Sultanate of Oman

THE GLOBE PROGRAM

The Ministry of Education

Directorate General of Education in Al Wusta Governorate

Rima Primary School

Search About:

THE IMPACT OF OIL EXTRACTION OPERATIONS ON GROUNDWATER POWER IN THE NORTHERN GHUBRA REGION

- **Students' names:**
- **Mariam mohammed Hamdy**
- **Suheil Mohammed AL-Harsosi**
- **Shahla Hamad Al-Lahifi.**
- **bdullah Saeed Abdullah AL-Harsosi**
- **Under the supervision of Professor:**
  - **Badriya Hilal Mohammed Al-kaanuni**
  - **Translate by: Mahfooda Hilal Mohammed Al-kaanuni**
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CONTENT

1. Summary:

Is groundwater in northern Gharbah suitable for human use? Is groundwater near the oil fields suitable for farming? What is the effect of the emission of gases on the validity of water in the northern Ghobra? What is the effect of petroleum derivatives on groundwater in the region? What is the effect of petroleum derivatives on agricultural production in the region? The purpose of this research is to determine the effect of oil extraction on groundwater power in the northern Ghubra region. The northern Ghubra region is characterized by the presence of oil extraction companies such as: Petro Gas Rima, Oxy Bmzizna. The northern Ghobra region is a populated area with animal resources and agricultural areas that rely entirely on groundwater whether in drinking or watering crops. By applying soil and water protocols, we will find answers to research questions.

❖ **Keywords:**

*** Groundwater:** is the water that is underground

***Oil fields:** A place where oil wells are abundant to extract crude oil from the ground.

*** Petroleum:** A mixture of complex hydrocarbons, produced from organic matter and compounds consisting of carbon gas and hydrogen.

*** Petroleum derivatives:** A mixture of propane and butane gases such as gasoline and kerosene and diesel.

2. Research questions:

- **Is the groundwater in the northern Ghubra suitable for human use?**
- **Is the groundwater near the oil fields suitable for farming?**
- **What is the effect of the emission of gases on the validity of water in the northern region of Ghobra?**

"The previous questions were answered through the application of the water and soil protocol and a laboratory examination of different samples of groundwater extracted from water wells in the northern region of Ghobra".

1. Introduction and literature review:

The northern Ghubra area is located near the oil fields of PDO, Petr, Jazz Rima, and Oxy, in the mezzanine, a populated area characterized by the presence of farms and livestock resources that rely entirely on groundwater extracted from wells. Therefore, we found that the team of the Globe program must study the field to discover the impact of the oil extraction operations on the groundwater power in the northern region of Ghobra.

2. Methods of research:

Firstly: Research Plan:

** The members of the Globe team used the program protocols to study the effect of the oil extraction operations on the groundwater power in the northern Ghobra region:

1. **taking different water samples** (Student: Abdullah Saeed Abdullah Al-Hargousi, Student: Suhail Mohammed Saeed Al-Hargousi)
    - Sheikh Nasser Farm
    - Government Desalination Well
    - Sample water transfer tank.

2. **Taking these samples to the laboratory** of the school to conduct a thorough laboratory examination on the validity of this water for different uses.

3. **Taking different soil samples** to study the effect of oil extraction operations on the soil (Student: Maryam Mohammed Hamdi)

4. **Record the results of the laboratory examination** and draw the most important conclusions.

5. **The students of the Globe team interviewed an engineer of Petro Jazz Rima company with Mr. Sulaiman Al Busaidi**, to know the nature of the company's work and to know the ways of extracting oil from the ground and the impact on the environment.

- The student Abdullah Al-Hargousi and the student Maryam Mohammed Hamdi conducted the following dialogue:

Q 1) What is the nature of the work of Petro Jazz Rima?

- Rima Oil & Gas Company is a local company contracting with PDO to enhance oil production in the Rima field in the southern Sultanate of Oman.

Q2) What do you do with your work at PetroGaz Rima?

- One of the most important responsibilities of my job as a health and safety official is that development of the annual plan of the Department of Health and Safety, which is due to several factors, including the distribution of work tasks among the staff of the department and the end of the incidents resulting from the production processes to achieve the ultimate goal and the level of company in the same field.

Q3: Why did Petro Jazz choose Rima North Region to extract oil from it?

-Based on the seismic surveys carried out by PDO in the past years, as well as on its vital location between the two

concession areas (Mukhizna and Nimr).

Q4: What is the best way to extract oil from the ground?

-The best way to extract oil from the ground is drilling rig and then lifting the ore to the surface using special pumps called Peam pumps and progressive cavity pump.

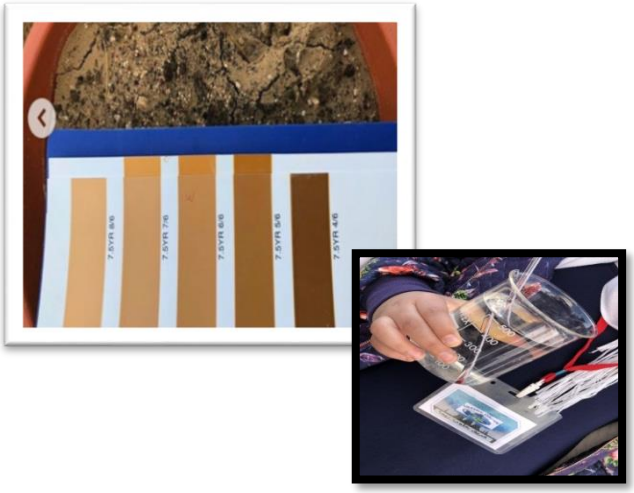
Q5: Is it possible to leak pollutants during the extraction of oil from the ground?

- Yes / Exceptional leaks can occur, which may be mechanical failures and sometimes high-pressure leaks from pumping oil to the surface of the earth.

Q6: Are you facing difficulties to extract oil from the underground in the northern region of Ghobra?

-In some areas of the northern Ghobra there is the problem of lifting oil from the ground for the weight and density of oil.

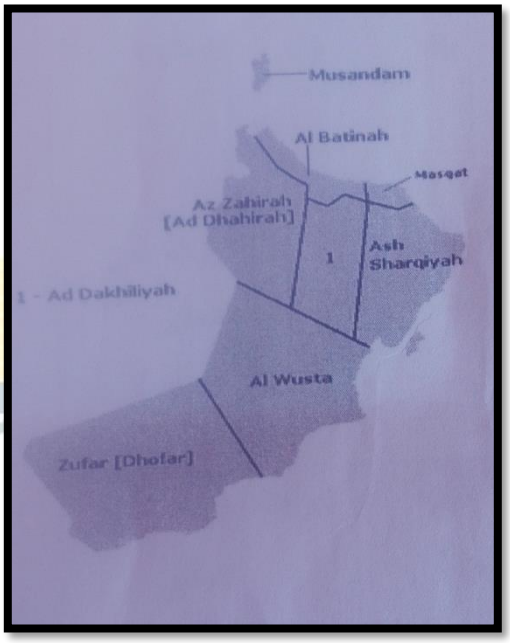
- Through the soil protocol we studied soil texture, **pH and water salinity.**



Secondly: Study Location:

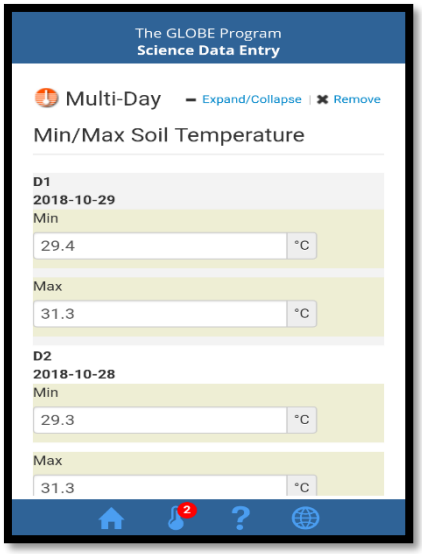
****Research limits:**

- **Region:** Al-Ghubra North Region, Wilayat Al-Jazer, Wasta Governorate.
- **The study site coordinates:**
  - E:056.27.288
  - N:1902.75.7
  - H:147M
- **Schedule:** from 8/10/2018 to 15/2/2019
- **Climate characteristics of the region:** arid inland desert region.
- **Protocols used in the study:** soil and water protocol.



Thirdly: Data collection and analysis:

- Various samples are taken to see **soil protocol data and water protocol.**
- **Laboratory test** results for different water samples.
- **Interview** with one of the engineers of Petro Jazz Rima.



3. Results:

1) Results of soil samples:

**** Data collection and analysis of soil:**

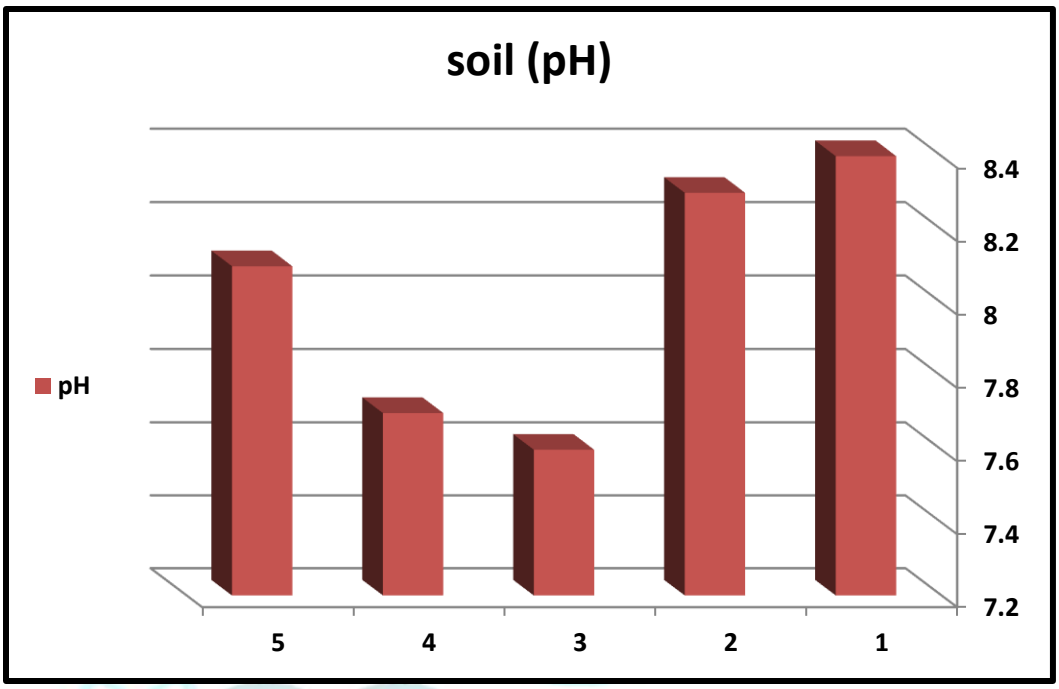
- Soil temperature at 5 cm: 30 degrees
- soil temperature at 10 cm: 35 degrees
- Soil temperature at 15 cm: 37 degrees
- soil temperature at 20 cm: 40 degrees

layer	Range cm		structure	Hardness	Consistency	pH	Soil color	Containing		
	from	to	Clay	Fragile				Carbonate	root	rocks
1	0	19	Clay sand	Fragile	Non	8.4	7.5YR 5\4	Many	Many	few

2	19	41	Small clay sand	Fragile	Non	8.3	7.5YR 4\4	Many	few	few
3	41	64	sandy	Medium hardness	Non	7.6	7.5YR 4\4	too many	Very few	Small rocks
4	64	78	sandy There are no silt	hard	Non	7.7	7.5YR 6\4	too many	There is no	There is a small coherent whole
5	78	110	Sandy has no silt	Cruel	Non	8.1	7.5YR 5\6	Too many	there is not	a small coherent

- **Different samples of soil (pH)**

	pH
1	8.4
2	8.3
3	7.6
4	7.7
5	8.1


soil (pH)
pH
8.4
8.2
8
7.8
7.6
7.4
7.2
5
4
3
2
1

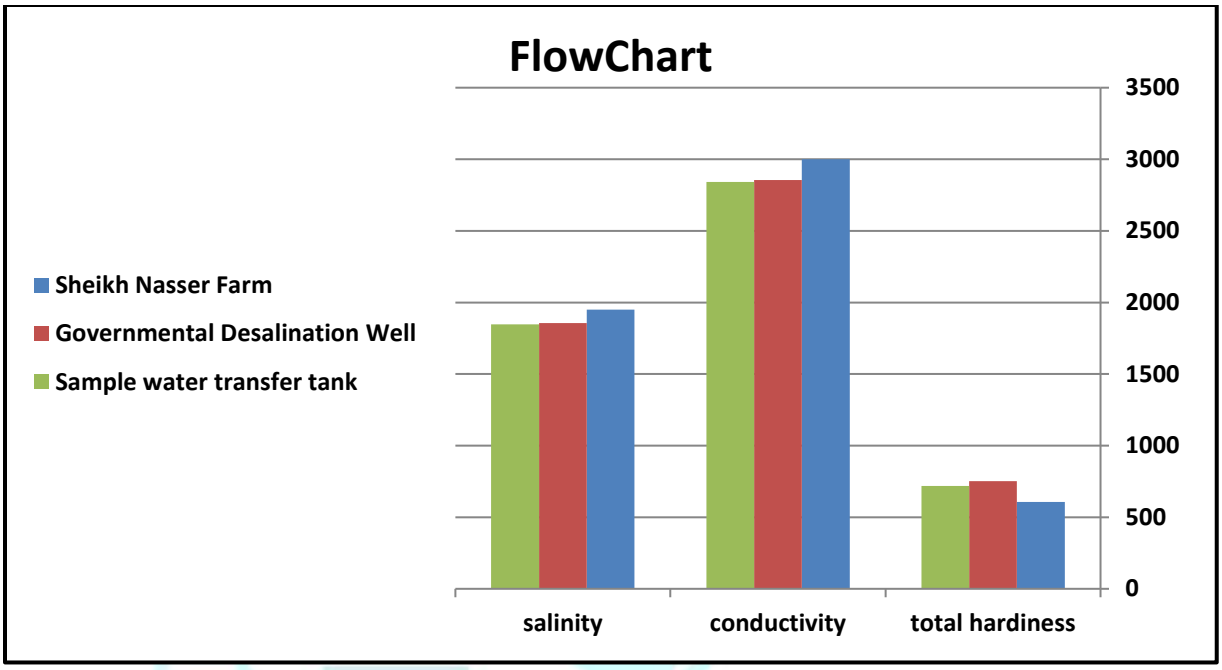
2) Results of water samples:

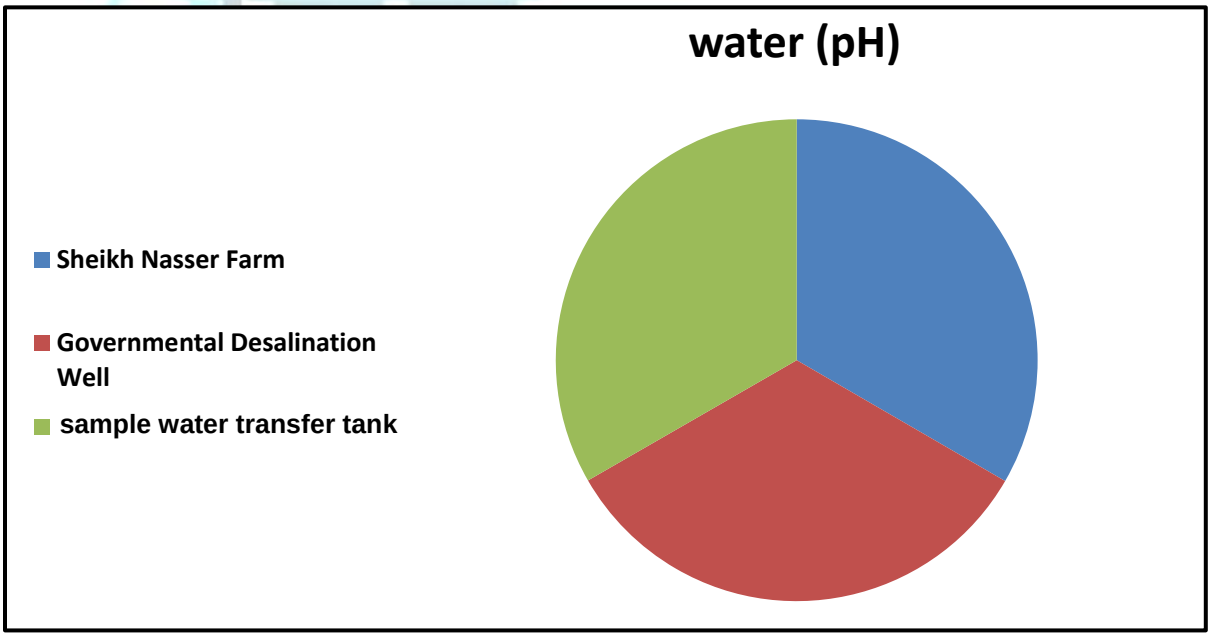
Water samples were taken from different wells at different time intervals. Results were analyzed and the following results were obtained:

	pH	salinity	conductivity	transparency	total hardiness
Sheikh Nasser Farm	7.54	1950	3000	0.49	607

	pH	salinity	conductivity	transparency	total hardiness
Governmental Desalination Well	7.53	1855.75	2855	0.09	753

	pH	salinity	conductivity	transparency	total hardiness
Sample water transfer tank	7.53	1847.3	2842	0.08	719


FlowChart
Sheikh Nasser Farm
Governmental Desalination Well
Sample water transfer tank
3500
3000
2500
2000
1500
1000
500
0
salinity
conductivity
total hardiness


water (pH)
Sheikh Nasser Farm
Governmental Desalination Well
sample water transfer tank

6. Discussion of results:

- Soil data showed that the soil in the northern Ghobra area is alkaline clay soil.
- After analyzing the results of the soil protocol it was found that pH has an alkaline tendency because it is greater than 7 and is suitable for the cultivation of some alkaline crops and all acidic crops.

- The first layer of the soil is fragile and contains a large amount of roots, residues of organisms and carbonate.
- Through the water protocol data after its examination, the unexpected surprise was that it was good and excellent water even though it was adjacent to the companies.
- A comparison of the results where it was proved that:

  - ✓ The water is suitable for use either for drinking or for cultivation.
  - ✓ Water is suitable for the cultivation of all acidic or basal plants.

- **There are several reasons for the purity of groundwater in the northern Ghobrah, including:**

  - **Groundwater is located under a layer of surface clay**, which reduces the infiltration of pollutants into groundwater.
  - Also due to the presence of groundwater **under hydraulic pressure**.
  - **Good method** used by companies to extract oil without leaking groundwater contamination materials.

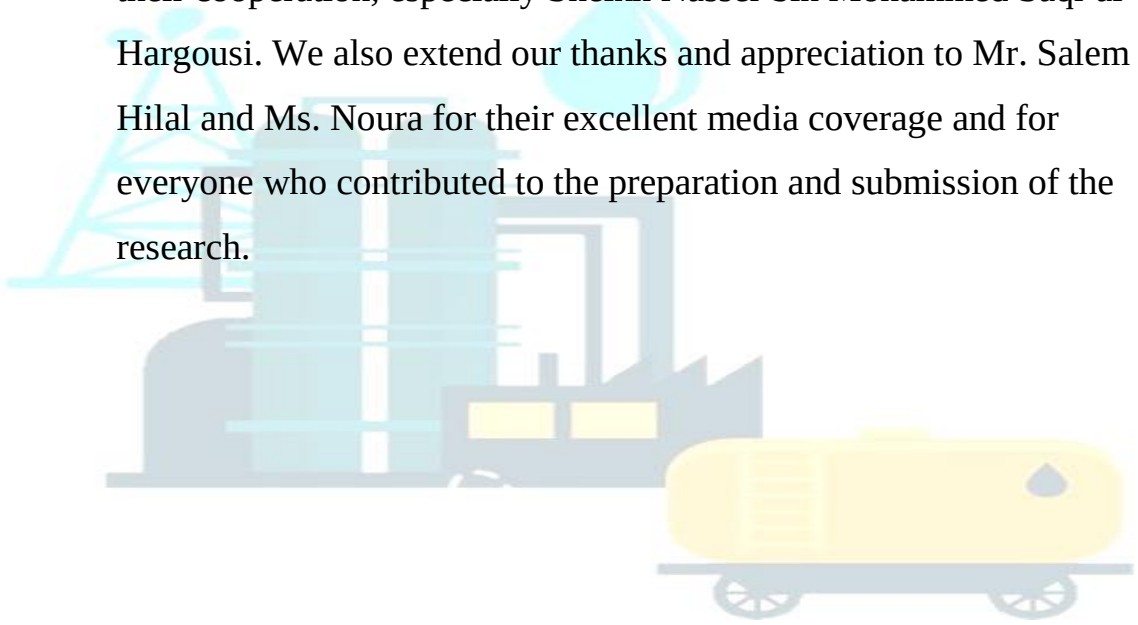
7. Conclusion:

Through water and soil protocol data and laboratory test data for different water samples we found that:

- Although we believed that the groundwater in the northern Ghubra area was not suitable for agriculture or drinking due to the proximity of the area to oil extraction companies, the results showed otherwise that this water is pure and suitable for all uses.
- The reason may be due to the good method used by companies in extracting Without the diversion of groundwater contamination materials or because ground water in the northern Ghubra area is located under a low-lying surface clay layer, thus reducing the infiltration of contaminants into groundwater.

8. Thanks and Appreciation:

We are pleased to extend our sincere thanks and appreciation to the Director of the School, Mr. Salem Al-Zar'i and his role in advising and scientific guidance and knowledge regarding the research. I also thank the people of the northern Ghubra region for their cooperation, especially Sheikh Nasser bin Mohammed Saqr al-Hargousi. We also extend our thanks and appreciation to Mr. Salem Hilal and Ms. Noura for their excellent media coverage and for everyone who contributed to the preparation and submission of the research.



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