

A Study on Surface Water Pollution in Pazhayar River of Kodaiyar River Basin System - Causes and Remedial Measures

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Abstract - Water is the most economic essential thing to human for their consumption, for the production of many industrial goods, food and fiber. With the population growth rapidly, the water resource are becoming one of the most important assets of the world. The Kodaiyar system is one of the oldest systems in Tamilnadu, situated in a terrain in Western slopes of Western Ghats in Kanyakumari District providing irrigation facilities for double crop paddy. The Kodaiyar system comprises of two major rivers namely Kodaiyar and Paralayar and two drainage carrier systems namely Pazhayar and Valliyar covering an extent of 26000 ha for double crop paddy with an extent of 4368 ha under Pattanamkal command and also for supplementation to 6883 ha of rain fed lands under Radhapuram command. Pazhayar River is one of the major drainage river actually originates in the Northern slope of Western Ghats from Kuratti Malai at an altitude of 550m above MSL. The river Pazhayar has got eleven anicuts from Veerapuli anicut to Mission Dam. Pazhayar river passes through the villages and confluences with Arabian Sea. The Kodaiyar system has undergone many developments and it's high time to draw policy on pollution control on surface water. The system has lost much of its ability to give adequate supply of good quality water to its tail end ayacut as it passes through many villages. The productivity has declined due to reduced good quality water availability. There are some deficiencies in the physical system and pollution control practices which needs improvements. As such the Pazhayar river running through Nagercoil Town, Vadiveeswaram, Suchindram and North Tamaraiikulam, the surface water gets polluted. The maximum surface water is utilized for irrigation purpose through canals from anicuts. The pollution on surface water makes harmful effects in the growth of crop and agriculture output. In this project an attempt is made to study the pollution level in each anicut from Veeranamangalam anicut to Mission Dam, so as to ascertain the level of pollution beyond the tolerance limit for crop.

Key Words: Kodaiyar river basin, Pazhayar River, Surface Water Pollution, Irrigation, Pollution Study

1. INTRODUCTION

One of the Sub basins of Kodayar River basin called Pazhayar Sub basin is located in between Western Ghats and Vellimalai Hills. It starts at Surulacode village of Kalkulam Taluk and covers Thovalai and Agasteeswaram taluks of

Kanyakumari district, comprising an area extent of 558.82 Sq.Km area. Pazhayar river is the second biggest river in Kanyakumari district. It originates in the Northern slope of Western Ghats Kurattimalai at an altitude of 550m above MSL and supplemented by Kodayar Irrigation System. It gets water from Surulacode Headworks of Kodayar Irrigation system at Surulacode village of Kalkulam taluk and runs for 38.11 Km and confluences with Arabian sea at Manakudy village of Agasteeswaram taluk. There is no reservoir constructed across Pazhayar river to control the flood water, but there are 13 diversion channels that takes off from the existing 11 diversion weirs across Pazhayar river to feed 16550 Acres of double crop wetlands. Pazhayar river gets rainwater from its own catchment and enormous drainage water from ayacut lands of Anandanar Channel and Thovalai Channel running on either side of Pazhayar river. Pazhayar river gets flood water from many streams originating from Western Ghats and Vellimalai Hills on either side. Pazhayar river passes through the following villages of Kalkulam Taluk, Thovalai Taluk and Agasteeswaram Taluk in Kanyakumari district (1)Suralacode (2)Arumanalloor (3)Dersanamcopu (4)Thazhakudy (5)Thirupathisaram (6)Nagercoil Town (7)Vadiveeswaram (8)Suchindram and (9)North Tamaraiikulam and confluences with Arabian Sea. Pazhayar river is the main source of irrigation for Thovalai and Agasteeswaram Taluks and also it acts as a flood carrier. Major tanks of Kanyakumari District namely Putheri, Theroor, Parakkai, Suchindram in Kanyakumari district gets flood water from the above Diversion weirs (Anicut).

1.1 Surface Water Pollution

Covering about 70% of the earth, surface water is what fills our oceans, lakes, rivers and all those other blue bits on the world map. When toxic substances enter lakes, streams, rivers, oceans and other water bodies, they get dissolved or lie suspended in water. This results in the pollution of water. Due to pollution the quality of the water deteriorates, affecting aquatic ecosystems. These pollutants can also seep down and affect the groundwater deposits. The most polluting source of water is the City sewage, Hospital and industrial waste. Agricultural run-off, or the water from the fields that drains into rivers, is another major water pollutant as it contains fertilizers and pesticides. These pollutants enter into groundwater, rivers and other water bodies. Such water, which ultimately ends up in our households, is often highly contaminated and carries disease causing microbes.

1.2 Objectives of Surface Water Pollution Study

For the study purpose the samples from the upstream side of six anaicut. The objective of the project is to analyse whether the surface water used for irrigation in Pazhayar river is of admissible quality or poor quality creating environmental hazards and also to create an awareness to the public to understand the effect of water quality upon soil and crops and to assist in selecting suitable alternative to cope with potential water quality related problems that might reduce production under prevailing conditions of use.

2. METHODOLOGY

For the study purpose, the samples from the upstream side of six anaicut locations viz. 1, Veeramangalam Dam 2. Sabari Dam 3. Kumari Dam 4. Cholanthattai Dam 5. Pilapetha Dam 6. Mission Dam have been collected. The samples were analysed for their physical and chemical properties at the central water testing of TWAD Board, Govt. of Tamilnadu, Nagercoil. Out of eleven anaicuts in Pazhayar river, the above six anaicuts have been selected for study purpose starting from Veranamangalm Anaicut to Mission Dam which are located in township areas in Nagercoil, Vadeeswaram, Sucindram and North ThamaraKulam of Kanyakumari District.

2.1 SAMPLE TESTING AND ANALYSIS

After collecting the water samples, we have given the collected water sample to the TWAD Board before 24 hours from the time of collection in order to test the surface water for both physical and chemical property. The Junior Water Analyst TWAD tested and analysed the collected surface water sample and issued it in a standard poroform.

The result of the surface water samples tested were obtained from laboratory and the analysis have been made based on the bar-chart taking name of anaicuts in X axis and Physical parameters in Y axis. Also, analysis have been made based on the bar chart taking name of the anaicuts in X axis and Chemicals in Y axis.

3. OBSERVATION AND INTERPRETATION OF ANALYTICAL RESULTS

For their physical and chemical parameters, the samples were tested, the physical parameters such as turbidity, Total dissolved solids, electrical conductivity etc and chemical parameters such as pH, Amt of Ca, Mg, Na, K, Fe, NH₃, NO₂, Cl, F, SO₄, PO₄, O₂ were obtained. Some of the obtained parameters are explained below.

3.1 Physical and Chemical parameters:

3.1.1 Appearance:

All the samples were turbid and turbidity in irrigation water will not cause any deleterious effect on crop growth.

3.1.2 Color:

All the water samples were brownish in color and most of the irrigation waters would be colorless, but the brown color may not cause any negative effect for crop growth.

3.1.3 Electrical Conductivity (mmhos or dS/m):

For good quality irrigation water the EC should be <7. If it is >7, it is unsuitable for irrigation purposes. The data shows that all samples are having extreme EC ranging from 99-278 dS/m which indicates severe saline water not suitable for irrigation.

3.1.4 pH:

A range of 6.5 to 7.5 pH is neutral. Since, the pH of all the samples are hovering around 7.0, there is no problem with pH.

3.1.5 Sodium Concentration:

Excepting the sample collected from Veeramangalam Tank, the other entire sample are highly alkaline because the permissible limit being 9.0. For good quality water the levels should be <3 SAR (Sodium Absorption Ratio)

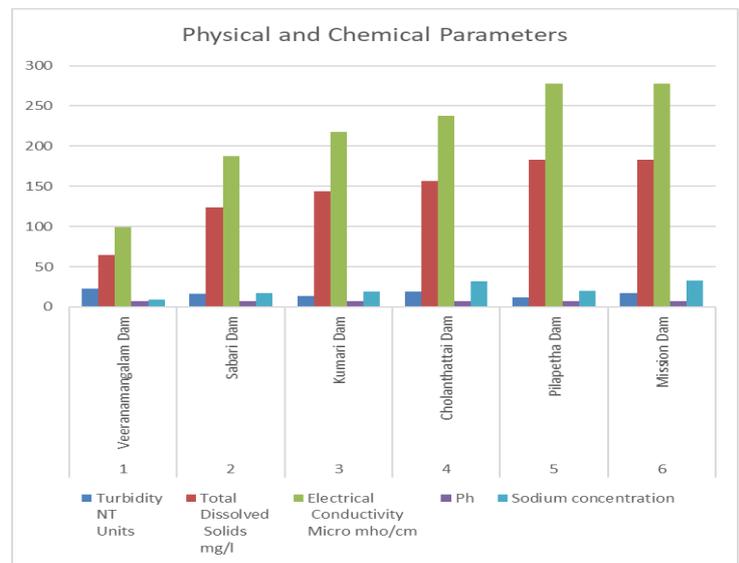


Fig 1 Results of the Physical and Chemical Parameters

3.2 INFERENCE:

1. Based on the results, all the six samples are not suitable for irrigation as the crops are highly sensitive of Electrical Conductivity which is the importance parameter to express the salinity of water. As the EC of all the samples are very high, the quantity of salts dissolved in these waters very high which will not permit the crop growth.

2. Similarly, the Sodium levels of these waters are also very high indicating the alkalinity which is not suitable for irrigation.

3. The river waters at all these places have been polluted due to habits of using Fertilizer and Pesticides for crop by farmers as return low and Hospital industrial effluents joins with storm water drains. A common treatment plant is necessary for treating the pollutant water to be used for irrigation.

4. CONCLUSIONS

As such the Pazhayar River is a drainage basin, it collects all return flow of irrigation activities from Thovalai channel, N.P Channel, Anandanar channel and drainage return flow from its all eleven anicuts, the saline and alkaline nature is very high. The habits of using Fertilizer and Pesticides for crop by farmer are unavoidable and it joins with river as return flow adds total salts in river water. Also, Kanyakumari District is facilitated with hundreds of good Hospital industry. Hospital effluents in and around study area are join with storm water drains, even without preliminary treatment. These effluents are ultimately joins with Pazhyar River. Remedial measures are essential to overcome adverse effect on crop.

Here are some recommendations for remedial measures

1. As the water is highly saline and alkaline in nature, annual crops like rice, pulses, ground nut can't be grown using these waters. Instead, some perennial crops like tree fodders, woody perennial trees can be suggested which are resistant to salinity.
2. Dissolution of good quality with polluted water will help in raising some annual crops like millets.
3. Continued use of these waters would deteriorate the soil quality and make the soil completely saline alkali making the soil barren in future.
4. All farmers should be educated in terms of using organic Fertilizers, so as to save the mother soil for future generations.
5. All Hospital industry effluents joins with storm water drains without any preliminary treatment. Needs strict implementation of preliminary treatment plants to safeguard future generation and for sustainable development.

5. REFERENCES

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