EVALUATION OF ORGANIC CARBON AND OTHER ELEMENTS FROM THE SOIL OF SAMBHAR LAKE AND ADJOINING LOCATIONS DURING THE WINTER SEASON

Abstract

The main purpose of this research is to profile of soil of sambhar Salt Lake. Organic carbon can be taken as a parameter of soil health. It is imperative to understand the relationship between wetlands and activities. The present work is aimed at the assess analytes of soil samples of sambhar lake. It is done because a large number of migratory birds died at sambhar lake in 2019 and 2020. The study area was the three sites lake. The research mainly includes measurements of organic carbon, iron, zinc, copper and manganese by standard techniques. This research concludes that all elements in wetlands provide a basis for the formulation of gambits for evaluation. Proposed the development of a stress-free ecosystem.

Keywords: Environment, Eco System, Gambits, Migratory Birds, Organic Carbon, Wetlands

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I. INTRODUCTION

Soil is a valuable cache that maintains life. Research in the field of micronutrient profiling of soil has become an important area to find out the incidence of dearth and retorts of various crops to them. Simultaneously this helps to reassess the state of resources of the elements. Living soil biota and dead biotic material form soil organic carbon. Organic carbon constitutes the food web of soil. Soil carbon pool plays a chief role in the investigations of the greenhouse effect and global variations (Zhi *et al.*, 2013). Organic carbon can be taken as a parameter of soil health. Climate change affects mineral constitution. For the carbon cycle, exchange between the soil and the environment is important. Iron is considered the fourth most abundant element on the earth.

The correlation of various elements present in the soil can help in making the strategies to prevent deficiencies or excess. The wetland ecosystem helps in maintaining biodiversity by governing climate change. A sink of carbon is formed in the soil of wetland soil due to residues of vegetation which are accumulated in the form of organic matter (Liao *et al.,* 2007 Shang *et al.,* 2015).

It is imperative to understand the relationship between wetlands and activities. The Sambhar Salt Lake is a saline wetland in Rajasthan hospitable to a large number of flamingos along with a good number of Pelicans every year. Constant reduction of Sambhar Lake in Rajasthan with the worsening of soil and water quality forced a rapid restitution move for conservation of wetland. Measurement of elements from the soil will help in understanding the transfer of minerals from the soil to the crop (Ondo *et al.,*2013).

A large number of migratory birds died in the year 2019 which triggered a descent in the number of migratory birds during the year 2020 at Sambhar Lake. Since the migratory prototype of birds was influenced by the death of a large number of birds in 2019, it became essential to investigate the health of lake soil to protect biodiversity. The present work is aimed at the assess analytes of soil samples of sambhar lake collected from different sites to evaluate alterations in the characteristics of soil after the 2019 tragedy. For top-quality land management, appraisal of the physical behavior of soil to recognize changes in the soil is very significant and of major concern (Campos *et al.,* 2007).

The result of the present research would give an insight into the features affecting the attributes of the lake. The objective of this investigation was to appraise the alterations of the soil samples collected from various sites of Sambhar Lake considering different mineral analytes that might affect the diversity in this lake. This will assist in evaluating ecosystem management and restoration.

II. MATERIALS AND METHODS

1. **Study area:** Study area incorporated Sambhar Salt Lake, Rajasthan, India. This saline lake is lying at a latitude and longitude of 26°55'12"N and 75°12'00"E respectively. It is situated off National Highway 8 about 64 km northeast of Ajmer and 96 km southwest of Jaipur, extending up to Nagpur district in Rajasthan. The lake is elliptical running about 22 km in length and is surrounded by Aravalli Mountain ranges. It occupies an area of approximately 230 km2 with a width varying from 3 to 11 km. The average depth of

water in the lake is 1 m in the dry season and the maximum depth is 3 m which is achieved during the monsoon season. The Sambhar Lake is of geological importance because of its different physical and chemical characteristics. Sambhar is designated as a Ramsar site (wetland of international importance) as it is a key wintering area for thousands of flamingos and other migratory birds from northern Asia.

2. **Collection of samples:** The soil samples were collected during December month in sterilized bags in triplicate from three sites. Samples were collected from the depth of 0 to 20 cm. A site I included Sambhar Lake; site II included the Jhapok dam and site III incorporated a water body from Phulera, Jaipur. The samples were brought to the laboratory in an ice box and analyzed immediately.

3. **Analyses:** The standard methods were used to measure organic carbon, iron, zinc, copper and manganese.

4. **Statistical analysis:** The data obtained from the different sites were analyzed in duplicate and appraised as mean values± standard error. Since site III was away from the proper Sambhar Lake area, soil samples collected from site III were considered control samples.

III. RESULTS AND DISCUSSION

Mean values of organic carbon, iron, zinc, copper and manganese with standard error are presented in Tables 1, 2 and 3, respectively for sites I, II and III. Mean changes are depicted in figures 1(organic carbon, iron and manganese) and 2 (zinc and copper). Mean values of organic carbon, iron and zinc were observed to be lower in the samples from the site I and II as compared to the samples from site III. Mean values of copper and manganese were found to be lower in the samples collected from site II and site III as compared to the site I.

Soil carbon pool works as the principal carbon pools in the ecosystem. The reservoirs and distributed model of soil organic carbon can be useful to foresee the feedback between the ecosystem and alterations in climate (Jia *et al.*, 2012). It can be suggested that distribution patterns can help in understanding the long-term living mechanism (Jia *et al.*, 2006). The rise in temperature of the soil can enhance the decomposition rate of organic matter by microorganisms present in the soil (Tong *et al*., 2014).

Iron is a micronutrient required for the growth of the plant. The concentration of iron along with its availability in soil is affected by many factors including pH, moisture, organic matter, zinc, manganese etc. Uptake of iron is inhibited by excessive manganese and zinc. Iron deficiency can be observed in the plants due to many factors along with alkaline soil or when zinc and manganese levels are higher. Soil naturally contains copper ranging from 2 to 100 ppm. A high proportion of copper is present in the soil in bound form with organic matter. Shi *et al.*, (2018) studied the interaction of copper and zinc in the soil. In a study, A stronger impact on the availability of heavy metals in soil was exerted by pH and organic matter content together (Hou *et al.*, 2019).

The warming of climate can enhance soil carbon decomposition within a short period. A systematic analysis of the mechanisms of the impacts of altering temperature on the decomposition of soil carbon should be made (Wu, 2007). Production of ferroalloy can generate a variety of metals into the ambience. Manganese is an element of key importance. Iron, zinc and copper are also important. Exposure to manganese derived from dust and suspended aerosols can produce a range of neurological impacts on chronically exposed individuals (Pavilonis *et al.*, 2015).

Table 1: Soil analytes (n=30) of site I (Sambhar Lake)

Sl. No.	Analytes	Mean ±SEM	Range
1.	Organic carbon, %	9.90± 0.001	9.8-10.0
2.	Iron, ppm	10.43± 0.002	10.42-10.44
3.	Zinc, ppm	2.55± 0.0001	2.54-2.56
4.	Copper, ppm	2.44± 0.001	2.43-2.45
5.	Manganese,ppm	10.22± 0.001	10.1-10.3

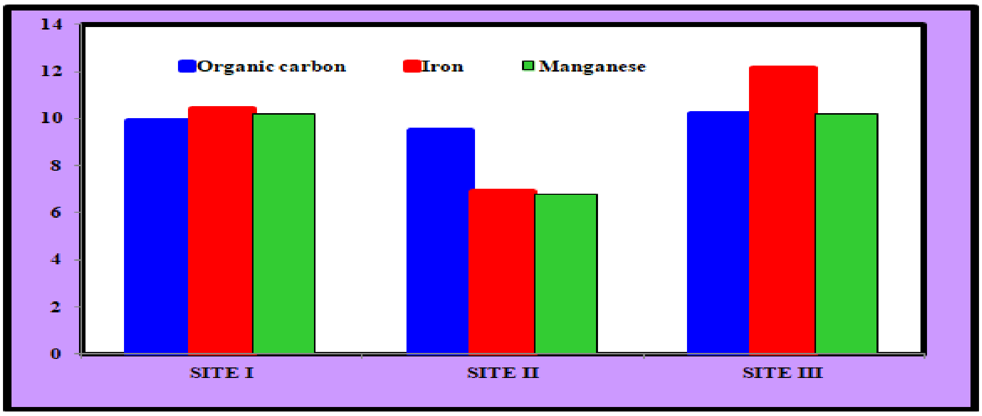
Table 2: Soil analytes (n=30) of site II (Jhapok)

Sl. No.	Analytes	Mean ±SEM	Range
1.	Organic carbon, %	9.50± 0.001	9.4-9.6
2.	Iron, ppm	6.92± 0.002	6.91-6.93
3.	Zinc,ppm	0.71± 0.0001	0.70-0.72
4.	Copper, ppm	2.39± 0.001	2.38-2.40
5.	Manganese,ppm	6.80± 0.001	6.7-6.9

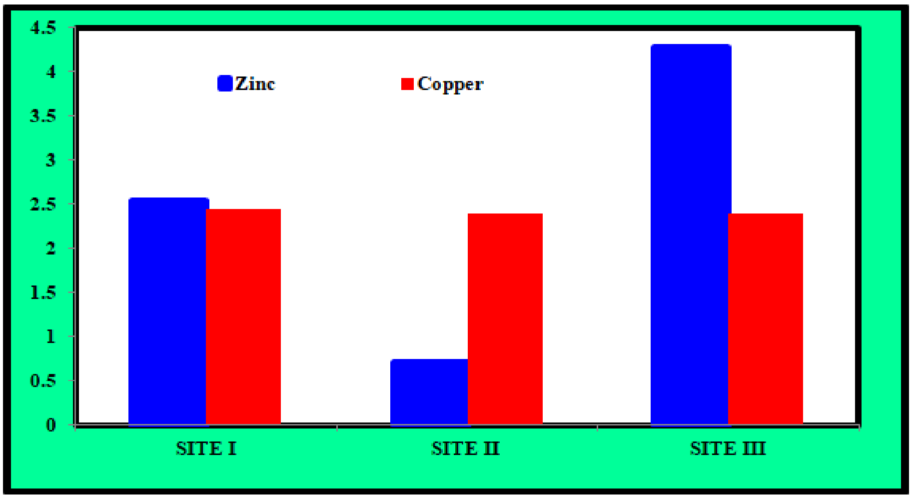
Table 3: Soil analytes (n=30) of site III (Phulera)

Sl. No.	Analytes	Mean ±SEM	Range
1.	Organic carbon, %	10.20±0.001	10.1-10.3
2.	Iron, ppm	12.18± 0.002	12.17-12.19
3.	Zinc,ppm	4.27± 0.0001	4.26-4.28
4.	Copper, ppm	2.39±0.001	2.38-2.40
5.	Manganese,ppm	10.20±0.001	10.1-10.3

Graph 1: Depiction of organic carbon (%), iron (ppm) and manganese (ppm) of soil samples from Sambhar Lake (Site I), Jhapok (Site II) and Phulera (Site III)



Graph 2: Depiction of zinc (ppm) and copper (ppm) of soil samples from Sambhar Lake (Site I), Jhapok (Site II) and Phulera (Site III)



IV. CONCLUSION

This investigation evaluated the distribution of elements in the soil of wetland and adjoining areas. These results can supplement and enliven the data of soil carbon and other elements in wetlands in to provide a basis for the formulation of gambits for the evaluation of ecological function and management. Data revealed that there is a paucity of work on this aspect in the area in and around Sambhar Lake, thus the result of the present study will assist to comprehend the variety of chemical properties for better planning to execute ecological management.

It can be proposed that for the development of a stress-free ecosystem, an adequate regulatory framework for the conservation of wetlands must be executed.

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