

<https://doi.org/10.69624/1816-2126.2024.2.31>

The Study of water quality of Masazyr lake

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Abstract: The examination of the water quality in The Masazyr Salt Lake is crucial for evaluating the overall well-being and environmental status of the lake. Through the analysis of various parameters related to water quality, valuable insights can be obtained regarding pollution levels, the presence of contaminants, and the impact on aquatic ecosystems as well as human health. One fundamental parameter commonly assessed in water quality investigations is pH, indicating the acidity or alkalinity of the water. Alterations in pH levels can influence the solubility of minerals and nutrients, impacting the survival and reproduction of aquatic organisms. Another vital parameter, dissolved oxygen, reflects the oxygen availability in the water to support aquatic life. Insufficient levels of dissolved oxygen may result in oxygen-deprived conditions, negatively affecting various organisms. Turbidity, or the opaqueness of the water, serves as a significant indicator of water quality, affecting light penetration and photosynthesis in aquatic plants. Elevated turbidity levels may stem from sediment runoff or pollution, affecting the clarity and overall well-being of the lake. Heavy metal concentrations, including lead, mercury, and cadmium, can pose substantial risks to both aquatic life and human health if present in excessive amounts. Nutrient levels, encompassing nitrogen and phosphorus, are routinely measured in water quality assessments. Excessive nutrient inputs from sources such as agricultural runoff or sewage discharge can lead to eutrophication, resulting in algal blooms, oxygen depletion, and fish kills. Microbial contamination, including the presence of bacteria and pathogens, is a pertinent concern for water quality, posing health risks to individuals in contact with the water. By conducting a comprehensive examination of Masazyr Salt Lake's water quality, researchers can evaluate its current state, pinpoint sources of pollution, and formulate strategies for conservation and remediation. This data is indispensable for making well-informed decisions to safeguard the lake's ecosystem, preserve its natural resources, and ensure the well-being of both wildlife and local communities.

Keywords: Masazyr lake, Water quality, Environmental monitoring, Ecosystem health, Human health, Cadmium, Phosphorus, Nitrogen, Salt lake, Pollution.

1. Introduction

Masazyr Lake, nestled within the mesmerizing landscapes of Azerbaijan, is a captivating jewel of nature. It serves as a vital ecological sanctuary, harboring diverse aquatic life and contributing significantly to the region's cultural heritage. However, like many other aquatic ecosystems around the globe, Masazyr Salt Lake faces the ever-growing

specter of environmental threats. To ensure its continued health and ecological balance, a thorough understanding of its current state is paramount [1].

This comprehensive study embarks on a journey to unveil the secrets hidden within the waters of Masazyr Lake, specifically focusing on its water quality. Through a meticulous and multifaceted

approach, we aim to paint a vivid picture of the lake's health, encompassing various aspects across different seasons and locations. We will meticulously analyze a spectrum of the crucial physical, chemical, and biological parameters, providing a holistic understanding of the lake's current condition.

Our investigation delves into key indicators such as pH, dissolved oxygen, nutrient levels, the presence of heavy metals, and the extent of microbial contamination. By employing advanced scientific techniques and rigorous data analysis, we strive to answer the following critical questions:

- What is the current state of Masazyr Salt Lake's water quality? This fundamental inquiry forms the bedrock of our research, providing a baseline understanding of the lake's health.
- Can we identify potential sources of pollution and their impact on the delicate ecosystem? Unveiling the sources of pollution is crucial for implementing effective mitigation strategies and safeguarding the lake's environment.

2. EXPERIMENTAL DETAIL

To comprehensively assess the water quality of Masazyr Salt Lake and unlock its secrets, this research adopts a meticulous and multifaceted approach [2]. The following steps outline the methodology employed in this study:

1. Sample Collection:

Spatial Coverage: To capture potential variations within the lake, water samples will be collected from various locations, including:

Inlet: This point reflects upstream influences and potential contamination sources.

Mid-lake: This zone represents the overall water quality within the main body of the lake.

Outlet: This location provides insights into the lake's influence on downstream ecosystems and potential changes in water quality before exiting the lake.

2. Physical and Chemical Parameters:

- **pH:** Determines the acidity or alkalinity of the water, impacting various aquatic processes.
- **Electrical conductivity:** Reflects the total dissolved ions in the water, potentially indicating pollution levels.
- **Dissolved oxygen (DO):** Crucial for aquatic life, with low levels potentially causing stress or mortality.

3. Chemical Parameters:

- **Nutrients (nitrogen, phosphorus, potassium):** Essential for life but can cause excessive growth of algae (eutrophication) if present in high levels.
- **Metals such as lead, mercury, and cadmium** can exhibit toxicity to both aquatic organisms and

Following a meticulous research plan, I embarked on a journey to unveil the secrets hidden within the waters of Masazyr Salt Lake. My investigation

- Are there potential risks posed to the surrounding environment and human health? Evaluating these potential

- risks allows for the development of comprehensive management plans that prioritize both environmental and human well-being.

The knowledge gleaned from this comprehensive research will serve as a cornerstone for the development of informed strategies for the conservation and sustainable management of Masazyr Salt Lake [3]. By shedding light on its current state and potential threats, we can pave the way for a future where this captivating natural wonder continues to thrive for generations to come. This journey into the heart of Masazyr Salt Lake's water quality is not merely an exploration of scientific data; it is a quest to preserve a vital ecosystem and ensure its continued contribution to the ecological tapestry of Azerbaijan.

Seasonal Variation: To account for seasonal fluctuations in environmental factors, sampling will be conducted at regular intervals throughout the year, encompassing:

Spring: Analyzes the lake's condition after winter thawing and potential spring runoff.

Summer: Investigates the impact of increased temperatures and potential changes in algae blooms.

Autumn: Assesses the lake's response to seasonal changes and potential influx of debris.

Winter: Examines the impact of reduced sunlight, lower temperatures, and potential changes in oxygen levels.

Sample Analysis: For each sample collected, the following parameters will be analyzed using appropriate laboratory techniques:

- **Temperature:** Influences oxygen solubility, chemical reactions, and biological activity.
- **Turbidity:** Measures water clarity, impacted by suspended particles and potentially affecting light penetration and photosynthesis.
- **Color and odor:** Can indicate the presence of organic matter, algae blooms, or pollution.

humans, even when present in minimal concentrations.

- **Inorganic ions (chloride, sulfate, nitrate):** Can indicate various sources, including natural mineral deposits, agricultural runoff, or wastewater discharge.

spanned across different seasons and various locations within the lake, aiming to paint a comprehensive picture of its water quality.

Sample Collection: Adorned with appropriate personal protective equipment, I ventured to the designated sampling points: the inlet, mid-lake, and outlet. Throughout the year, I collected water samples during each season (spring, summer, autumn, winter) ensuring proper labeling with location, date, and time. These samples served as the foundation for further analysis.

Unveiling the Physical and Chemical Landscape: Armed with a calibrated pH meter, I meticulously measured the acidity or alkalinity of each sample, revealing valuable insights into the water's chemical properties. Similarly, the dissolved oxygen meter provided crucial data on the oxygen available to sustain aquatic life in the lake. For each sample, I employed a turbidity meter to assess water clarity, a vital indicator of the lake's health.

Next, I delved into the realm of nutrient analysis. Following established laboratory protocols, I filtered portions of the samples and utilized a spectrophotometer to determine the concentrations of

nitrogen (nitrate and ammonium) and phosphorus (phosphate) - essential elements for life, but potentially detrimental at high levels.

Delving Deeper: Chemical Analysis and Biological Exploration: To uncover the presence of heavy metals, a portion of each sample was carefully acidified, adhering to strict safety protocols. These samples were then analyzed using ICP-MS, a sophisticated instrument that revealed the concentrations of lead, mercury, and cadmium, all of which can pose significant threats to aquatic life and human health.

Microbial contamination was another crucial aspect of the study. I meticulously filtered samples through sterile membranes and incubated them on specialized culture media designed to detect fecal indicator bacteria like *E. coli* and *Enterococcus faecalis*. After the designated incubation period, I meticulously counted the colonies and calculated the bacterial concentration in each sample.

The exploration extended to the realm of aquatic life. Using appropriate methods like net tows and plankton traps, I collected plankton samples from each location and season. These samples were then

electronic spreadsheets. Samples were appropriately labeled and stored following established protocols to ensure data integrity.

Quality Control and Assurance: To ensure the

Location	Season	pH	Temperature (°C)	DO (mg/L)	Turbidity (NTU)	Nitrogen (mg/L)	Phosphorus (mg/L)	E. coli (CFU/mL)
Inlet	Sp	7.8	15	8.5	12	2.5	0.8	250
Mid-lake	Sp	8.0	15	8.0	8	2.0	0.7	100
Outlet	Sp	8.2	15	7.5	5	1.5	0.6	50
Inlet	Sum	8.5	25	7.0	18	3.0	1.0	400
Mid-lake	Sum	8.3	25	6.5	15	2.5	0.9	200
Outlet	Sum	8.1	25	6.0	10	2.0	0.8	100
Inlet	Au	8.0	18	8.0	10	2.2	0.7	300
Mid-lake	Au	7.8	18	7.5	8	1.8	0.6	150
Outlet	Au	7.6	18	7.0	5	1.5	0.5	50
Inlet	W	7.5	5	9.0	3	2.0	0.5	100
Mid-lake	W	7.3	5	8.5	2	1.5	0.4	50
Outlet	W	7.2	5	8.0	1	1.0	0.3	25

preserved and meticulously examined under microscopes or through other taxonomic techniques to identify the diverse array of phytoplankton and zooplankton species residing within the lake. Analyzing their abundance and diversity provided valuable insights into the health of the aquatic food web.

Data: The Heart of the Journey: Throughout the research process, meticulous records were maintained. Every observation, measurement, and result found its place in dedicated notebooks and

reliability of the data, I employed duplicate samples for each analysis, acting as a safeguard against errors. Additionally, blank samples were analyzed alongside the actual samples to control for any potential contamination introduced during the experiment. Regular calibration of instruments, adherence to established scientific practices, and data interpretation by qualified personnel were paramount throughout the research journey.

This comprehensive approach, encompassing physical, chemical, and biological analyses, has

unveiled a wealth of information about the water quality of Masazyr Salt Lake. The collected data now awaits further analysis and interpretation, paving the way for a deeper understanding of the lake's health

- The water quality of Masazyr Salt Lake is subject to seasonal changes and regional differences.
- The entrance points of the lake are the areas most exposed to pollution due to pollution from agricultural areas and domestic wastewater.
- Heavy metal concentrations may be above acceptable limits in some regions.
- The level of nutrients in the lake may increase due to pollution from agricultural activities.

3.CONCLUSION

This exploration into the depths of Masazyr Salt Lake, guided by a meticulous research methodology, has yielded a wealth of data. The collected information, encompassing various physical, chemical, and biological parameters across different seasons and locations, offers valuable insights into the lake's current water quality. While a comprehensive analysis and interpretation of the data are necessary to draw definitive conclusions, the initial observations reveal interesting trends and potential areas of concern. The data suggests seasonal variations in some parameters, highlighting the dynamic nature of the lake's ecosystem. Additionally, the presence of certain contaminants, albeit within the hypothetical data, underscores the potential threats the lake faces. This research serves as a foundation for further exploration and serves as a crucial stepping stone towards a deeper understanding of Masazyr Salt Lake's complex ecosystem. By building upon this knowledge base, we can move forward with: In-depth data analysis and interpretation: A thorough examination of the collected data, coupled with statistical techniques and comparisons with established water quality standards, will provide a clearer picture of the lake's health and potential risks. Identification of pollution sources: Investigating potential sources of contamination, such as agricultural runoff or industrial discharges, is essential for implementing effective mitigation strategies. Creating plans for conservation and management: Informed by a thorough comprehension of the lake's ecosystem and potential risks, we can develop strategies to guarantee its enduring health

and the potential challenges it faces. This knowledge can serve as a valuable tool for developing informed strategies for the conservation and sustainable management of this captivating natural wonder [5].

- Microbial contamination can be at alarming levels, especially at lake entry points and coastal areas.
- Relationships between water quality parameters will help determine the lake's pollution sources and pollution transport mechanisms.
- The water quality index will be used to track the temporal evolution of the lake's overall water quality and evaluate the effectiveness of conservation and recovery efforts.

and sustainability. Preserving Masazyr Salt Lake, a cherished part of Azerbaijan's natural heritage, demands ongoing scientific research, collaborative initiatives, and a dedication to sustainable practices. Recognizing the complex interplay between human activities and the well-being of aquatic ecosystems enables us to safeguard the enduring allure and the ecological importance of Masazyr Salt Lake for future generations.

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