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Physicochemical Assessment And Water Quality Evaluation Of High-Altitude Sani Lake In Zanskar, Kargil (Ladakh, India)

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Abstract

High-altitude lakes act as important indicators of ecology and freshwater resources in the Himalayas. This study appears at the physicochemical parameters of Sani Lake, which is located in Zanskar, Kargil district, Ladakh (India). Field sampling and laboratory analyses have been utilized to assess water quality in terms of pH, total dissolved solids (TDS), electrical conductivity (EC), hardness, alkalinity, turbidity, and major ions. The results indicated a slightly alkaline pH (7.4), low TDS (120 ppm), soft water hardness (40 ppm), and turbidity within safe limits (3 NTU). The absence of nitrate, nitrite, iron, and chlorine suggested minimal anthropogenic contamination. Overall, Sani Lake water was found to be fresh, soft, and in compliance with WHO and BIS drinking water standards, though the presence of ammonia (0.5 ppm) necessitates further monitoring. This baseline study emphasizes the ecological significance of Sani Lake and provides critical information for future conservation and climate change assessments.

Keywords. Sani Lake, High altitude Lake, physiochemical parameter, water quality, Zanskar, Kargil.

1.Introduction

High-altitude lakes in the Himalayas are fragile ecosystems that reflect the impacts of climate change, glacial melt, and anthropogenic activity. Sani Lake, situated in the Zanskar valley of Kargil district (Ladakh), is one of the significant high-altitude lakes, holding cultural as well as ecological importance. Despite its relevance, little is known about its water quality. This study aims to evaluate the physicochemical properties of Sani Lake water and assess its suitability for ecological sustainability and human consumption.

2. Materials and Methods

Water samples were collected from Sani Lake at important locations. APHA (2017) and WHO (2011) prescribed standard analytical procedures, which were followed. The following parameters were measured: pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Turbidity, Total Hardness, Alkalinity, Fluoride, Chloride, Sulphate, Ammonia, Nitrate, Nitrite, Iron, Chlorine, and Redox Potential (mV). Instruments were calibrated, and samples were tested on three separate occasions to ensure accuracy.

Figure1.1. We collected water samples at an important point on Sani Lake.

Figure 1.2. Zahara Batool determined the PH and redox potential of sani water.

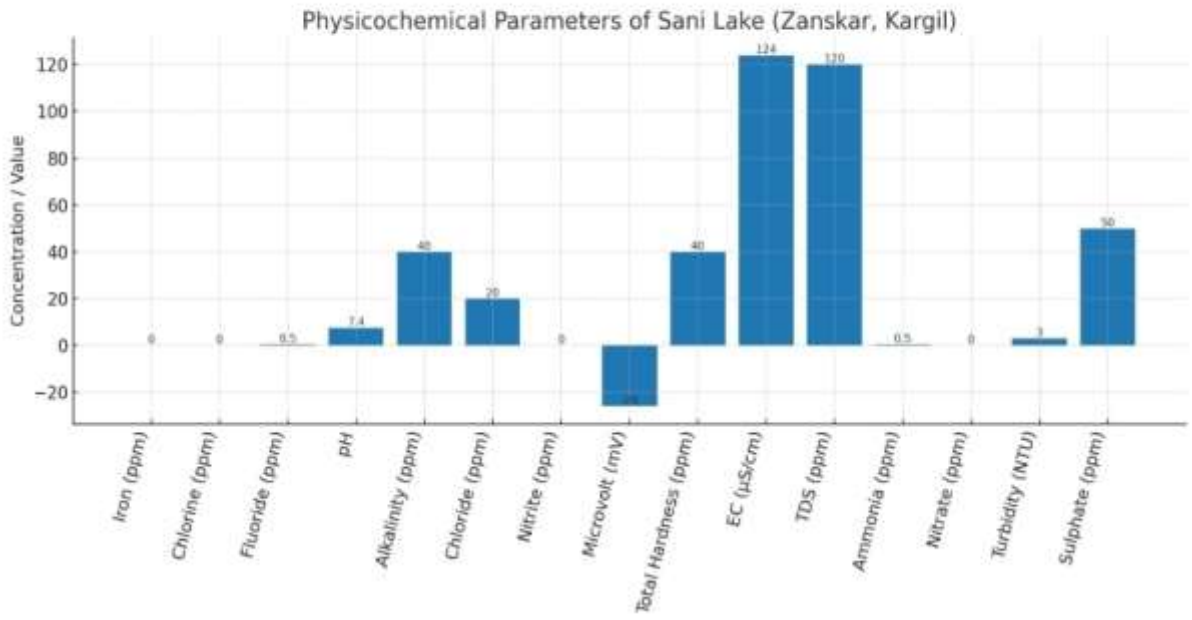
Figure.1.3. Determined the other 20 parameters of Sani water.

Figure 1.4. To determine the TDS and electric conductivity of sani water.

3. Results and Discussion

Parameter	Observed Value	WHO/BIS Limit	Interpretation
pH	7.4	6.5–8.5	Slightly alkaline, within safe range
TDS	120 ppm	<500 ppm	Freshwater, potable
EC	124 µS/cm	<1500 µS/cm	Low ionic concentration
Total Hardness	40 ppm	<75 ppm	Soft, suitable for consumption
Alkalinity	40 ppm	<200 ppm	Moderately buffered
Turbidity	3 NTU	<5 NTU	Clear, low suspended solids
Fluoride	0.5 ppm	0.5–1.5 ppm	Beneficial level
Ammonia	0.5 ppm	<0.5 ppm desirable	Slightly elevated
Chloride	20 ppm	<250 ppm	Safe
Sulphate	50 ppm	<250 ppm	Within safe limit

Iron	0 ppm	<0.3 ppm	Desirable
Nitrate	0 ppm	<50 ppm	Safe
Nitrite	0 ppm	<3 ppm	Safe
Chlorine	0 ppm	<0.2 ppm residual	Safe
Redox Potential	-26 mV	Variable	Slightly reducing environment



4. Conclusion

The physicochemical analysis of Sani Lake confirms that it is a pristine high-altitude freshwater system with outstanding water quality, appropriate for drinking and supporting aquatic life. Apart for slightly elevated ammonia levels, no significant contaminants were identified. This study serves as a baseline for future monitoring of Himalayan lakes under the influence of climate variability, tourism, and human-triggered pressures. Conservation measures and regular monitoring have been suggested to protect the lake's ecological and cultural importance.

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