

The Natural Characteristics Affecting the environmental pollution Contrast at the Center of Al-Manathira District

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Abstract: *The natural characteristics at the center of Al-Manathira directorate have a clear impact on the natural environment that surrounds the human-being. These characteristics are represented by the geological structure, surface characteristics, climatic characteristics, water resources, soil characteristics, and natural local plants, which have a clear impact on water, soil and air pollution, especially in changing their physical and chemical properties. The intensity of its effect may vary as a result of a change in the properties of the soil in the area in terms of texture, color, and porosity, which increases its pollution and thus affects the growth of living organisms in it. It also affects the properties of the water in the study area in terms of color, taste and smell. These properties are affected by increasing the quantities of pollutants in it and changing its physical, chemical and biological characteristics, which works to increase the percentage of sedimentation in it, which, in turn, increases the levels of pollutants and negatively affects the water system.*

Keywords: Pollutants, geological structure, water, soil and air, natural environment

The research problem: - What is the impact of the natural geographical characteristics on the environmental pollution of the center of Al-Manathira directorate?

Research hypothesis: - The natural and human characteristics have a clear impact on environmental pollution in the study area represented by natural characteristics, which are: surface characteristics, climate characteristics, soil, water resources and natural local plants.

Research objective: - The study aims to detect environmental pollution at the center of Manathira district by showing the impact of the natural characteristics affecting pollution in the study area by standing on the types of pollution and identifying the compounds and the chemical, physical and microbiological properties.

Geological structure:-

The geological structures in the study area, which were formed over time, consist of the following formations:

1- Al-Dabdaba: - These formations cover a few areas of the region, and the quality of the rocks constituting them affects the increase in the leakage of rainwater to the surface water, which works to change its characteristics because of the surface pollutants it carries from the agricultural and industrial areas, which, in turn, affects the properties of water and soil in the region.

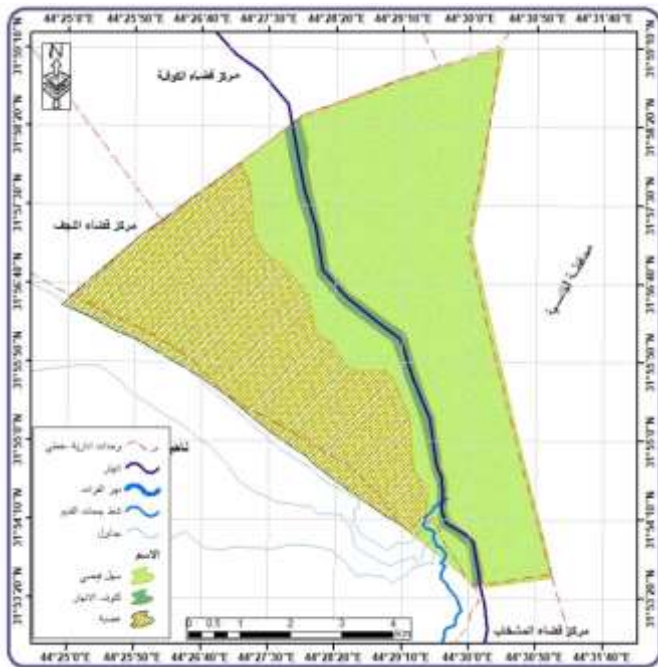
2- Sediments of the Flood Plain: - These formations occupy a large area of the center of Al-Manathira district. These deposits arose as a result of the frequent flooding of the Euphrates River and its branches on the neighboring lands. This area is located between the Dabdaba formations and the area of the deposits of the inner depressions.

3- The deposits of the internal low-lands: - These deposits occupy the majority of the study area and are located between the Dabdaba from the east and the deposits of the floodplain from the western side. It varies greatly from place to place in terms of its color and texture, and this is due to the type of rocks from which it is derived.

1- Surface characteristics: The surface is considered one of the factors affecting the environmental pollution directly and indirectly through the quality of the rocks that makes up the soil when transformed from a soft material by the action of various processes to soil with developed horizons. This process affects its cohesion and the accumulation of sediments in it. The surface flatness helps to preserve the soil from erosion, especially the flood soils, which are characterized by their quality. In spite of the flatness of the surfaces of the Manathira soil, it is interspersed with some terrain features that affect the salinity of the soil, such as the shoulder area and the area of river basins. This is related to the thickness of the soil and its ability to drain excess water. Such ability largely depends on the slope of the surface, which affects plants' growth. In addition to that, the appearance of salts on the surfaces as a result of increased evaporation from them due to high temperatures. This affects the characteristics of water resources by affecting the nature of flow and the characteristics of river drainage and determining the speed of flow as it increases in less rugged areas,

which reduces the quantities of underground water and the lack of sedimentation. However, the lack of turns, twists, and river islands works on the speed of self-purification of the river, while the opposite occurs in rugged areas.

Map (1) Surface sections in the study area



Source: General Committee for Survey and Satellite Visualization of the study area satellite using Arq Gis 10.5 software.

2- Climatic characteristics in the study area:

The climate has both direct and indirect effective effect on the components of the ecosystem in the study area, which is reflected in its impact on the environmental pollution of various activities, including (civil, agricultural and industrial) with various elements (solar radiation, temperature, wind, rain, evaporation, and relative humidity). Climate elements on environmental pollution by analyzing the climatic data of the study area as follows:

1- Solar radiation: -

The study area is located within an astronomical location that receives large amounts of solar radiation. The angle of incidence of solar radiation, and the length of the brightness period affects it in increasing the number of hours of actual and theoretical solar brightness, as in Table (1).

The general annual average of the amount of solar radiation for the study area was (528.8 cal/cm²), and this monthly average varied throughout the year, reaching its maximum in June (771 cal/cm²). (80.86°), which is closer to the vertical, which led to a longer period of theoretical and actual solar brightness. It appears, from Table (2), that the average hours of theoretical brightness of the sun begins with a gradual increase in January at a rate of (10.13) hours and continues to increase until it reaches its highest levels in June at a rate of (14.12) hours. This is due to the lack of relative humidity, the lack of clouds and the clearness of the sky. As for the difference between the number of theoretical hours of brightness in the month of December, which recorded its lowest rate of (10) hours / day, and its highest average in June, which amounted to (14.12) hours, due to the sun being perpendicular to the Tropic of Cancer, and given that the annual average of theoretical solar radiation In the study area, it reached (12:04) hours, while the actual hours of sunshine were

Table (1) Average angles of solar radiation and average amount of solar radiation in Najaf Governorate for the year (2020)

Solar Radiation Angle	Amount Solar Radiation cal/cm ²	Month
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37.03	293	January
45.23	380	February
57.03	475	March
68.36	588	April
77.03	684	May
80.86	771	June
78.83	763	July
72.23	703	August
60.69	600	September
49.19	467	October
39.03	332	November
34.19	290	December
58.31	528.8	Annual Rate

Source: Ministry of Transport, General Authority for Meteorology and Earthquake Monitoring in Iraq, Climate Department, unpublished data, 2021.

Its rates begin with a gradual increase starting from January, at a rate of (6:4) hours, and this gradual increase continues until it reaches its maximum in July, at a rate of (11:4) hours. Which level up to be class close to the semi-vertical. While the actual hours of brightness begin to gradually contradict until it reaches its lowest levels in December, when it reached (5:9) hours, and the reason is due to the small angle of incidence of solar radiation and the increase in the number of cloudy days for this month, and thus the annual average number of hours of actual brightness in The study area reaches (7:8) hours, and this indicates that there is a significant difference for the summer and winter seasons in the amount of solar radiation, which resulted in a variation in the recorded temperature rates. From the foregoing, it is clear that the study area receives large amounts of solar radiation, which leads to the length of the day and an increase in the number of hours of brightness in it, which is reflected in the increase in the quantities of evaporation, transpiration and water losses, and exposes the area to drought and affects the agricultural activity in it and the variation in the properties of soil, water and air in it temporally and spatially. It leads to high levels of pollution.

Table (2) Climate elements according to Al-Najaf Governorate station for the year (2020)

Evaporation ml	Rain ml	Humidity %	Wind Speed m/sec	Maximum Temperature C°	Minimum Temperature C°	Average Temperature	Actual Hours of Sunlight hrs	Theoretical Hours of Sunlight hrs	Month
82.7	14.7	67	1.2	16.8	5.7	10.9	6.4	10:13	January
116.6	13.5	57	1.6	20	8	13.8	7.3	11:05	February
195.3	11.3	48	2	25.2	12.4	18.5	7.9	12:00	March
270.9	13.4	41	2	31.5	18.3	24.8	8.3	12:05	April
388.9	3.2	31	2.1	38.2	23.6	31.1	9.4	13:45	May
487.5	0	25	2.6	42.8	27.2	35.4	11.1	14:12	June
526.7	0	23	2.6	45.2	29.7	37.9	11.4	13:57	July
499.1	0	24	2	44.9	29.3	37.3	10.9	13:19	August
364.3	0	29	1.6	41.1	25.4	32.6	10	12:20	September
253.1	5.8	40	1.3	34.5	20.1	28.1	8.2	11:25	October

129.4	17.2	56	1.1	24.4	12.3	17.8	7.2	10:28	November
86.8	14.4	65	1.1	18.5	7.7	12.7	5.9	10:00	December
-	-	42.2	1.8	31.9	18.3	25.1	8.7	12:04	Annual Rate
3401.3	93.5	-	-	-	-	-	-	-	

Source: Ministry of Transport, General Authority for Meteorology and Earthquake Monitoring in Iraq, Climate Department, unpublished data, 2021.

Temperature: -

The study area is characterized by the fact that it receives large quantities of temperatures in two seasons a year (summer and winter). Table (2) shows that the average annual temperature reaches (25.1°C) and begins to follow gradually from the end of March at a rate of (18.5°C), to reach its highest average in July at a rate of (37.9°C). While the average annual minimum temperature was (18.3 °C), the highest average was in July, at (29.7 °C), while the lowest average was in January, when it reached (5.7 °C), while the annual mean of the maximum temperature was It reached (31.9 °C), as the highest rate was in July at (45.2 °C) and the lowest rate was in January, which was (16.8 °C). It is clear from the foregoing that temperatures have a direct and indirect effect on environmental pollution in the study area, where high temperatures in most days of the year lead to soil drying and affect its properties, in addition to increasing evaporation and transpiration from plants in it, in addition to affecting water resources and increasing the amounts of evaporation from them and increasing Withdrawing quantities of water for irrigation operations in agricultural areas, which leads to an appropriate decrease in water and high levels of pollution in it. Also, high temperatures lead to dry air in the region, all of which reverses its impact on various activities (civil, agricultural, and industrial).

2- Wind:-

The wind is one of the elements affecting the environment of the study area through the pollutants it carries when it blows, polluting the air, soil and water, and this is reflected on the living organisms in the area and on the activities (civil, agricultural and industrial). 1.8 m/s) Note Table (2). The wind speed and the amount of pollutants it carries increase during the summer, as it reached its highest rate in the months of (June and July) at a rate of (2.6 m/s) for each. While its speed decreases during the winter to reach its lowest level in the months (November, December and January) at a rate of (1.1, 1.1, 1.2 m/s), respectively. The reason for the variation in wind rates between the months of the year is due to the fluctuation in the amounts of rain falling on the region during the summer season, which is characterized by its killing, as it works to dry the soil and an appropriate decrease in the water due to the increase in evaporation processes and the blowing of dry winds laden with dust that pollute the air unlike in the winter season.

3- Dust storms:-

Dust storms are common climatic phenomena in arid and semi-arid regions. Strong winds carry large amounts of dust and silt, and their speed increases with the increase in wind speed and the plankton it carries, polluting the area it passes through. Table (3) shows that the annual total of dust storms is (4.8) a storm, where the highest rate of dust storms was recorded in April (1.3) storms, while the lowest rate of dust storms was in the months of August and December, with a rate of (0.0) storms. As for the annual total of rising dust (31.0) days, the highest frequency of rising dust was recorded in the months of June and July (5.0-6.0) days, respectively, due to high temperatures, dryness of the region and wind speed, while the lowest frequency of rising dust was recorded in December (0.0)) days, while the annual total of suspended dust reached (89.5) days, and this phenomenon increased during the summer, as the highest frequency was in June (11.4) days, while the lowest frequency was in December (2.4) days. The reason for the activity of dust storms in the region is due to the presence of large uncultivated areas, the dryness of the soil and the lack of rainfall, especially in recent years, which was reflected in its activity accompanied by dust and pollutants that pollute the soil, water and air in the study area.

Table (3) The rate of dust storms and days of recurrence of other dust phenomenon Najaf Governorate for the year (2020).

Suspended	Elevating	Sand	Month
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Dust / Day	Sand Particles / day	Storms / Storm	
3.5	1.0	0.3	January
5.5	2.0	0.3	February
9.3	4.0	0.8	March
10.9	3.0	1.3	April
13.3	4.0	0.8	May
11.4	6.0	0.8	June
10.3	5.0	0.1	July
6.6	3.0	0.0	August
5.5	1.0	0.1	September
7.7	1.0	0.2	October
3.1	1.0	0.1	November
2.4	0.0	0.0	December
89.5	31.0	4.8	Annual Rate

Source: Ministry of Transport, General Authority for Meteorology and Earthquake Monitoring in Iraq, Climate Department, unpublished data, 2021.

4- Rain:-

Rainfall is one of the climatic elements affecting the ecosystem in the study area through its quantity and what it carries during its fall. Table (2) shows that the annual total amount of rain falling in the study area was (93.5 mm), and this amount is very small and cannot be relied upon in a dam. The need for civil, agricultural, or industrial activity, and the rains begin to gradually increase at a rate of (14.4 and 14.7 mm) in December and January. There is an exceptional increase in the amount of rain falling in the region during the month of November, at a rate of (17.2 mm), due to the rains in Iraq in general and the study area in particular. In the months (June, July, August) and this is one of the dry months in the summer season, which is characterized by low humidity and high temperatures in it, in addition to the arrival of Mediterranean depressions and the dominance of hot, dry tropical air masses e. It appears from the foregoing that the study area has very little rain, and this is reflected in the lack of water resources in the area and the dryness of the soil and air, and this works to pollute these resources, which is reflected in the living organisms present in it and the activities they practice.

5- Humidity:-

The relative humidity has an important role in the study area, which varies from year to year and according to the seasons and months of the year, as it appears from Table (2) that the relative humidity is at its lowest levels during the summer, if it reaches its lowest rate in the months (June, July, and August) at a rate of (25, 23, 24%) and the reason is due to high temperatures at very high rates, lack of rain, clear skies, northern and northwest winds, and western winds that are characterized by a high temperature, while the highest rates were recorded in the winter season in the months (December and December). the second, and February) at a rate of (65, 67, and 57%), respectively, and the reason is due to the decrease in temperatures, the increase in precipitation rates, and the predominance of cold, moist air masses in the region. It is clear from this that the months in which the relative humidity decreases are the drier months and in which the erosion / evaporation processes increase and in which the surface water is exposed to contradiction as a result of the increase in the amounts of clouds on it, which affects its properties and an increase in a certain

concentration in it, which makes it polluted and unfit for use, which in turn affects The soil is dry and unsuitable for cultivation, in addition to the dryness of the air and a change in its general properties, which is unsuitable for the living organisms present in the area.

6- Evaporation:-

Table (2) shows that the evaporation rates vary in the study area between the seasons of the year, where the largest evaporation rate was recorded in the summer months (June, July, August) at a rate of (487.5, 526.7, 499.1 mm), respectively, due to the high temperatures and low temperatures. Relative humidity is a clear sky and an increase in wind speed, in addition to the predominance of hot air masses and dryness in the region during the hot season. While evaporation rates begin to gradually decrease in the winter season and during the months of (December, January, February) at a rate of (86.8, 82.7, 116.6 mm), respectively. cold wind. Through the foregoing, it is clear that the months in which the humidity decreases are the dry months, which increase by withdrawing the surface percent quantities that work, which are known to decrease due to the lack of precipitation and the high rate of evaporation, which exposes it to pollution, which works to dry the soil and thus is reflected in the existing vegetation cover in addition to The area's air pollution that affects the characteristics of its natural resources.

E: Soil Characteristics:

The soil in the study area is diverse, as it appears from the map () that there are four types, including the soil of river basins, the soil of flooded river islands, the mixed gypsum desert soil, and the soil of the shoulders of rivers, and each of them has certain characteristics, which are as follows

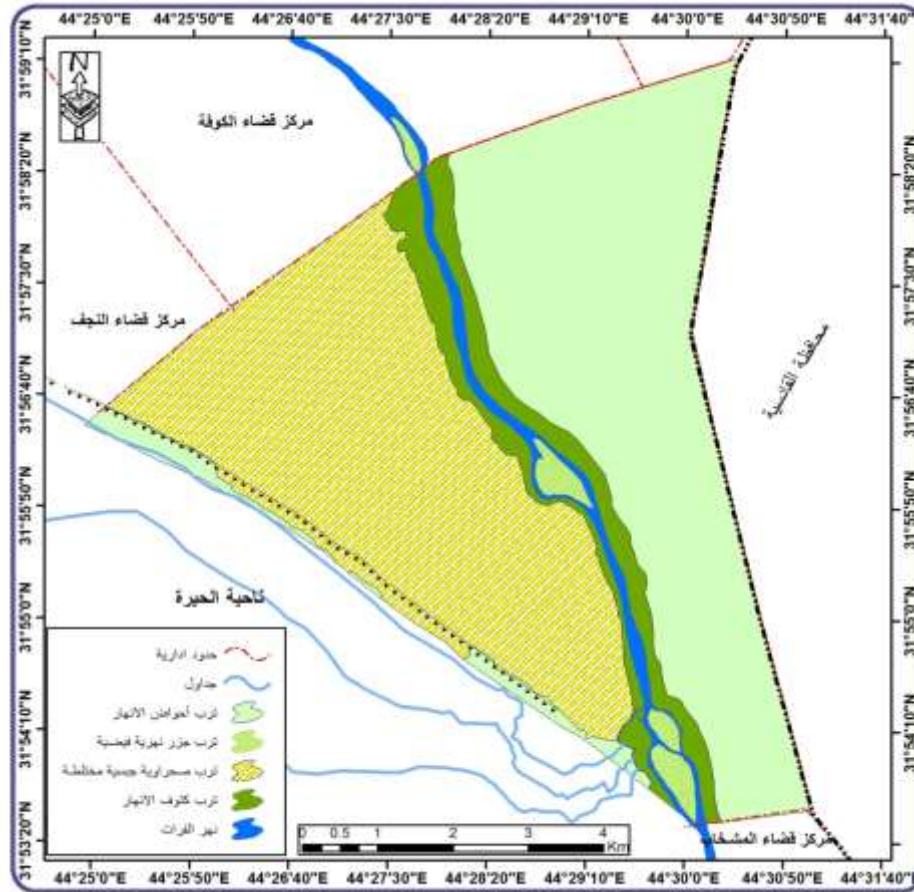
1- Soil of river basins:

These soils are found in separate parts of the study area, but the greatest part of them is located in the east of the Euphrates River and is formed by the floods of the Euphrates River when it submerges the areas behind the discovery, as the river water covered all lands at times of floods, carrying with it fine sediments of silt, fine sand and clay. These soils were exploited for agricultural purposes, although some of them have poor drainage, especially in areas with a clay texture.

2- Soil of river islands:

This soil occupies very few parts of the study area, as it is spread in the islands in the Euphrates River, and this soil is characterized by having a very soft texture.

Map (2) Soil types in the study area.



Source: Iraq Exploration Map (Björnack), using Arq map 10.6

3- Mixed gypsum desert soil:

This type of soil prevails in the west of the Euphrates River. These soils were formed as a result of the torrents that the region was exposed to through small valleys, some of which are the result of the exposure of some parts to the high-level floods of the Euphrates River, which led to the formation of a type of soil whose components are dominated by the desert character of gypsum and aggregate soils. Mixed and sandy, with high porosity and low fertility compared to the soils of the floodplain. This soil is characterized by a high percentage of gypsum, reaching 25%. This is due to the evaporation of groundwater close to the surface, which is loaded with calcium sulfate salts.

4- Soil of river caves:

This type of soil is found in the areas adjacent to the Euphrates River from the beginning of the study area to its end, and it is due to the frequent floods of the Euphrates River. It was woven between a mixture of sandy loam and sandy mixture, its pure body called it from the stream and of high honor, and it was exploited by the cultivation of vegetable crops on a large scale.

H: Water Resources:

The water resources in the study area were represented by the airport and the surface and groundwater. The properties of rainwater in the Al-Manathira district center have already been studied within the climate elements that it touched on. It was found that the region is dominated by a dry desert climate and that the amount of precipitation does not exceed the total annual average of (93.5) mm. Annually, as shown in Table (1), and this amount is insufficient for use in agriculture, so it depends on the surface water represented by the Euphrates River (Shatt al-Kufa) and the streams branching from it, in addition to the use of groundwater. The water resources in the study area are divided into:

1- Jahat table:

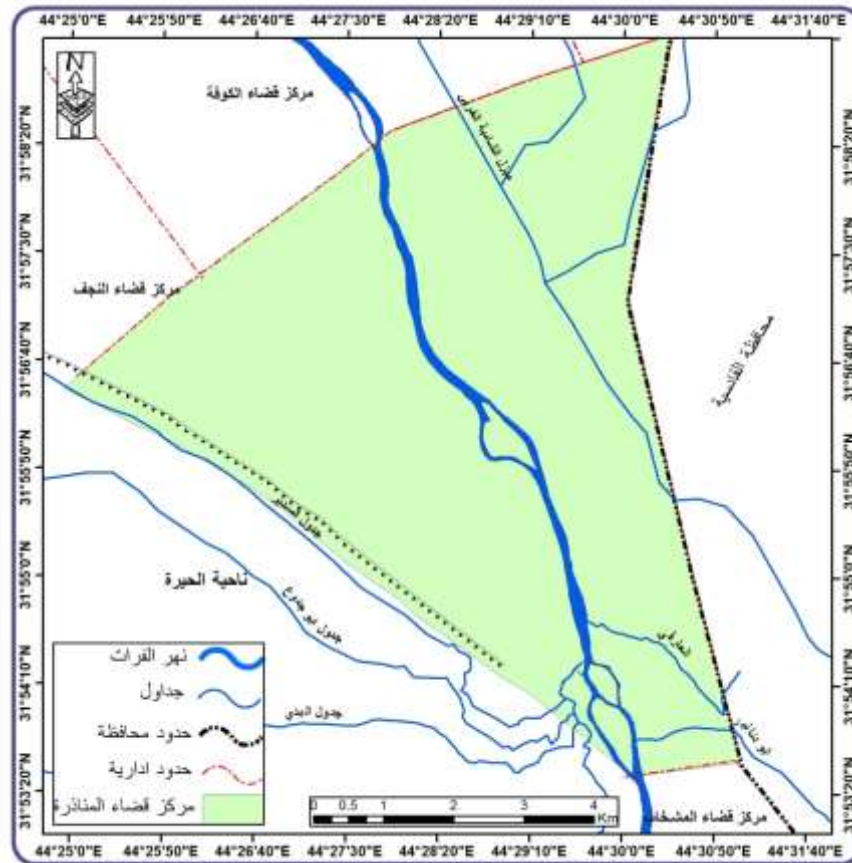
It is divided into two branches: the old Jehat creek, which branches out from the city of Abu Sakhir, the center of the Al-Manathira district, and later branches from it the Sudair, Abu Jadoua and El-Beea streams. As for the modern Juha creek, which is 5.4 km away, and it is one of the donations of Shatt al-Kufa, it irrigates a large number of agricultural areas in the district of Al-Hirah, and ends its course in the Najaf Sea, and benefits from its main course (2100) dunums of agricultural lands by way of opinions by pumping and tourists, see the table (4) and map (3)

The main tables (4) in the center of Manathira district for the year 2021.

Irrigation Method	Irrigated Areas	Drainage	Length / Km	اسم النهر	No.
Pumping	2100	25	5.4	Jahat	1
Pumping 50	8000	3.28	28	As-Sadeer	2
Pumping 60	35000	4.17	18	Abu-Jadoo	3
Pumping 80	10500	8	26.5	Al-Bdairyra	4
Pumping 50	8000	3.25	4.1	Al-Aarifi	5
Pumping 50	2100	3.25	5.8	Abu Ad-Dananir	6
-	-	46.95	87.8	Total	

Source: Ministry of Water Resources, Directorate of Water Resources in Al-Najaf Governorate, Water Resources Division in Al-Manathira, unpublished data 2021.

Map (3) the most important main streams in the study area.



Source: General Authority for Survey and Satellite Visualization of the study area satellite using Arq Gis 10.5 program.

2- Al-Sudair schedule (Al-Ghazi):

It is one of the main streams in the study area, which branches from the right side of the Jahat River and empties into the Najaf Sea. Its discharge rate is (3.28 m³/s) and its length is (28) km. The area of land benefiting from this stream is (8000) dunums, and irrigation is done by pumping.

3- Abu Jadoua's schedule:

It is considered one of the main streams in the study area and it branches from the right side of the Euphrates River and empties into the Najaf Sea. Its length is (18) km and the discharge rate is (4.17 m³/s).

4- Badiriyah schedule:

It branches from the right side of the Jehat creek, with a length of (26) km, and empties into the Najaf Sea, with a discharge rate of (8 m³ / s).

5- Al-Arafi table:

This stream branches from the left side of the river and its length is (4.1) km, while the discharge rate is (3.25) m³. The lands benefiting from it are approximately (8000) dunums within the center of Al-Manathira district.

6- Abu Dinars Table:

Which branches from the left side of the river and has a length of (87.8) km, while the average discharge is (3.52) m³, while the lands benefiting from it within the study area amounted to (2100) dunums within the center of Al-Manathira district.

X: natural Plant:

The natural vegetation is one of the factors affecting the environmental pollution in the center of Manathira district, as the natural vegetation contributes to the pollution of the soil and surface water through increasing the quantities of salts and sediments and increasing the concentration of elements in them. Through the field observation of the study area, it is clear that there are many types of natural plants that grow around the banks of Rivers, surface wells, drains, and streams, including what grows on the surface of the soil, which was monitored in the field, is (reed), which is considered one of the perennial plants that grow as water is available with high temperatures in the summer. The growth of the golan plant, which is one of the active creeping perennial plants, whose height ranges from (60-90 cm), the growth of (the tamarisk plant) in arid and semi-arid areas, and (the aristocracy plant) which is within the waterways in a small and scattered form, and (the sapiens plant) is a plant Herbaceous perennial, reaching a height of (40-100) cm, even with deep roots inside the soil by absorbing moisture, and its growth was observed near surface wells in the area, (algae plants), which are autotrophic organisms characterized by containing It is based on the chlorophyll pigment, simple in composition, found on the banks of rivers and on soil surfaces. Invasive (invasive) aquatic and semi-aquatic plants were monitored in the area, namely the Nile flower plant and the jungle crocodile (Senecilae), and other endemic plants, including chamblan, water lentils and papyrus, which grow densely in rivers and streams. And irrigation and drainage networks, which reach a height of (4) meters. Its spread causes the waste of large amounts of water through evaporation, which leads to an increase in the quantities of pollutants in it and thus a decrease in water efficiency, as well as the decomposition and rotting of the remains of plant parts after their death, which leads to a high concentration of biological pollutants in the soil, as well as the growth of some types of weeds in nearby areas. From the banks of rivers, streams, and irrigation canals, including the weeds of comfrey and antelope. If these plants work to impede the flow of water at the banks compared to the middle of the river, which works to precipitate the suspended materials at the bottom and increase the percentage of polluting concentrations and increase the percentage of transpiration at the expense of surface water, which affects the water revenue of the streams, causing pollution, and it is also a suitable environment for the growth of algae as it produces These plants have millions of seeds and pollen grains as well as leaves and twigs that fall on the surface of the water and as a result of their decomposition cause an increase in the percentage of pollutants.

Results:-

- 1- The geological structure has an effect on increasing the percentage of pollutants in the soil through the rock formations that make up the soil, which affects the percentage of salts and lime in it and the cohesion and porosity of the soil.
- 2- An increase in the rate of erosion in the soil of the region because of the surface characteristics in it, which reduce the percentage of organic matter and expose the soil to processes of erosion and drought, which leads to pollution.
- 3- An increase in the percentage of pollutants in the water resources due to the climatic characteristics of high temperatures that increase the rate of evaporation, dry winds and lack of rainfall.
- 4- The high percentage of biological pollutants due to the increase in the quantities and types of aquatic and semi-aquatic plants and the inability of the river to self-purify.
- 5- An increase in the percentage of river pollutants in the region due to the increase in soil erosion, which affects the physical and chemical properties in the region.
- 6- The lack of rainfall in the region, which is reflected in the characteristics of the soil and surface water in it and the high level of pollution in it.

Sources:-

- 1- The General Authority for Survey and Satellite Visualization of the study area using the Arq Gis 10.5 program.
- 2- Ministry of Transport, General Authority for Meteorology and Earthquake Monitoring in Iraq, Climate Department, unpublished data, 2021.
- 3- Iraq Exploration Map (Bjornak), using Arq map 10.6 program
- 4 : Ministry of Water Resources, Directorate of Water Resources in Al-Najaf Governorate, Division of Water Resources in Al-Manathira, unpublished data 2021.
- 5- Ministry of Water Resources, Directorate of Water Resources in Al-Najaf Governorate, Division of Water Resources in Al-Manathira, unpublished data 2021.