

Parameters	Permissible Limit
pH	6.5-8.5
Alkalinity	200
Chloride	250
DO	4
TDS	500
Total hardness	200
Nitrate	45
Iron	0.3
Acidity	200

\*all the parameters expressed in mg/l except pH in pH

### 4. Result & Discussion

The tested results of all the parameters are tabulated below as in Table-3 and Table-4. Some of the values are not within

the standard permissible limit according to the IS 10500(2012)

**Table-3: Test Results**

Sl. No	pH (pH)	Alkalinity (mg/l)	Chloride (mg/l)	TDS (mg/l)	Hardness (mg/l)
S1	6.11	30	13.2	20	44
S2	6.3	25	16.9	34	16
S3	4.57	10	10.99	12	7
S4	5.18	55	12.95	21	30
S5	4.98	20	7.9	18	10
S6	6.03	85	27.9	20	69
S7	4.69	5	8.9	10	19
S8	6.85	50	16.22	32	17
S9	5.45	10	13.9	54	21
S10	8.13	100	14.9	36	69
S11	7.83	65	3.9	51	20
S12	5.96	55	10.9	59	29
S13	7.18	30	6.9	46	20
S14	5.12	15	32.9	33	40
S15	6.29	40	10	42	40
S16	4.88	25	11.69	12	40
S17	7.7	20	12.96	9	21
S18	6.53	50	15.69	51	40
S19	6.4	80	21.9	25	32
S20	5.99	15	19.63	38	39

**Table-4: Test results**

Sl No	Acidity (mg/l)	Iron (mg/l)	Nitrate (mg/l)	DO (mg/l)
S1	4	0.57	5	3.8
S2	4	0	0	5.8
S3	2	0.31	6	5.3
S4	44	0.36	22	6.3
S5	6	0.56	5	6.7
S6	2	0	30	3.6
S7	2	0	10	6.6
S8	10	0.34	5	5.9
S9	4	0.48	0	5.8
S10	2	0	10	6
S11	4	0.67	50	7
S12	4	0	45	3.5

S13	4	0.63	52	6.9
S14	8	0.21	56	6.2
S15	10	0.12	30	5.4
S16	2	0.23	36.	6.2
S17	10	0.36	10	5.4
S18	4	0.76	15	5.8
S19	2	0.01	63	7.4
S20	8	0.54	15	6

**5. CONCLUSION**

The quality parameters pH, Dissolved oxygen, Iron, Nitrate is not within the Indian standards. This shows that the water resource in this region is contaminated and the main reason for this is flood. High values of some parameters will cause health problems in humans. The common peoples are not aware about this. Apart from the flood, solid waste disposal and industrialization also are the contributing factors for water contamination in the municipality region.

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