1 - Title of the research:

Study of the causes of the decrease in the amount of fish in the region of Risut Governorate Dhofar

Prepare students

1 - student / Mahmoud Mohammed Ahmed	Grade 9
2 - Student / Alwaleed Omar Bakhit Al - Kathiri	Grade 8
3 - Student / Ahmed Khalifa Saeed Al Khawaldi	Grade 8

(Khaled Bin Al Waleed Primary School (5 – 9)

Sultanate of Oman - Salalah

Supervised by Mr. Hany Makram Basheer Hanna

January 2019

2 -Table of Contents

3 - summary

The research aims to study the reasons for the decrease in the amount of fish in the Raysut are of which came the research questions What is the impact of industrial facilities in Raysut on the aquatic Environment?How do water characteristics affect marine organisms?How to practice fishing in Raysut? We set up a time plan for work that began with a field visit to the study site and identified several other sites to study to help discover the main cause of the problem, limit the number of industrial establishments and how to dispose of the waste, the Department of Fisheries Development to follow up the fishing plan and the extent of its control , Fisheries Research Center of Dhofar Governorate to cooperate with the team in the study , fishermen to share their views and Implementation of atmosphere and hydrosphere cover protocols at specified sites.

Results were:The industrial city has 190 Industrial Projects, Such as Cement plant, Chemical plant, Methanol project , the difference was evident in the measurement of transparency and dissolved oxygen,The Fisheries Development Service reported that there is no Overfishing,The group of fishermen reported the existence of this problem at intervals and the start of their impact is increasing

Conclusion:The industrial city has a negative impact on the marine environment of Raysut, Changing natural measurements of water have a direct effect on the low quantity of fish and There is no illegal fishing and therefore has no effect.

Recommendations:Ministry of Trade and Industry Evaluation of the work of the industrial establishments in the region and finding solutions for disposal of waste,Ministry of Regional Municipalities and Water Resources Increasing and cultivating aquatic plants in the region to increase Dissolved oxygen and food with water and Fisheries Research Center: Developing performance and increasing research and studies on water.

4 - Basic terms

Overfishing

This is a randomized, non-permitted fishing during a Specific time period of the year.

Red tide

They are finely populated marine organisms called Phytoplankton when appropriate conditions are available, Increase some of which poisonous to fish and cause Dissolved oxygen deficiency leading to the death of fish.

fish landing

Is the period of return fishermen and fishing boats to the coast during Which data collector Counting the types and quantity of fish.

STEM

Is a term used to synthesize these academic disciplines together science, technology and engineering Mathematics is a shortcut: Science, Technology, Engineering and Mathematics (STEM)

5 - Research Questions

the research team had several hypotheses The reason of the decrease in the amount of fish in the region of Risut Governorate Dhofar may be: Industrial facilities in the region, change in the characteristics of the aquatic environment or Overfishing of which came the research questions :

1. **What is the impact of existing industrial facilities in the Raysut area on the aquatic environment?**
2. **How do water characteristics affect marine organisms in which you live?**
3. **How to practice fishing in Raysut?**

6 - Introduction and literature review

Fishing is a profession practiced by a large sector of Omani citizens and is based on several industries that affect large sectors of the society and have a central role in increasing national income and providing some of the food wealth of the Omani people. This is because the Sultanate has a distinct coastal environment that extends to 3165 km Start from the Gulf of Oman in the north Then The Arabian Sea to the Sultanate's borders with Yemen to the south, which qualifies it to take the lead in this area and when the problem of low fish quantity in Raysut and affected a large sector of the operators of fishing as it is considered a source of income for them, which led to abandonment of the region to search for fish populations in Other areas and damage to the rest of society and the impact of fish wealth in the region, where Raysut is a source of fish feeding markets Fish

This was a motivation for us to study the problem and identify the reasons that led to it. The study was successful and based on the scientific basis of identifying the problem, establishing the hypotheses, verifying them, implementing the necessary protocols to study the characteristics of the water, Outcomes may be a cause of the problem as well as provide recommendations to remedy this problem because of the positive impact on society and to maintain the development of our resources and increase our national income and maintain the ecological balance, which benefits the environment and our local community and our dear country Oman.

7 - Methods of research

First research plan

1 - Develop the proposed timetable for the research plan .

Table (1) Action Plan

the month	work plan
January 2019	Formulation of the research problem Determination of study sites Identify and process the tools used
February 2019	Data collection and analysis
1 March - 5 March 2019	Reaching conclusions and writing research
5 March - 10 March 2019	Review your search Poster design Submission of research

2 - Distributing the work roles to the research team and start implementation.

Table (2) Distribution of roles to the research team

the student	the work
Al-Walid	Formulation of the problem of research and identification of study sites
Al-Walid + Mahmoud	Develop the research plan and identify the tools required and processed
Ahmed + Alwaleed + Mahmoud	Collect and analyze data by applying planned protocols and conducting interviews
Ahmed	Data Entry
Ahmed + Mahmoud	To reach conclusions about the study and make recommendations
Ahmed + Al-Walid	Drafting the abstract and writing the paper
Mahmoud	Review your search

3 - Identify and review the study sites and determine the required implementation site and the appropriate protocol to apply.

Table (3) shows the study sites and determine theappropriate protocol

Site	the work	Protocol used
Raysut Beach	Study the properties of water and atmosphere	Atmosphere Protocol Water Protocol
Almogsil Beach	Study the properties of water and atmosphere	Atmosphere Protocol Water Protocol
Taka Beach	Study the properties of water and atmosphere	Atmosphere Protocol Water Protocol

4 - Conducting meetings with STEM specialists in the field of fishing and the environment in support of the study.

Table (4) shows the data of specialists who contributed to the research

The name	Occupation
Dr. Omar Ahmed Al - Turk Al - Kathiri	Director of Fisheries Development Department in Salalah
Mr. Ali Muslim Al-Muhri	Head of Statistics Department, Department of Fisheries Development
Dr. Salem Ahmed Al - Ghassani	Director of Fisheries Research Center, Dhofar Governorate
Mr. Mohamed Ibrahim	Fisher man
Mr. Murad Saleh	Fisher man

5 - Identify the devices and tools used in the study.

Table (5) shows the tools used and their function

the tool	Occupation
GPS device	Specify location coordinates
Tube Transparency	Measurement of water transparency
Thermometer	Temperature measurement
Oxygen group dissolved	Measuring dissolved oxygen in water
PH meter	Measuring Hydrogen
Humidity meter	Measurement of relative humidity of air
Directory of Cloud Forms	Select the cloud format
compass	Determination of geographical directions
Bucket - (2) Cup 100 ml - Distilled water - Soft towels - Camera	

6 - Calibration of devices: Calibrated thermometer - pH scale

7 - Gather information from scientific sources and references.

8 - Application of the study on samples through the application of the activities of appropriate protocols

- Place of implementation of the protocols: in the study sites

Table (6) Mechanism for the application of protocols to collect data

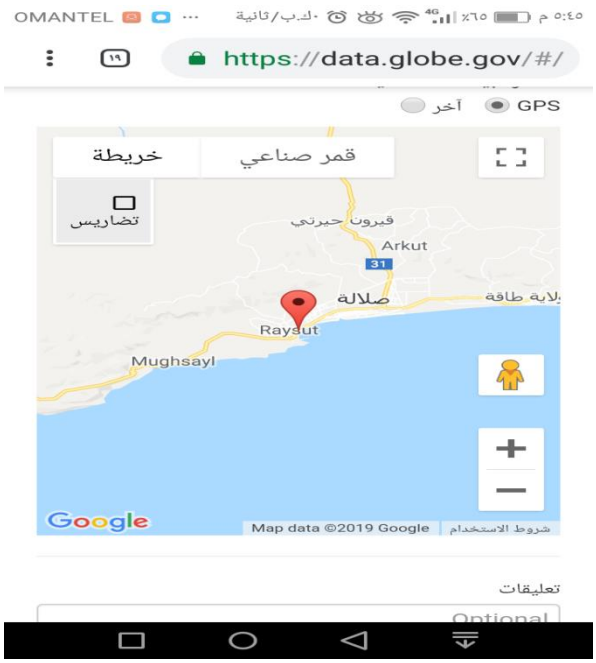
research question	Protocol	Application mechanism
The first question	Atmosphere	- Measurement of air temperature using the thermometer - Measuring the relative humidity of the air using a Humidity meter - Determination of the type and quantity of clouds using the Directory of Cloud Forms - Determine the amount of rainfall through the use of meteorological centers
And second question	water	We take three samples of water from each location in the bucket after washing with the water of the site and then: -We measure the transparency of the water using the transparency tube -We measure the water temperature of the sample using the thermometer -We measure the dissolved oxygen using the dissolved oxygen group: Take 25 ml of the water sample in the special beaker and then put the tube and break the tip and the slowly slowly and heart up and down and leave for two minutes without movement then compare the color guide and reject the number -We measure salinity which is naturally high -We measure the hydrogen figure using the PH meter Which should be washed with distilled water first and then washed with sample water and then placed In the sample and take the reading after its stability -We calculate in each measurement the rate of the three samples -Record the results in the forms prepared by the team
The third question	It is answered by the information derived from the interviews conducted by the research team with the specialists and the fishermen group who were met to explain how the fishing process in Raysut in terms of being subject to specific laws or regulations or is random	

9 - Data collection and organization in tables.

10 - Data entry in the WWW. GLOBE.gov

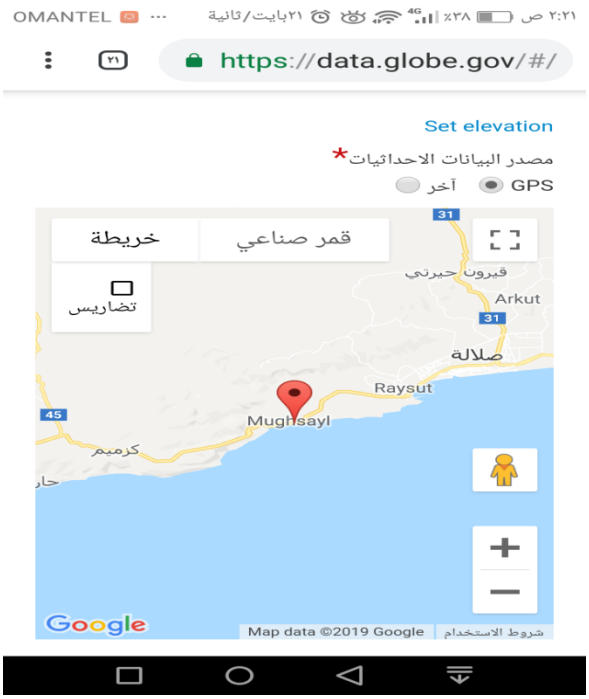
11 - Data analysis and representation graphically.

12 - To reach conclusions and recommendations.



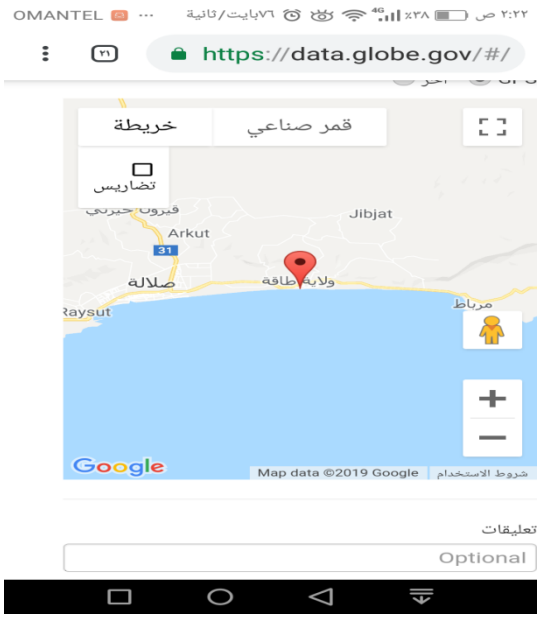
Second Study site

(Sultanate of Oman - Dhofar Governorate), Raysut Beach, February, cold weather, atmosphere and water protocols were used



(Sultanate of Oman - Dhofar Governorate), Al-Moghasil Beach, February, cold weather, atmosphere and water protocols were used

(Sultanate of Oman - Dhofar Governorate), Taqa Beach, February, cold weather, atmosphere and water protocols were used



Third Data collection and analysis

✍ **The data for the first and second questions were collected in each location through:**

❶ **Conducting air atmosphere protocol from measuring air temperature, covering clouds and humidity, and using meteorological centers to determine the amount of rain.**

❷ **Implementation of the water protocol at each location of the measurement of transparency,water temperature, dissolved oxygen, salinity and waterhydrogen.**

- The study data were entered in the program site.

- Organize data in tables.

- Make comparison tables between the three sites studied by the research.

- Use graphs to express data in each location as well as to compare them.

✍ **Data on the third question were collected through interviews with:**

Table (7) shows the meetings of the research team

The name	Occupation	Contribution
Dr. Omar Ahmed Al - Turk Al - Kathiri	Director of Fisheries Development Department in Salalah	Strengthening the team To inform the team of the fishing regulations and laws in the region and the extent of the employees' commitment to them
Mr. Ali Muslim Al-Muhri	Head of Statistics Department, Department of Fisheries Development	Provide statistics on the amount of fish and the movement of fishing in Dhofar
Dr. Salem Ahmed Al - Ghassani	Director of Fisheries Research Center, Dhofar Governorate	To strengthen the research team with the available techniques and research directions for conducting the study on scientific bases
Mr. Murad Saleh	Fisher man	Give the team a picture of the reality of the problem of low fish intake in Raysut area
Mr. Mohamed Ibrahim	Fisher man	

Pictures of students during the implementation of protocols sites

(1) Measuring transparency

(2) Measurement of water temperature

(3) Measurement of water temperature

(4)Measurement of dissolved Oxygen

(5) Measurement of dissolved oxygen

(6) Hydrogen measurement

(7) Hydrogen measurement

8 - Results

First: the results collected by the team for the sites studied over three weeks

Table (8) Measurements of the location of Almgassil

Date for 2019	Local Time 24 h	Degree Air temperature C°	Humidity %	the clouds	Rainfall mm	Transparency Cm	Degree Water temperature C°	Dissolved oxygen mg/L	Salinity ppm	PH
12/2	11:00	29	37	50%	0	Larger than 120	26.3	5.6	High	8.6
19/2	11:00	29.5	35	25%	0	Larger than 120	26.4	5.7	High	8.61
26/2	11:00	30.4	37	Clear	0	Larger than 120	26.9	5.7	High	8.61
the average	/	29.6	36.3	/	/	Larger than 120	26.5	5.66	/	8.6

Table (9) Raysut location measurements

Date for 2019	Local Time 24 h m	Degree Air temperature C°	%Humidity	the clouds	Rainfall mm	Transparency Cm	Degree Water temperature Co	Dissolved oxygen mg/L	Salinity ppm	PH
13/2	11:00	30.3	25	10%	0	30	28.7	3.67	High	8.23
20/2	11:00	32	33	10%	0	31	28.2	3.2	High	8.17
27/2	11:00	33.6	35	Clear	0	33	28.3	3.66	High	8.41
the average	/	31.96	31	/	0	31.3	28.4	3.51	/	8.27

Table (10) Taqa location measurements

Date for 2019	Local Time 24 h m	Degree Air temperature C°	Humidity %	the clouds	Rainfall mm	Transparency Cm	Degree Water temperature C°	Dissolved oxygen mg/L	Salinity ppm	PH
14/2	11:00	29.1	27	10%	0	101	27	5.8	High	8.63
21/2	11:00	30	32	10%	0	103	27.7	6	High	8.25
28/2	11:00	31	36	10%	0	102	28.1	6	High	8.42
the average	/	30	31.6	10%	0	102	27.6	5.9	/	8.43

Through the measurements shown, we find a significant difference in the locations specified in the measurements of transparency and dissolve oxygen and this is what we will see in the following tables and graphs:

Table (11) Comparison of transparency in the three sites during the study period

Site	First week	second week	the third week
Almgassil	Greater than 120	Greater than 120	Greater than 120
Raysut	30	31	33
Taqa	101	103	102

Diagram (1) shows the comparison of transparency of the three sites during the study period

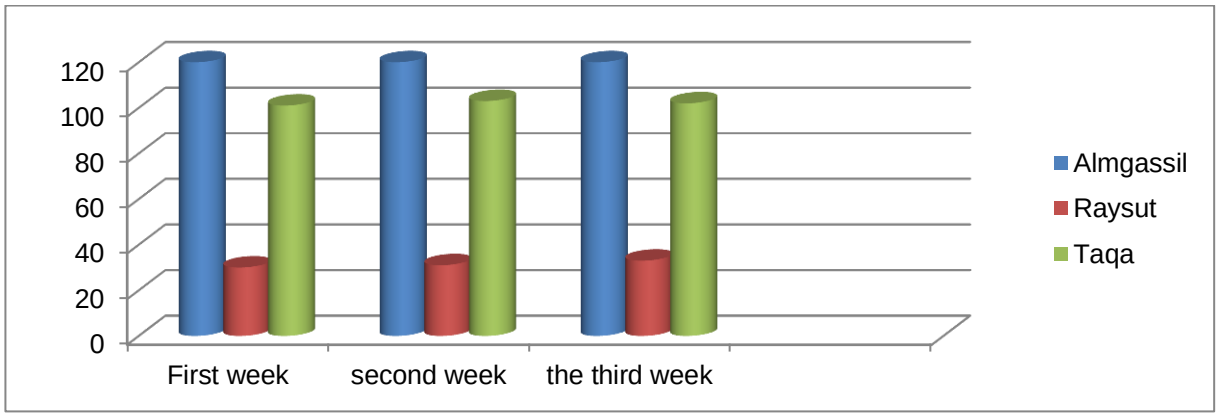


Table (12) Comparison of dissolved oxygen (gm / L) in the three sites during the study period

Site	First week	second week	the third week
Almgassil	5.6	5.7	5.7
Raysut	3.67	3.2	3.66
Taqa	5.8	6	6

Diagram(2) shows the comparison of dissolved oxygen to the three sites during the study period

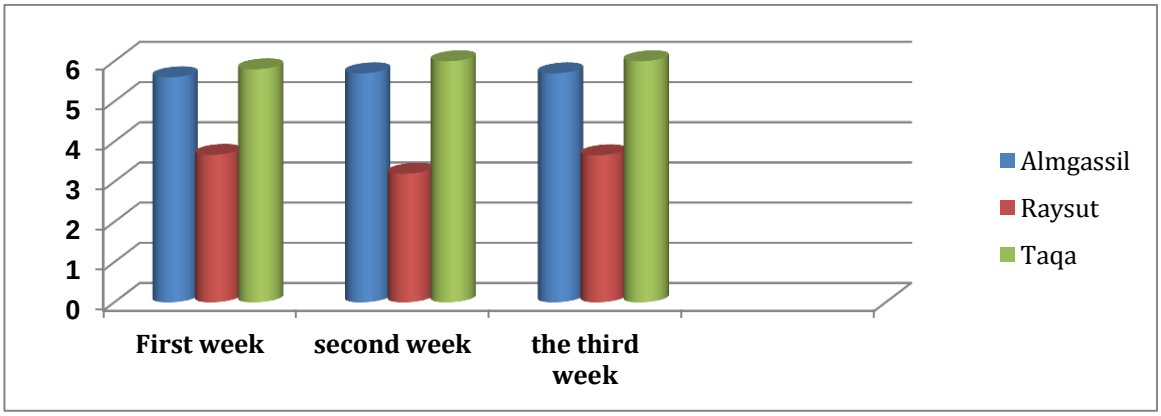


Table (13) Comparison of transparency rate in the three site

Site	Transparency Cm
Almgassil	Larger than 120
Raysut	31.3
Taqa	102

Diagram (3) shows the comparison of transparency rate in the three sites

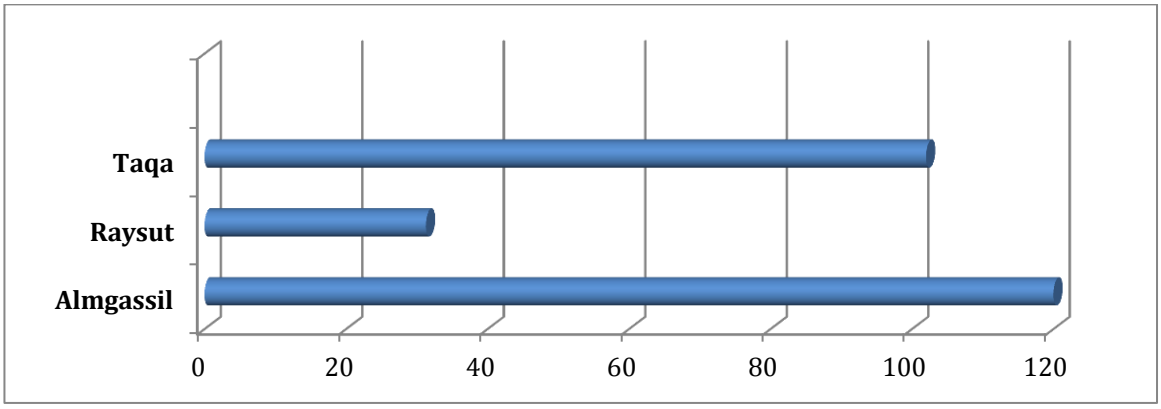
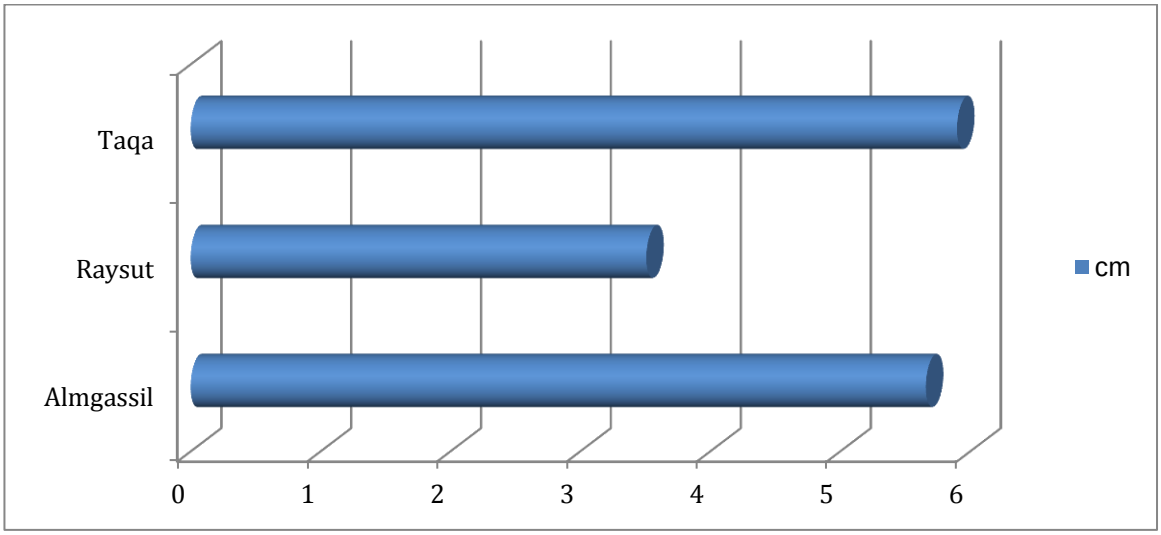


Table (14) shows the comparison of oxygen dissolved rate in water to the three sites

Site	Dissolved oxygen (mg/L)
Almgassil	5.66
Raysut	3.51
Taqa	5.9

Diagram (4) shows the comparison of oxygen dissolved rate in the three sites



Second: Interview Results

1 - Mr. Ali Al-Muhri: Head of the Statistics Department of the Fisheries Development Department

- Provide the teams with the latest statistics available for the quantity of fish and types of conservation and give the team another release of the team about the efforts of university data at the time of landing in the registration of fish quantity and types.

2 - Dr. Omar Ahmed Turk Alkathiri : Director of the Department of Fish Development in Salalah

- Informing the team of fishing regulations and rules in the area and subject to censorship and statistics and denied the existence of illegal fishing in the region and the role of the Department in the development of fish

- Help the team in how to do the right scientific study to cover all aspects of the problem

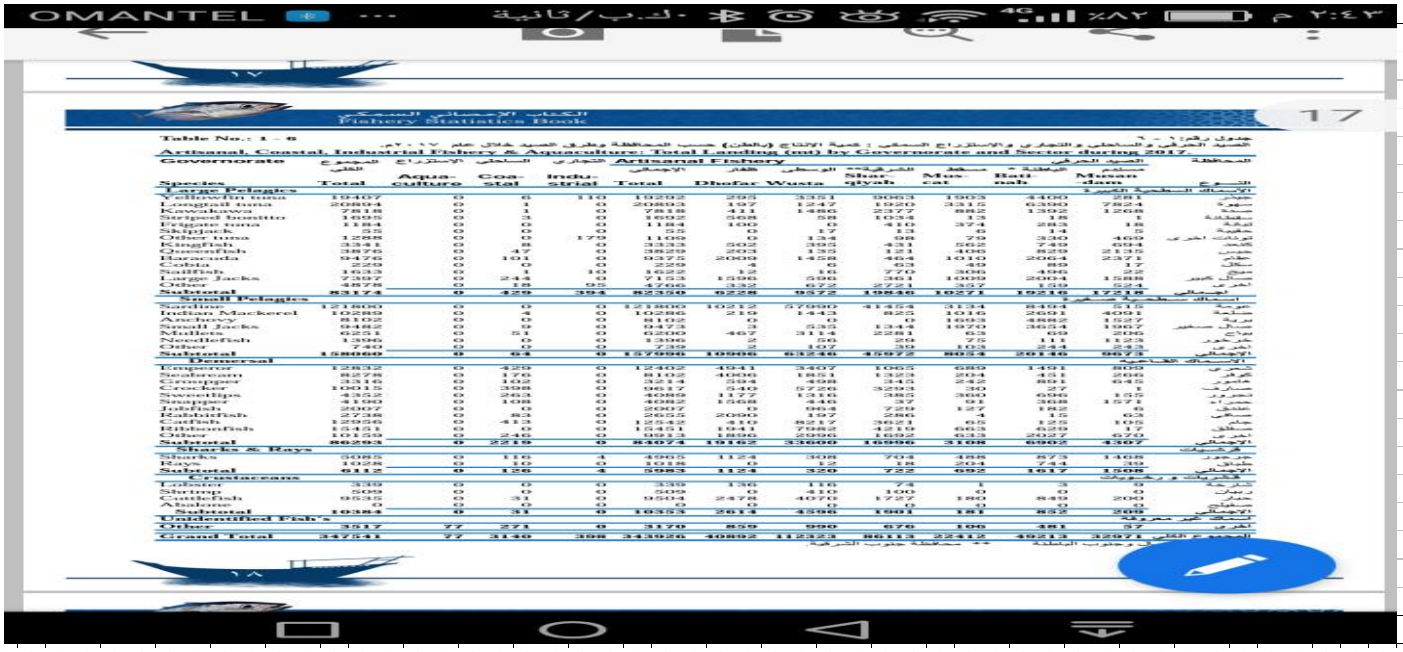
3- Dr. Salem Ahmed Al-Ghassani, Director of Fisheries Research Center, Dhofar Governorate

To inform the team that the studies are ongoing in the region and it is complex ,Talk about the red tide and its impact on the marine environment , he extended the team with some research results and help the team and support in the study to guide the team in how to take samples and measurements and determine the study sites

-Mr. Mohamed Ibrahim Fisher man and Mr. Murad Saleh Fisher man

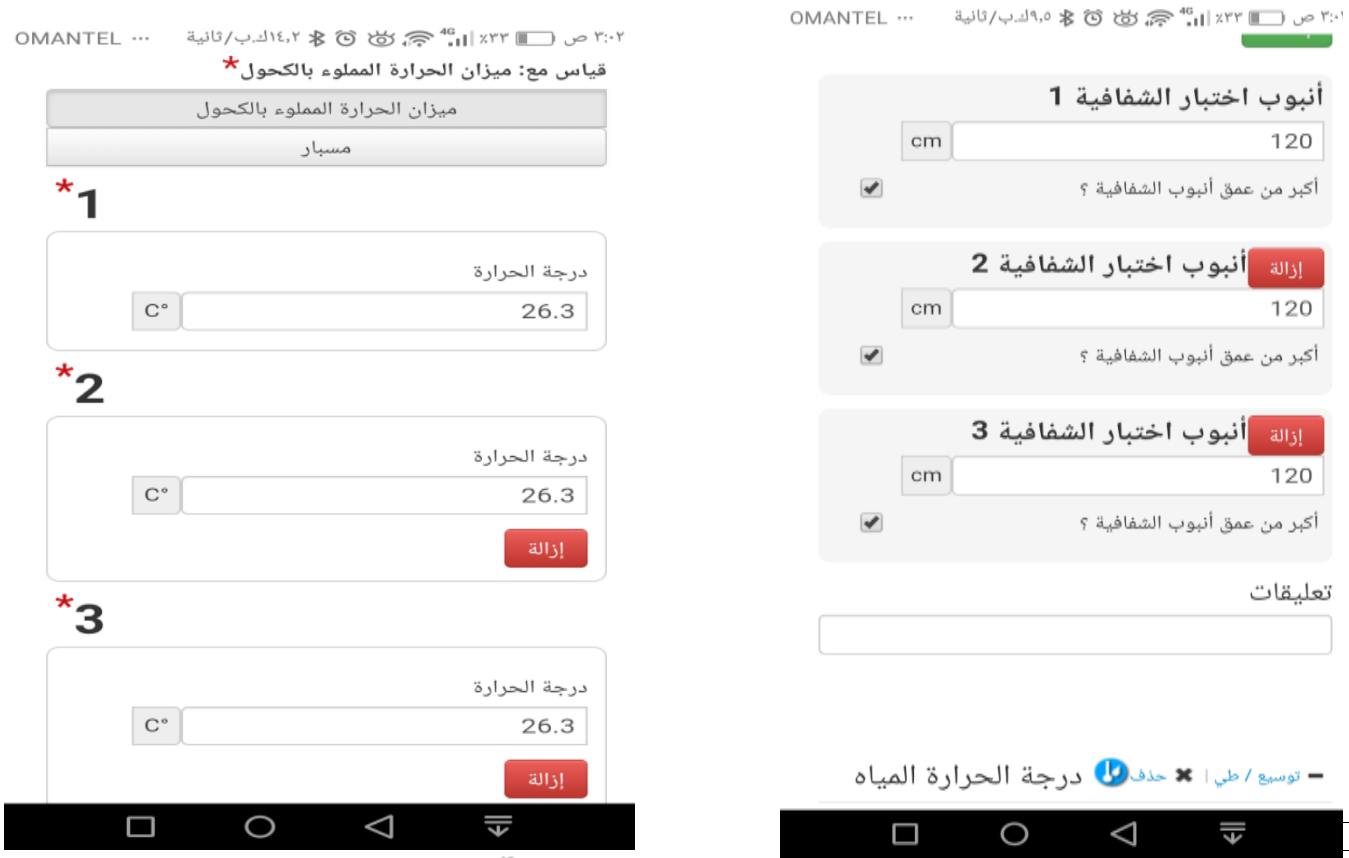
To inform the team how to complete the fishing process and the extent of the fishermen's commitment to fishing rules and rules because it is their source of income as reported in the quantities of fish according to the seasons of the year, where it is frequent in the fall.

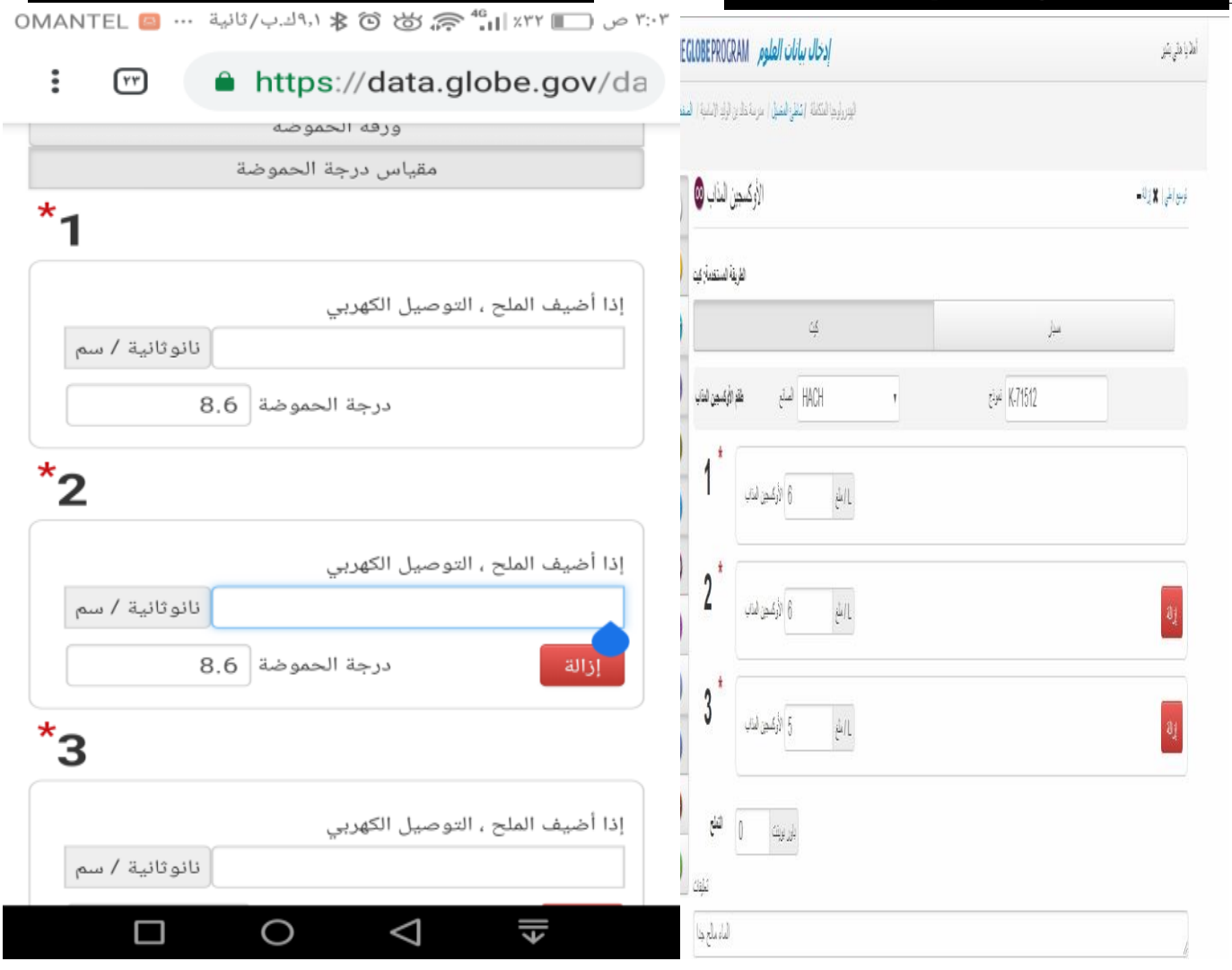
📖A copy submitted by the head of the statistics department on the quantity of fish in the governorates through the book of fish statistics:



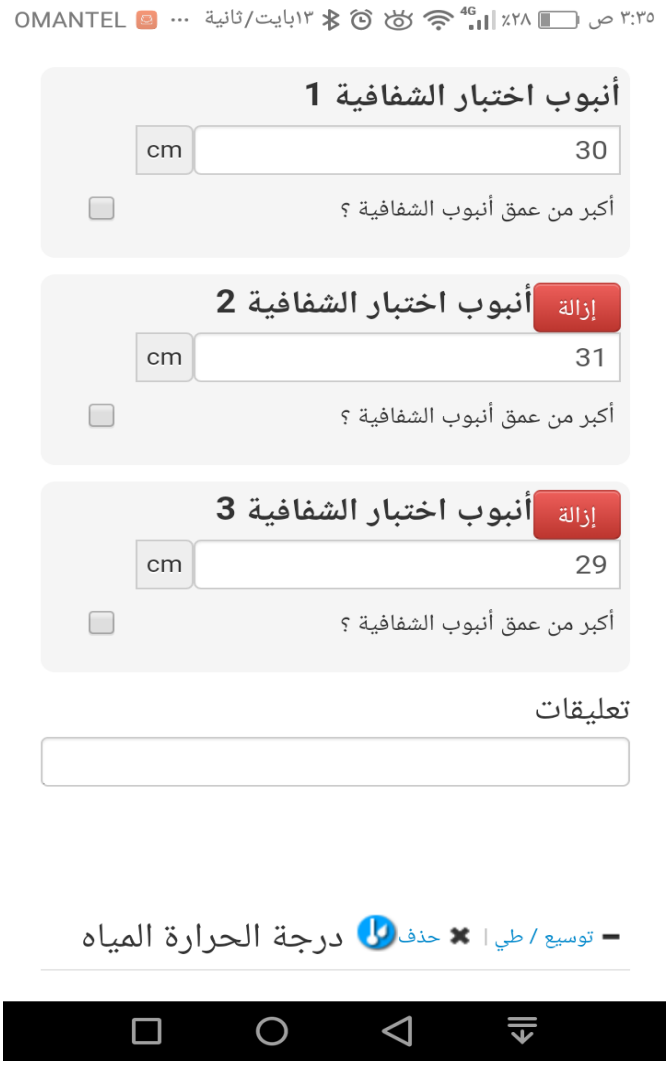
A part of the data entered into the program site (WWW. GLOBE.gov)

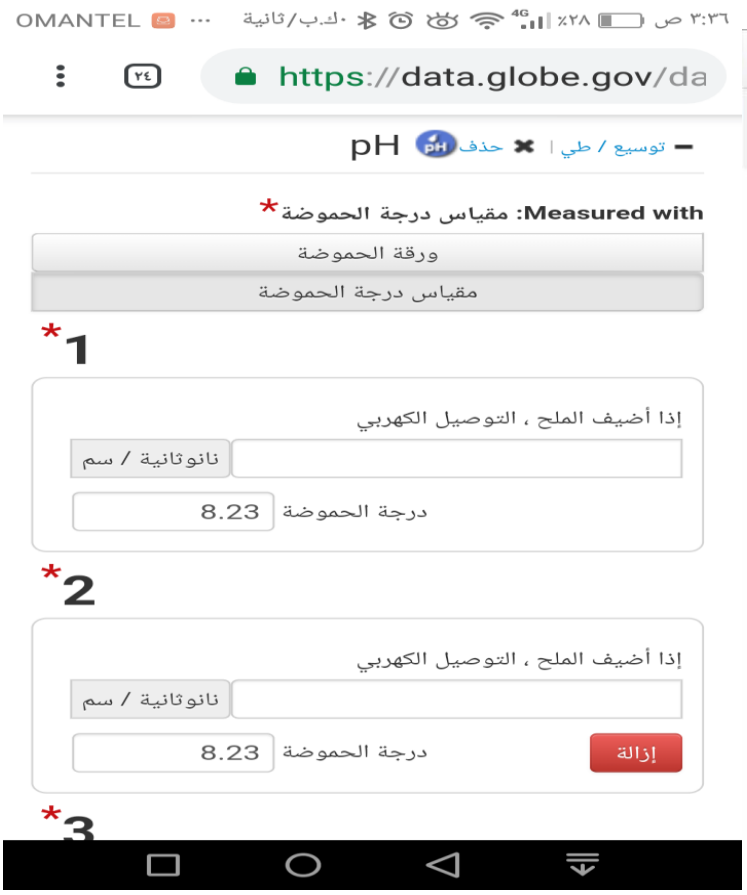
First site Almgsil :

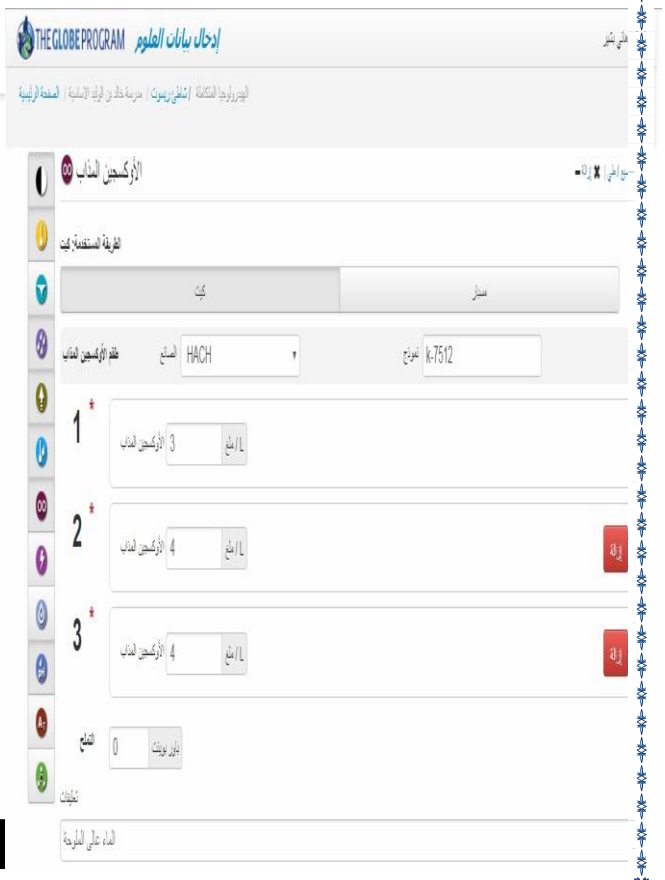




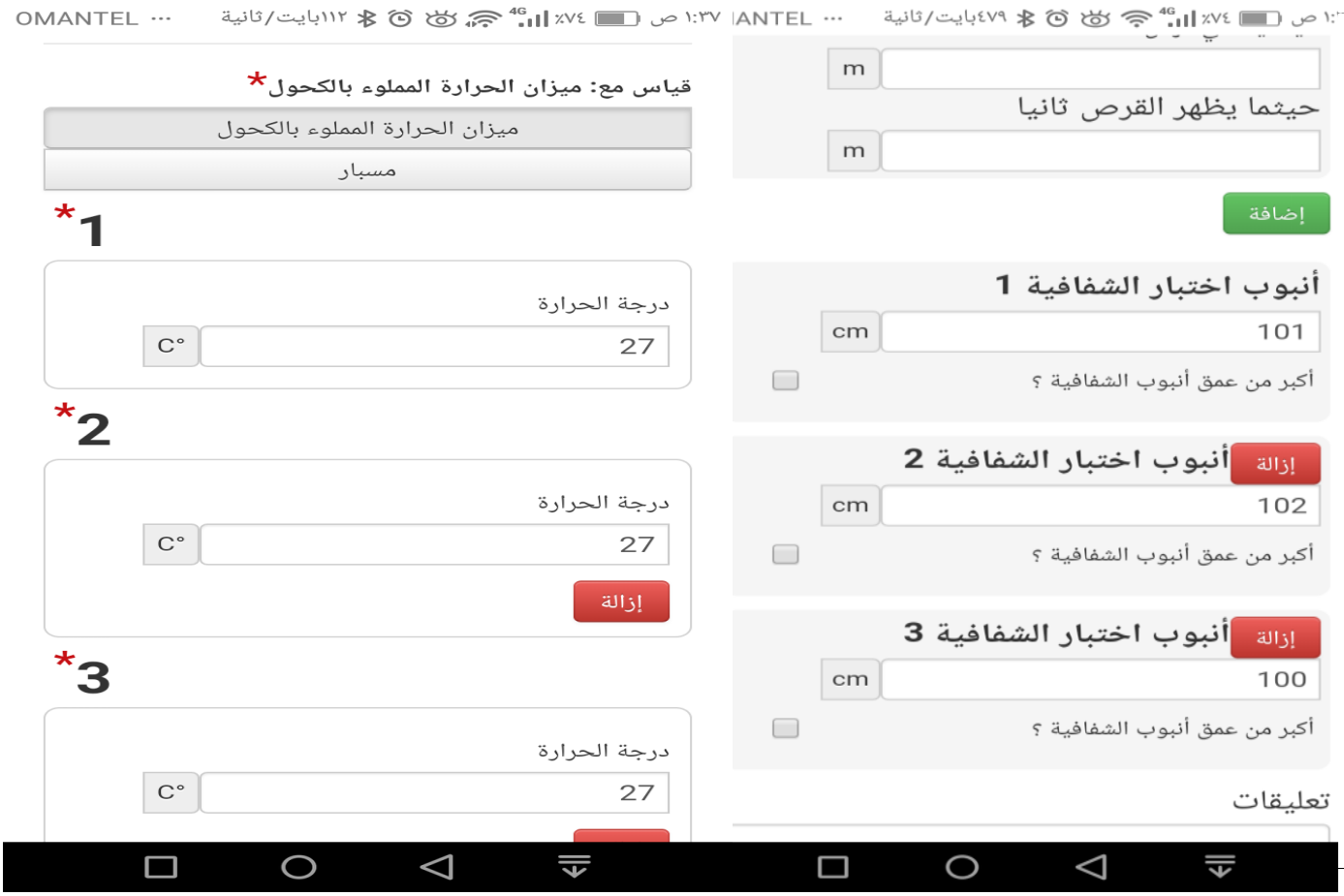
Second site Raysut:

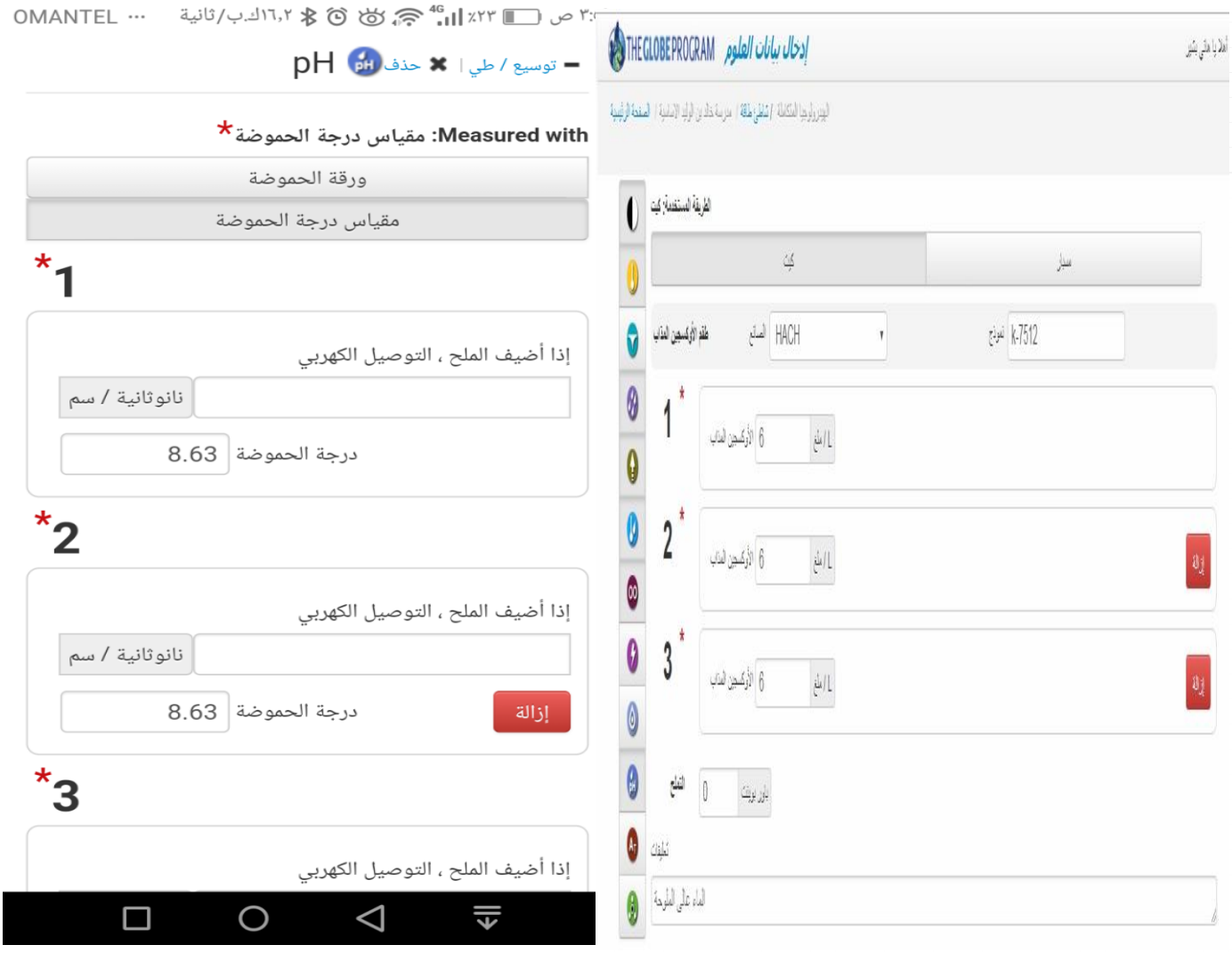






Third site TAQA:





9 - Discussion of the results

After the data collection and presentation, which were summarized previously in the tables and charts that reflect the measurements and readings taken during the application of water and atmosphere protocols

To answer the first and second questions in the research, tables (11, 12, 13 and 14) show a significant difference in the measurements of transparency and the amount of oxygen dissolved in water in the study sites, as expressed in diagrams (1, 2, 3, 4) The Raysut region has the lowest transparency rate due to the impact of the industrial zone in the region (especially the methanol plant) and the leaching of its wastes to the water. This increased the inorganic solids in water, resulting in the scarcity of aquatic plants and thus the lack of dissolved oxygen in the water expressed in the data. The lack of food on which the fish depend has led to migration Fishmonger to another pasture in search of food and this explains the low amount of fish In the Raysut area.

Thus, the existing industrial facilities in the Raysut area, despite their economic importance, have a negative impact on the marine environment as well as changing the characteristics of natural water.

And comparing the results of our research with the results of a study entitled the causes of chemical pollution and ways to address

To the student / Rawas Fadhil light University of Qadisiyah found that the methods of research are similar and their results in support of the results we have obtained from the impact of chemicals and if they differ from us in the possibilities available to them and academic specialization

To answer the third question of the research:

Field interviews were the best answer to this question:

-Dr. Omar Ahmed Al-Turk Al-Kathiri: Director of Fisheries Development Department in Salalah

-Inform the team of fishing regulations and rules in the area and subject to censorship and statistics and denied the existence of illegal fishing in the region.

Mr. Mohamed Ibrahim Fisher man and Mr. Murad Saleh Fisher man

Inform the team of how to complete the fishing process and the extent to which fishermen are committed to fishing rules and rules because it is their source of livelihood and they know how to keep it.

In other words, the process of overfishing does not exist in the region, which negates the third hypothesis of the research team and answers the third question of the research.

10 - Conclusion

The research sought to study the reasons for the decrease in the quantity of fish in the region of Raysut and this was done through the research team to limit the number of industrial facilities in the area of Raysut and how to get rid of their residues with the implementation of the atmosphere and water protocol to explore the negative impact on the water which was discovered as reflected by the results of the research. We found that changing the water characteristics of the transparency and quantity of oxygen dissolved in Raysut directly affect the aquatic plants and their inability to perform the process of photosynthesis because of lack of light access, which led to the lack of plants and the lack of oxygen dissolved and this leads to the lack of food and hence the migration of fish from Raysut in search of food in other areas and through the cooperation of officials of the Department of Fisheries Development in Salalah and the Fishery Research Center of Dhofar Governorate we were able to obtain accurate and clear information

✸ Strengths in research: The spirit of cooperation between the members of the research team and the distribution of roles between us and each member has an active role in enriching the study and the existence of a spirit of cooperation and support from all those involved in the problem.

✸ Weaknesses in research: The inability of the research team to implement other water-specific protocols such as alkali, nitrates and ammonia for lack of tools and these protocols would support the study better

✸ It is possible to apply the research again by taking samples from different sites in the Sultanate such as the Qurum Beach (Muscat), the beaches of Musandam, the beaches of Al Jazer and Mahout in the Wasta Region, Raysut Beach (Salalah).

In our view, full water protocol tools should be provided for future research

GLOBE protocols should be implemented continuously and in multiple locations to monitor any change in the environment. It should help everyone and those who need it, which will benefit future studies. Cooperation between local and international schools should be increased to improve future research.

11 - Thanks and appreciation

we pleased to thank all those who contributed to the study

- **All members of the GLOBE team in Dhofar have expressed their support and encouragement**

- **Mr. Al-Fadil / Mohamed Mana Al-Kathiri, Director of Khaled Bin Al-Walid School For his facilities and overcoming the obstacles encountered by the research team**

- **Professor / Hany Makram Basheer teacher of the program in Khalid bin Walid School**

For the support and guidance of the length of the research period and remove many of the obstacles we encountered and provide what is available and not available to us

- **Dr. Ahmed Al Turk Al - Kathiri Director ofFisheriesDevelopmentDepartment**

For its support to the team and to inform the team of the fishing regulations and laws in the region and the extent of their commitment.

- **Mr. Ali Al-Muhri, Head of Statistics Department, Department of Fisheries Development**

For the provision of statistics on the amount of fish and fishing movement in Dhofar

- **Dr. Salem Ahmed Al-Ghassani Director, Fisheries Research Center, Dhofar Governorate**

For his support to the research team and his research directions for the study on scientific grounds.

- **Mr.Mohamed Ibrahim Fisherman and Mr. Murad Saleh Fisherman**

Because they gave the team a picture of the reality of the problem of low fish intake

12- References 🕮

1- ALHayesha , M,S (2007). Physical and chemical pollution of the aquatic environment (Edition No. 1). Cairo, Egypt: Scientific House for Publishing and Distribution

2- Fadl, Wahid (2014, December 2). Mass mortality of fish causes and possible solutions. Retrieved on 9/3/2019 from WWW.aljazeera.net/news/scienceandtechnology

3- Hussein, S,A (2010, January 1). Encyclopedia of Environmental Pollution (Edition No. 1). Hashemite Kingdom of Jordan: DarDjlah

4- Ministry of Agriculture and Fisheries, Department of Fish Statistics (2017). Statistical Yearbook 2017. Sultanate of Oman

١ - حسين،سحر (٢٠١٠، ١ يناير) . **موسوعة التلوث البيئي** (ط.١). المملكة الأردنية الهاشمية : دار دجلة

٢ – الهايشة ،محمود (٢٠٠٧). **التلوث الفيزيائي و الكيميائي للبيئة المائية** (ط.١).القاهرة ، مصر : الدار العلمية للنشر و التوزيع

٣ – فضل ، وحيد (٢٠١٤ ، ٢ ديسمبر). **النفوق الجماعي للأسماك الأسباب و الحلول الممكنة**.استرجعت في ٣/٩ / ٢٠١٩ من WWW.aljazeera.net/news/scienceandtechnology

٤ – وزارة الزراعة و الثروة السمكية، دائرة الإحصاء السمكي .(٢٠١٧) . **الكتاب الإحصائي السمكي ٢٠١٧**. سلطنة عمان