



Sultanate of Oman

Ministry of Education

Al-Fadl Bin Al-Hawari Basic Education
School (Grades 5-10)



**A study of the impact of water from Lake Al-Kroum in the village of
Maqzah**

**Its suitability for agricultural use and a comparison with the school's
water supply**

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Introduction:

This research focuses on the existence of a lake in the Muqzah area of Izki Governorate. A large quantity of water emerged during mining operations conducted by a chrome company, and the locals named it "Lake Al-Krum" (The Chrome Lake). Local residents and farmers believe this lake is unsuitable for agricultural use and may negatively impact their crops.

Abstract:

This research aims to study the suitability of the water from Lake Al-Krum in Muqzah village for agricultural use. We observed a belief among the locals that this lake could negatively affect their crops.

The research questions are:

- 1- How suitable is the water from Lake Al-Krum for agriculture?
- 2- Does this water affect the quality of agricultural production in Muqzah village?

The work was divided between students Omar and Mudrik. The water protocol was applied, and measurements of conductivity, transparency, temperature, and dissolved oxygen levels were taken from both Lake Al-Kroum and the school water. Omar took the measurements from Lake Al-Kroum, and Mudrik took the measurements from the school water. After analysis, we found that the pH values were good in both waters, approximately 8.5. We also observed that the conductivity and dissolved salt values in the lake water were 524 $\mu\text{S}/\text{cm}$, while they were higher in the school water, reaching 947 $\mu\text{S}/\text{cm}$. The transparency values were above 120, indicating very clear water. The dissolved oxygen levels were suitable for both waters, ranging from -mg/L in the school water to 8-10mg/L in Lake Al-Kroum.

Research Questions:

1. How suitable is Lake Al-Kroum water for agriculture?
2. Does this water affect the quality of agricultural production in the village of Muqzah?

Introduction:

A lake is defined as a body of land containing water and surrounded by land on all sides. Lakes can be fresh or saline and are located at varying elevations depending on their geographical features. The nature of lakes depends on their surrounding area and their water source, making them unique ecosystems that influence biodiversity and human uses.

Lake Al-Kroum is a tectonic lake, formed by the collapse and hollowing of rock layers, allowing water to collect within it through these rock fissures. Therefore, studying its water quality and its use in agriculture is crucial, especially in areas that rely on natural water sources for crop irrigation.

This research aims to evaluate the effect of Lake Al-Kroum water in the Muqzah area on pepper plant growth compared to the school's water supply. This will be achieved through a scientific experiment measuring growth rate, leaf density and color, and stem thickness. The results will help determine the suitability of the lake water for agricultural use, which could have a positive impact on farmers in the area.

Research Methods:

1- Selecting the research problem, which was identified by the students and then discussed with the supervising teacher.

2. A meeting was held with Engineer Sulaiman bin Saif Al-Harasi, Acting Director of the Agricultural Development Department in the Wilayat of Izki, and Mr. Juma bin Saud Al-Jabri, Head of the Agricultural Development and Water Resources Section.

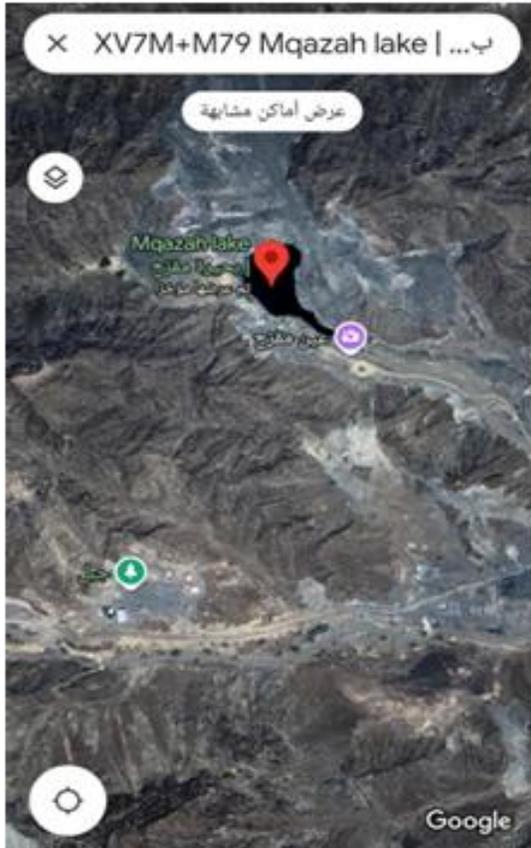
3. A water sample was taken from the lake for Nama Water Services Company in the Al-Dakhiliyah Governorate.

4. The water protocol was implemented, and measurements were taken of conductivity, transparency, temperature, pH, and dissolved oxygen levels in both the Al-Kurum Lake water and the school water.

5. Testing which water is suitable for agriculture: Al-Kurum Lake water or the school water? Ten pepper seedlings were planted in the same climate and soil, one irrigated with Al-Kurum Lake water and the other with school water. Observations were recorded over a full month.

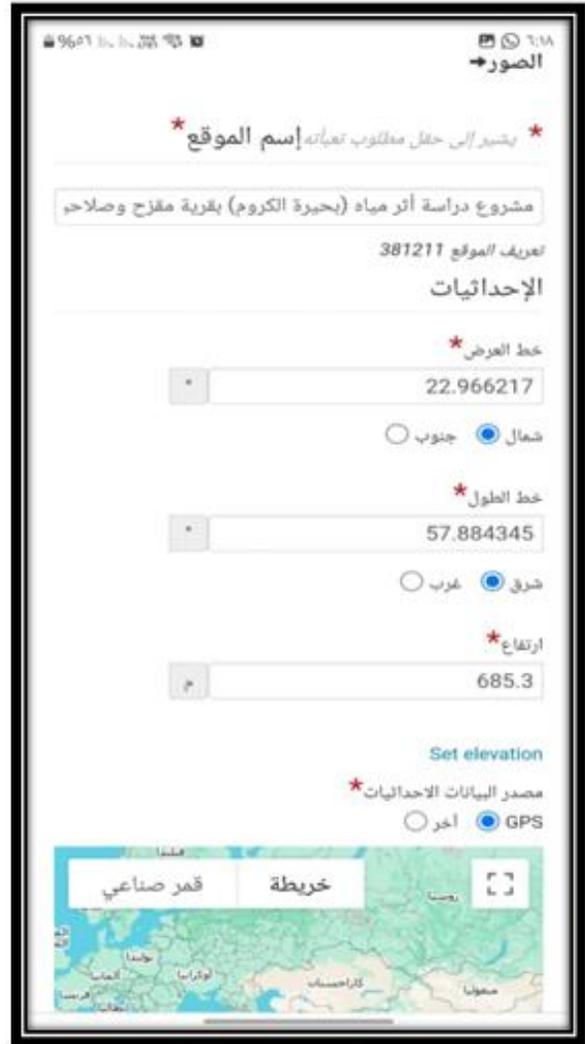
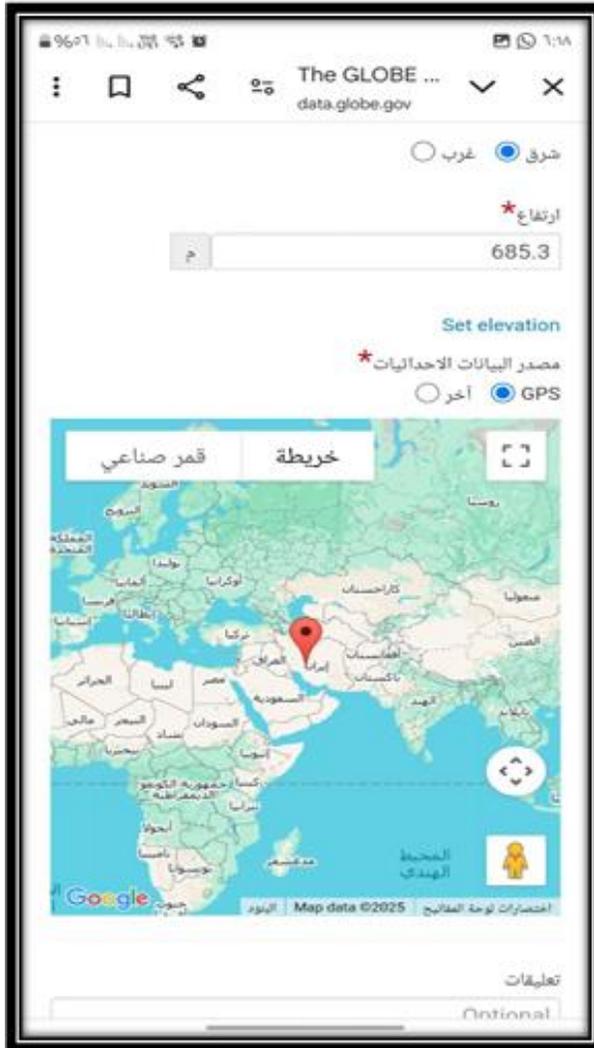
6. The results were compared. A meeting was held with the supervising teacher, and roles were assigned for implementing the water protocol.

Sample site (Sultanate of Oman - Al Dakhiliyah Governorate, Wilayat of Izki, Maqzah village, March, hot weather, and the water protocol was used.



Data Entry:

The data was entered and submitted to the program's website, where a new location was added and the data collected in the search was entered.



Data Collection and Analysis:

Water Type	Conductivity ($\mu\text{S}/\text{cm}$)	Transparency	PH	Temperature ($^{\circ}\text{C}$)	Dissolved Oxygen Percentage
Chrome Lake Water	524	<120	8.4	22.9	9
School Water	947	<120	8	22.9	7

Results:

To answer the first question, we proved that the water in Lake Al-Kroum is suitable for agriculture.

This was done by planting ten seedlings of the same type and in the same soil, placing them in the same location, and watering them with the same amount of water. Five seedlings were watered with lake water, and the other five with school water. We monitored them daily and recorded observations over four days for a full month. Our results are shown in the following tables.

Day	Seedling 1 (cm)	Seedling 2 (cm)	Seedling 3 (cm)	Seedling 4 (cm)	Seedling 5 (cm)	Average (cm)
2	10	10	10	10	10	10
6	10.9	10.8	11.2	11.1	10.7	10.9
10	13.5	13.4	13.8	13.8	13.3	13.5
14	14.9	15.2	15.0	15.6	14.7	15.0
18	16.0	16.2	16.1	16.4	15.9	16.1
22	18.1	18.0	18.4	18.2	17.8	18.1
26	20.0	20.1	20.3	20.5	19.7	20.1
30	22.0	22.2	22.4	22.7	21.8	22.2

Seedlings that are watered with school water:

Day	Seedling 1 (cm)	Seedling 2 (cm)	Seedling 3 (cm)	Seedling 4 (cm)	Seedling 5 (cm)	Average (cm)
2	10	10	10	10	10	10
6	11.2	11.0	11.4	11.1	11.3	11.2
10	14.0	13.9	14.5	14.2	14.6	14.2
14	16.1	15.8	16.4	16.1	16.2	16.1
18	18.3	17.9	18.1	18.2	18.0	18.1
22	20.0	19.7	20.4	20.1	20.2	20.0
26	22.1	21.8	22.1	22.3	22.4	22.1
30	25.0	24.9	25.1	25.4	25.3	25.1



Discussion of Results:

After completing the investigation and comparison, and based on the results, we concluded that the water from Lake Al-Kroum in the village of Muqzah is suitable for agricultural use. We observed that the stem length and thickness, and leaf density, were greater in the seedlings irrigated with the school water than in those irrigated with the water from the school. The conductivity and dissolved salts were relatively high in both waters, and the transparency value was 120, indicating that the water is very clear. We also observed that the pH value was 8.4 in Lake Al-Kroum and 8 in the school water. The dissolved oxygen concentration in the lake water ranged from 8 to 10 mg/L, while in the school water it ranged from - mg/L. Therefore, to answer the first question, we concluded that the water from Lake Al-Kroum is suitable for agricultural use.

To answer the second question, our study showed that the lake water does not negatively affect agricultural production in the village of Muqzah; rather, it increases plant growth and overall agricultural output.

Conclusions:

By applying the water protocol to the samples, we obtained accurate information about the properties of the school water and the lake water. We concluded that the pH values were good in both, and we observed high conductivity in the lake water, making it suitable for agriculture. The transparency values in both waters were 120, and the dissolved oxygen concentration was 10 mg/L in the lake water and - mg/L in the school water.

Based on these results, we concluded that the water from Lake Al-Kroum is more suitable for agriculture than the school water. We advise the residents of the area to utilize this water.

This study can be further developed in the future by using soil and atmospheric protocols for greater accuracy.

The Meeting:

We went to the Department of Agricultural Development in the Wilayat of Izki, accompanied by the supervisor, Mr. Abdullah bin Hamdan Al-Toubi, and met with Engineer Sulaiman bin Saif Al-Harasi, the acting director of the department, and Mr. Juma bin Saud Al-Jabri, head of the Department of Agricultural Development and Water Resources. Engineer Sulaiman Al-Harasi was asked about the relationship between increasing the percentage of oxygen in the water and the rate of plant growth. The engineer replied that the higher the percentage of oxygen, the higher the rate of plant growth, and it also increases the rate of fruit growth.



References and Sources:

- 1- Irrigation Water Quality and Methods of Analysis - by Abdul Rasoul Omran.**
- 2- Water Quality Analysis and Evaluation - by Maher George Nassim.**
- 3- Evaluating Water Quality and Suitability for Agriculture - by Hassan El-Shimi.**
- 4- Farmers in the town where the lake is located.**
- 5- Google.**

Acknowledgments:

We are pleased to extend our sincere thanks and appreciation to everyone who contributed to the success of this research. Special thanks are due to Mr. Abdullah bin Hamdan Al-Toubi, the GLOBE Program Supervisor at Al-Fadl bin Al-Hawari School, for his dedicated efforts, unwavering support, and provision of the tools that enabled us to complete this study. We also thank the school principal, Dr. Mohammed bin Abdullah Al-Amri, for his constant encouragement and urging us to continue. Furthermore, we express our deep gratitude to Engineer Sulaiman bin Saif Al-Harasi, Acting Director of the Department of Agriculture in the Wilayat of Izki, and Mr. Juma Al-Jabri, Head of the Agricultural Development and Water Resources Department. Finally, we thank Nama Water Services Company in the Al-Dakhiliyah Governorate for analyzing a sample of the lake water and identifying its constituent elements.

Badges:



WATER ANALYSIS REPORT

TEST REPORT NO. : 77276		REPORT DATE : 08-Apr-2025						
SAMPLE NO. : DK2504077276		SAMPLE RECEIVED DATE : 4/8/2025 1:06:00 PM						
REQUESTER :		CUSTOMER CONTACT NO :						
REGION : Al Dakhliyah		WILAYAT : Izki						
SAMPLE DESCRIPTION : Al Fadil bin Al Hawariy School - Muqazah lake		SAMPLE SOURCE :						
SAMPLE POINT :		COLLECTION DATE & TIME :						
START DATE OF TESTING : 4/8/2025 1:06:45 PM		END DATE OF TESTING : 4/8/2025 1:09:57 PM						
SAMPLED BY :								
TEST PARAMETERS	METHOD OF TESTING	OMAN STD No. 8/2012		UNIT	LOQ	UoM	RESULTS	AREA
		MIN	MAX					
Inorganic Tests								
Bicarbonate Alkalinity as CaCO3				mg/L	0		130.00	Al Dakhliyah
Calcium as Ca++				mg/L	0		11.92	Al Dakhliyah
Calcium Hardness as CaCO3				mg/L	0		29.80	Al Dakhliyah
Carbonate Alkalinity as CaCO3				mg/L	0		48.80	Al Dakhliyah
Carbonate Hardness as CaCO3				mg/L	0		178.80	Al Dakhliyah
Chloride as Cl-				mg/L	0		50.481	Al Dakhliyah
Hydroxide Alkalinity as CaCO3				mg/L	0		0.00	Al Dakhliyah
Magnesium as Mg++				mg/L	0		51.71	Al Dakhliyah
Methyle Orange Alkalinity as CaCO3				mg/L	0		178.80	Al Dakhliyah
Non Carbonate Hardness				mg/L	0		63.80	Al Dakhliyah
Phenolphthalein Alkalinity as CaCO3				mg/L	0		24.400	Al Dakhliyah
Potassium				mg/L	0		1.60	Al Dakhliyah
Sodium				mg/L	0		29.00	Al Dakhliyah
Total Hardness as CaCO3				mg/L	0		242.60	Al Dakhliyah
Physical Chemistry								
Electrical Conductivity				uS/cm	0		545.00	Al Dakhliyah
pH					0		7.68	Al Dakhliyah
TDS (Calc)	EPA1202			mg/L	0		327.000	Al Dakhliyah
Turbidity				NTU	0		0.90	Al Dakhliyah
OVERALL REMARKS:	THE ABOVE TEST RESULTS ARE ONLY APPLICABLE TO THE SAMPLE(S) REFERRED ABOVE.							

Legend : LOQ : Limits of Quantification

n/a : Not Available

ND : Not Detected

Red Color : Out of specification

UoM : Uncertainty

REPORT VERIFIED BY

Salim Saif Said Al Alawi -Sr.Chemist - lab supervisor

Sr.Chemist -lab supervisor

*** End of Report ***