

Research Article

Study of Physico-Chemical Properties of Palvani Unhavare Euthermal Spring of Konkan Region, Maharashtra, India

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ABSTRACT

A thermal water spring or hydrothermal spring is place where warm or hot groundwater issues from the earth on a regular basis for at least a predictable part of the year, and it is significantly above the ambient ground temperature. Each thermal spring is unique. Even spring that look same differ in characteristics such as temperature, flow rate and chemistry of water. Palvani Unhavare thermal spring is a Euthermal thermal spring, this spring is a sulphur containing hot spring. The temperature of this spring ranges between 48 to 51°C, the pH ranges 7.5-8.2 and the chloride is about 529-691 mg/L. Thermal spring have extreme environment such as high temperature, alkalinity, acidity, high sulphur concentration, metal concentration etc. The present investigation includes the data of physico-chemical characteristics of the Palvani Unhavare Euthermal spring.

Keywords: Limnology study, Physico-Chemical properties, Thermal spring.

INTRODUCTION

Palvani Unhavare is a small village; it has 30 km from Mandangad Taluka in Ratnagiri district. Geographically it lies between 17° 56' North latitude and 73° 11' East longitude. There are two thermal springs; both are situated on the banks of Bharja river. Only one thermal spring is built up with concrete. The water of spring is very clear, colour is transparent. Algal growth is abundant. On the side wall of the tank, 1.5 inch algal patches are growing. The temperature of the water is varied from 48-51°C. The size of the reservoir is 14'x9'and depth is 3'. The water has no smell of sulphur. The thermal spring of Palvani Unhavare is of Euthermal type as the water flows immediately away on a slope. There is record to show that most of the thermal springs have been remarkably constant in thermal, chemical and hydrobiological properties for many years although minor variations do occur.

According to the classification as proposed by Vouk (1950), the thermal springs having temperature range of 30-50°C are "Euthermal", springs having 50-70°C temperature ranges are "Acrothermal". Thus the thermal spring of Palvani Unhavare is Euthermal spring. Rafiqzaman and Hassan (1964) have suggested that the curative effect of the water were due to the presence of arsenic in it. A thermal spring usually maintains a constant temperature and flow of water and thus it is a 'Laboratory in the natural condition'. The high temperature environments most useful for study are those associated

with volcanic activity. Such as hot springs, since these natural habitats probably existed throughout most of the time in which organisms have been evolving on earth. Unfortunately, the geochemist has different interest than biologist, and therefore assays different substances for the geochemist; substances like silica, potassium, sodium and rare gases are of interest. Whereas biologist is interested in nitrogen, phosphorus, organic carbon, sulphide which is essential for the growth of the organisms. The water of many thermal springs is either neutral or alkaline consisting essentially of dilute sodium chloride- bicarbonate solutions with small amount of trace elements and biologically important anions.

MATERIALS AND METHOS

Thermal spring water samples were collected seasonally through ten trips during the period of January 2012-October 2012 at the Palvani Unhavare thermal spring of Maharashtra. About 10 readings were made throughout analysis. The samples were collected in 1.5 L clean plastic bottles and each bottle was rinsed by several times with sample water before collection. Physico-chemical analysis were carried out for the collected water samples to measure the following variables (Table 1); Temperature, measured by an ordinary thermometer accurate to 0.1°C. The pH value, measured by a portable pH meter, Dissolved oxygen (DO) was analyzed according to the modified Wrinkler's method; Chloride, hardness and total alkalinity were

determined by trimetry with standard silver nitrate, EDTA and hydrochloric acid. Phosphate was determined by spectrophotometry using Systronics 105 spectrophotometer. Nitrate was estimated using brucine sulphate as derivating reagent. Sulphate was determined by turbidimetric method using barium chloride were analyzed using standard method, Total Dissolved solids are analyzed by WTW LF 230 conductivity meter, all parameters analyzed with using standard procedures (Trivedy and Goel, 1986, APHA, 2005) in the laboratory next day.

RESULTS AND DISCUSSIONS

The water from Palvani Unhavare thermal spring seeps out as transparent, colourless and odorless. The water temperature observed between 48-51°C as compared to air temperature of 27 to 34°C. The spring may be classified as Euthermal spring (Vouk, 1950) and provided stable environment to ecosystems which may have remained unchanged (Brock, 1967). The results of chemical analysis are summarized in table 1. There is no significance difference in the values of water temperature during ten trips. The water of thermal spring was alkaline throughout the period. The pH was observed

within 7.2-8.5. The concentration of dissolved oxygen was mostly absent and when it was present, it was showing less concentration. The dissolved oxygen was observed 2.2-3.1 mg/L. The concentration of Free Co₂ is 4.4-49.2 mg/L. The carbonate was totally absent at all the months during ten trips. Whereas bicarbonate and total alkalinity observed within in sufficient concentration, 24.4-35.5 mg/L., 20-30 mg/L. respectively. The concentration of hardness was less in Mansoon. The concentration ranges were observed 420-450 mg/L. The concentration of chloride variation was observed within the range 529-691 mg/L. The nitrate and phosphate are very low in concentration ranged 0.21-0.36 mg/L. The sulphate varied within 20.8-39.6 mg/L. There is no significant difference in the concentration of sulphate. The total dissolved solids varied within 420-1370 mg/L.

The observed chemical analysis results are in agreement as reported by Beg et al. (1984) and Nandan and Galankar (2001), examined the concentration of nutrients and major metal contents in the thermal water. The temperature of the spring water has remained constant for over 1½ century.

Table 1: Physico-chemical properties of the studied sampled on january 2012-october 2012 from palvani unhavare euthermal spring. (concentration in mg/l.)

S. No.	Parameters	Concentration in Ranges
1.	Temperature	48-51°C
2.	pH	7.5-8.2
3.	Dissolved Oxygen (DO ₂)	2.2-3.1
4.	Free Co ₂	4.4-49.2
5.	Carbonate	-
6.	Bicarbonate	24.4-35.5
7.	Total alkalinity	20-30
8.	Hardness	420-430
9.	Chloride	673-691
10.	Nitrate	0.21-0.24
11.	Phosphate	0.31-0.36
12.	Sulphate	20.8-39.6
13.	Total Dissolved Solids (TDS)	420-1370

Note: All parameters are expressed in mg/l except pH and temperature.

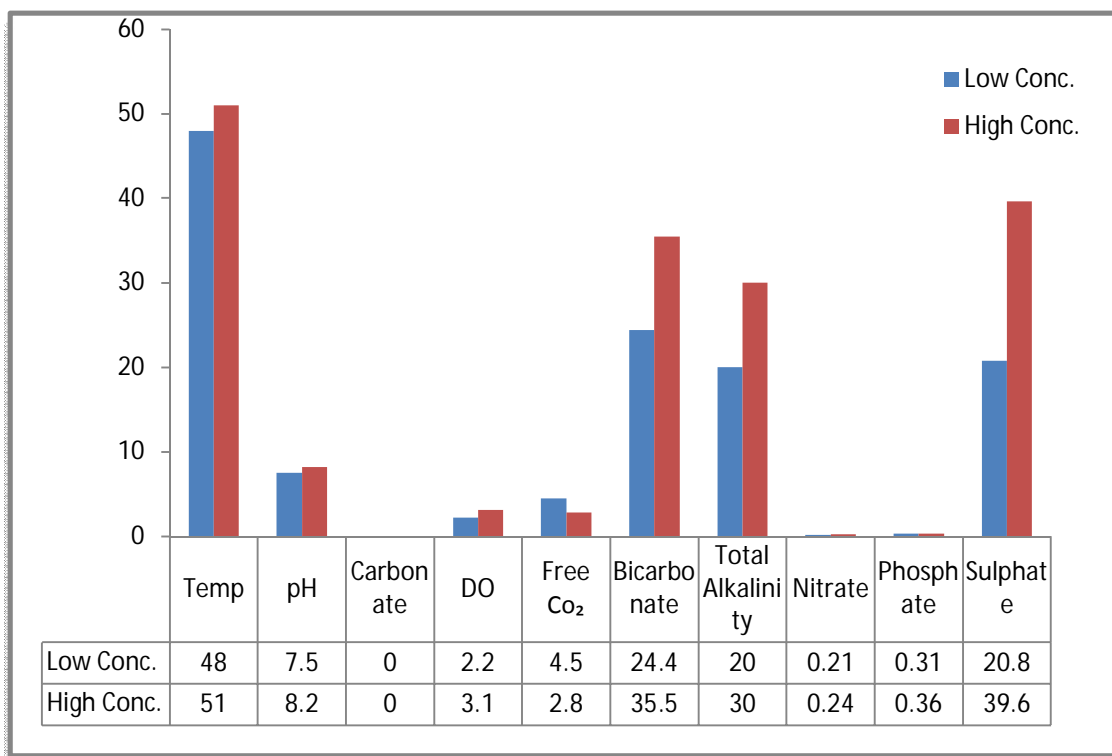


Fig.1: Diagrammatic showing different parameters of Palvani Unhavare Euthermal Spring

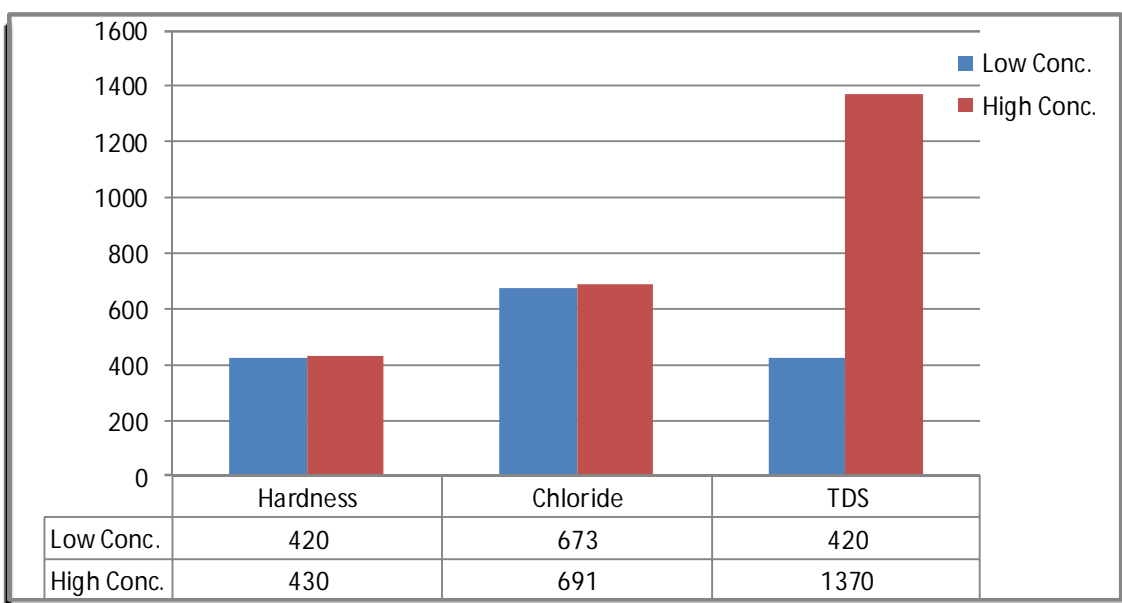


Fig. 2: Diagrammatic showing different parameters of Palvani Unhavare Euthermal Spring

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