

STUDIES ON THE PHYSICO CHEMICAL ANALYSES OF TWO DIFFERENT WATER BODIES

A. Eswari, B. Amala and Dr. T.V. Poonguzhali*

Department of Botany, Queen Mary's College, Chennai-600 004

E-mail: eswari535@gmail.com (**Corresponding author*)

Abstract: Much of the current concern with regards to environmental quality is focused on water because of its importance in maintaining the human health and health of the ecosystem. The piece of investigation was carried out to study the pond water as well as sea water quality, physico-chemical characteristic of both the water of India. Attempts were made to study and analyze the physico-chemical characteristics of the water. Various parameters like Appearance, odour, Turbidity NTU, Total dissolved solids and Electrical Conductivity, pH, Alkalinity, Total hardness. Calcium, Magnesium, Sodium, Potassium, Iron, Manganese, Free ammonia Nitrite, Nitrate, Chloride, Fluoride, Sulphate, Phosphate (Pond water and Seawater) etc. By observing the result it can be concluded that the parameters which were taken for study the water quality are below the pollution level for ground water which satisfy the requirement for the use of various purposes like domestic, agricultural, industrial etc.

Keywords: Pond water and seawater, physicochemical characteristics.

INTRODUCTION

Water is one of the most important factors for all living organisms, imagine a form of life that can impossible without water. Approximately 71% of the earth surface covered by water in the form of oceans, glaciers, fresh water bodies, rivers, wells, lakes (Patel and Patel, 2012; Nirmala et al 2012). Ponds are important wetlands located in and around human habitations as they are generally semi natural ecosystems constructed by man in landscape suitable for water stagnation. Ecosystem services rendered by these wetlands are innumerable including tangible and non -tangible ones. Besides acting as a source of fresh water, they lower the ambient temperature, raise the water table, increase the diversity of flora and fauna, and provide aesthetic ambience. Due to uncontrolled increase in human population and development of township at large, these freshwater bodies are under tremendous pressure owing to their overuse on one hand and enrichment due to nutrients and organic matter on the other, leading to the cultural eutrophication. Sea water is a mixture of various salts and water. Most of the water in the ocean basins is believed to originate from the condensation of water found in the early atmosphere as the earth cooled after its formation. This water was released

from the lithosphere as the Earth's crust solidified. Additional water has also been added to the oceans over geologic time from periodic volcanic action. Some scientists have recently speculated that comets entering the Earth's atmosphere may be another important source of water for the oceans. Hence, the present study was conducted to study the physico-chemical properties of water in the pond and seawater.

Materials and methods:

Study site:

Quaid-e- millath college located in Chennai at Annasalai. The pond was a small, temporary water body present in the garden. The pond was encircled by *Tecoma stans*, *Vitex negunda*, *Mangifera indica*, *Nycantanthus*, *Crotalaria*, *Croton*, *Polyathiya*, *Cycas*, *Anona squamosa*, *Musa paradisaca*.

Sea water was collected from Marina Beach Chennai, along the bay of Bengal. The beach is primarily sandy water samples were collected in the month of January 2015 between noontime samples water can and analysed for physical-chemical parameter.

Table -1: Methods used in physico -chemical analyses of water

SI.No	Parameter	Method	Instrument
1	Electrical Conductivity		Digital Conductivity meter model :611E
2	PH	Electrometric method	Digital PH meter global make, 0-14 range 0.1 accuracy
3	Turbidity	Turbidimetry	Nepheloturbidity
4	Total dissolved solids Mg/L	Gravimetric method	
5.	Calcium	Titrimetric	
6.	Magnesium	By calculation method TH-CaH=MgH	
7	Sulphate	Turbidimetric method	
8	Iron	Colorimetric method 470 nm	Spectrophotometric DR 2000
9	Chloride	Argentometric	
10	Alkalinity Total as Caco ₃	Titrimetric method	
11	Total hardness as Caco ₃	Titrimetric method	
12	Sodium	Photometry	Flame photometer
13	Potassium	Photometry	Flame photometer
14	Phosphate	Colorimetric method 720nm	

15	Free ammonium as NH ₃	Colorimetric method 420nm	Spectrophotometer HACHD-2000
16	NO ₂	Colorimetric method 535nm	Spectrophotometer HAcI+DR-700
17	NO ₃	Colorimetric method 220 nm to 275nm	UV spectrophotometer Shimadzu model

RESULTS AND DISCUSSION

Physico-chemical parameters of the water samples (pond water and sea water) collected were analyzed as per the standard methods for the examination of water and waste water (APHA, 20th Edition 1998). Various physico-chemical parameters are given in Table III and IV.

Appearance and odour:

The appearance and odour of both pond water and seawater was clear and colourless. No specific odour was found in both the water samples.

Turbidity (NTU):

The turbidity of pond water was recorded as 0.5 mg/L and sea water as 9.3mg/L. Increased turbidity of seawater may be due to the presence of increased total dissolved solids.

Total dissolved solids (TDS) and Electrical Conductivity (EC):

Total dissolved solids value of pond water was recorded as 142mg/L and seawater was recorded as 24602mg/L. Since the pond is very small and the quantity of water in the pond is also very less, the TDS value was lower than the TDS of seawater. Total dissolved solids of water is an important parameter that occurred due to the disposal of domestic and industrial effluent.

Chemical parameters:

Total hardness (as CaCO₃)

Total hardness value of pond water was 70mg/L and total hardness value of seawater was recorded as 6500mg/L. Hardness can be considered in two forms: carbonate hardness and non-carbonate hardness. Carbonate hardness can be removed by special suitable treatment, while non-carbonate hardness requires different treatment. The pond water was used for watering the garden plants.

Alkalinity and Alkalinity pH:

Total alkalinity and alkalinity pH of pond water was observed as 80mg/L and 0 respectively. Total alkalinity of seawater was recorded as 152mg/L but the alkalinity pH of seawater was also recorded as 0. The total alkalinity is a function of both carbonates and bicarbonates.

Sodium and Chloride:

The concentration of sodium and chloride of pond water was found to be 12mg/L and 6 mg/L respectively pond water and sea water was found to be 5500mg/L and 12623mg/L. chloride ions which are known to impart saltish taste to water have been found to be present in all the bodies of water.

pH:

The pH value of pond water and seawater almost remained equality that is 7.47 and 7.57 respectively.

Calcium:

The concentration of calcium of pond water was recorded as 17 mg/L but the concentration of seawater was recorded as 1506 mg/L. Calcium is the one of the important cations imparting hardness.

Magnesium:

The concentration of magnesium of pond water was recorded as 7 mg/L and sea water was 624 mg/L. Total hardness of water is the sum of concentration of alkaline earth metal cations present in it. Calcium and magnesium being the major cations responsible for hardness.

Potassium:

The concentration of potassium of pond water and sea water recorded as 2mg/L and 300 mg/L respectively. Sodium ion, potassium ion, calcium ion and magnesium ions have important role in osmoregulation of aquatic floras.

Iron:

Iron content of pond water was observed as 0.04mg/L and seawater was 0.01mg/L. It is indicated that iron might have accumulated in marine algae.

Ammonia, Nitrate and Nitrite:

Ammonia, Nitrate and Nitrites concentrated of pond water and seawater was recorded 0.09mg/L, 0.008 mg/L, 3mg/L and 0.16mg/L, 0.53mg/L 3mg/L respectively.

The amount of ammonia, nitrite and nitrate are interrelated and they are acted upon by ammonifying and nitrifying bacteria respectively when both ammonia and nitrite. In the present study the amount of nitrate was found to be higher than ammonia and nitrite.

Sulphates and Phosphates:

Sulphate and phosphate content of pond water recorded as 1mg/L and 0.06mg/L respectively. The concentration of sulphate and phosphate of seawater was recorded as 1177mg/L and 0.07mg/L respectively. The sources of sulphates include the dissolution of soil and rock.

Phosphorous has been referred to as a limiting nutrient. The amount of phosphates determines the organic content of the water.

TABLE-II: PHYSICAL PARAMETERS

Physical parameter	Pond water	Seawater
Appearance	Colourless & Clear	Colourless & Clear
Odour	None	None
Turbidity NTU	0.5	9.3
Total dissolved solids mg/L	142	24602
Electrical conductivity (mico mho/cm)	198	35108

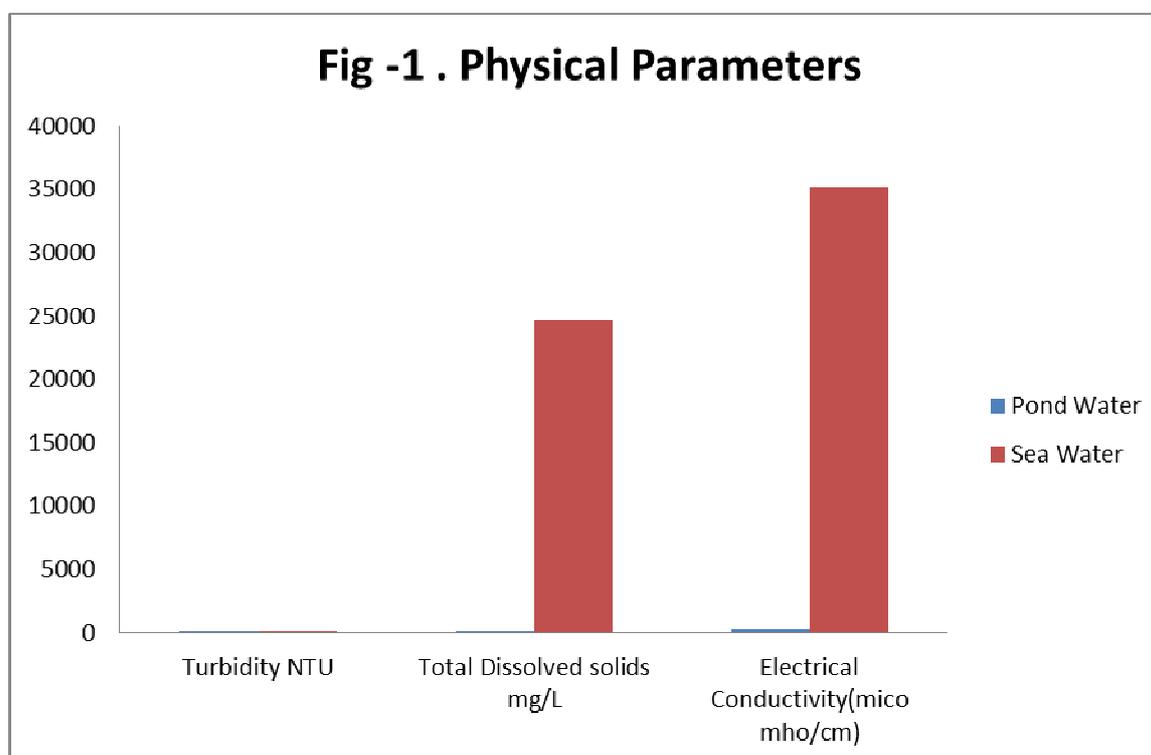
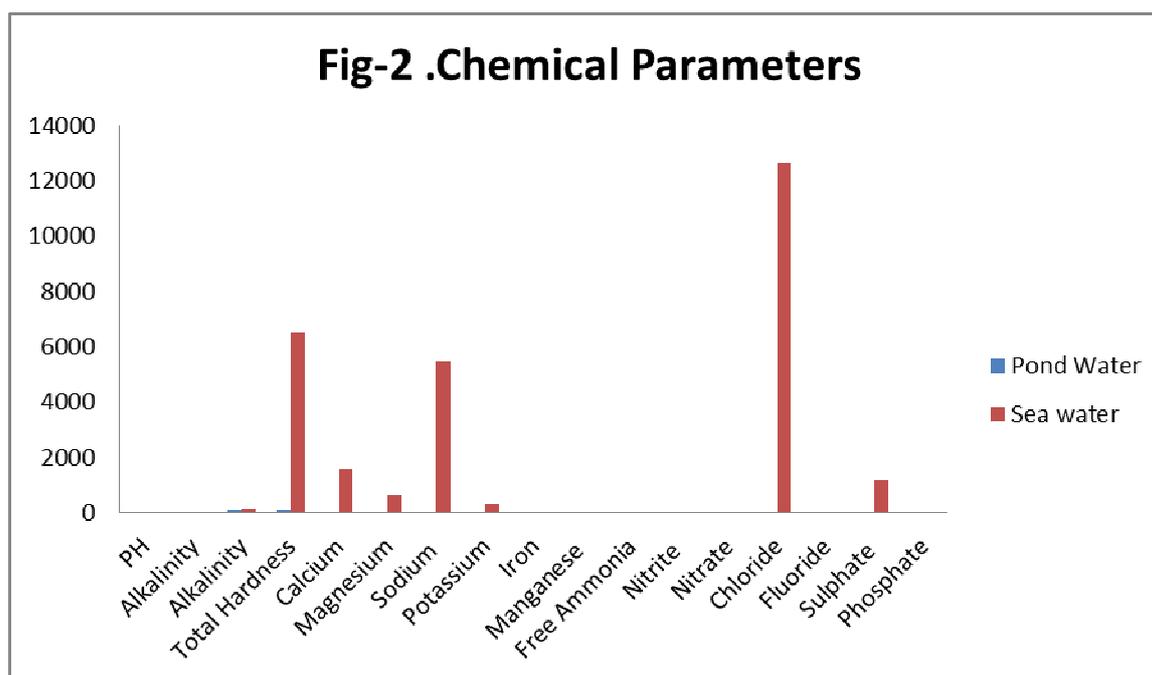


TABLE-III: CHEMICAL PARAMETERS

Chemical parameter	Pond water	Seawater
PH	7.47	7.57
Alkalinity ph (as CaCO ₃)mg/L	0	0
Alkalinity Total (as CaCO ₃)mg/L	80	152
Total Hardness (as Ca) mg/L	70	6500
Calcium(as Ca) mg/L	17	1560

Magnesium (as Mg) mg/L	7	624
Sodium (as Na) mg/L	12	5500
Potassium (as K) mg/L	2	300
Iron (as Fe) mg/L	0.04	0.01
Manganese (as Mn) mg/L	0	0
Free Ammonia (as NH ₃) mg/L	0.29	0.16
Nitrite (as NO ₃) mg/L	0.008	0.53
Nitrate (as NO ₃) mg/L	3	3
Chloride (as Cl) mg/L	6	12623
Fluoride(as F) mg/L	0.15	0.062
Sulphate (as SO ₄) mg/L	1	1177
Phosphate (as PO ₄) mg/L	0.06	0.07



CONCLUSION

Water samples were collected from pond and marina beach analysed for both physical and chemical parameters. Physical analyses of both the water samples showed that pH remains just above the neutral level, and so specific odour was found. Chemical analysis of water showed that manganese and Alkalinity pH remains zero. Among Ammonia, nitrite and nitrate

the amount of nitrate was found to be higher than ammonia and nitrite. The concentration of iron in pond water was higher than sea water the present study showed that phosphate level in both the water samples were equal physico-chemical analysis is the prime consideration to assess the quality of water for its best utilization like drinking, irrigation, fisheries etc.

REFERENCES

- [1] A.P.H.A 1998, Standard methods for the examination of water and wastewater 20th edition American public Health Association American water works Association and Water Pollution Control Federation Washington.
- [2] Chintan Barot, Vasant patel (2014), Comparative Study of Seasonal Variation in physicochemical Properties of Selected Wetlands of Mehsana Districts, North Gujarat. Volume: 4, Issue: 7 | July 2014 | ISSN - 2249-555X.
- [3] Patel J.N & Patel N.K (2012): Study of Physico-Chemical Properties of Water in Amirgadh Taluka of Banaskantha District of North Gujarat, India, Life Science Leaflets, 9 82-90.
- [4] Patil and Gorade (2013): Assessment of Physicochemical Characteristics of Godavari River Water at Trimbakeshwar & Kopergaon, Maharashtra (India). Indian Journal of applied research, 3(3) 149-152.
- [5] Nirmala.B, Kumar.S, Suchetan. P, and Prakash M (2012): Seasonal Variations of Physico Chemical Characteristics of Ground Water Samples of Mysore City, Karnataka, India. International Research Journal of Environment Sciences, 1(4) 43-49.
- [6] Rajakumar, N. 2000 Physico-chemical analysis of a polluted freshwater pond of pollachi, Tamil Nadu, J. Phytol Res., 13(2): 167-170.