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Physico-Chemical characteristics of Palar-Porundalar River dam for drinking water, Palani Town, Tamilnadu

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ABSTRACT

Palani hill temple is one of the most important pilgrim centres for south Indian people. It is located in western part of dindigul district of tamilnadu and also it is situated at foot of kodaikanal hills. The temple attracts lacks and lacks people throughout the year. This temple and town are mainly depending upon Palar-Porundalar river dam for drinking water. The physico-chemical studies such as electrical conductivity, P^H , Total dissolved salts, Total hardness and total alkalinity for this dam was analysed. All the physical parameters were below the permissible limit of WHO. For this analysis ten places were chosen. All the ten samples were free from CO_2 which indicates this water was free from organic wastes and effluents from industries. Total hardness and total alkalinity of all the samples were below the permissible limit of WHO. Therefore this is water recommended for drinking and washing.

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Introduction

Water is the major requirement for all living organism among natural resources[1]. Now a day's quality of drinking water is the major problem due to increase in population, organic wastes and industries. Therefore there is a demand for pure water both from river and ground water. In urban areas the exploitation of natural resources due to improper management of disposal of waste. Many heavy metals from industries effluent discharged into rivers makes the drinking water unsafe mainly they will alter the percentage of dissolved oxygen, dissolved metals and suspended solids [2-7].

The physico-chemical parameters of palar river in vaniyambadi [8] segment were studied. The P^H , Total hardness, Dissolved oxygen, BOD, COD were not in the permissible scale of WHO. This induces us to study the quality of drinking water of palar porundalar river dam which is main source for palani temple and town.

Materials And Methods

About ten water samples were collected from palar-porundalar river dam. This water is used for drinking water for palani, a holy pilgrim centre where lacks and lacks of people visited all over the year. Polythene bag of one litre capacity was thoroughly washed and rinsed with distilled water and water was collected from ten places. Sample 1 was the palar river site, sample 2 was the porundalar river site, sample 3 was the surface water of dam, sample 4 was deep water of dam, sample 5 water was collected at the discharge end of the dam, sample 6 was bore well water nearby dam, sample 7 was bore well water about 1 km from the dam, sample 8 was open well about 2 km from the dam, sample 9 was open well about 4 km from the dam and sample 10 was open well about 5 km from the dam. The samples were collected and tested in water testing lab of tamilnadu water board department.

Results and discussion

The physico-chemical parameters of palar-porundalar river dam of various places were tabulated in table 1. These

parameters were taken at the average temperature of 28°C, since temperature varied the physico-chemical parameters.

Electrical Conductivity

Conductivity is the measurement of conductance in water i.e., presence of more salt [9]. The electrical conductivity ranged from 115 to 1380 $\mu S/cm$. At the river site the samples value averaged 115 $\mu S/cm$. But in the well site averaged to 1100 $\mu S/cm$. From EC results all the river side samples were much below the desirable limit and then the well side samples were slightly higher conductance than riverside showed that well side samples were high quantity of salt than river side samples.

P^H

The P^H of water samples at river site were little lower than 7. But in dam site the average value of 7.2 and well site samples were higher than 7 and averaged 7.7. But the permissible and desirable limit of WHO and BIS is between 6.5 to 8.5. According WHO the P^H value below 6 cannot used for drinking purpose as in vaniyambadi [8] section of palar river. But all these samples were averaged to 7.1 which is the most suitable for drinking purpose. Again this water does not contain carbonate ion which resulted to form carbonic acid in water. Since the P^H averaged to 7.1, it was not polluted by organic vegetation or dissolution of sulphide or any effluents from industries which were the primary responsible for change in P^H and again the carbonate estimation of all samples were zero. Therefore the water recommended for drinking and washing purposes.

Presence of calcium, Magnesium, Sodium, Potassium, Bicarbonate, carbonate, sulfate and Nitrate

The calcium value ranged from 14 to 28 mg/L which were much lower in WHO permissible limit. In the same way magnesium ranged from 6 to 21 mg/L which was also below the desirable limit. Sodium and potassium were meagre amount present in all samples. Carbonate was zero value for all samples. But bicarbonate ranged from 61 to 171 mg/L bicarbonate alkalinity was not exceed the desirable limit of WHO.

Table 1: Physico-Chemical Parameters of Polar-Porundalar Dam at various places in Palani Town

Parameters (mg/L)	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	D.limits	P.limits
E.C	124	115	116	260	1171	335	1231	549	140	1380	750	3000
P ^H	6.79	7.22	7.81	7.14	7.38	7.43	7.81	7.81	7.42	7.49	6.5-8.5	6.5-8.5
Ca	14	20	26	24	14	16	24	28	28	18	75	200
Mg	12	15	21	21	12	6	21	18	19	17	30	100
Na	2	2	2	4	2	2	4	5	7	5	--	--
K	0	1	1	1	1	1	2	1	1	1	--	--
HCO ₃	79	98	153	153	73	61	146	146	171	110	--	--
CO ₃	0	0	0	0	0	0	0	0	0	0	--	--
SO ₄	0	0	0	3	0	5	31	8	0	52	200	400
Cl	15	15	15	20	15	15	200	50	20	150	250	1000
NO ₃	5	1	1	2	1	2	4	3	1	4	50	50
TDS	84	78	79	177	80	228	837	374	95	138	500	2000
CaCO ₃ (TH)	32	32	28	56	28	72	280	116	32	300	300	600
CaCO ₃ (TA)	40	36	36	96	36	120	300	196	40	420	200	600
Fluoride	0.2	0.2	0.2	0.6	0.2	0.4	1.4	0.8	0.2	0.4	0.5-1.5	0.5-1.5

(E.C=Electrical Conductivity; Ca=Calcium; Mg=Magnesium; Na=Sodium; K=Potassium; HCO₃=Bicarbonate; CO₃=Carbonate; SO₄=Sulphate; Cl= Chloride; NO₃= Nitrate; TDS= Total Dissolved Solids; TH= Total Hardness; TA= Total Alkalinity; D= Desirable; P= Permissible)

Therefore in our analysis the water in this area both ground water samples and river, dam water samples were below the WHO value. But in some of places in tamilnadu and northern india [10-14] had bicarbonate more than WHO due to the presence of bicarbonate increased irritation [15] was the major cause.

TDS and Turbidity

The turbidity of all the water samples showed nil. The total dissolved salts ranged from 80 to 837 mg/L. In the river bed it ranged from 80 to 84 mg/L. but in open well it was increased from 228 to 837. It was due to salt of the respective soils. The total dissolved salt values in river and dam sides were below the desired value of WHO. But TDS of well water were within the limit of permissible of WHO. Therefore this water is recommended for drinking water.

Total Hardness

The total hardness of water ranged from 32 to 300 mg/L for ten samples. The samples near the dam were averaged to 40 mg/L. But in the open well have averaged to 200 mg/L. But all the samples were low value than desirable value of WHO. Total hardness is the sum of calcium and magnesium present in the water. These two ions were lowered all the sample and the total hardness was lowered and recommended for washing and drinking water.

Total Alkalinity

Alkalinity is acid neutralising capacity. It ranged from 36 to 300 mg/L for all ten samples. The dam site samples averaged to 40, well side averaged to 200 mg/L, but below the ranged of permissible limit of WHO. The dam site samples were below the desirable range. The alkalinity value indicated that the dam site and river sides were support the aquatic and algae growth.

Chloride and Fluoride

The chloride content of water sample ranged from 15 to 200 mg/L. All the river, dam site samples were below the desirable limit but open well was slightly higher than dam samples but below the desirable limit, recommended for drinking water.

The fluoride ranged from 0.2 to 0.8 mg/L which were much below the desirable limit. Fluoride content was higher and then it was dangerous to teeth. But fluoride range was much below the desirable limit recommended for drinking purpose.

Conclusion

The Palar-Porundalar river dam site and its surrounding sites were analysed. The physico-chemical parameters i.e, dissolved salts, Electrical conductivity, Turbidity, Total hardness, presence of calcium, magnesium, sodium, potassium,

carbonate, fluoride, chloride and bicarbonate were below between the desirable and permissible limit of WHO and recommended for both drinking and bathing purpose.

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