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THE WATER TABLE POLLUTION IN THE CITY OF AL -NASR AND ITS ENVIRONMENTAL EFFECTS

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Abstract:
The problem of water pollution has become the problem of the times, and this is the result of climate changes, the lack of rain on Iraq in general, the southern parts in particular, and the increase in the quantities of evaporation on the one hand, and the lack of water releases, increased wastewater, and its drainage to the schedule of al -Gharaf contributed to increasing the amount of pollutants for water and thus the occurrence of physical and chemical pollution Biological and the characteristics studied in the research have exceeded the standards specified by the relevant authorities in Iraq and the global developed by the World Health Organization for the summer and winter season, which contributed to the occurrence of significant environmental effects within the city of Al -Nasr on the material and immobility side represented by pollution (air, water, water, and water, and water. Soil) eliminating the natural plant and spreading strange plants from the local environment as well as unpleasant odors, insects and rodents.

Keywords: Environmental pollution, Water pollution, Nasr-City, Graph Table , Water properties, Environmental impacts

INTRODUCTION:

Water is one of the most crucial natural resources, serving as a fundamental element for the continuity of life. Human activities across various aspects of daily life, including economic and social endeavors, heavily rely on water. These resources possess a fixed quantity but can renew over time due to the hydrological cycle. However, in recent times, water sources in Iraq have been facing significant deterioration. This deterioration results from insufficient water inflow into Iraq and pollution due to inadequate monitoring and the scarcity of projects aimed at treating water within the country. Moreover, the disposal of domestic wastewater, industrial activities, and various urban practices into rivers, as well as the washing of agricultural lands, drainage, and irrigation, all contribute to the discharge of pollutants into river channels. This situation is further exacerbated by the lack of strategic plans and management for developing and enhancing the provision of clean and potable water for daily activities, including household consumption.

The waters in Iraq are witnessing noticeable pollution at various levels, affecting both their main sources, namely surface waters, and the distribution of treated water through urban water networks to the population.

Water used for human activities undergoes multiple treatment processes before distribution in urban areas. These water sources contain varying levels of contamination that necessitate treatment to make them safe for use. This treatment involves reducing or eliminating harmful bacteria and viruses and removing chemical substances that alter the water's properties. However, the impact is not confined to water alone; it also affects the transport pipeline network from the source to the consumer. This results in corrosion or rusting of these pipelines, contributing to the worsening problem of water pollution and its unsuitability for drinking or other domestic activities.

Research Problem:

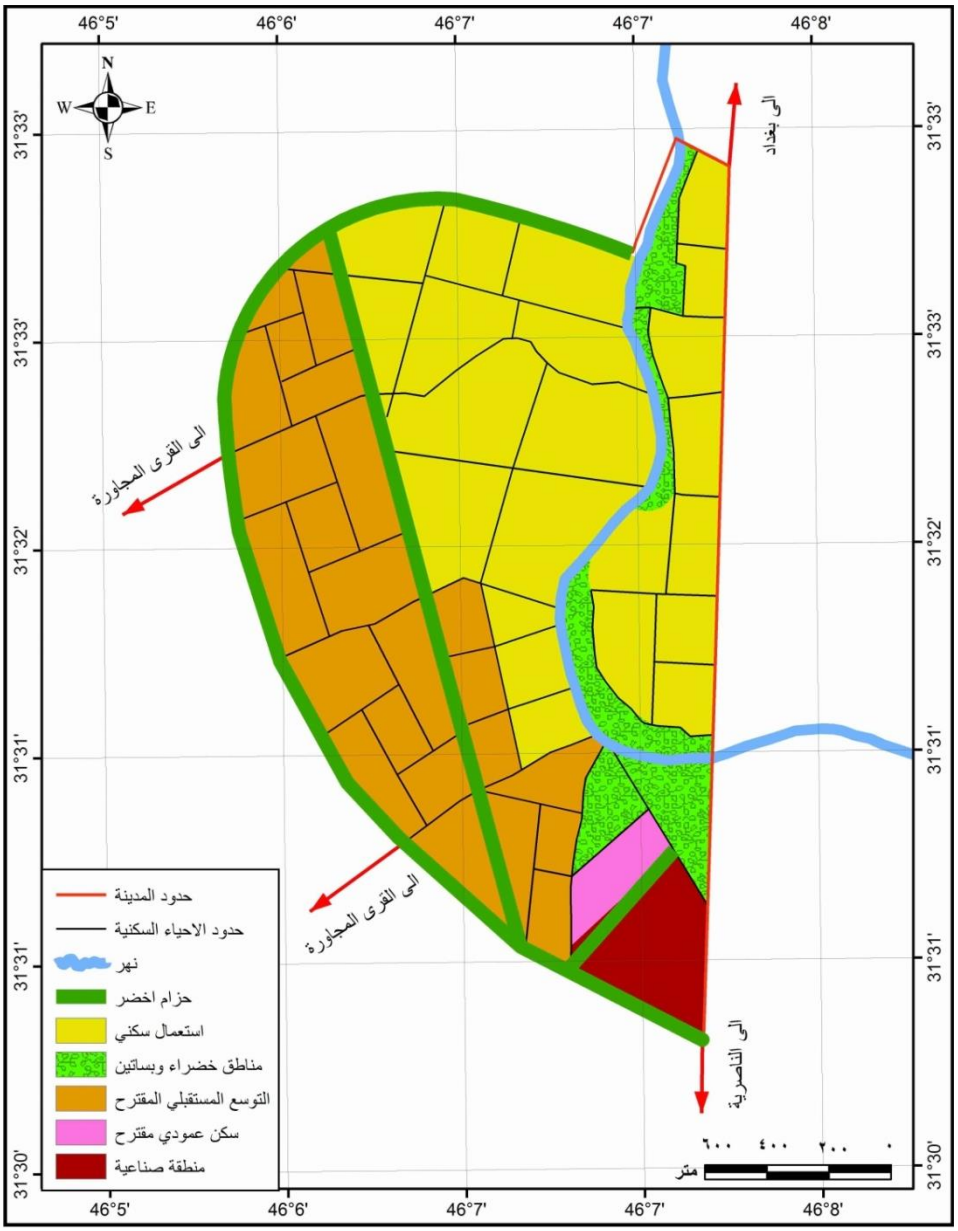
The research problem is centered around the presence of polluted water in the city of Al -Nasr, where the characteristics of water pollutants vary depending on the type and source of pollution. Some pollutants are natural, while others are of human origin, and both can exceed specified standards, rendering the water polluted. Additionally, the environmental impacts of water pollution are visibly evident to observers within the city.

Significance of the Study:

1. To study the physical and chemical characteristics of the water in the Al-Gharaf River in Al –Nasr , with a comparative analysis between the summer and winter seasons.
2. To understand the environmental effects of water pollution in Nasiriyah.

Study Area:

Al –Nasr is located in the northeastern part of Dhi Qar Province (formerly known as Al-Muntafiq district), between latitude (30°, 30' - 31°, 30') to the north and longitude (46° - 47°) to the east. It is bordered by Al-Rifai district to the north, Al-Dawayia district to the east, Al-Shatrah district to the southeast, Al-Gharaf district and Al-Bat'ha sub-district to the south, and Muthanna Province to the west (General Authority for Survey, 2006). The city of Nasiriyah is divided into two parts: the eastern part known as "Al-Soub Al-Saghir" (Qaragul), and the western part known as "Al-Soub Al-Kabeer" (Bani Rikab) (Al-Hilalah, 2008, pp. 113-114). See Map (1).



Map (1) Study Area Location

Source: The researcher relied on: The Directorate of Urban Planning in Thi Qar, the updated master plan for Nasiriyah city, the technical department, 2015.

Water Pollution:

Environmental pollution is defined as the existing state of the environment resulting from changes that cause disturbance or have an impact on humans, leading to direct death or disruptions in ecological systems. The causes of pollution are referred to as pollutants (Islam, 1990, p. 52). Pollutants, on the other hand, are substances or microorganisms that cause harm and result in diseases (Shalash, 2000, p. 117).

Water pollution, specifically, refers to a change in the natural characteristics of water that renders it unsuitable for its designated uses due to the introduction of foreign substances, which can impart unusual color, taste, or odor. Water can become polluted by microorganisms resulting from the disposal of various types of waste. Additionally, water pollution can involve toxic chemicals being added to it (Al-Dabaa, 2004, p. 100). It encompasses any changes in the physical, chemical, and biological properties of water that contribute to its unsuitability for drinking, domestic, and industrial purposes. These changes are often a result of thermal alterations due to thermal pollution (Aba Al-Khail and Qawas, 2005, p. 241).

Pollutants vary based on their sources into:
1. Biological pollutants.
2. Chemical pollutants.
3. Physical pollutants.

Causes of Water Pollution in Al-Gharaf River in Al –Nasr :

Water in the Al-Gharaf River becomes polluted due to various pollutants, and this is attributed to a combination of natural and human factors that directly impact water quality. These factors also affect the aquatic life living in river waters and their transmission to humans and animals, thereby indirectly affecting public life.

1. Natural Causes:

- Climate Change: Climate change refers to alterations in climate characteristics over varying time periods, ranging from decades to centuries, and occurs when the average climate conditions change significantly. Climate change has significantly affected water resources because they are vital for sustaining life and preserving aquatic and non-aquatic ecosystems. The study area, which is part of Dhi Qar Province, has experienced significant climate fluctuations. Temperature changes have increased, leading to decreased humidity levels, which, in turn, have resulted in reduced rainfall in the region. Consequently, droughts have become more frequent, leading to increased evaporation rates from water bodies. This, in turn, reduces the quantity and quality of surface water in Al-Gharaf River.
- Evaporation: Evaporation is the process by which water particles transition from water bodies, soil, and other surfaces into the atmosphere (Tirkmani, 2005, p. 129). The study area faces a water deficit due to high evaporation rates, which are inversely related to the amount of rainfall in the region. With limited rainfall, evaporation rates increase, depleting water in surface bodies and causing an increase in salinity levels in Al-Gharaf River, which, in turn, affects water quality.
- Salinity Concentrations: Salinity concentration is related to the water's nutrient source, and there is an inverse relationship between salinity concentration and water nutrition. The higher the discharge or water nutrient input, the lower the salinity concentration, whereas it increases with decreased water discharge. The highest salinity concentrations occur when water discharges into Iraq fall below 200 m3/s (Ali et al., 2002, p. 435). This aspect will be discussed further in the research.

2. Human Causes:

- Domestic Sewage Water: Domestic sewage water includes water consumed by individuals to meet various daily needs, including domestic, agricultural, industrial, and commercial uses. It also includes liquid medical waste from health centers, hospitals, medical clinics, and rainwater that carries significantimpurities and organic and inorganic suspended matter. This contributes to the loss of the water's physical and chemical properties. Water constitutes 99% of domestic sewage, with the remaining percentage consisting of pollutants (Abdel Sabour, 2000, p. 33). The sewage system in the city is inefficient and consists of a unified water network that collects rainwater and sewage without treatment, directly discharging it into Al-Gharaf River. It should be noted that sewage water channels are open ditches that discharge water into the river, contributing to water pollution and changes in its characteristics. In 2022, the sewage discharge rate in Al -Nasr was approximately 8,494,050 liters/day, which equals 8,494.05 m3/day. The quantity of water discharged per person through various uses is about 150 liters/day, according to the local standard used by the Dhi Qar Sewerage Directorate. It's worth mentioning that this quantity increases with the growth of the city's population.

Figure 1. Waste collection near Graf Lake in Nasiriyah city.
Source: The researcher captured the image on August 24, 2022.

Table (1): Average Daily Sewage Discharge Rate in Al -Nasr City

Population (people)	Sewage Discharge Rate (liters per day)	Volume of Domestic Sewage (liters per day)
56,627	150	8,494,050

Source: Compiled by the researcher relying on:

1. Republic of Iraq, Ministry of Planning, Central Statistical Organization, Directorate of Statistics in Dhi Qar, Census and Enumeration Results, 2022 Estimates, Unpublished Data, 2022.
2. Republic of Iraq, Ministry of Construction, Housing, Municipalities, and Public Works, Directorate of Sewage in Dhi Qar, Al -Nasr Sewage Directorate, Unpublished Data, 2022.

Figure (2): Sewage Sewers Discharging into Al-Gharaf River in Al -Nasr City
Source: The researcher captured the image on August 24, 2022.

Industrial and Agricultural Waste: This term refers to the total quantity of gaseous, liquid, and solid waste generated from industrial and agricultural human activities. These activities include relatively simple primary industries, such as food processing, meat processing, construction industries in the city, as well as the presence of blacksmith and carpentry workshops, automobile repair shops, and electric generators scattered within the city. All of these activities discharge their waste into Al-Gharaf River in Al -Nasr City, contributing to the pollution and alteration of its characteristics, as these waters are disposed of without any treatment.

As for agricultural waste varies due to the diversity of agricultural activity in the study area, encompassing both animal and crop farming. Agricultural lands surround the city, and the river flows through these agricultural areas, directly or indirectly receiving agricultural waste. When agricultural lands are irrigated, the polluted water is carried to the river, carrying along with it soluble chemical materials used in agricultural processes. Often, farmers use excessive amounts of pesticides or fertilizers, exceeding the plant's needs, thus increasing waste that ends up in the river. Notably, extensive areas adjacent to the river are used for vegetable cultivation, as the soil is fertile. This further contributes to the increased pollutants in the river.

Solid Waste: This term refers to the remnants of cardboard, wood, furniture residues, plastics, household utensils, and waste generated by commercial establishments in the city, including what results from the process of transporting goods and using them in bags, crates, or boxes. Frequently, organic and inorganic waste is disposed of near the river, especially by residential units located near the river and commercial shops located nearby. It is often observed that large quantities of waste accumulate on both sides of the river. The accumulation and stacking of waste leads to significant harm to the water, as it contains chemicals that sometimes react quickly with water, resulting in contamination of the water in the river. This poses a risk to humans through transferring these pollutants to animals in the water or those that drink river water, in addition to the plants irrigated with Al-Gharaf River water. Sometimes, the presence of such waste acts like an insulating layer on the water, hindering the passage of light through it and impeding the growth of aquatic plants and algae, which are the primary food sources for fish and other organisms.

The Qualitative Characteristics of Water in Al -Nasr City:

The chemical properties determine the suitability and quality of water for various uses. Al -Nasr City relies on the Tigris River, represented by Al-Gharaf River, for its water supply. The quality of this river depends on the type of Tigris River water, its discharge volume, characteristics, as well as the feeding sources, the areas and environments it passes through, and the waste disposed of by the residents in the areas through which it flows.

Samples of Al-Gharaf River water were collected from different parts of the city at various times during the day, as well as during different seasons (winter and summer), totaling nine samples for each season collected from Al-Gharaf River and Shatt Al-Hatem. The study relied on local standards and the World Health Organization standards for environmental determinants to assess their suitability.

Table (2) Iraqi and World Health Organization Standards for Water Use

No.	Parameter	WHO Standard (mg/L)	Egyptian Standard (mg/L)
1	pH (Hydrogen Ion Concentration)	6.5 - 9	6 - 8
2	Total Suspended Solids (T.S.S)	60	
3	Total Dissolved Solids (T.D.S)	1500	1500
4	Chemical Oxygen Demand (C.O.D)	100	
5	Biochemical Oxygen Demand (BOD5)	40	0.5
6	Dissolved Oxygen (D.O)	At least 4	At least 4
7	Nitrate (NO3)	Less than 30	50
8	Chlorides (Cl-)	Less than 200	400
9	Sulfates (SO4)	Less than 200	400
10	Phosphate (PO4)	3	Less than 3
11	Magnesium (Mg)	50	150
12	Sodium (Na)	350	200

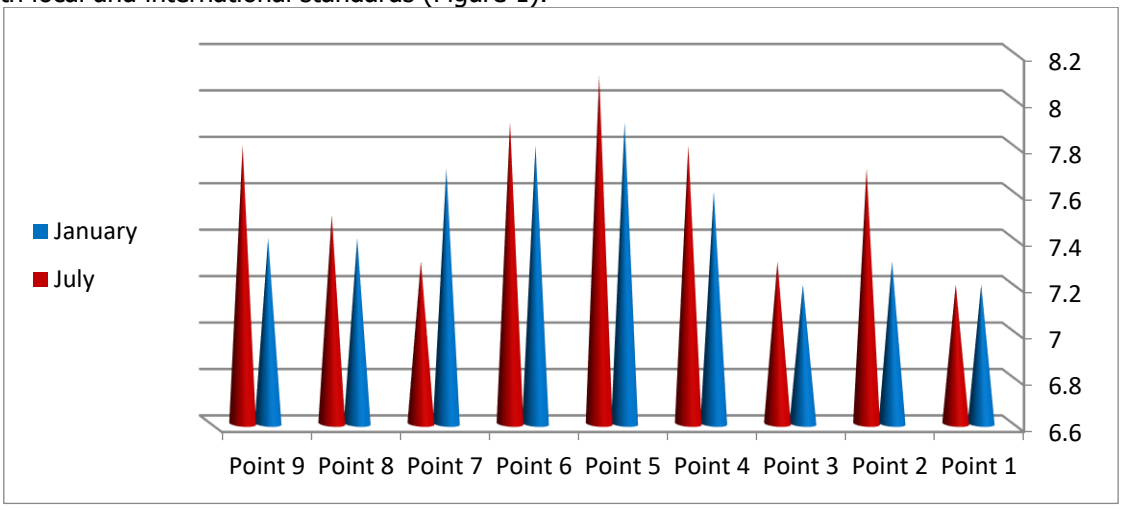
*Measurement units used are mg/L except for pH, which is unitless.

Source: The researcher's work isbased on:

1. Republic of Iraq, Ministry of Health, Environmental Legislation, Environmental Protection and Improvement Center, 1998.
2. Republic of Iraq, Law No. (2) for 2001, amending the Environmental Determinants Law for the Maintenance of Rivers and Public Waters from Pollution, dated (25) for 1967, Official Gazette of Iraq, No. (3890) on 8/6/2001, Iraq, 2001.
3. World Health Organization (WHO), International Standards for Water, 3rd edition, Geneva, 1971, p. 32.
4. World Health Organization (WHO), Guidelines for Drinking Water Quality Standards in Developing Countries, Lima 2002, p. 65.

1. PH Value:

The pH value, also known as hydrogen ion concentration, indicates the acidity or alkalinity of water and ranges from 0 to 14. In cases of acidity, the pH value falls within the range of 0 to 7, while alkalinity has values greater than 7. A pH value of 7 indicates neutrality. Based on the analysis results of the studied samples, it was found that the pH value was 7.2 in January, while in July, it reached 7.6. Therefore, the water is alkaline, suitable for aquatic life, irrigation, and complies with local and international standards (Figure 1).



(Figure 1). The value of the pH (PH) in the waters of Al -Ghrouf table in the city of Al -Nasr

Source: Based on the researcher's work using the results of the analyzed samples.

2- Total Suspended Solids (T.S.S):

Total Suspended Solids (T.S.S) refers to non-dissolved materials in water, such as mud, silt, sand, plant and animal matter. Their presence in water can cause cloudiness and changes in taste. When not removed, they create an

environment conducive to anaerobic microorganisms, contributing to environmental pollution. This can ultimately affect aquatic life and hinder photosynthetic processes, impacting overall growth. (Al-Kalabi, 2013, p. 176).

Figure (2) illustrates that the average Total Suspended Solids (T.S.S) in the analyzed samples was 9.2 milligrams per liter in January, exceeding the local standard. In contrast, the level in July was higher than in January, mainly due to increased evaporation rates caused by higher temperatures and a lack of rainfall in Iraq during the summer. Additionally, there was a decrease in water discharges from upstream countries. In July, the T.S.S level reached 10.8.

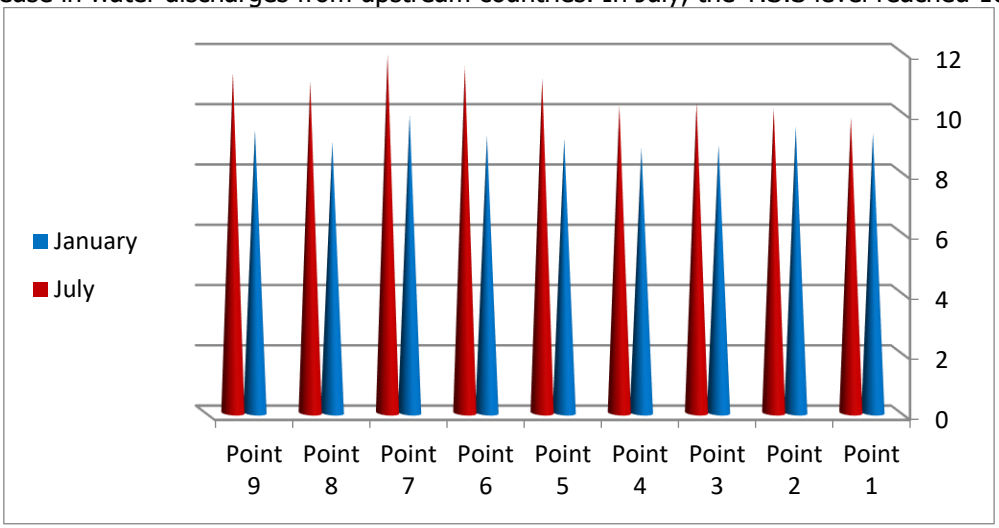


Figure (2) The total suspended solids (TSS) value in Graf Lake waters in Nasiriyah city
Source: Based on the researcher's work using the results of the analyzed samples.

3- Total Dissolved Solids (T.D.S):

Total Dissolved Solids (T.D.S) refers to the total amount of dissolved solids in water, including inorganic salts (calcium, magnesium, potassium, sodium, bicarbonates, chlorides, sulfates) and organic matter that dissolves in water. The sources of T.D.S in water vary from natural sources to sewage and industrial wastewater used in human activities. Geological differences and variations in the solubility of carbon and minerals also contribute to differences in T.D.S levels (WHO, 2011, p. 423).

The T.D.S level in the waters of Al-Gharraf Table in the city of Al -Nasr was 668.2 milligrams per liter in January, within both local and international standards. However, in July, it reached 1318.8, primarily due to soil erosion from agricultural lands and industrial waste discharged into the table . Despite the increase, this level still falls within the local and international standard limit of 1500 milligrams per liter, as shown in Figure (3).

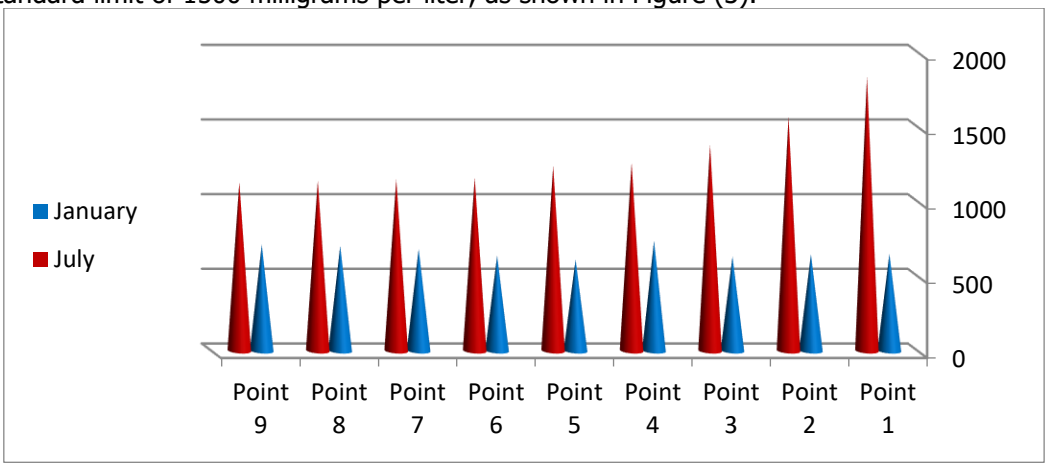


Figure (3) The value of total dissolved solids (TDS) in Graf Lake waters in Nasiriyah city
Source: Based on the researcher's work using the results of the analyzed samples.

4- Chemical Oxygen Demand (COD):

Chemical Oxygen Demand (COD) serves as an indicator of the organic components that can undergo chemical oxidation. It is one of the most powerful and rapid indicators of organic compounds (Awn et al., 2019, p. 233). In sewage water, which contains toxic substances for aquatic life (APHA, 1998), COD is linked to the quantity of organic materials oxidized by microorganisms. The COD level in the study's samples for January was 105 milligrams per liter, exceeding the local standard of 100 milligrams per liter. This increase can be attributed to the presence of biologically refractory organic matter in the water (Al-Obaidi, 2019, p. 26). In July, the COD level recorded 155 milligrams per liter, likely due to an increase in organic waste, food residues, and industrial pollutants. This negatively affects dissolved oxygen and anaerobic decomposition processes.

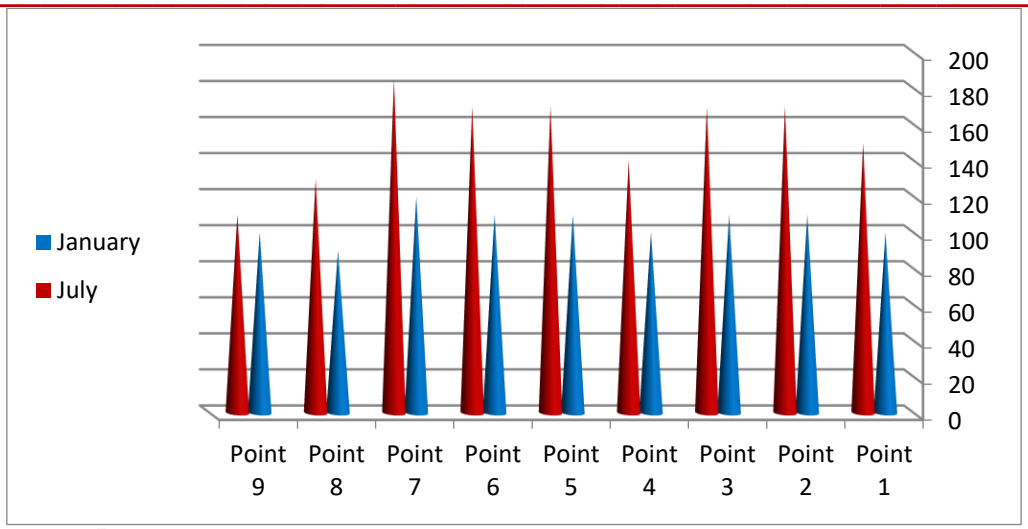


Figure (4) The chemical oxygen demand (COD) value in Graf Lake waters in Nasiriyah city.
Source: Based on the researcher's work using the results of the analyzed samples.

5- Biological Oxygen Demand (BOD5):

Biological Oxygen Demand (BOD5) measures the amount of oxygen consumed by microorganisms for breaking down and digesting organic materials, including non-organic substances, in river and polluted waters of various types (Al-Mashhadani and Jasim, 2012, p. 21). The BOD5 level for December was 5.1 milligrams per liter, significantly exceeding the local and global standards of 4 milligrams per liter. This increase is associated with the presence of refractory organic materials and various types of pollution. In July, the BOD5 level reached 8.5 milligrams per liter, attributed to increased organic waste, food residues, and industrial waste. This negatively impacts dissolved oxygen and anaerobic processes.

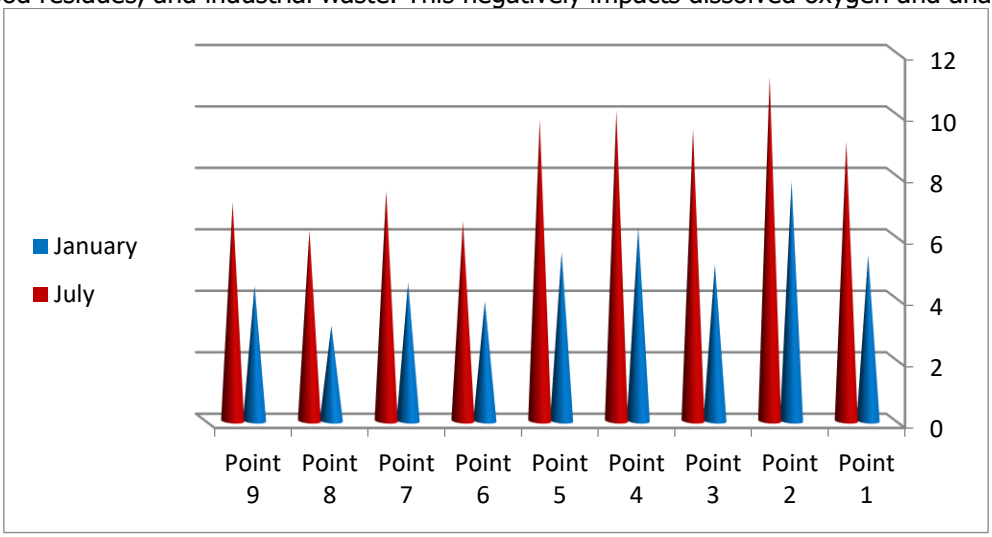


Figure (5) The biological oxygen demand (BOD) value in Graf Lake waters in Nasiriyah city.
Source: Based on the researcher's work using the results of the analyzed samples.

6- Dissolved Oxygen (DO5):

Dissolved Oxygen (DO5) in water samples from Al-Gharraf Table in Al -Nasr city was found to be 6.4 milligrams per liter in January and 10.9 milligrams per liter in July. DO5 plays a crucial role in aquatic environments by sustaining and supporting aquatic life through respiration. Its presence is affected by temperature and salinity levels. The minimum required level is 4 milligrams per liter. Various factors contribute to DO5 levels, including evaporation, industrial washing, and water used for operating and washing generators. The table receives direct pollution from untreated sources, including agricultural runoff, given that it passes through agricultural areas before entering the city.

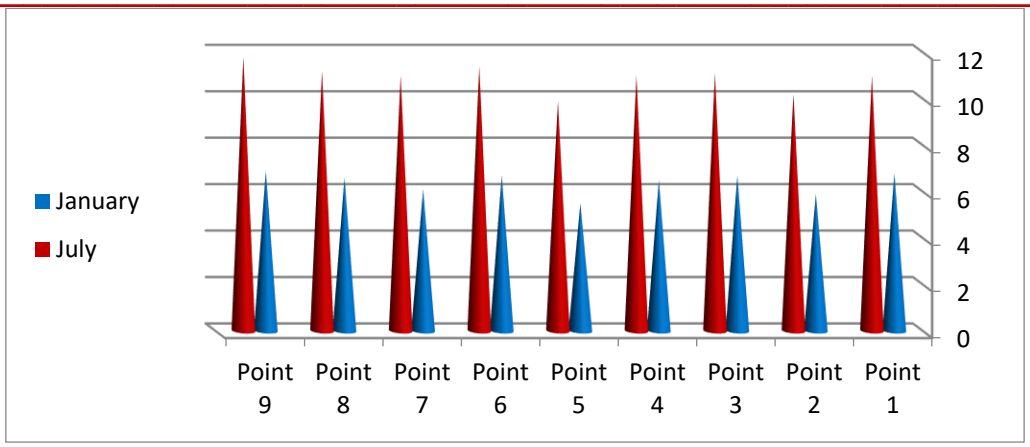


Figure (6) The dissolved oxygen (DO) value in the waters of the Graf River in Nasiriyah city.
Source: Based on the researcher's work using the results of the analyzed samples.

7- Nitrates (NO3):

The nitrate level in Al-Gharraf Table waters in Al -Nasr city reached 13.9 milligrams per liter in January and 18.2 milligrams per liter in July, falling within the local and global standards (less than 30, 50 milligrams per liter, respectively). Nitrate's primary source is nitrite, originating from ammonia and non-aerobic bacterial activity. The oxidation of nitrogen compounds present in the water contributes to nitrate levels (Al-Obaidi, 2019, p. 24). It's important to note that nitrates themselves do not pose a direct threat to human health, but the danger arises when nitrates transform into nitrites, which can then convert into nitrosamines, known carcinogens (Habib, 2004, p. 19).

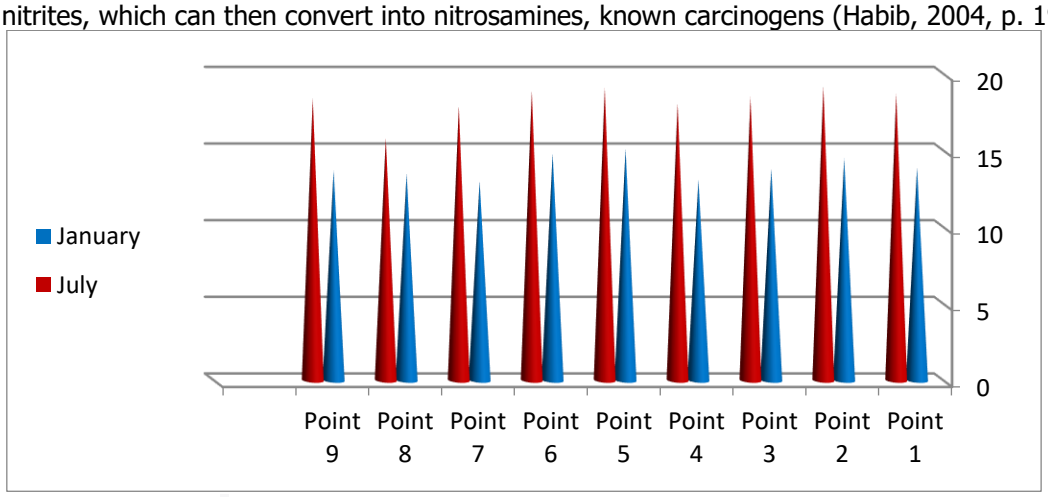


Figure (7) The nitrate value in the waters of Graf Lake in Nasiriyah city.
Source: Based on the researcher's work using the results of the analyzed samples.

8- Chlorides (Cl-):

As shown in Figure (8), the concentration of chloride ions (Cl-) reached an average of 525.5 milligrams per liter in January, surpassing both the local standard (less than 200 milligrams per liter) and the global standard set by the World Health Organization (400 milligrams per liter). In July, it recorded an even higher level of 756.6 milligrams per liter. Chlorides are among the major inorganic compounds found in waters suitable for human use and sewage waters. Their presence is mainly attributed to the dissolution of salt deposits.

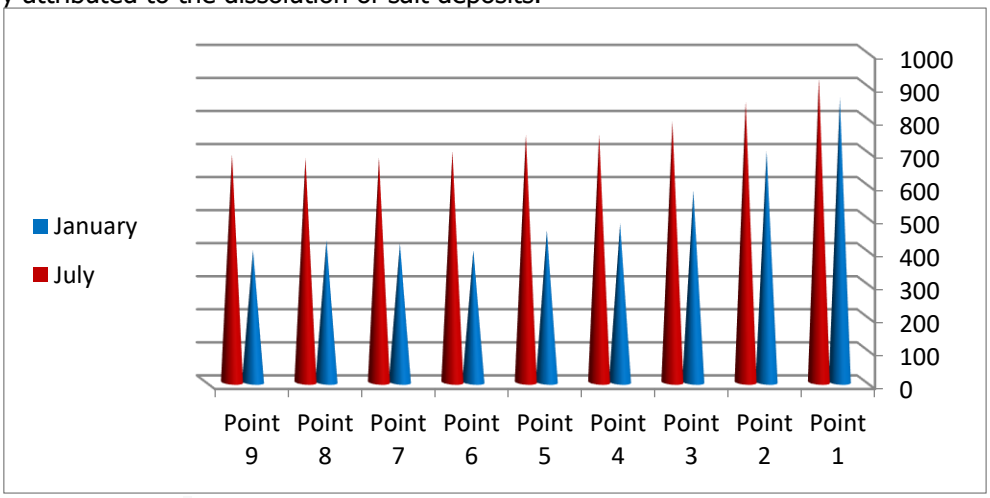


Figure (8) The chloride value in the waters of Graf Lake in Nasiriyah city.
Source: Based on the researcher's work using the results of the analyzed samples.

9- Sulfates (SO4):

The sulfate level (SO4) for January was 177 milligrams per liter, consistent with the local standard (200 milligrams per liter). In contrast, it reached 266.3 milligrams per liter in July, exceeding the specified standard. Sulfates in sewage water, disposed of in Al-Gharraf Table in Al -Nasr, originate from the breakdown of organic matter in organic waste (Khasaf, 2014, p. 33).

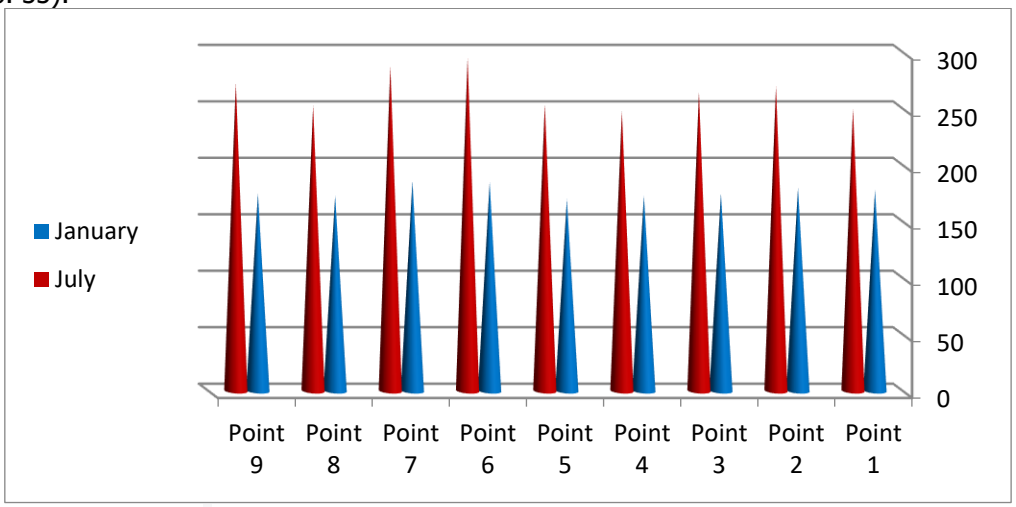


Figure (9) The sulfate value in the waters of Graf Lake in Nasiriyah city.
Source: Based on the researcher's work using the results of the analyzed samples.

10- Phosphates (PO4):

From the results shown in Figure (10), it was found that the phosphate (PO4) level was 11.6 milligrams per liter in January, exceeding the local standard of 8.11 milligrams per liter, given that the standard is 3 milligrams per liter. In July, it reached 19.9 milligrams per liter. The primary source of phosphate in the water is cleaning agents found in sewage water discharged into Al-Gharraf Table in Al -Nasr city. These cleaning agents contain active phosphorus-containing substances, particularly sodium tripolyphosphate (STPP), which rapidly and directly breaks down in washing water (Salem et al., 2019, p. 220).

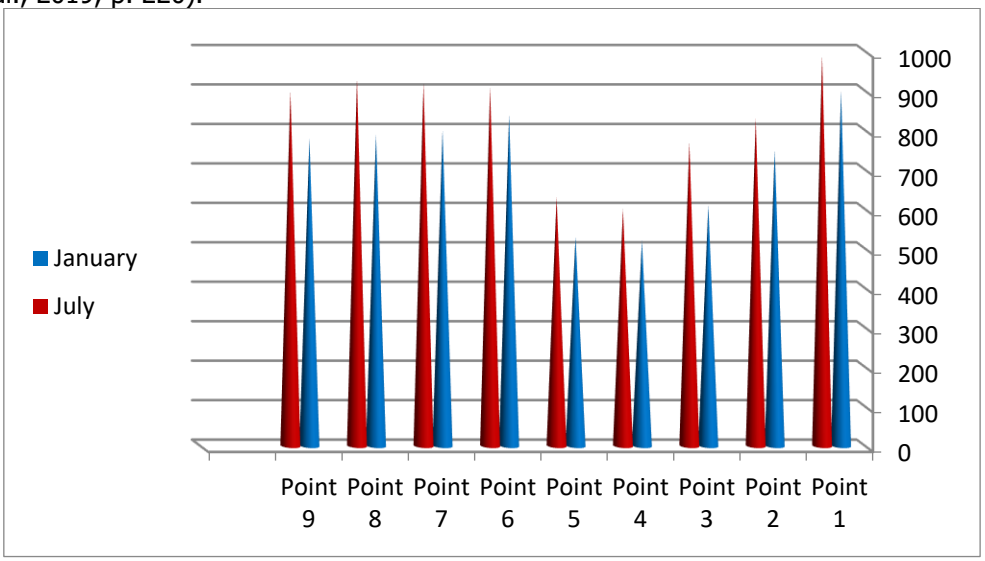


Figure (10) The phosphate value in the waters of Graf Lake in Nasiriyah city.
Source: Based on the researcher's work using the results of the analyzed samples.

11- Magnesium (Mg):

Magnesium (Mg) is an important element for maintaining the ecological system as it is a component of chlorophyll, essential for the growth of green plants and algae in water. It also supports the growth and reproduction of river fish. The average magnesium level for January was 13.1 milligrams per liter, as shown in Figure (11), which is 36.9 milligrams per liter higher than the specified standard. This increase is due to low water discharge, limited precipitation, and a lack of rainwater runoff that would otherwise wash the soil. In July, the level reached 24.2 milligrams per liter.

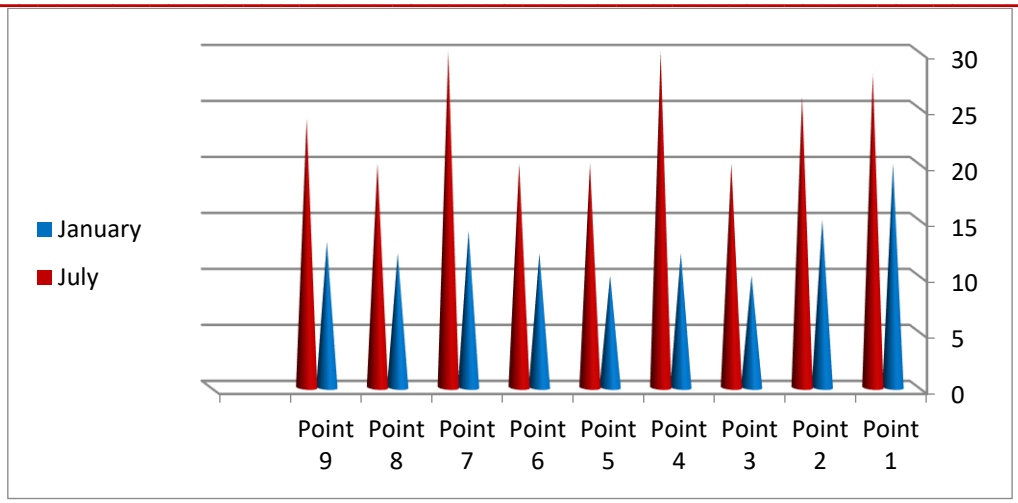


Figure (11) The magnesium value in the waters of Graf Lake in Nasiriyah city.
Source: Based on the researcher's work using the results of the analyzed samples.

12- Sodium (Na):

In contrast, as shown in Figure (12), the sodium (Na) level reached an average of 724 milligrams per litre in January, exceeding the local standard of 350 milligrams per litre. This indicates water pollution in the Al-Gharraf Table in Al -Nasr city. In July, it recorded an even higher level of 831.1 milligrams per litre.

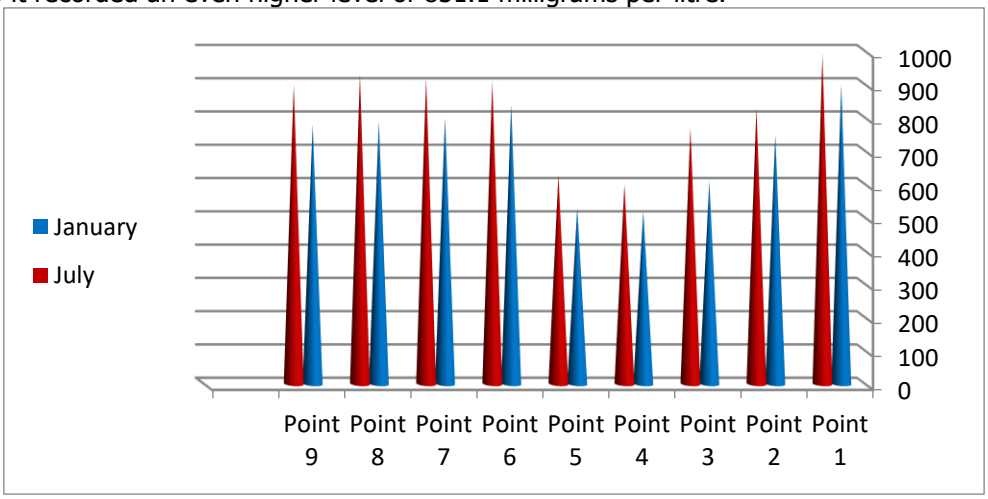


Figure (12) The sodium value in the waters of Graf Lake in Nasiriyah city.
Source: Based on the researcher's work using the results of the analyzed samples.

Environmental Impacts of Polluted Al-Gharraf Table Waters in Al -Nasr City:

The environmental impacts of the polluted waters in Al -Nasr city's Al-Gharraf Table are diverse and not limited to one aspect; they encompass both physical and non-physical aspects. These environmental impacts can be discussed as follows:

1. Air Pollution: The quality of the air in the city is affected by rising temperatures, increased evaporation rates, higher levels of water pollutants, and reduced water discharges from upstream countries. This leads to exceeding the prescribed limits for water discharges within Iraq for provinces through which the Tigris River flows. Consequently, there is an increase in air pollutants, which can adversely affect the health of living organisms in the city, including humans, animals, and plants, especially in areas close to the table within the city.
2. Water Pollution: The increased pollution levels in Al-Gharraf Table , exceeding local standards, contribute to higher water pollution rates. This, in turn, affects the quality of drinking water supplied to city residents. Notably, the sewage treatment plants within the city are old and in disrepair, unable to cope with the growing population. Furthermore, these treatment plants solely rely on chlorine for water treatment, which is inadequate for handling the volume and types of pollutants directly discharged by the city's residents and those of the preceding cities upstream. Field studies and interviews with city residents, particularly in the Hospital neighborhood, have revealed dissatisfaction with the quality of water supplied to homes, often containing silt and algae. This indicates the inefficiency of existing sewage treatment plants, random discharges into water networks, pipe corrosion near sewage outlets, and the subsequent mixing of sewage water with freshwater, negatively impacting the quality of water supplied to city residents. Additionally, new neighborhoods developed within the city, especially informal settlements, lack sewage services and rely directly on river water for domestic use.
3. Soil Pollution: Soil contamination can occur when polluted water is used for irrigation in the agricultural lands surrounding the city. These lands serve as a food source for city residents and some neighboring cities. This can affect

soil quality, agricultural production (quantity and quality), and act as a source for the transfer of various pollutants that can impact human and animal health. As agricultural lands gradually transform into non-productive, non-agricultural lands, it leads to the migration of many farmers into urban areas, leaving their lands unused.
4. Natural Plants: Natural plants along the banks of the river within the city are affected by water pollution. As pollutant levels rise beyond what these plants can tolerate, they reach a point where they cannot absorb excessive pollutants, resulting in their deterioration or extinction. This pollution also affects algae and aquatic organisms present in the table
5. Spread of Rodents, Insects, and Stray Dogs: These pests tend to thrive in areas with accumulated solid waste and sewage outlets that discharge into the table . These areas provide a food source for these organisms. The decomposition of organic matter contributes to the spread of unpleasant odors on both sides of the table and in nearby areas.
6. Impact on Recreational Areas: Polluted waters negatively affect recreational areas within the city, especially the cafes along the table . With rising temperatures, increased evaporation rates, and the spread of unpleasant odors, these factors can negatively impact the experience of visitors to these areas. The city lacks recreational facilities, parks, and gardens.

RECOMMENDATIONS:

1. Upgrade sewage networks along Al-Gharraf Table , given its significance as the primary water source for the city.
2. Establish sewage treatment plants within the city with high standards and suitable capacities to accommodate the growing population.
3. Treat water discharged into the table by generators to reduce the influx of pollutants into the city.
4. Enhance monitoring and control of activities along the table that contribute to both solid and liquid pollutants.
5. Advocate for the construction of sewage treatment plants and the use of treated water for irrigation of crops and livestock. Additionally, utilize the organic fertilizer produced in these plants for agricultural purposes, creating an economic resource.
6. Form a monitoring team by responsible authorities to regularly sample and analyze table water, ensuring the quality of the water in Al -Nasr 's Al-Gharraf Table .

Appendix (1): Results of sample analysis during the winter season

Element	pH	T.S.S (mg/ L)	T.D.S (mg/ L)	C.O.D (mg/ L)	BOD5 (mg/ L)	D.O (mg/ L)	NO3 (mg/ L)	Cl- (mg/ L)	SO4 (mg/ L)	PO4 (mg/ L)	Mg (mg/ L)	Na (mg/ L)
Season	January	January	January	January	January	January	January	January	January	January	January	January
Point1	7.2	9.3	650	100	5.4	6.8	13.9	860	178	12.1	20	900
Point2	7.3	9.5	647	110	7.8	5.9	14.5	700	180	10.7	15	750
Point3	7.2	8.9	632	110	5.1	6.7	13.8	580	175	12.5	10	610
Point4	7.6	8.8	737	100	6.3	6.5	13.1	480	173	10.1	12	520
Point5	7.9	9.1	611	110	5.5	5.5	15.1	460	170	11.8	10	530
Point6	7.8	9.2	638	110	3.9	6.7	14.8	400	185	12.4	12	840
Point7	7.7	9.9	683	120	4.5	6.1	13	420	186	10.9	14	800
Point8	7.4	9	704	90	3.1	6.6	13.5	430	173	11.5	12	790
Point9	7.4	9.4	712	100	4.4	6.9	13.7	400	175	12.4	13	780
Average	7.5	9.2	668.2	105	5.1	6.4	13.9	525.6	177	11.6	13.1	724

Source: Prepared by the researcher based on the laboratory analysis results of samples collected from the study area (Graf Table) in Al -Nasr City, Thi Qar University, Multidisciplinary Consulting Office, Environmental Consulting Office, 2022.

Appendix (2): Results of sample analysis during the summer season

Element	pH	T.S.S (mg/ L)	T.D.S (mg/ L)	C.O.D (mg/ L)	BOD5 (mg/ L)	D.O (mg/ L)	NO3 (mg/ L)	Cl- (mg/ L)	SO4 (mg/ L)	PO4 (mg/ L)	Mg (mg/ L)	Na (mg/ L)
Season	July	July	July	July	July	July	July	July	July	July	July	990
Point1	7.2	9.8	1840	150	9.1	11	18.7	920	250	22	28	830
Point2	7.7	10.1	1570	170	11.2	10.2	19.2	850	270	18.9	26	770
Point3	7.3	10.3	1380	170	9.5	11.1	18.5	790	265	19.7	20	600
Point4	7.8	10.2	1260	140	10.1	11	18.1	750	248	18	30	630
Point5	8.1	11.1	1240	170	9.8	9.9	19.1	750	254	20.3	20	910
Point6	7.9	11.5	1160	170	6.5	11.4	18.9	700	295	19	20	920
Point7	7.3	11.9	1150	185	7.5	11	17.9	680	288	17	30	930
Point8	7.5	11	1140	130	6.2	11.2	15.8	680	253	21.1	20	900

Point9	**7.8**	**11.3**	**1130**	**110**	**7.1**	**11.8**	**18.4**	**690**	**273**	**23.3**	**24**	**831.1**
Average	**7.6**	**10.8**	**1319**	**155**	**8.5**	**11**	**18.3**	**757**	**266.2**	**19.9**	**24.2**	**990**

Source: The researcher's work is based on the laboratory analysis results of samples collected from the study area (Gharaf table) in Al -Nasr City, Thi-Qar University, Multidisciplinary Consulting Office, Environmental Consulting Office, 2022.

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- Field Study