

Study of Physico-Chemical Characteristics of Fresh Water Wetland in Rang Mahal (Water Logged area of Suratgarh) Sri Ganganagar District, North Rajasthan,India



Deepmala Garg

Lecture,
Deptt.of Zoology,
Seth G.L.Bihani S.D (P.G)
College, Sri Ganganagar,
Rajasthan



Anil Kumar Soni

Associate Professor,
Dept. of Zoolozy,
Seth G.L Bihani S.D (P.G)
College.Sri Ganganagar,
Rajasthan

Abstract

The Present work deals with the study of water quality of Fresh water Wetland (Water Logged Area) of Suratgarh in Sri Ganganagar District with regards to physico chemical parameters like water temperature, pH, Turbidity, Dissolved oxygen (DO₂), Total alkalinity (TA), Electrical conductivity(EC), Salinity and phosphate (PO₄³⁻). The physico chemical characteristic of Suratgarh Wetland is found to be highly fluctuated with seasonal variations during the present investigation. High value of dissolved oxygen obtained during winter months and shows inverse relation with water temperature, pH, EC have had maximum concentrations in summer. The study revealed that the water quality is rich in salinity and Phosphate content which indicates that of Tibbi waterlogged area is higher saline and moderately eutrophicated . high salinity damage the crop area

Keywords: Water quality, Wetland (Water Logged Area), physico-chemical parameters,

Introduction

Wetlands are very productive ecosystems that help in the regulation of hydrological cycles, maintenance of water quality, nutrient movement and support for food chains. Wetlands are the areas wherein water is the primary factor controlling the environment and the associated plant and animal life. The essence of a wetland being its relative shallowness, hydric soil and hydrophytic vegetation. Their important functions include biodiversity reserves for threatened and endangered species, nutrient recycling, purification of water and ground water recharge. (Pramod, *et.al.* 2011 and Sarkar and Upadhyay, 2013). Water logging problem has been cause due to excessive irrigation seepage from canal and lack of drainage. Indiscriminate use of irrigation water, canal seepage, sandy texture, and absence of natural surface drainage are considered as the main reason for soil degradation (Shankarnarayan and Gupta 1991). These factor resulted in to the rise of water table , development of salinity and the finally submergence of the land .

Aim of the Study

The purpose of the present study is to observe water quality of Suratgarh wetland by physico chemical parameter and to determine the changes in water quality parameters by seasons.

Review of Literature

Quality of an aquatic ecosystem is dependent on the physical and chemical qualities of water as also biological diversity of the system (Ghavzan *et al.*, 2006 ; Tiwari and Chauhan, 2006; Tas and Gonulol, 2007). The physical and chemical characters of the wetlands water can be used to assess the ecological nature of the wetlands. Several studies have been conducted to understand the physical and chemical properties of lakes, wetlands and reservoirs Rajasekara *et. al.* (2005). Barman D.*1, Roy B2 and Roy S3 (2015) studied that the physico – chemical parameters of wetlands in West Garo Hill, Meghalaya were recorded in different seasons to assess the quality status of water. The parameters were water temperature, pH, electrical conductivity (EC), dissolved oxygen(DO), biological oxygen demand (BOD), chemical oxygen demand (COD), total suspended solid (TSS), total dissolved solid (TDS), total hardness, nitrate

(NO₃) and phosphate (PO₄). The wetlands of west Garo Hill were found to be highly fluctuates with season

Material and Methods

Study Area

Sri Ganganagar is a city in North Rajasthan, and Rang Mahal (Water Logged area of Suratgarh) is situated in sri ganganagar District. About 210 villages have been affected by water logged problem. But Rang Mahal covered 650 meter area of waterlogged problem in Sri Ganganagar District. These waterlogged area affected from Salinity/ Alkalinity problem. In this research work Climate is divided into three seasons, summer (March –June), rainy (July – October) and winter (November – February).

The present study was conducted on the physico-chemical parameters of the Rang Mahal (Sri Ganganagar) Wetland. The wetland is situated at a distance of about 10 km from the Suratgarh and almost 40 km far from hanumangarh District. It is a freshwater wetland with an average depth of 0.5

0.8 m. Salinity is one of the most important problems of this wetland (Water logged).

Name Rang Mahal (Water Logged area of Suratgarh) wetland



Location 29°.23*18" N Latitude
73°.57*23" E Longitude
Wetland Type Waterlogged (Natural)
Wetland Area 650 meter
Overall Tubidity Normal

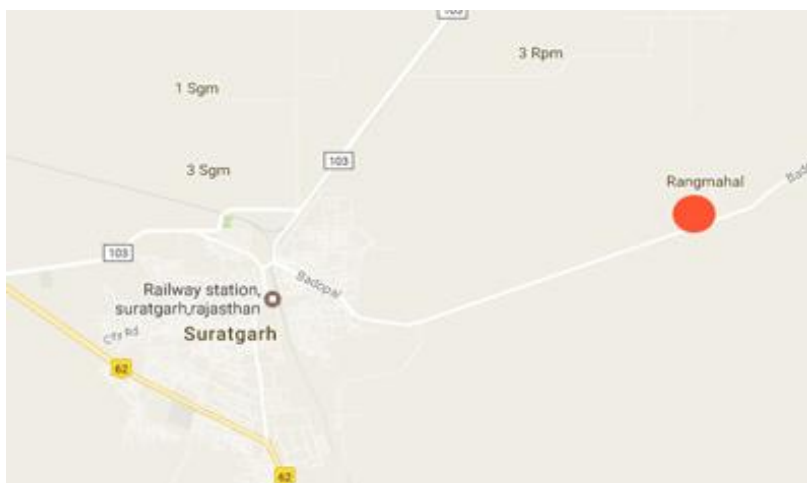


Figure No.1 Location of Rang Mahal (Water Logged area of Suratgarh) wetland District Sri Ganganagar (Raj.)

Sampling Methods

The water samples were collected from Rang Mahal wetland at monthly intervals from April 2015 to March 2016 during 8.00 – 10.00 am in fresh unsullied plastic bottles. The closed bottle was dipped into the water and then the cap is opened and water is allowed to fill up the bottle absolutely. The cap is then closed and the bottle is bring out of the water. Several physico chemical parameters such as, water temperature, pH, turbidity, electrical conductivity, Salinity, dissolved oxygen (DO₂), total alkalinity (TA), and phosphate (PO₄³⁻) has been analyzed .In which water temperature, pH, DO were determined in the field itself.

Analysis of Water Quality Parameters

Water temperature is measured *in situ* by using hand mercury thermometer, pH was estimated by Digital pH –meter (Systronics Type-335). Turbidity was measured by Water Analyzer, Turbidity meter, Electrical conductivity was measured by conductivity meter. For the estimation of other parameters and water sample is brought to the laboratory. The analysis of various physico-chemical characteristics of

water were done as per the standard methods given by APHA (1998) and Trivedi and Goel (1984)

Results and Discussion

Physico-chemical parameters (Water logged area) wetland obtained during the present investigation (during April 2015 – March 2016), is presented in table.

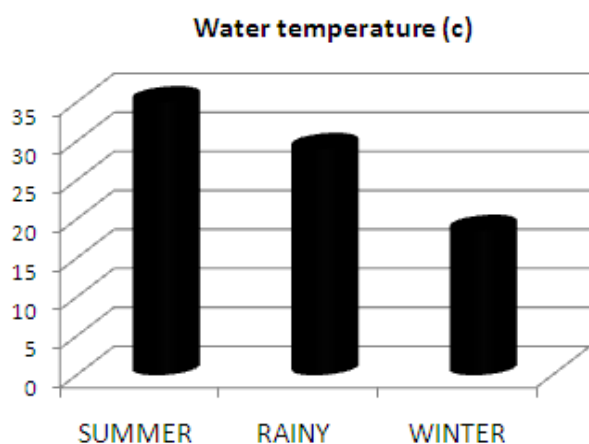
Seasonal Variation of Physio-Chemical Characters of Rang Mahal (Water Logged Area of Suratgarh) In Sri Ganganagar District Rajasthan (April 2015- March 2016)

Parameter	Season		
	Summer	Rainy	winter
Water temperature (°C)	35	29	18.5
pH	7.5	8.1	8.5
Turbidity NTU	49	40	39
EC ds /m	4.40	4.30	4.13
Salinity mg/l	26,400	25,800	24,780
Do mg/l	8.0	8.8	10.5
Total Alkalinity mg/l	140	260	370
Phosphate mg/l	4.3	6.5	3.5

Water Temperature

Temperature is a physical factor that alters the water characteristics and considered as an important factor in controlling the fluctuation of plantation and functioning of aquatic ecosystem .In the present investigation seasonal variability of atmospheric and water temperature have been observed. It was maximum (35⁰C) during summer and minimum (18.5⁰C) during winter. This investigation is also in close conformity with the finding of Singh and Mathur, (2005). Chaturbhuj *et.al.*, (2004,)

Figure no. 2

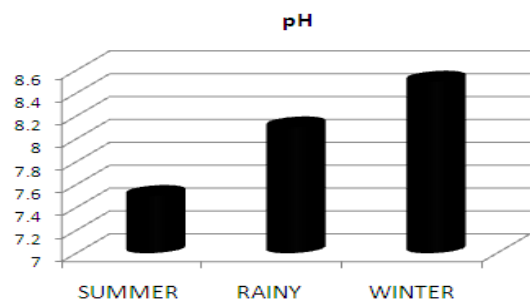


Seasonal Variation in Water Temperature of Rang Mahal (Water Logged Area of Suratgarh) During one year Study Period

pH

pH determines the acidic and basic characters of water. It is a index of general environmental condition.. The maximum pH value were in the month of June 8.5 and minimum in the month of December 7.5 and are related to photosynthetic activity of phytoplankton and macrophytes resulting in CO2 utilization .The similar finding given by Brose and Bhawe, 2000, Satpathy *et.al.*, 2007, Bhat, 2009 and Kumar *et. al.*, 2009)

Figure no. 3

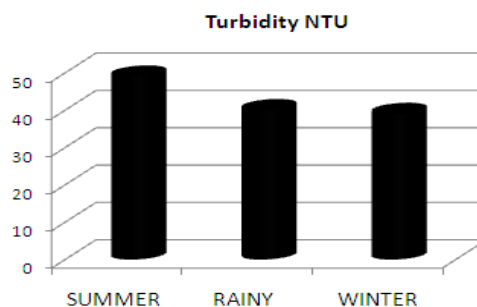


Seasonal Variation in pH of Rang Mahal (Water Logged Area of Suratgarh) During one year Study Period Turbidity.

Turbidity reduces the amount of light penetrating the water due to the presence of various suspended particles such as clay, silt, plankton,

algae, etc. In the present investigation the turbidity of water was found maximum 49 NTU during the summer season and minimum turbidity 39 NTU was obtained during winter . Similar findings have been projected by offem *et al.* (2011) and Tamrakar and Raj (2013).

Figure no. 4

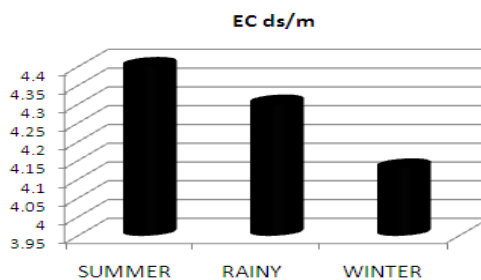


Seasonal Variation in Turbidity of Rang mahal (Water Logged area in Suratgarh) During one year Study Period

Electrical Conductivity (EC)

Electrical conductivity of the water depends on the nature and concentration of salts. In the present study high values of conductivity, High conductance leads to salinity problem, eutrophication and finally leads to pollution of water body .The values of electrical conductivity maximum 4.40 ds/m during summer and minimum 4.13 ds/m during winter season. Similar results were observed by various workers (Datta and Bhagwati, 2007; Hulyal and Kaliwal, 2011; Ramulu. and Benarjee, 2013).

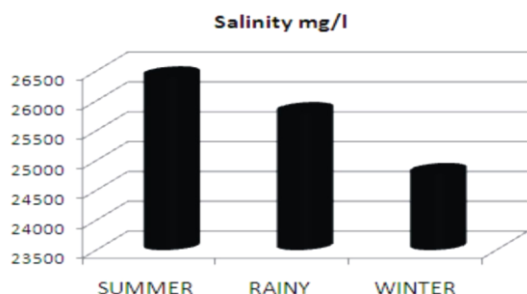
Figure no. 5



Seasonal Variation in Electrical Conductivity of Rang Mahal (Water Logged area of Surtagarh) During one year Study Period Salinity

Salinity is the saltiness or dissolved salt content of a body of water Salinity is an important factor in determining many aspects of the chemistry of natural water and of biological processes within it.in the present investigation the maximum salinity 26,400 mg/l observed in summer season and minimum salinity 24,780 mg/l observed in winter season. (Verma *et al.*, 2012).

Figure no. 6

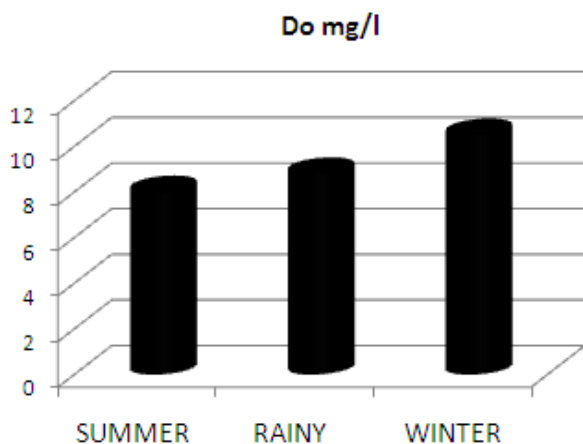


Seasonal Variation in Salinity of Rang Mahal (Water Logged Area of Suratgarh) During one year Study Period

Dissolved Oxygen (DO)

Dissolved oxygen is regarded as one of the best indicator to assess the health of a water body. Minimum DO of water was recorded in the month of May (8.0 mg/L) and maximum in December (10.5 mg/L). Results of the present study are similar to those reported by other workers S.B Hulya. And B.B Kaliwal (2011), N.K. Ramulu *et.,al.*, (2013) B.N Prasad (1985) . The maximum dissolve oxygen in winter may be due to low atmospheric temperature and minimum dissolve oxygen in summer may be due to high metabolic rate of organisms.

Figure no. 7

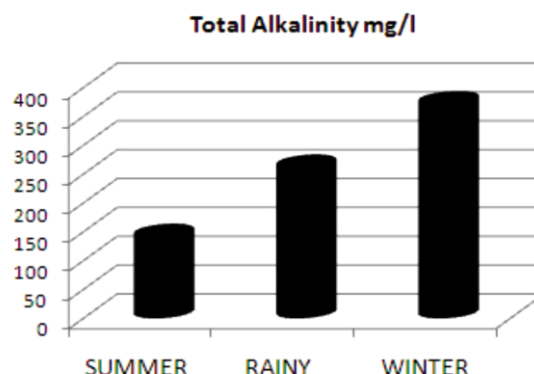


Seasonal Variation in Dissolved Oxygen of Rang Mahal (Water Logged Area of Suratgarh) During one year Study Period

Total Alkalinity (TA)

Total alkalinity is imparted by presence of bicarbonate, carbonate and hydroxide and less frequently in wetland by borate, silicate and phosphate. Total alkalinity obtained in the range of 140 mg/l to 370 mg/l. In the present investigation the highest value shows during the winter months and lowest in the summer months. Similar trend was reported by Dhembare (2011).

Figure no. 8



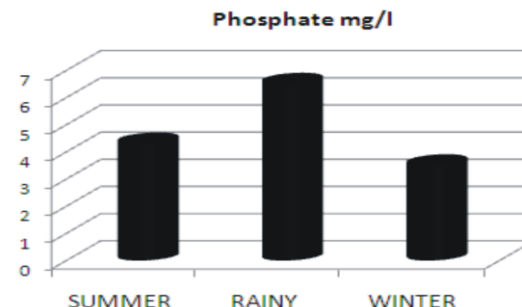
Seasonal Variation in Alkalinity of Rang Mahal (Water Logged Area of Suratgarh) During one year Study Period

Phosphate (PO4---)

Phosphate is the key nutrient also causing eutrophication leading to extensive algal growth. Data from the observation showed that maximum amount of phosphate present in monsoon season and declined in Summer season in the year.

The seasonal mean of the year 6.5 mg/l to 3.5 mg/l. These high nutrient levels during periods of peak bird densities, attributable to bird droppings, is also supported by Sathya and Sharma (2009), Zuber and Sharma (2007) and Parrayet *al.* (2010).

Figure no. 9



Seasonal Variation in Phosphate of Rang Mahal (Water Logged Area of suratgarh) During one year Study Period

Conclusion

From the present study it is observed that seasonal variation has highly influenced on the physic-chemical characteristic of water. Data of alkalinity and dissolved oxygen showed the favourable environment of water for aquatic life though it is not useful for drinking, irrigation and any culture purpose. High Concentration of Salinity, DO, Phosphate value indicate that the water logged is moderately eutrophicated that is suitable for migratory birds. All value of waterlogged area cross permissible value of (WHO)

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