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SPATIAL ANALYSIS OF THE CHARACTERISTICS OF THE AL-SHUWEJA MARSH USING GEOGRAPHIC INFORMATION SYSTEMS (GIS).

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Abstract:

The Shuweija Depression is a water body and a natural depression located north of the city of Kut, at a distance of (10) km, and extends parallel to the Tigris River, with a length of about (5) km and a width of (25) km.with rectangular shape and is filled with rain and torrential waters that reach it from valleys such as Wadi Harran, Tarsag, Shurshirin, Kanjan, Jum and Kafi rivers, and their combined annual discharge. Likewise, water reaches it through Kilal Badra from the east and Kilal Tarsakh from the north. A part of the marsh water is drained by irrigation and evaporation, and the other part goes to the Tigris River, and the percentage of salts in addition to the salinity of the soil rises. Its area is (292.288) km 2, with its highest discharge in Kilal Badra reaching (68.76) m 3 / s. The formation of the Al-Shuweja marsh for geological and morphological reasons, the chemical and physical characteristics of the depression of the Al-Shuweja marsh in Wasit governorate were analyzed for the wet and dry seasons, as it reflects the chemical characteristics of the water About the composition of the strong building and its quality resulting from the dissolution of many elements, gases and particulate matter, as well as human influences, and there is a different variation of water in its chemical compositions from one region to another and from one season to another as it interacts with the soil and thus works on the decomposition of rocks and when the water is exposed to evaporation leads to an increase salt concentration in it. Therefore, the study of the chemical properties of water and its changes is of great importance in evaluating the water resources in the region.

Keywords:(spatial analysis,international standards, satellite visuals, geographic information systems, physical and chemical properties, ecological systems).

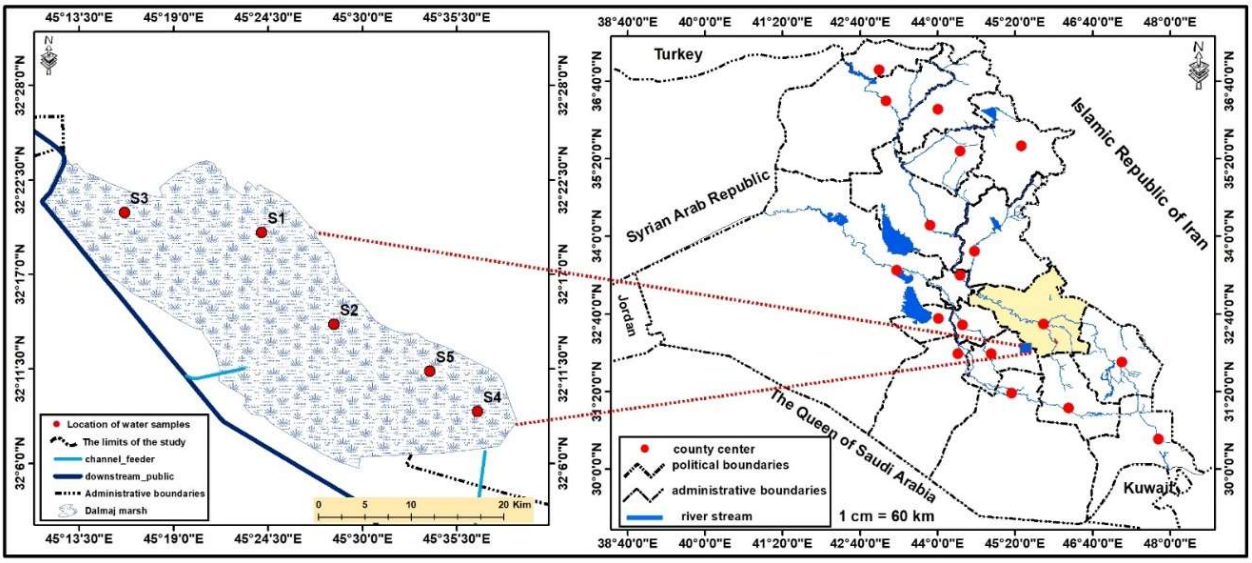
Introduction

The physical and chemical properties change in terms of water depth, light and heat permeability, suspended matter, dissolved salts, total hardness, turbidity...etc. The physical and chemical properties of the Shuweja Marsh vary from time to time, whether it is from one month to another or one season to another. The different characteristics of the marsh water contributed to the creation of certain ecosystems. The different physical and chemical properties of the marsh al-Shuwija water affect the diversity of the ecosystems, such as the vegetation cover that is compatible with

water and extreme climatic conditions. Therefore, water may affect the existence of different types of plant and animal organisms and their suitability for human use. Water varies in its chemical composition from one region to another and from one season to another. It interacts with the soil and then leads to the decomposition of rocks and the concentration of salts in them when the water evaporates. Therefore, the study of the chemical properties of water and its changes is of great importance in evaluating water resources in the region (Hussein, 819, 2000).

-The research framework can be summarized as follows:

1. **Research Problem:** The main research problem revolves around the possibility of revealing the physical and chemical characteristics of the waters of the Al-Shuweija marsh and its spatial correlations and the reasons that contributed to its formation.So it can be rephrased it as a major question which is (i5 there any disparity in phy sical and chemical properties of Hor Shuwaja water ?).
2. **Research Hypothesis:** It is represented by the answer to the research problem, which is (the physical and chemical characteristics of the Shuwija marsh vary due to the different climatic conditions and water sources).
3. **Research Objective:** The study aims to achieve a scientific goal, which is (analyzing the physical and chemical properties of Hawr al-Shuweja to determine its suitability for different uses)
4. **Research Scope:** It is located in the north of Wasit Governorate, 10 km away from the city of Kut,and is confined between latitudes(41 32-57 32)to the north, and longitudes (38 45-13 46) to the east. Its area is (292,288) square kilometers. See map (1).



Map (1): Location of the study area.(The source: researcher relied on field study and satellite imagery from Landsat 8.)

Firstly, the analysis of the chemical characteristics of Al-Shuweja marsh: The chemical and physical properties of Al-Shuweja marsh were analyzed for both the wet and dry seasons, as shown in Table (1). Five water samples were taken from the marsh, and the properties include the following:

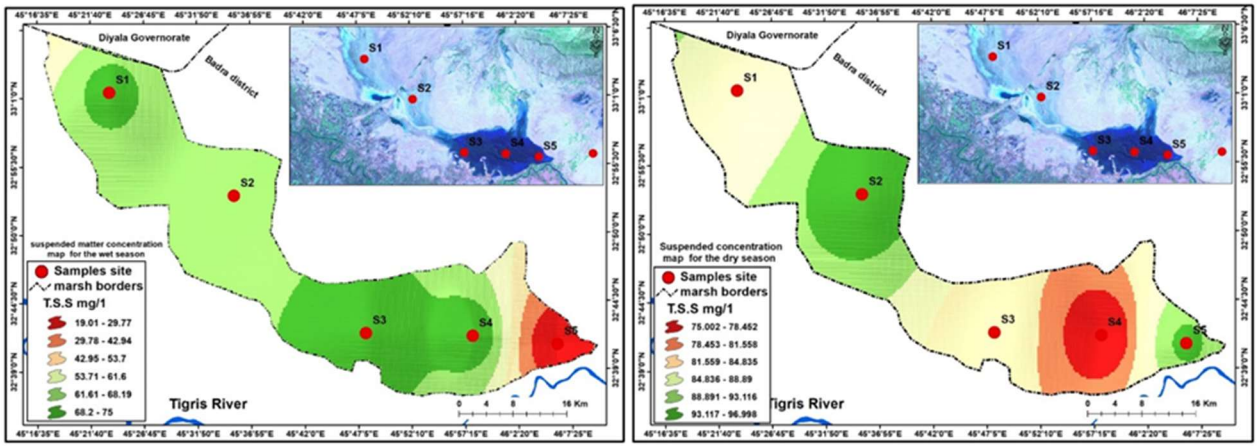
1. **Total alkalinity (ALK.) in milligrams per liter (mg/L):** It is noted from the analysis of the marsh water samples that the total alkalinity of the Al-Shuweija Marsh water recorded different values, and it was highest in the (S5) sample, as it reached (190) in the wet season, and decreased in the (S3) sample, as it reached (143) in the same season, while the highest value of alkalinity was recorded in The dry season in the (S5) sample, which amounted to (300), and the lowest value was recorded in the (S3) sample, which amounted to (180). It is noted from the analysis of the samples of the marsh waters, and when compared with some, it is noted that the alkalinity is high in the water of the Dalmaj Marsh. The acidity and alkalinity are present in the water in the form of calcium carbonate and basic water in its normal state.And the basicity indicates the ability to absorb some substances in the water that contains in its composition an equivalent amount of acid and is found naturally as the dissolution of calcium and magnesium or other sources due to their excretion in the marsh waters, from the factories (Hamad, 2019, 1259), see map (2).

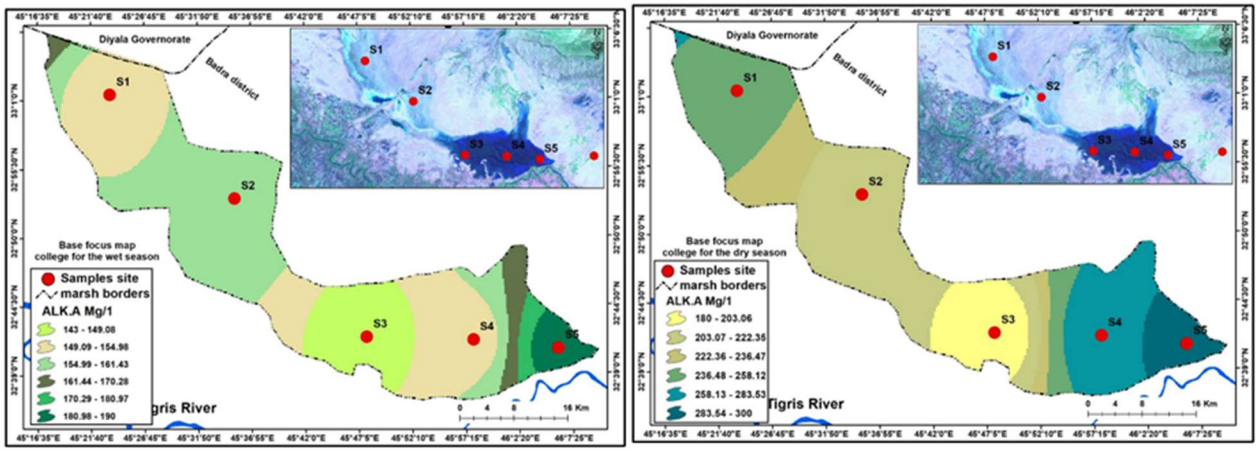
Table (1): Chemical and Physical Characteristics of Al-Shuweja Spring Water for the year 2022

water temperature	air temperature	Depth(cm)	Turbidity (NTU)	E.C	T.D.S mg/1	T.S.S mg/1	ALK.A	season	Samples site
18	22	1.65	2.4	4.24	1850.5	70	150	wet season	S1
41	44	1.1	3.5	5.5	4400	85	240	dry season	
25	21	2.17	2.8	3.5	2210	65	160	wet season	S2
40	40	1.12	3.6	5.76	5122	97	212	dry season	
19	23	3.4	5.2	4.51	1992.4	75	143	wet season	S3
37	42	2.2	6.3	6.25	5351	83	180	dry season	
22	26	5.14	7.4	4.2	1857.3	73	150	wet season	S4
39	44	3.12	7.2	6.16	5290	75	280	dry season	
20	24	3.54	7.5	4.27	2121	19	190	wet season	S5
36	42	2.23	7.3	6.41	5910	94	300	dry season	

Source: The researcher relied on the Ministry of Water Resources, National Center for Water Resources, and the Monitoring Stations Department.

Map (2): Total alkalinity in Al-Shuweja Oasis for the wet and dry seasons. Source: Based on the work of the researcher relying on Table (1).

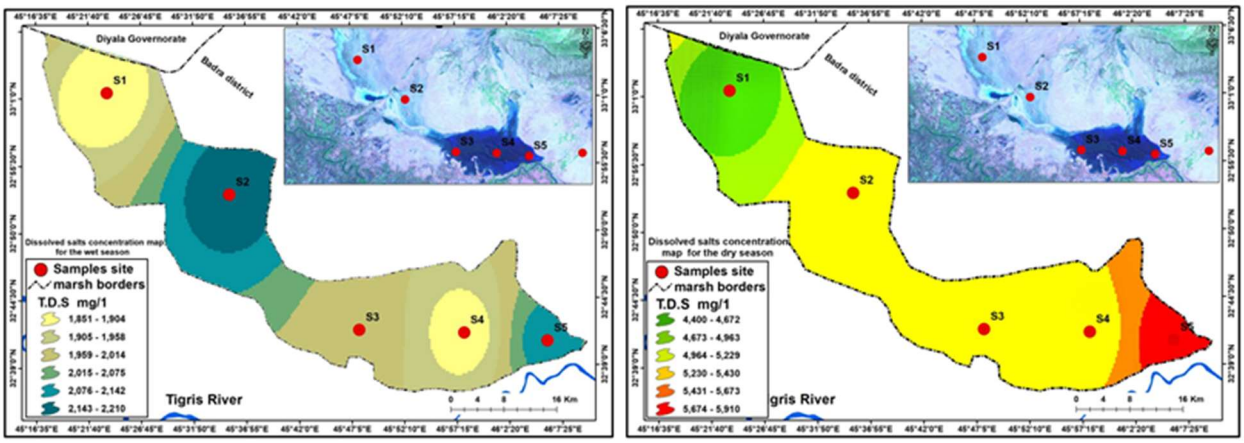




2. **Suspended Solids (T.S.S) (mg/L):** As for the amount of suspended matter in the waters of Marsh Shuweja, the highest values were recorded in the (S3) sample, as it amounted to (75) mg / liter during the wet season, and decreased in the (S5) sample, when it reached (19) mg / liter in the same season, see map (3), while The highest value of suspended matter during the dry season was recorded in the (S2) sample, which amounted to (97) mg / liter, and the lowest value was recorded in the (S4) sample, which amounted to (75) mg / liter.When compared, it is noted that the amount of suspended matter in the waters of marsh Shuweja Recorded the highest values, which leads to the lack of light transmittance easily in the water. See map (3).

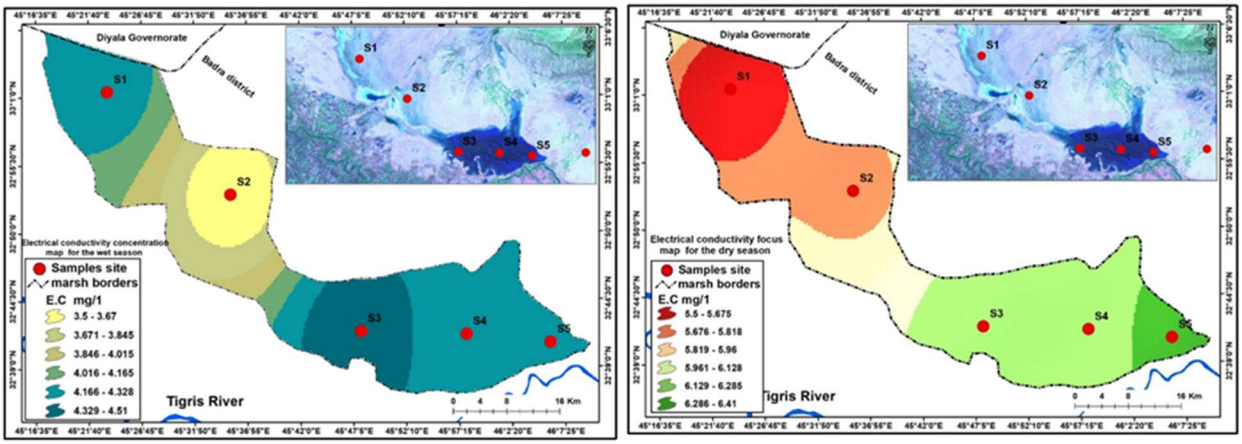
Map (3): Suspended solids quantity in Al-Shuweja Oasis for the wet and dry seasons. Source: Based on the work of the researcher relying on Table (1).

3. **Total Dissolved Solids (T.D.S) (mg/L):** As for the TDS values in the waters of Marsh Shuweja, during the wet season it reached the highest value (2210 mg / liter) in the (S2) sample, and the lowest value was recorded in the (S1) sample, as it amounted to (1850.5 mg / liter), while the highest value of the TDS was recorded in the season The dryness of Al-Shuweja marsh in the sample (S5) amounted to (5910 mg / L), and the lowest value was recorded in the sample (S1) and amounted to (4400 mg / L). See map (4).



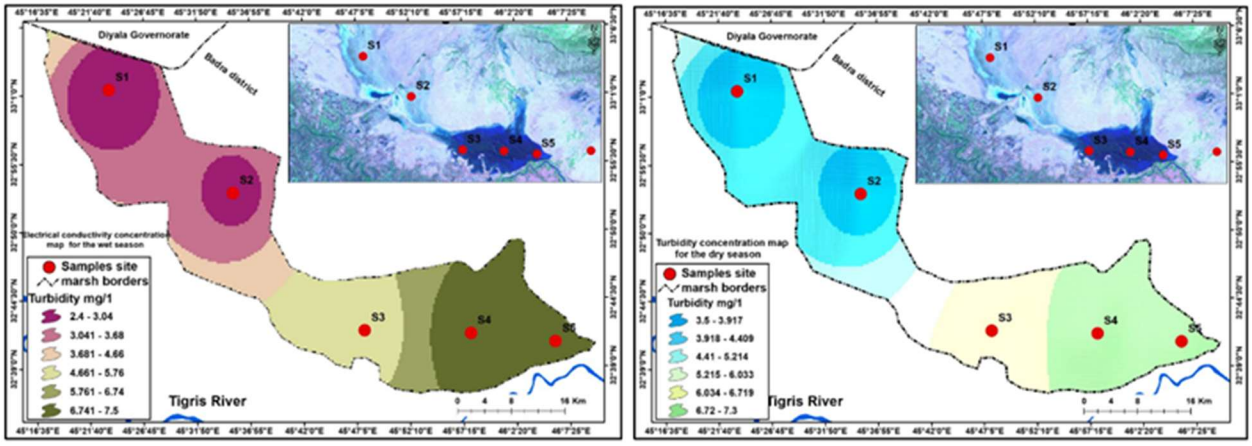
Map (4): Concentration of dissolved salts in Al-Shuweja Oasis for the wet and dry seasons. Source: Based on the work of the researcher relying on Table (1).

4. **The electrical conductivity (EC) values, measured in millimhos per centimeter (mmhos/cm)**: It is noted that the EC values in the waters of Hor Al-Shuweja reached during the wet season the highest value (4.51 mmoz/cm) in the (S3) sample, and the lowest value was recorded in the (S2) sample as it reached (3.5 mmoz/cm), while the highest value of EC was recorded In the dry season of Al-Shuweja Marsh in the (S5) sample, it reached (6.41 mmoz/cm), and the lowest value was recorded in the (S1) sample, which was (5.5 mmoz/cm). See map (5).



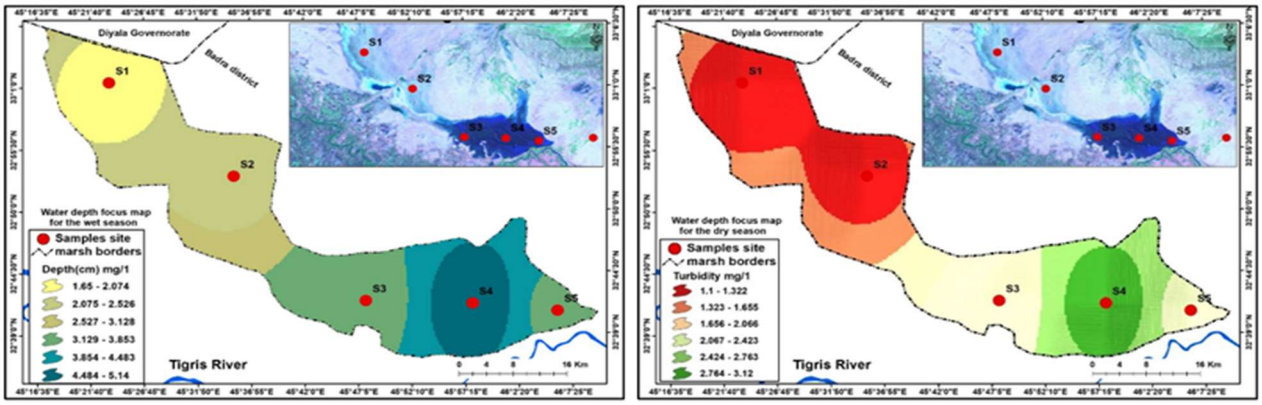
Map (5): Electrical conductivity concentration Al-Shuweja Oasis for the wet and dry seasons. Source: Based on the work of the researcher relying on Table (1).

Secondly, the analysis of the physical characteristics of Al-Shuweja Oasis water includes: The turbidity (TUR) values, measured in milligrams per liter (mg/L): As for the amount of suspended matter causing turbidity in the water of Hor Al-Shuweija, the highest values were recorded in the (S5) sample, as it reached (9.5 Ntu) in the wet season, and decreased in the (S1) sample, as it reached (3.2 Ntu) in the same season, while looking at map (). The highest value of the basal value was recorded in the dry season in the (S4) sample, which amounted to (7.4 Ntu), and the lowest value was recorded in the (S2) sample, which amounted to (3.4 Ntu). Among the factors affecting water turbidity are the speed of currents, the nature of the bottom, climate changes, the density of vegetation cover, and others (Al-Hasnawi, 2013, 120). Map (6).



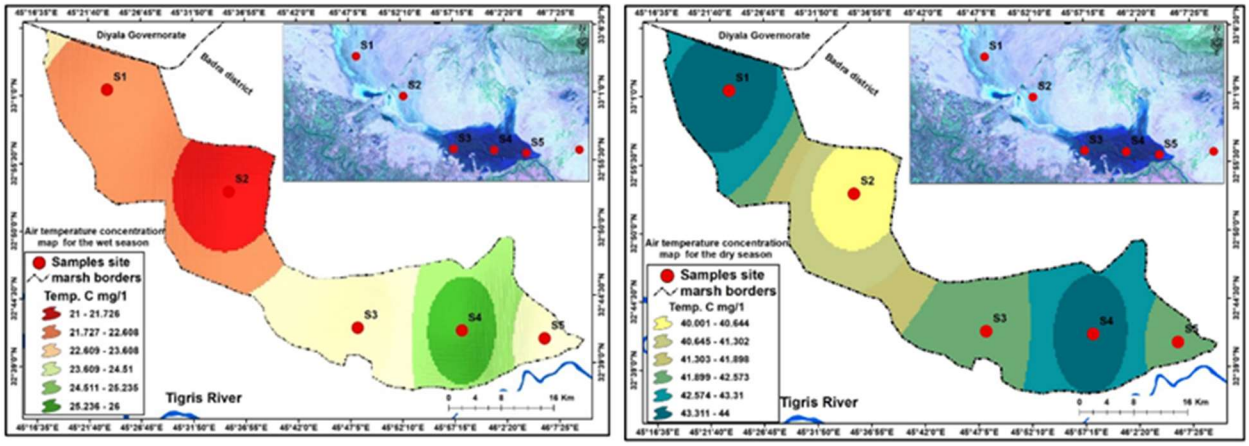
Map (6): Turbidity concentration in Al-Shuweja Oasis for the wet and dry seasons. Source: Based on the work of the researcher relying on Table (1).

2- As for the water depth and light transmittance: The (S4) sample recorded in the wet season the deepest point of the marsh, which amounted to (5.14) cm, while the (S4) sample recorded a depth that reached (3.12) cm in the dry season, due to the decrease in the amount of discharge coming from the sources of nutrition, the rise in temperatures, and the increase in the amount of evaporation that Lead to a decrease in the levels of the marshes of the region, see map(7).



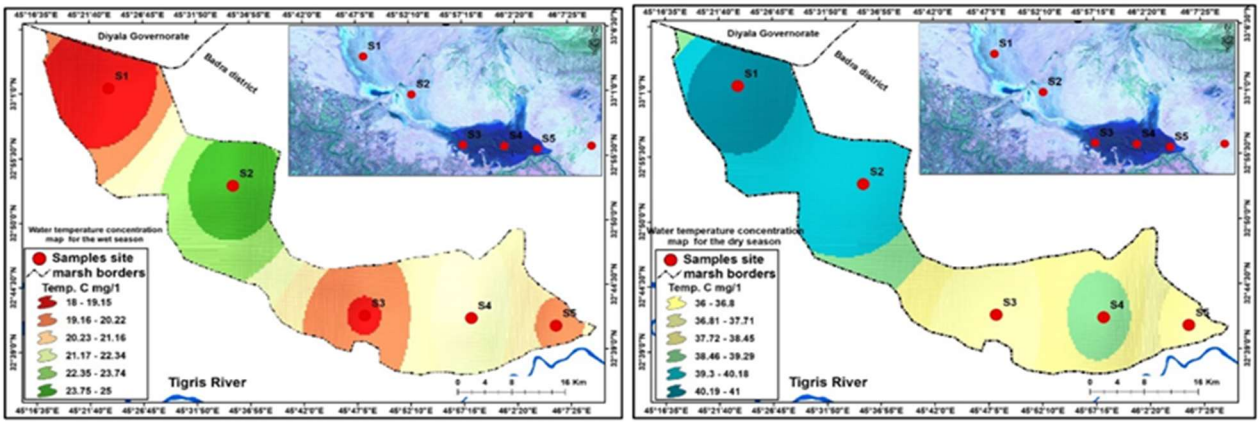
Map (7): Water depth and light transmittance concentration in Oasis for the wet and dry seasons. Source: Based on the work of the researcher relying on Table (1).

1. **Temperature (°C):** The highest air temperature was recorded in the wet season in the Al-Shuweija marsh in sample (S4) (26) C. While in the dry season, the highest air temperature was recorded in both samples (S1) and (S4) (44) C, see map (8).



Map (8): Air temperature concentration in Al-Shuweja Oasis for the wet and dry seasons. Source: Based on the work of the researcher relying on Table (1).

The highest temperature of the water in the wet season of the Shuweija Marsh in sample (S2) was (25) C. As for the water temperature in the dry season, it was recorded in sample (S1), the highest was (41) C, and the reason for the difference in the temperature of water and air in the water The marshes are due to the seasonal changes in addition to the difference in the time for sampling, and the water temperature is directly related to the changes in the air temperature. See map (9).



Map (9): Water temperature concentration in Oasis for the wet and dry seasons. Source: Based on the work of the researcher relying on Table (1).

Conclusions and Recommendations.

Conclusions:

1- The study revealed that there is a clear spatial difference in the physical and chemical characteristics of the water of the Al-Shuweija marsh. From the analysis of the samples of the marsh water, it is noted that the alkalinity and TDS values in the Al-Shuweija mart water are high for the year 2022.

2- The study revealed that all the EC values of the electrical connection were very high and not within the permissible limits.

3- The study showed that the turbidity values recorded the highest values in the wet season. Among the factors affecting the turbidity of the water are the speed of the currents, the nature of the bottom, climatic changes, the density of the vegetation cover, and others.

4- The study revealed that the difference in water and air temperature in the waters of Hor Al-Shuweja is due to the seasonal changes, in addition to the difference in the time for sampling, and the water temperature is directly related to the changes in the air temperature.

Recommendations:

1- Benefiting from the waters of the Al-Shuweja Marshes and making optimal use of them, and using modern technologies to construct reservoirs for the marsh's nutrients and reduce the volume of water losses.

1- Defining environmental regulations and laws to determine the possibilities of preserving the marsh waters, and reducing the manifestations of pollution resulting from various human uses, especially industrial ones.

2- The need for the Ministry of Water Resources and the Marshes Revitalization Center to take the necessary measures to preserve the quality of the water of the Dilmaj marsh in a way that has physical and chemical characteristics suitable for human, plant and animal use.

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