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Analysis of water quality Parameters in Vembakottai water reservoir, Virudhunagar district, Tamil Nadu – A report

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Abstract

Over the years plants have been used for the management and treatment of male infertility and it's gradually gaining The Vembakottai dam is situated near Viudhunagar, Tamil Nadu. The present study deals with the change in physico-chemical parameters, such as air, water temperature, pH, dissolved solids, conductivity, alkalinity, hardness, Calcium, Magnesium, Ammonia, Nitrite, Chloride, Sulphate and Phosphate. These parameters were observed analysed from July 2012 to June 2013. The results suggest that water quality of the reservoir is within the desirable limits.

Keywords: Water reservoir, Physico - Chemical parameters, Electrical Conductivity, Seasonal variations.

Introduction

Dams are the most important water resources. Unfortunately, the dams are polluted by indiscriminate disposal of sewage, industrial wastes and human activities. Fresh water resources need special care and attention to make it available sustainably for the present and future generations. Water is vital for agriculture, industries and almost all other human activities. Ensuring uninterrupted fresh water supply is a greater challenge the water managers of the world have to face incoming decades[1].

In the recent years environmental monitoring through regular assessment of water quality has become a crucial factor in the exploitation or conservation of aquatic resources. Water quality regulates biotic diversity and biomass, energy and material cycles, tropical levels and rate of succession. This, in turn, helps in planning exploitation, antipollution or conservation strategies. The environmental monitoring through water quality assessment should be a continuous process and regularly undertaken for a variety of purpose like testing suitability of water for agricultural, industrial, aquaculture, recreational and domestic purposes. Therefore, various water quality parameters of Vembakottai reservoir have been analysed to assess the nature of water for drinking purpose.

Material and Methods

Water sample was collected from Vembakottai fresh water reservoir at a depth of one feet using polyethylene bottles of two liter capacity for a period of one year (July 2012 - June 2013) at monthly invtervals. The collected water samples were immediately bought to the laboratory and analysed. All the physico-chemical parameters like air temperature, water temperature, turbidity, dissolved solids, conductivity, pH, carbonate alkalinity, bicarbonate alkalinity, alkalinity, hardness, calcium, magnesium, ammonia, nitrite, chloride, sulphate and phosphate were carried out as per the standard methods[2,3].

Results and Discussion

The results of variations in physical parameters, chemical parameters and ionic parameters of water were grouped in to three seasons as such monsoon (July - Nov), winter (Dec - Feb) and summer (Mar - June) and presented in the tables 1.

Physical Parameters: Air Temperature: Air temperature of the sampling station ranged from 38^{O}C to 39.5^{O}C. The maximum temperature 35^{O}C was recorded during summer and minimum temperature was recorded during winter.

Water temperature: In the present study, water temperature of the sampling station ranged from 34.5^{O}C to 35.5^{O}C. The maximum temperature of 35.6^{O}C was recorded in Summer and a minimum of 34.5^{O}C was observed in winter. Water temperature was high in summer due to clear atmosphere without cloud. It is supported by Simpi et al in Hosahalli tank, Karnataka[4].

Water Evaporation: Evaporation rate of water body ranges from 163.4 mm to 231.4 mm. The maximum value (231.1 mm) was recorded in summer and minimum (163.4 mm) in winter. Amount of evaporation depends upon climatic factors. Vembakottai water reservoir is coming under semi arid zone.

Turbidity: In the present study the minimum value of 4.6 NTU in summer season. The maximum value of 15.2 NTU turbidity was recorded during Monsoon season where as turbidity was decreased towards winter to summer season. Similar results have been reported by Garg et al in Ramsagar reservoir[5].

Table-1
Seasonal Variations in physico-chemical parameters of Vembakottai water reservoir during the year of July'2012-June'2013

Sl. No	Parameters	Units	Monsoon	Winter	Summer
1.	Air Temperature	^{O}C	38.5	38	39.5
2.	Water temperature	^{O}C	35.4	34.5	35.6
3.	Evaporation rate	Mm	163.4	173	231.4
4.	Turbidity	NTU	15.2	5.1	4.65
5.	Total Dissolved Solids	mg/L	742.4	308.3	599.2
6.	Electrical Conductivity	mic.mho/ cm	1119.6	453.6	893.2
7.	pH	---	7.8	7.9	7.9
8.	Total		193	144.3	582
9.	Total Hardness	mg/L	150.8	72.3	144.2
10.	Calcium	mg/L	41.8	23.6	39.5
11.	Magnesium	mg/L	11.2	5.3	10.7
12.	Ammonia	mg/L	1.08	0.49	0.60
13.	Nitrite	mg/L	0.08	0.03	0.14
14.	Chloride	mg/L	121.4	22	74.7
15.	Sulphate	mg/L	189.6	49.3	131.2
16.	Phosphate	mg/L	0.35	0.29	0.56

TDS: Level of TDS ranges between 308.3 mg/l to 742.4 mg/l. The maximum amount of TDS was recorded in monsoon season and minimum value in winter season. The variability of TDS value may be due to dissolved soil minerals, surface run off etc.

Electrical Conductivity: The maximum Electrical Conductivity (EC) value was recorded as 1119.6 mic.mho/cm monsoon season. This value decreased in winter to 453.6 mic.mho/cm. The high value of conductivity was recorded during the monsoon season where as low value was recorded during winter season. A high level of conductivity reflects the pollution status as well as trophic level of the aquatic body. Similar seasonal variation was examined by Verma et al in Kalpi river, Gwalior[6].

Chemical Parameter: pH: The pH value recorded ranges between 7.8 to 7.9. The maximum pH was recorded during summer and winter season. The minimum pH was recorded during monsoon. In the present investigation, the pH during summer and winter might be low water level. During monsoon season pH level was decreased by rain. Similar trend was also reported by Mathavan and Nambirajan in Kallanai, Thanjavur[7].

Total Alkalinity: In the present investigation, the total alkalinity ranges from 144.3 mg/l to 579 mg/l. The maximum value (579 mg/l) was recorded during summer and minimum value (144.3 mg/l) was in winter. It was observed that the sampling station is highly productive from the view point of alkalinity. The maximum alkalinity was observed in summer due to increase and carbonates and bicarbonates in the water. Similar results were also reported by Bhalerao in Kasar Sai Dam, Hinjewadi, Pune[8]. During summer the water level decreases result decay of living organism. Thus during decomposition of this C_{O2} is released resulting in the addition of carbonate and bicarbonates. Similar results was observed by Pradeep et al in Chandola Lake Gujarat[9].

Total Hardness: Total hardness varies between 72.3 mg/l to 150.8 mg/l. The least value 72.3 mg/l was recorded in winter. The maximum values more 150.8 mg/l recorded during monsoon may be due to dissolved minerals from sedimentary rocks, run-off, detergents and soaps also aggravate the situation reported by Kalavathy in Cauvery river, Tiruchi[10].

Ionic Parameters: Calcium: Calcium hardness values ranged between 23.6 mg/l to 41.8 mg/l. Least value 23.6 mg/l had been found in winter. Decrease of calcium hardness may be due to calcium being absorbed by living aquatic organisms in winter. The amount of calcium (41.8 mg/l) increases during monsoon season due to rapid oxidation of organic matter. Being present

in higher quantities in rocks it is leached during raining season. Similar results were recorded by Kiran in Bhadra Project, Karnataka[11].

Magnesim: The amount of magnesium recorded in the water body of Vembakottai reservoir ranged between 5.3 mg/l to 11.2 mg/l. The maximum amount (11.2 mg/l) Magnesium in water recorded during monsoon season and the minimum value (5.3 mg/l) was recorded during winter season may be due to addition of animal organic and other wastes.

Ammonia: In the present investigation the amount of ammonia had fluctuated at different study period. The maximum vale 1.08 mg/l was observed in Monsoon season and the minim value 0.49 mg/L was recorded in winter.

Nitrite: The values of nitrite content varied between 0.03 to 0.14 mg/l. The maximum (0.14 mg/l) amount of nitrite was recorded during summer season and minimum value (0.03 mg/l) was observed in winter. In the present study, the content of nitrite value was high in summer may be due to human activities. Similar, results have been reported by Rajasekar et al in minor reservoir, Nadergal, Andra Pradesh[12].

Chloride: The maximum amount (121.4 mg/l) of chloride in vembakottai dam was recorded during monsoon and the minimum (22 mg/l) during winter season. Higher values chloride during monsoon could be due to dissolved salts from rocks and soil by surface run off water during raining season. In the present study, relatively higher concentration of calcium in surrounding rocks and soils of sampling sation might have also contributed to the rich calcium level in monsoon season.

Sulphate: The Sulphate content varies from 49.3 mg/l to 189.6 mg/l. Higher values (189.6 mg/l) was observed and minimum value (49.3 mg/l) in winter season. Sulphate is an important constituent of water hardness. In the present study, the Sulphate value determined by surface run off water during raining season.

Phosphate: In the present study, amount of phosphate ranges between 0.29 mg/l to 0.59 mg/l. Lower values (0.29 mg/l) was recorded during winter. The high phosphate concentration of the water body (0.59 mg/l) may be due high rate of water evaporation and washing activities.

Conclusion

The present study suggested that most of the physical and chemical properties of Vembakottai water reservoir were with in desirable limits. The quality of water is not stable and it may be changed due to seasonal variations stagnant conditions.

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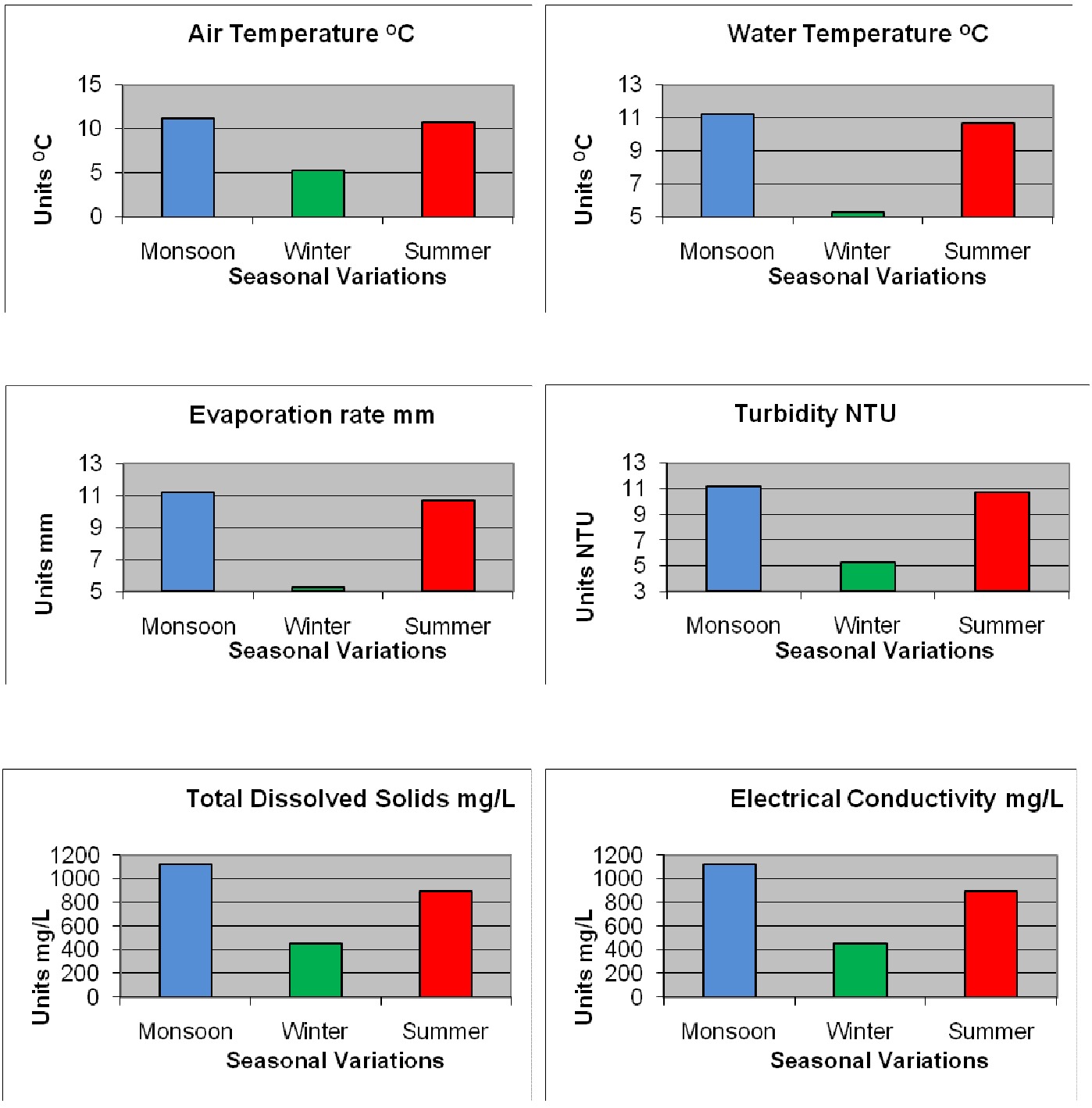

Figure-1
The Graph showing Seasonal variations of Air Temperature, Evaporation rate, Turbidity, Total Dissolved Solids and Electrical Conductivity in Vembakottai Water Reservoir during July 2012 to June 2013

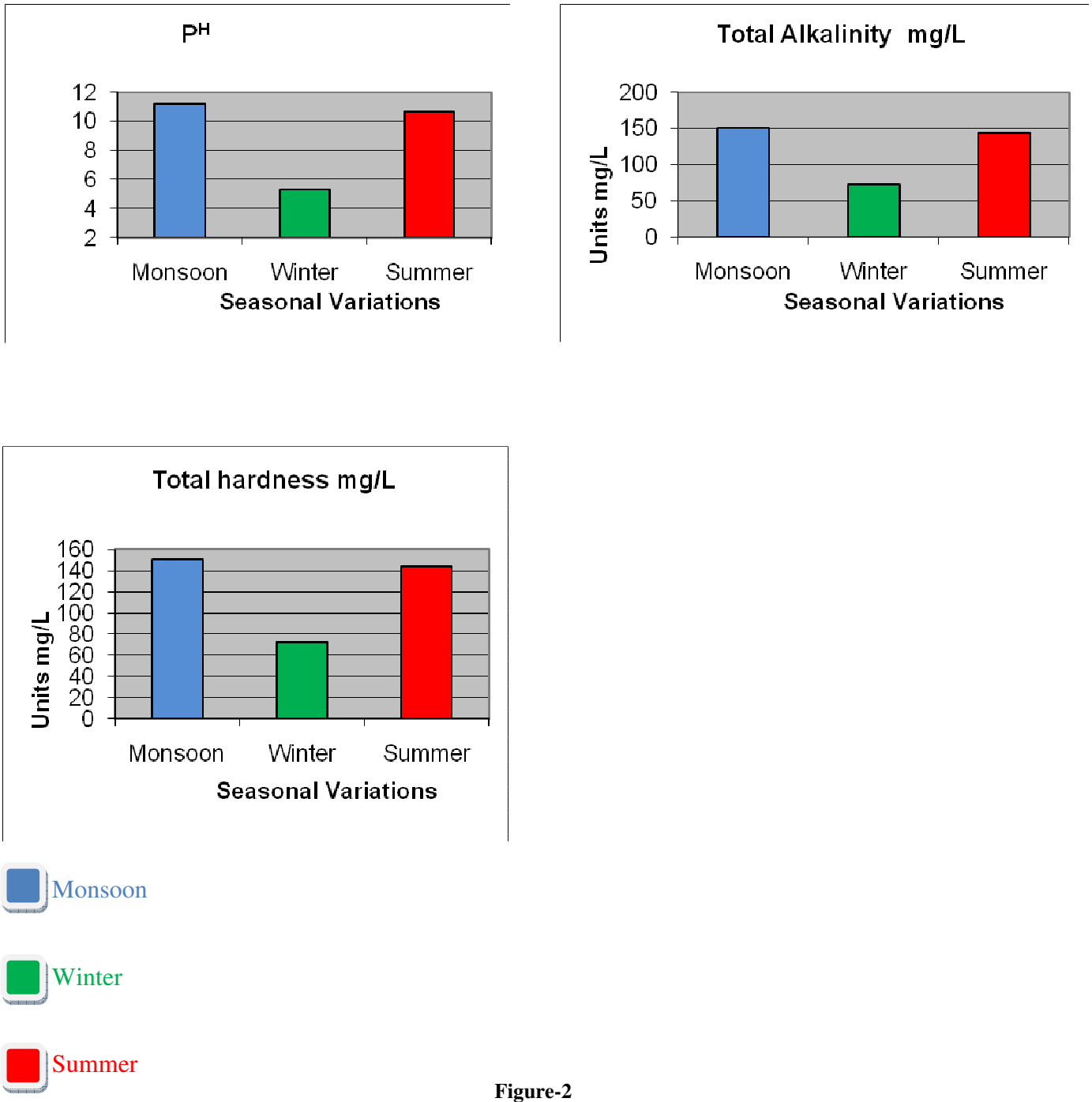

Figure-2
The Histogram showing Seasional variations of P^H, Total Alkalinty, Total hardness in Vembakottai Water Reservoir during July 2012 to June 2013

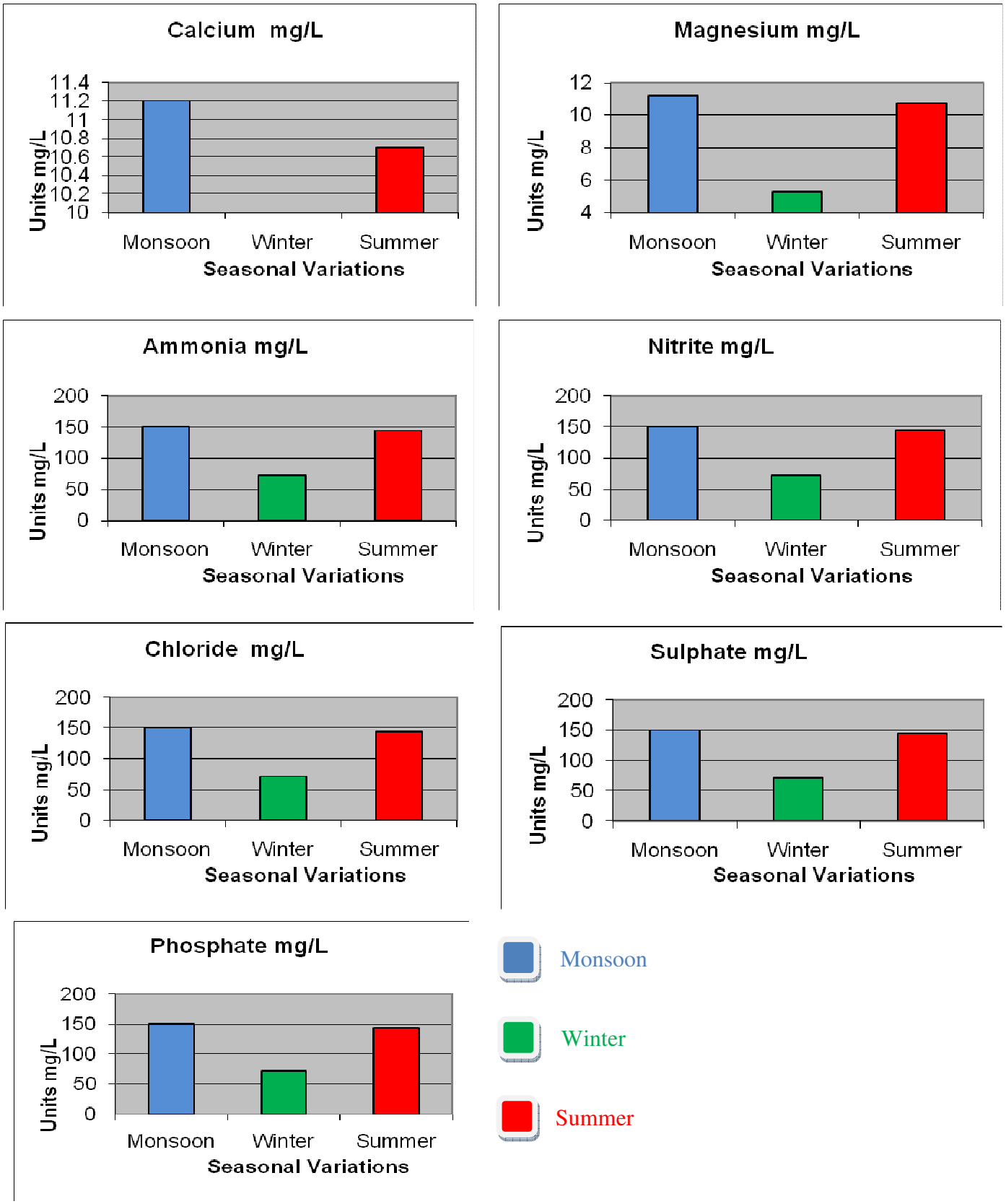

Figure-3
The Histogram showing Seasonal variations of Calcium, Magnesium, Ammonia, Nitrite, Chloride, Sulphate and Phosphate in Vembakottai Water Reservoir during July 2012 to June 2013