

Research Article

Impact of dyes used in the mat on groundwater in and around Pattamadai, Tirunelveli district, Tamilnadu

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Abstract

The main focus of this study concentrates on evaluating the quality of groundwater in and around the zone of pattamadai where the production of the mat in this region is a landmark industry, which is using dyes in a larger volume. The primary work starts with the collection of water samples from 13 boreholes and 13 hand-dug wells in different time intervals in the month of March 2021, which is a dry season. As per standards the water quality parameters have been evaluated and observed to be within the range. All the physico-chemical parameters for the samples have been studied for boreholes and hand-dug wells as all the values are observed to be within the range and are highlighted in the results.

Introduction

Pattamadai the name highlights the manufacturing of mat, which is located in the Tirunelveli region with a population of just 14000 people gabbai Muslims. The history of this small town is familiar for weaving mats since the nineteenth century. Due to industrialization, the availability of dye is cost-effective and it is one of the major parameters added in the manufacturing of mat. The raw material for the production is available within pattamadai which is a type of sedge named korai from this the traditional name has originated as korai mats and has been widely recognition by Indian craft producers and cultural heritage departments. Nowadays many enterprises around Tamilnadu are producing mats and the addition of dye during manufacturing causes environmental pollution [1,2]. This research study focuses on the identification of the quality of groundwater near the manufacturing site, which has a direct impact on the wide usage of coloring dyes. Dyes are naturally coloring substances that will chemically bond to the substrate and normally they are soluble. The addition of pigments enhances the fastness of dyes on the fiber and is insoluble. Vast ranges of dyes introduced in the manufacturing are cranberry, dark green, golden brown, storm gray, charcoal, slate, royal blue, billy blue, navy, black, walnut and red. All the above-mentioned dyes are

organic compound that contains carbon; whereas pigments are inorganic that gives brighter colors [3-6].

Methodology

The pattern of work to be progressed is categorized in the flowchart (Figure 1).

The samples are collected as per standard procedures in and around pattamadai town and the collected samples are preserved at 27 °C [7-10] (Figures 2-4) (Table 1).

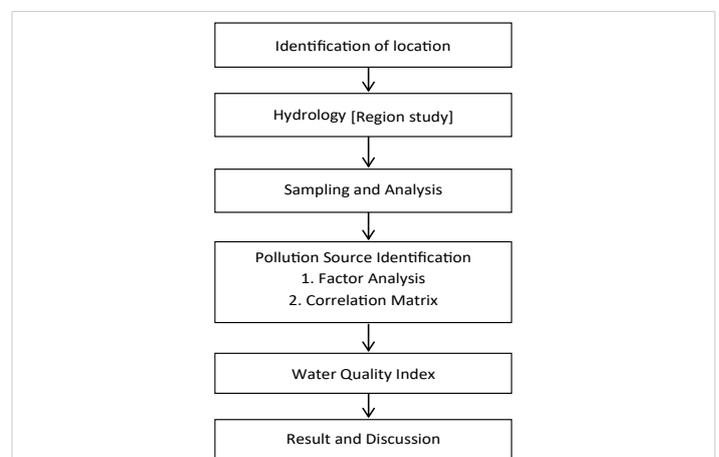


Figure 1: Pictorial representation of the methodology.

More Information

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Keywords: Groundwater; Quality parameters; Public health; Pollution

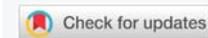




Figure 2: Pictorial representations of collected samples.

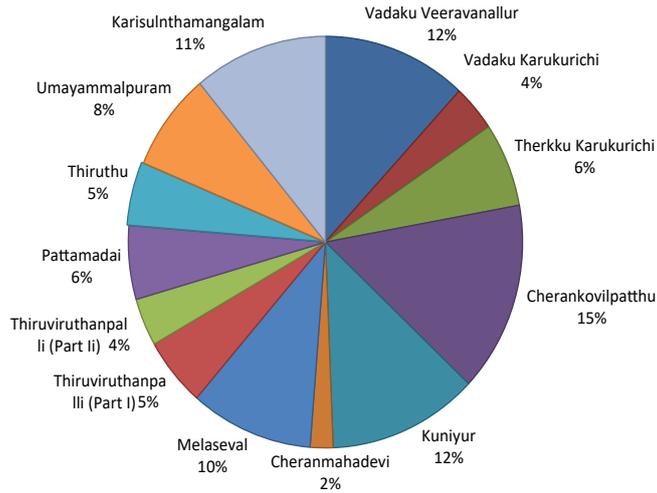


Figure 3: Graphical representations of collected samples.

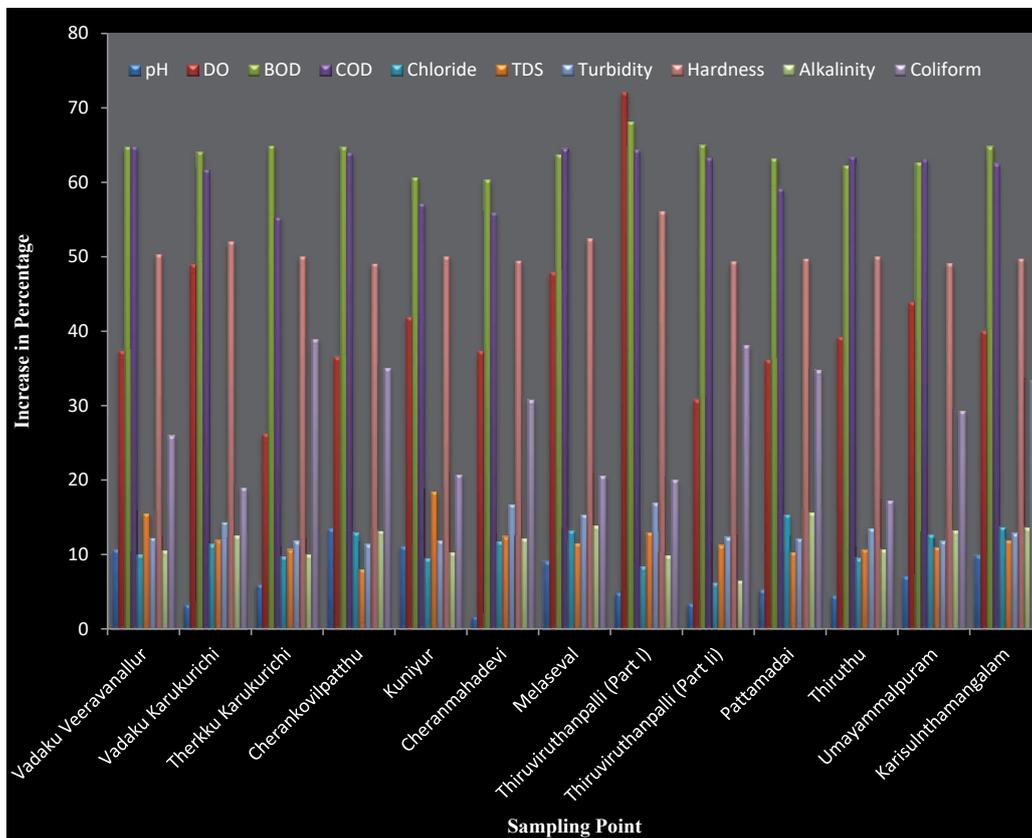


Figure 4: Graphical representations of collected samples.

Table 1: Physico Chemical parameters from the location.

S.No.	Sampling points	pH increased %	DO increased %	BOD increased %	COD increased %	Cl ⁻ Chloride increased %	TDS increased %	Turbidity increased %	Hardness increased %	Alkalinity increased %	Fecal Coliform increased in %
1	Vadaku Veeravanallur	11	37.25	64.73	65	9.93	15.47	12.16	50.29	10.43	25.93
2	Vadaku Karukurichi	6.3	48.94	64.08	62	11.35	11.87	14.29	52.02	12.43	18.92
3	Thercku Karukurichi	5.9	26.15	64.85	55	9.7	10.67	11.76	50	9.89	38.89
4	Cherankovilpatthu	13	36.51	64.76	64	12.93	7.89	11.32	49.02	13.09	35
5	Kuniyur	11	41.82	60.62	57	9.35	18.41	11.84	50	10.21	20.69
6	Cheranmahadevi	7	37.25	60.27	56	11.61	12.4	16.67	49.42	12.09	30.77
7	Melaseval	9.1	47.83	63.71	65	13.13	11.43	15.29	52.45	13.77	20.51
8	Thiruviruthanpalli (Part I)	6.9	72.09	68.1	64	8.26	12.81	16.85	56.09	9.82	20
9	Thiruviruthanpalli (Part II)	5.4	30.77	64.95	63	6.2	11.2	12.28	49.36	6.41	38.1
10	Pattamadai	5.2	36	63.18	59	15.3	10.2	12.12	49.7	15.58	34.78
11	Thiruthu	4.5	39.13	62.13	63	9.45	10.65	13.41	50	10.6	17.14
12	Umayampalpuram	6.9	43.86	62.61	63	12.64	10.84	11.76	49.11	13.14	29.17
13	Karisulnthamangalam	9.9	40	64.81	63	13.62	11.84	12.9	49.69	13.52	33.33

Conclusion

The experimentation on the groundwater quality of pattamadai town has been done in a fruitful way. The outcome of this study clearly highlights the status of the groundwater contamination report. From the graph, it is clear that the level of contamination is very less as all the values are within the range of standard protocols. Meanwhile, from observation, it is predicted that the role of dye is directly mixed with groundwater and gets diluted in meantime. With the optimization study, it is clear that the dissolved oxygen content is higher in Thiruviruthanpalli (Part I) which is observed to be a safer zone.

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