



ORIGINAL ARTICLE

Comparative Analysis of pH and Alkalinity in the water of Dal Lake and Nageen Lake, Kashmir, India**Nazia Koser¹ and Mohd Jabbar²**¹ School of Earth Science, Central University of Rajasthan² School of Bioscience and Biotechnology, BGSBU RajouriEmail: naziakoser90@gmail.comReceived: 7th Oct. 2017, Revised: 28th Nov. 2017, Accepted: 1st Dec. 2017**ABSTRACT**

Water bodies are very important from the point of view of human health as these are the main sources of drinking water supply in concerned area. Any disturbance in water quality will affect the human health in many ways. Household sewage and other waste material is responsible for water quality deterioration. Use of plastic is also an important reason. Keeping these points in view, the present study is undertaken to analyse the pH and alkalinity to assess the water quality of Dal and Nageen Lake in Kashmir.

Key word: pH and Alkalinity in the water of Dal Lake and Nageen Lake

INTRODUCTION

A Lake is a reflection of its watershed as watershed landscape-the topography, soil, geology and vegetation-determines the kinds of materials entering into Lake that in turn reflects its water quality. Dal Lake and Nageen Lake are situated in the State of Jammu and Kashmir (J&K), the northern most state of India, strategically surrounded by four countries, on the east by Tibet, on the North-East by China, on the North by Afghanistan and on the west by Pakistan. Dal Lake is a Himalayan urban Lake, located in the heart of Srinagar (34°18'N latitude and 74°91'E longitude) at an average altitude of 1583 m. There has been growing concern about the needs to protect the environment from various forms of pollution caused by growing population, industrialization and by modern agricultural methods (Hunt & Wilson 1986). Water and land based anthropogenic activities within the system and in the catchment including the release of nutrients, organic matter, toxic chemicals and water borne pathogens have a negative effect on water quality. Nutrient enrichment of Lakes is considered to be one of the major environmental problems in many countries. Though it stimulates the growth of plants (algae as well as higher plants), nutrient enrichment ultimately leads to deterioration of water quality and degradation of entire ecosystems. In recent decades, population growth, agricultural practices and sewage runoff from urban areas have increased nutrient inputs many folds to the level of their natural occurrence, resulting in accelerated eutrophication. Most urban and rural Lakes have vanished under this pressure with worldwide environmental concerns. However in those Lakes that could endure, drinking water supply is either substantially reduced or is non-potable, flood absorption capacity impaired, biodiversity threatened and there is diminished fish production.

MATERIALS AND METHODS**Study Area Description:**

The Valley of Kashmir is a lacustrine basin of the intermountain depression existing between the lesser and Greater Himalayas characterized by numerous aquatic ecosystems of great ecological and economic importance. Freshwater Lakes of Kashmir Himalayas have important multistage components like source of drinking water, irrigation, navigation, fishery, agriculture, socioeconomic development and recreation. However, in recent decades, the Lake ecosystem has changed drastically and come into exacerbated trend because of disturbances in the catchment areas. As a result of heavy anthropogenic pressures, the Lake surface area is shrinking with deterioration of water quality. The main problem of these Lakes is nutrient enrichment from

catchment area in the form of domestic wastewaters (residential areas) and runoff from agricultural fields.

For the present study, five sampling sites are chosen in Dal Lake and five are from Nageen Lake to assess the water quality of these two Lakes in two different seasons (August and December).

1. Site 1 is located at latitude $34^{\circ} 08' 45.99''\text{N}$ and longitude $74^{\circ} 50' 48.23''\text{E}$ near Duck Park. Site 2 is located at latitude $34^{\circ} 08' 45.78''\text{N}$ and longitude $74^{\circ} 50' 34.34''\text{E}$ near Sewage treatment plant Habak. Site 3 is located near Primary health centre, Habak at latitude $34^{\circ} 08' 21.53''\text{N}$ and longitude $74^{\circ} 50' 23.08''\text{E}$ the average depth of the site is 1.4 m. Site 4 is located at latitude $34^{\circ} 08' 6.26''\text{N}$ and longitude $74^{\circ} 50' 27.44''\text{E}$ near Naseem Bagh. Site 5 is located at latitude $34^{\circ} 07' 43.85''\text{N}$ and longitude $74^{\circ} 50' 31.51''\text{E}$ near Hazratbal Dargh.
2. For the present study five sampling sites of Nageen Lake were selected on the basis of water depth, vegetation, biotic variables and anthropogenic stresses (Figs 1 & 2). The first site with depth of 1.5-2.5 m was located in south west area of Lake near residential area known as Khuj Yarbal. The second site with 4.0 m deep being located in central area of the Lake was clear with patchy growth of macrophytic vegetation. The third site was located near Golf club associated with house boats and its depth ranged from 2.0-2.6 m. The water of this site was slightly turbid compared to first site with sparse growth of macrophytic vegetation. The fourth site was located in the north east side of Hazratbal basin near Ashaibagh bridge acting as inlet source of Nageen basin and receiving water from other basins of Dal Lake. The depth at this site ranged from 2.3-2.7 m. Site five was selected opposite from Ghat 1.

Geological Background of Area:

The Geology of the territories of Jammu, Kashmir and Ladakh have been studied in some detail by R. Lydekkar. He has divided the territory into three different structural Zones: (1) The Panjal (2) The Zaskar (3) The Tertiary Groups

The Panjal forms the Outer plain, the Outer Hills and the Middle Mountains. The s includes the whole of the eastern region from Spiti and Lahol (32.170N Latitude) to the lofty Karakoram Mountains in the north. The Tertiary Groups include the valley of Kashmir and other river Valleys. The oval valley of Kashmir is longitudinal. It is about 1700 metres above sea level. There is a high wall of mountains round the valley. These rise to a height of 5500 metres above sea level. The only outlet of the valley is Baramulla where the Jehlum flows out through a narrow gorge. The entire drainage of the valley of Kashmir and its surrounding areas have only this outlet. In the north, Kashmir has many volcanic rock formations. These are mostly stratified and several thousand metres thick. There are many layers of sedimentary rocks which are found in Liddar valley, Baramulla, district and Banihal Verinag section of the Pir Panjal range. Limestones and shells are common. The rock layers have many fossils. Near Yarkand to the extreme north, shells have been found showing that the region was under sea in the geological past. To the south and west of the valley there are karewa formations which are Lake-laid clays and shales. These are lacustrine deposits and appear like flat mounds on the margin of high mountains. Below these karewas is spread the alluvium of the Jehlum. The highest karewa is near the Pir Panjal. It is 3800 meters above sea level and more than 2100 metres above the level of the Jehlum

Analysis of pH:

pH was measured by using pH meter. The electrode was conditioned (1 M KCl as filling solution) and calibrated with buffer solution of pH 4.0 and 7.0. The samples were stirred well during the measurement for homogeneity.

Analysis of Alkalinity:

Alkalinity was obtained by titrimetric method. Required chemicals are:- Methyl orange indicator(2-3 drops), Phenolphthelene indicator(2-3 drops), and titrate with H_2SO_4 solution(0.02N) till orange color change to pink.

RESULTS AND DISCUSSION

pH is a term used to express the intensity of acidic or alkaline conditions. It is the expression of hydrogen ion concentration, more precisely, the hydrogen ion activity Zutshi, *et al.* (1980). pH is an

important parameter in assessing the water quality. Acidic conditions will prevail as pH value decreases and alkaline conditions will prevail as the pH value increases. The BIS limit for drinking water is 7.0-8.5.

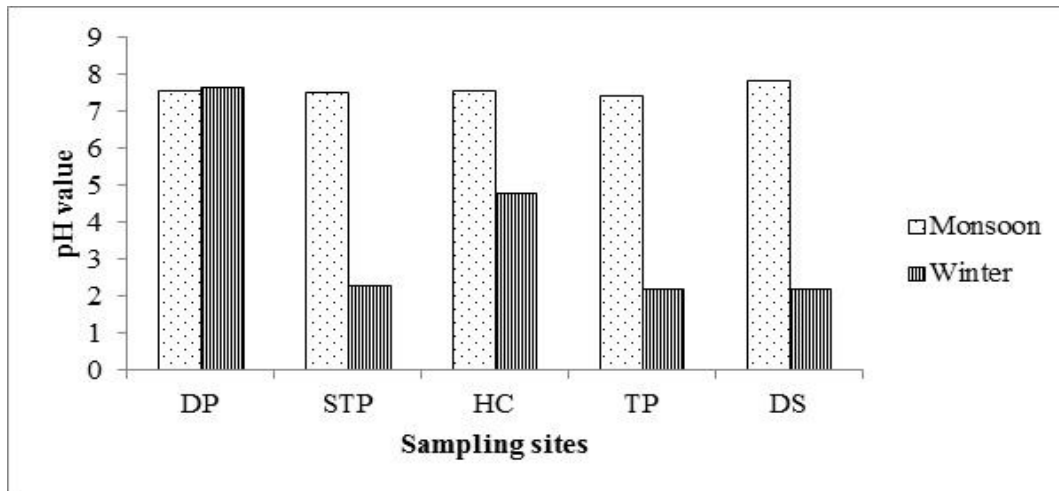


Fig. 1: Showing pH variation in pH values at different sites of Dal Lake

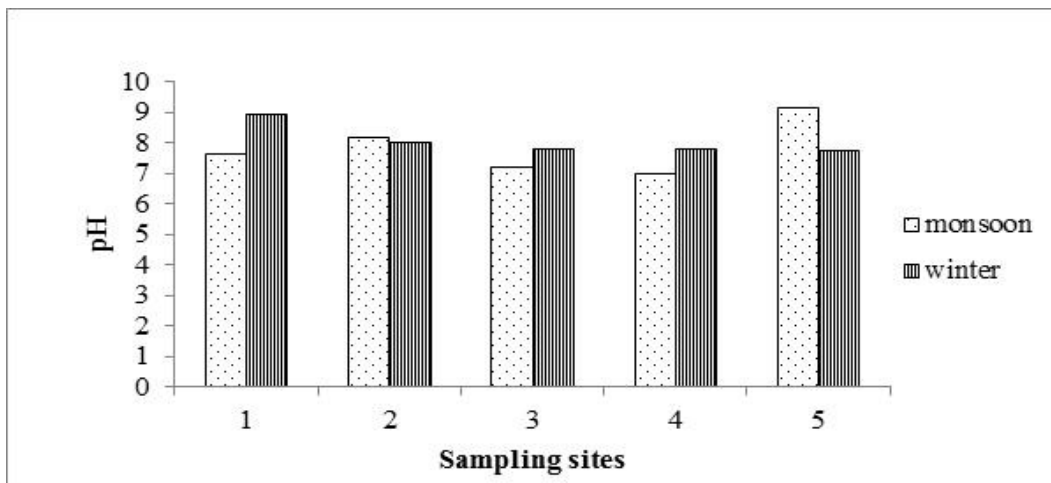


Fig. 2: Showing pH variation in pH values at different sites of Nageen Lake

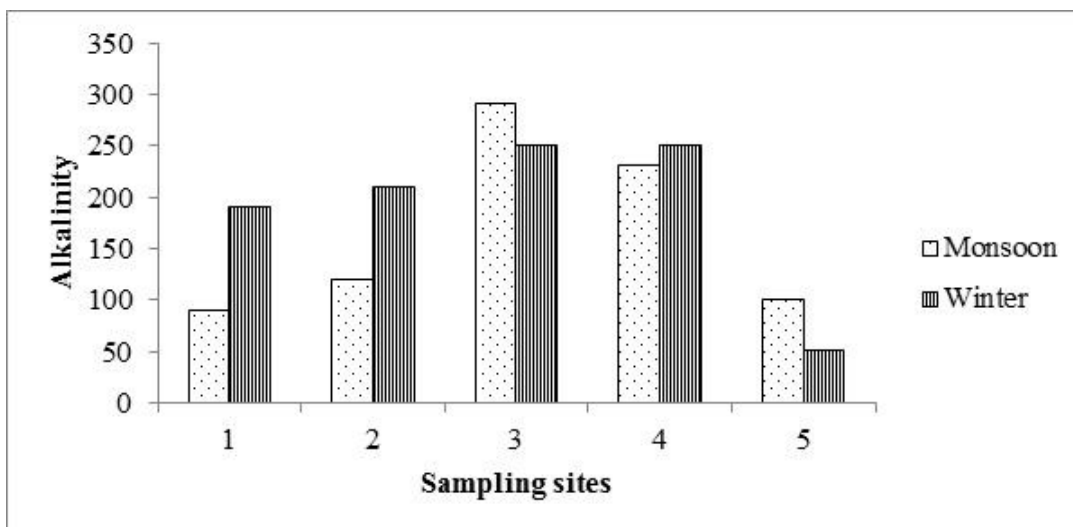


Fig. 3: Showing pH variation in pH values at different sites of Dal Lake

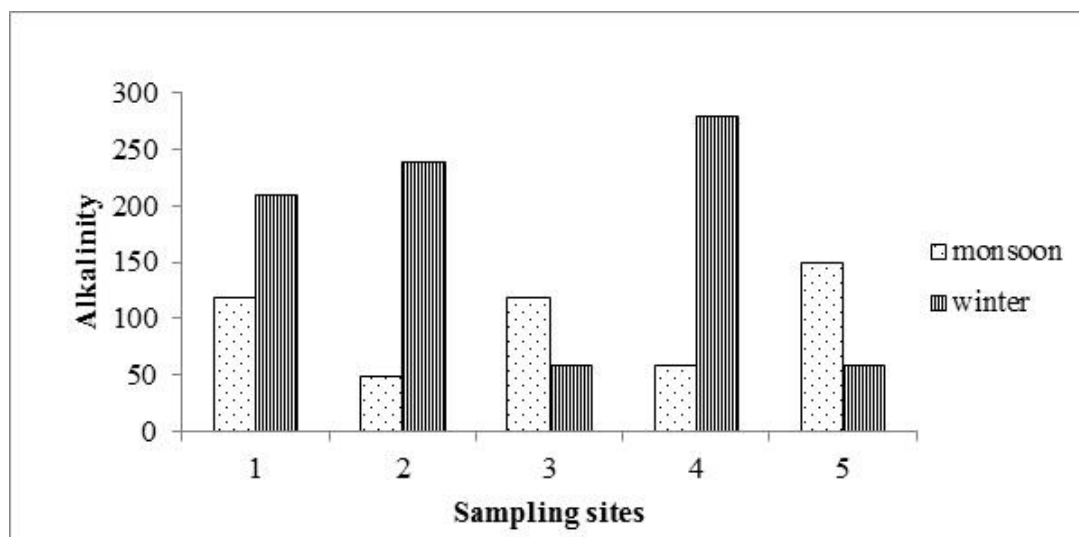


Fig. 4: Showing pH variation in pH values at different sites of Nageen Lake

The pH was slightly alkaline values ranges from 7.8-8.35. The maximum pH value 8.35 was found in site near primary health centre in month of December and minimum 7.5 in site near treatment plant in the month of August in Dal Lake. In Nageen Lake pH value ranges from 6.99 to 9.17 in month of August and 7.78 to 8.93 in month of December. The factors like air temperature bring about changes the pH of water. Most of bio-chemical and chemical reactions are influenced by the pH. The reduced rate of photosynthetic activities reduces the assimilation of carbon dioxide and bicarbonates which are ultimately responsible for increase in pH, the low oxygen values coincided with high temperature during the summer month.

Total alkalinity ranges from 150mg/l to 290mg/l. the maximum value (290 mg/l) was recorded in the month of August (summer) near primary health centre and minimum value (50mg/l) in the month of December (winter) in site near Dargh sharief. The alkalinity was maximum value in August (summer) due to increase in bicarbonates in the water. In Nageen Lake maximum value (280) was recorded in site 4 which is near Habak basin in the month of December.

The present study reveals alterations in pH and alkalinity levels of Dal and Nageen Lake which reflects increased water pollution. It is mandatory to minimize the sources of pollution to control the deterioration of water quality in these Lakes.

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