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Natural characteristics affecting the amount of solid waste and its health effects in the center of Nasiriyah district

Safaa M. Almudhafar

University of Kufa, Faculty of Arts, Department of Geography, Najaf, Iraq

Aseel Ali Ahmed

Dhi Qar University, College of Arts, Department of Geography, Iraq

Abstract---The natural characteristics affecting the amount of solid waste in the study area were studied through repeated field visits to the area and observation of solid waste on the soil in the hot and cold seasons. Data related to this study, including climatic data, were collected by government departments in the center of Nasiriyah district. In this research, we included the study of the natural characteristics and their contribution to increasing the amount of solid waste and its impact on the soil, including: the surface of the Nasiriyah district center and the climate and the study of its elements represented by solar radiation, temperature, moisture, evaporation, wind, dust phenomena and rain fall, as well as the study of each of the soils in the study area and an indication of its types and water resources.

Keywords---solid waste, water resources, health effects, temperature.

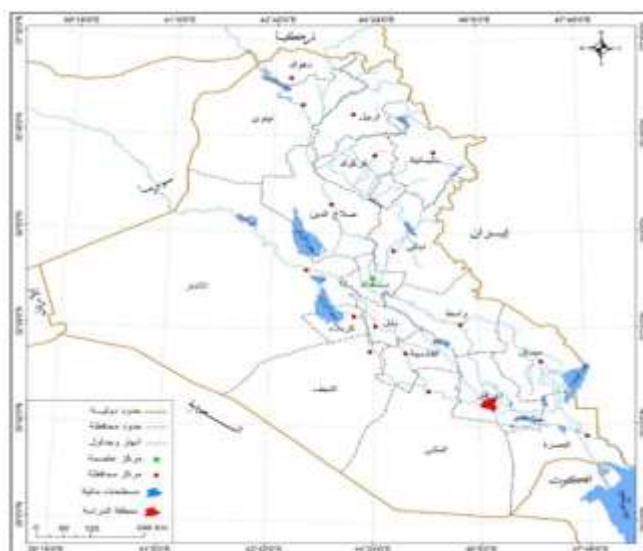
Introduction

have a contributing role in soil pollution with solid waste, but the strength of their impact on the soil comes beyond human characteristics. It is its interaction with the climatic factors prevailing in the region, some of which decompose easily such as organic waste, and some of them are delayed such as inorganic waste, and both of them have a great impact on the soil, as well as the process of oxidation, hydration and hydration that occurs to waste as a result of climatic factors. Through this, the research aims to reveal the characteristics and sources of soil pollution with solid waste and its spatio-temporal variation.

Theoretical guide to research

- First - the research problem: Do the natural factors have a direct impact on the variation in the characteristics of solid waste in the study area?
- Second - Research hypothesis: Natural factors clearly affect the variation in the characteristics of solid waste in the study area
- Third - The aim of the research: The study aims to reveal the characteristics and sources of soil pollution with solid waste and its spatial and temporal variation in the study area, in order to find out the problems that the soil suffers from
- Fourthly, the limits of the research: The study area is located in southern Iraq, as shown in map 1. In the southwestern part of Dhi Qar Governorate . As for the geographical location, it is bounded from the north by the district of Al - Gharraf and from the south by the direction of Ur . Longitude 31:0 – 31:7 N and Arc Long 46:10 – 46:20 E. As for the temporal limits, which is the time period that is based on the data used by the study, which is population and climatic data, visuals and maps, in addition to the period that started (August 14, 2020 to August 14, 2022. While the objective limits were the study of the environmental assessment of the variation in the characteristics of soils contaminated with solid waste in the center of Nasiriyah district, through the study of the characteristics of the natural factors affecting the nature of the soil affected by solid waste

The map 1 geographical boundaries of the study area



Source: Republic of Iraq, Ministry of Water Resources, General Authority for Survey, Map Production Department, Digital Unit, The administrative map of Iraq at a scale of 1/ 10,000,000

Map 2 The administrative boundaries of the study area



Source: Ministry of Construction, Housing and Public Municipalities, Directorate of Municipalities in Dhi Qar, map of the administrative governorate of Ya Qar, scale 1/250,000

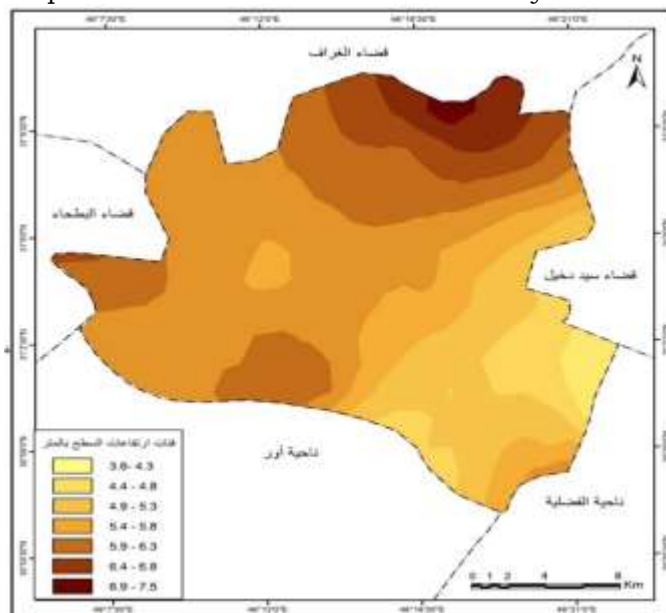
A number of natural factors contribute to increasing the impact of solid waste on the soil of the study area, and that effect doubles over time if it is left on the surface of the soil and the delay in raising it for several days from its throwing. This comes through the activities carried out by the residents of the study area of all kinds, including commercial and industrial activities. The natural factors can be summarized as follows :

First: the surface

The surface is one of the natural factors affecting the soil through its relative slope, in relation to the concentration and accumulation of waste on the surface of the study area. Through the visual analysis of the map (2) , it was found that the study area tends to be flat because it is Part of the lands of the alluvial plain that is characterized by low, but not without slight elevations, The map indicates that the surface of the study area ranges in height between (3.6 - 7.5 m), and that the highest heights of the district center appear in the northern region, then gradually decrease towards the center until it reaches about (5.8 and 5.4 m) in the city of Nasiriyah. The decrease in surface height continues until it reaches its lowest levels in the southeastern region, from the adjacent study area to the Al-Fadhliyah district. As for the western side of the study area, a wide elevation of the surface is also noted, especially in the area adjacent to Al-Batha district or close to it, as the height reaches 6.8 m . It is also noted that there is a rise in the surface in the vicinity to the district of Ur, which is estimated 3.6 m. Based on this, it becomes clear that the lower the slope, the more suitable for human activity and the more accommodating the population's concentration in practicing various activities that contribute to the generation of various solid wastes and their concentration on the surface of the study area, thus polluting the soil with solid waste. The effect of the surface is that it is a causative factor in activating

the action of the wind during its blow, as it volatilizes the light-weight waste scattered throughout the study area and transports it from one place to another while it pollutes the soil such as plastic bags, some water bottles, juice boxes, soft drinks, etc., the result of this is from The population's lack of awareness of the dangers of pollution by solid waste and the deadly toxic materials it contains while being randomly thrown on the surface of the soil and their ignorance of its harmful effects, which may flow into the soil through its pores during its disintegration and decomposition. What we call (temporary landfills) are usually open sites that are thrown as soon as a suitable place is found for them by the residents, which are thrown in empty squares or unbuilt plots and sometimes on sidewalks and sides of roads in order to get rid of them, so they are in direct contact with climatic factors, including heat, humidity and rain And the wind to come last and carry it to great distances, not to mention.

Map 2 the surface of the center of Nasiriyah district



Source: From the researcher's work based on: Satellite visualization of the study area, Land Sat-8 discriminatory accuracy 30m

Regarding the transfer of toxic fumes resulting from it during burning, this came due to the lack of possession of the study area to regular dumps that meet all environmental conditions, so we notice that waste is scattered here and there in the study area and its accumulation for several days without raising it in some cases due to the delay of municipal workers, and the lack of ownership of some Families to special containers were another reason for throwing them in this incorrect and hygienic way, as the soil is polluted with toxic substances, which are then transmitted to humans through the food chain.

Second: Climate

Climate is one of the important characteristics affecting the soil through the interaction of climate elements with solid waste, and for the purpose of explaining the link between climatic characteristics and soil pollution with solid waste in the study area, it is necessary to analyze the climatic data of the study area based on the data of the Nasiriyah climatic station, including

Solar radiation

Through table (1) we notice that there is an increase in the rates of solar radiation in the months (April, May, June, July, September), and the highest rate reaches in the month of June to reach (81.5) degrees, and the temperature is affected when the angle of incidence of the rays approaches from The vertical angle, and with the apparent movement of the sun towards the equatorial latitude towards the southern hemisphere, the angles of solar radiation gradually decrease in the months (October, November, December, January, February) until they reach their lowest rates in the month of November to reach 34.3 degrees, which indicates that the study area is characterized by low monthly rates of solar brightness during the winter season, then gradually increases during the spring and summer months, and then begins to decline during the autumn months. As for the annual average of the angles of solar radiation in the center of Nasiriyah district, it reached 57.6 degrees, while the number of hours of theoretical brightness was 12 hours. hour / day, while those values reach their peak in the months (May, June, July, August) to reach (13.4, 14.2, 13.8, 13.6) hours / day respectively, and this corresponds to the angle of incidence of solar radiation, which in that period is large And then the process of gaining solar radiation increases, which leads to a rise in temperatures. As for the actual hours of brightness, its annual average is 7.7 hours/day, it increased in the months March, May, June, July, August, September) at rates that reached (8.2, 8.2, 9.7, 9.8, 10.3, 10) hours/ day in a row, and it is clear from this that these values are related to the angle of incidence of the rays whose values increase in the study area. Its effect on the soil is evident through the long daylight hours (the length of the day) in the study area, which reaches (14 hours, as it works on the decomposition and decomposition of solid waste, which contains organic materials food leftovers) that are thrown from homes, vegetable stores and hotels, which happens Chemical reactions that lead to the concentration of toxic elements in the soil and thus increase the activity of microorganisms due to the availability of the appropriate and appropriate atmosphere for them, not to mention the emission of unpleasant odors and toxic gases during the decomposition process such as ammonia and methane

Temperature

The study area is characterized by high summer temperatures, due to the increase in the amount of solar rays arriving during the long daylight hours, and from the observation of Table (2) it is clear that the annual average maximum temperature has reached (33.1 m) in the center of Nasiriyah district for the year 2020, but it varied according to Months of the year to record their highest, with monthly rates of 33.15, 38.1, 36.5, 34.9 m. The reason for the rise is attributed to the transmission of the sun

Table 1 The monthly and annual average of theoretical and actual solar brightness hour/ Day at Nasiriyah station for the year 2020

Actual brightness hours)hour/day(Theoretical brightness hours)hour/day(Solar radiation angles)Degree(the month
6.6	10.6	38.8	January
4.3	11.8	45.3	February
8.2	12	56.5	March
7.3	12.3	69.4	April
8.2	13.4	75.7	May
9.7	14.2	81.5	June
9.8	13.8	73.8	July
10.3	13.6	71.4	August
10	12.2	61.3	September
7.3	11.7	48.2	October
5.9	10.9	34.3	November
4.8	10.6	35.4	December
7.7	12.2	57.6	annual rate

Source: Republic of Iraq, Ministry of Transport, General Authority for Meteorology, Climate Department unpublished data 2020

The apparent decrease is towards the Tropic of Cancer, which results in an increase in the length of the day and the acquisition of an amount of solar radiation that is more than the amount of lost radiation and an increase in the angle of incidence. In temperatures, the annual average of minimum temperatures reached 21.1 °C , as the lowest levels were recorded during the months December, January, February at rates of 10.7, 8.6, 9.8 , and with a monthly average of 15.5, 12.9 , respectively. , 14.9 m . This comes due to the decrease in the amount of sunlight and the shorter daylight hours south of the equator, which results in a decrease in both the amounts of solar radiation and the temperature

Temperature contributes to the concentration of pollutants on the soil through the decomposition of solid waste, especially organic waste (a residential neighborhood is not free from the accumulation of household waste) and then fermentation and oxidation Fig. 1, which was seen in the field in its widespread spread among residential neighborhoods, which led to It suffers from its accumulation in abundance and for a long time, especially those in the middle of the popular markets for the sale of vegetables and fruits and butcher shops (meat and chicken) such as the neighborhoods (Al-Thawra, Sumer, Al-Shula, Al-Sadr City, Salhiya, Arido) as well as (Haraj market, Sayed Saad market and Alwa vegetables in the neighborhood sacrifice, so that waste decomposes due to its decomposition by heat, as well as

Table 2 The annual average of maximum and minimum temperatures for Nasiriyah station for the year 2020

Monthly rate m	Minimum temperature C	Maximum temperature C	Months
12.9	8.6	17.2	January
14.9	9.8	20	February
18.55	12.5	24.6	March
24	17.9	30.1	April
33.15	25.4	40.9	May
38.1	30	46.2	June
39.25	30.7	47.8	July
36.5	28.6	44.4	August
34.9	27.5	42.3	September
30.75	22.7	38.8	October
20.85	17	24.7	November
15.5	10.7	20.3	December
26.6	20.1	33.1	annual rate

Source: Republic of Iraq, Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Division, 2020 unpublished data.



Picture 1 Accumulation of organic waste on the soil of the study area
Field study on 01/10/2021

The unpleasant odors emitted from it and the gathering of loose animals such as cats and dogs, and as it is known that the summer is one of the seasons most closely related to the generation of these wastes due to the high temperature in the study area due to the population's desire to buy consumer foodstuffs, especially soft drinks, juices and water bottles, as well as summer fruits and vegetables, as a result of the temperatures, decompose and activate bacteria, fungi and parasites, and insects, worms and rodents gather, causing epidemics and serious diseases. Heat also contributes to rotting vegetables and fruits ,

which causes sellers to throw them away, and this explains the large number of organic waste in the middle popular markets in those neighborhoods

Humidity

Moisture is one of the climatic factors affecting soil pollution with solid waste, because it has a role in providing the appropriate environment for the growth of pathogenic fungi and bacteria that cause diseases due to the accumulation of waste. It is clear from Table (3) that the annual rate of relative humidity in the study area was recorded (.(%39.4) for the year (2020), but it varies according to the months of the year, as humidity rates increase in the months in which the temperature rates drop and rain falls in each of the months November, December, January ,February ,as the highest rates were recorded in January At a rate of %70 ,while air humidity levels decrease in the hot summer months in which there is no rainfall June, July, August at rates of %19.2 ,%16.1 ,%17.1 , respectively .Through field observations and what we notice about the scattering of solid waste in most parts of the study area, the role of moisture and its impact on solid waste is highlighted, through an increase in its percentage in the winter season and as a result of the accumulation of waste and leaving it (several days without raising it in the study area, it works to hydrate the elements soluble dissolving and decomposing them, and then flowing through the pores of the soil to its lower layers to reach the groundwater and pollute it. Its presence in high quantities in the atmosphere transforms pollutants into more dangerous pollutants, and this is what becomes clear to the population from the interaction of waste with moisture as a result of the odors emitted from it

Evaporation

It is evident from Table 4 that the annual total of evaporation amounted to 2723.7 mm and that the month of July reached its highest rate at 628.4 mm and with a percentage of %16.5 due to high temperatures and low humidity. As for the lowest rates of evaporation, the station recorded in December and January at 83.4mm 86.4 ,mm and percentages amounted to %2.4 ,% 2.2 ,respectively, due to the low temperatures and high

Table 3 The annual average relative humidity of Nasiriyah station for the year 2020

Monthly average relative humidity(%)	Months
67.2	January
59.1	February
45.3	March
41.2	April
24.4	May
17.1	June
16.1	July
19.2	Father
21.2	September
35	October

55	November
73	December
39.4	annual rate

Source: Republic of Iraq, Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Division, 2020 unpublished data.

Relative humidity, as well For cloudy repetition that obscures solar radiation, which has a direct relationship with evaporation .The role of evaporation in solid waste emerges through the evaporation of some of it and with the help of climatic conditions, including the rise in temperatures that characterize the study area, forming toxic gases ,while the section deposits The other of them is in the soil layers, an increase in the concentration of chemicals, which harms and pollutes the soil ⁽¹⁾

Wind speed and directions

Through table (5) it is clear that the annual rate of wind speed reached (3.03 m/s) for the year 2020, as it varied between the summer and winter months, as the highest rate was recorded in the months of July and August ,which reached (4, 3.9 m/s) in order These winds carry drought and heat, while the lowest average wind speed was recorded in November at a rate of (2.2 m/s) .It follows from this that the wind speed increases in the months of the hot season with a rise in temperature, while it decreases in the cold season .

Table 4 The monthly average and annual total of evaporation mm in Nasiriyah station for2020

Evaporation rate(%)	evaporation rate mm	Months
2.4	86.4	January
3.6	129.8	February
5.4	198.7	March
7.6	283.5	April
10.5	399.6	May
13.4	490.8	June
16.5	628.4	July
15.6	577.3	Father
11.4	423.9	September
7.8	286.7	October
3.6	135.2	November
2.2	83.4	December
100	2723.7	Total

Source: Republic of Iraq, Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Department, 2020, unpublished data

The prevailing winds in the study area are the northern, northwest, and western winds, with a frequency of %16.29 ,%29.09 ,%14.45 ,respectively, and the eastern winds come after them with a frequency of (7.91%). As for the southeastern

winds, their recurrence rate is up to %4.63 ,as it comes from lands covered by water bodies, which made it retain moisture and water vapor. Then the northeastern winds come with a frequency of %3.02 ,and then the south winds with a frequency of %3.5 Finally, the southwest winds come with a frequency of %2.91 as it is characterized by These winds dry up during the hot season to raise temperatures. In the cold season, the opposite happens ,as these winds reduce temperatures and dryness together.

Table 5 Average wind speed and frequency in Nasiriyah district center for 2020

wind frequency								Wind speed	the month
western	southwest	southern	southeast	oriental	Northeast	North-west	north		
17.2	3.3	4	4	10.7	2.8	23.9	10.6	2.6	January
14.9	3.5	4.6	7.5	10.9	3.5	24	10.5	2.7	February
12.9	3.4	5.4	8.3	12	3.9	23.8	13.2	3.2	March
11.8	4.4	5.5	8.5	12.1	4.6	22.2	13.6	3.2	April
13.2	3.7	4.8	4.2	8.6	5.3	28.4	19.4	3	May
17.3	1.9	1.5	1.3	2	1.7	37.5	19.3	3.4	June
23.5	1.8	0.9	0.5	2.2	1.3	49.3	13	4	July
22.3	1.9	1.2	0.6	2.8	1.5	46.8	15.4	3.9	Father
16.6	2.7	1.6	1.5	3.6	2.4	36.9	19.8	3	September
14.3	3	4.5	5.7	9.4	3.7	26.6	14.7	2.9	October
14.9	2.6	3.9	6.2	9.7	3	26.9	13.3	2.2	November
16.6	2.8	4.1	7.3	11	2.6	2.8	10.6	2.3	December
16.29	2.91	3.5	4.63	7.91	3.02	29.09	14.45	3.03	average

Source: Republic of Iraq, Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Department ,unpublished data, 2020

The role of wind is highlighted by transporting solid waste from one place to another to cause soil and water pollution together in the study area . During field observations ,the ash emitted by the burning ,which inevitably carries a quantity of toxic chemicals, is transferred by the winds and deposited on the ground on the surface of the soil or remains suspended to fall On the surface of the soil when mixed with rain water, and as a result of the pressure process, these specific sites or places become poor in oxygen during the first week approximately due to its consumption by microorganisms, and then the aerobic decomposition processes turn into anaerobic decomposition processes, resulting in methane gas ⁽¹⁾ .This is on the one hand ,and on the other hand, and because the sanitary landfill area in the study area is in violation of the environmental conditions and that the prevailing winds in the area are (northwest), it plays a major role in transferring the landfill pollutants towards the neighborhoods near that site, which are industrial housing and the slums of Sayed Khudair Sura ,² both of them are far from the sanitary landfill with distances estimated between (1000-500 m) approximately, respectively ⁽²⁾ ,transporting vapors, toxic gases and ash resulting from the remnants of burning waste containing toxic elements such as mercury, lead, chromium, arsenic and cadmium, which pollutes the soil and enters the

chain Food through these environmental sources due to the almost daily burning of waste by the dumper in the sanitary landfill, and thus the residents of these neighborhoods are exposed to serious diseases. Indeed, the residents of industrial housing may complain Much of this phenomenon is due to their exposure For many serious illness cases, especially the elderly and children, as a result of burning operations, especially the entrance to industrial housing, as it is the most harmful ,which has recently become a solid waste dump due to the weakness in municipal services in raising the waste of that residential neighborhood ⁽³⁾ .

Sixth: Dust phenomena

It is clear from table 6 that the Nasiriyah climatic station recorded 14 dust storms, the month of July occupied the highest number of storms with the amount of 4 dust storms, while we note that the Nasiriyah station did not record any dust storms in some months of the year. As for the rising dust, it was The annual total was 31 days/month .As its quantities vary during the months, it rises in June by 7 days/month, due to high temperatures, low relative humidity and wind speed. While we note its absence in some months of the year and its decrease in other months, as for the suspended dust, the annual total was recorded 167days/year .It is noticeable that there is a discrepancy in the monthly rates for the months of the year and a difference in their total, as the months April, May and July were higher Rates of suspended dust, which amounted to 20 ,24 ,25 days/month, respectively, while decreasing in December and November, by 7 ,6 days/month.

Based on the foregoing, dusty phenomena contribute to obstructing the process of collecting and transporting waste to landfill areas, which causes a defect in the solid waste management process system during periods of dust storms, and this results in the accumulation of waste and its mixing with falling dust, which leads to its survival period to the concentration of trace elements in Soil and thus its transmission to the human body as a result of contact with contaminated soil, in addition to an uncivilized appearance that permeates the streets of the city, creating an unhealthy environment suitable for insects, rodents and stray animals

Rainfall

The annual average of the amount of rain falling on the study area is 17.3 mm for the year (2020) Table 7



Picture 2 Burning waste near the highway Picture 3 Burning sanitary landfills towards residential neighborhoods

The field study on November 15 2021 , The field study on November 15 2021 ,

Table 6 The frequency of dust storms, rising dust and suspended dust for the Nasiriyah station for 2020

Suspended dust/day	rising dust/day	Dust storms/day	Months
8	1	0	January
8	0	1	February
13	2	1	March
25	5	1	April
24	5	2	May
18	7	0	June
20	6	4	July
8	4	3	August
13	1	0	September
14	0	2	October
7	0	0	November
6	0	0	December
167	31	14	Annual total

Source: Republic of Iraq, Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Department, Unpublished data, 2020

It varied between the winter months with the highest rates recorded in November 83.4 mm, while there was no rainfall in the months (May, June, July, August and September due to the lack of air depressions during the dry summer. Therefore, the nature of the rain in the study area is mostly frontal rain that continues to fall for a short period of time, not exceeding a day or a few hours, due to the Mediterranean rain system, in which most of its rains are concentrated .

Table 7 The monthly average and annual total of the amount of rainfall mm for Nasiriyah station for 2020

Rain mm	Months
13.4	January
8.2	February
31.1	March
21	April
0	May
0	June
0	July
0	August
0	September
8	October
83.4	November
42.7	December
17.3	annual rate

Source: Republic of Iraq, Ministry of Transport ,General Authority for Meteorology and Seismic Monitoring, Climate Division 2020 ,unpublished data in Winter.

Through field observation ,despite the lack of rain in the center of Nasiriyah district and the fluctuation of its quantity, the rainfall on the soil containing the waste dumps works to moisten it and thus increases the activity of its decomposition ,thus forming harmful chemical compounds, some of which settle on the surface of the soil The other part filters into the lower layers of the soil (the joints of the soil of the study area) and penetrates through it to reach the groundwater . It is worth noting that there are a number of microorganisms that are active due to the cold, dark and humid climate during the winter season, such as pathogenic bacteria and fungi that coexist, activate and multiply within those wastes collected on the surface of the soil. pathogenic pseudomonas, while its numbers increase during the spring and autumn seasons. As for pathogenic fungi, the most prevalent are (Aspergillus niger, Aspergillus flavus and Penicillium) in varying proportions in the soils of the study area ⁽¹⁾ .On the other hand, he found solid waste mixed with rain water, thus forming water swamps filled with solid waste that is thrown by the residents ,as in pictures (4), (5) and (6), represented by the neighborhoods Al-Thawra, Al-Thawra, Industrial Housing, Sadr City, Al-Fida', Al-Shuhada, Aridu, Al-Mahadia, Al-Muhahia ,Al-Muntazah, and other residential neighborhoods due to its lowness in the study area first , and the lack of penetration of that water into the soil because of its texture secondly, and that most of the neighborhoods of the study area range in texture between (clay mixture to silty mixture) ⁽¹⁾ If the percentage of clay and silt particles is high . This, of course, may distort the appearance of the area and cause many environmental damages. It also creates a suitable environment for microorganisms to multiply and increase their activity ⁽²⁾ .Also, the reason for the emergence of swamps is not only limited to the decline of neighborhoods and their weaving ,but there is another reason, and perhaps a major reason for their appearance ,which is the absence of projects related to the study area infrastructure projects represented by sewage and sewage networks and rainwater networks, and if any, they are left in the middle of the work picture 7 It will not be

connected to the service line and will eventually be neglected, and this is what actually happened in the industrial housing district, from turning those unfinished pits into a landfill.

Third: Soil

Soil has physical, chemical and biological properties, all of which affect the soil of the study area affected by waste



Picture 4 The swamps of industrial housing



Picture 5 The swamps Sadr City

The field study dated 10/1/2021 The field study dated 10/1/2021



Picture 6 The swamps of Al-Thawra neighborhood

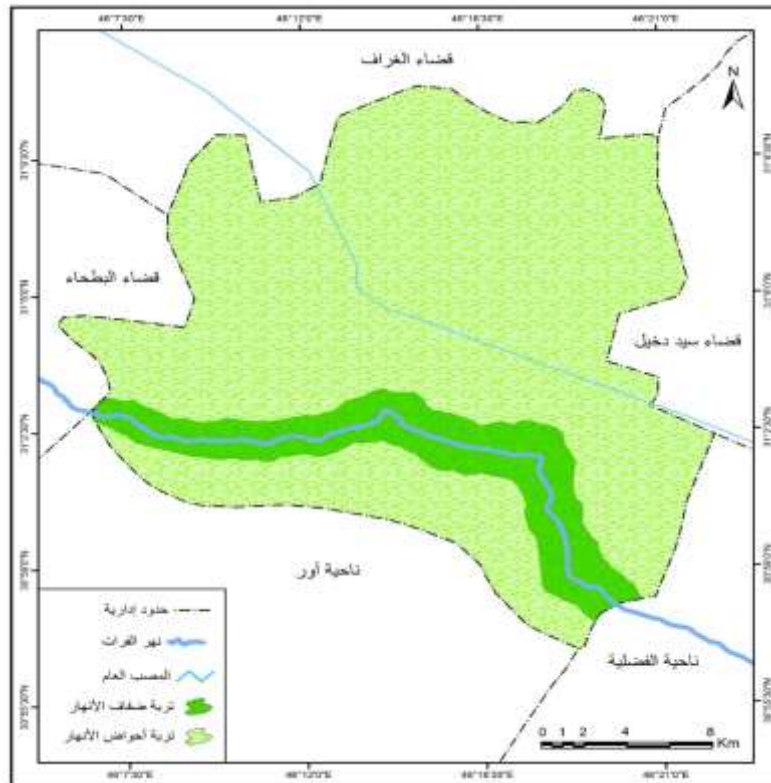


Picture 7 The transformation of riverbeds into a dumping ground for industrial housing

This photo was taken on 01/10/2021 This photo was taken on 12/6/2021

solid by prevailing climatic factors .Through map (3), the soil of the center of Nasiriyah district is divided into two parts

River shoulder soil



Map 3 of the soil of the center of Nasiriyah district

Source: Republic of Iraq, Ministry of Water Resources, General Authority for Survey, Map Production Department, topographic map of Dhi Qar Governorate, 1/100.000 scale

The soil of river shoulders extends in the study area parallel to the Euphrates River and the general estuary in the form of a strip narrow during its passage in the southern parts of the study area, which are high silt natural barriers or dams, gradually descending as we move away from the course of the river, and the thickness of this soil ranges from 2.5-3 m above the level of the neighboring ground ⁽³⁾, and of course These soils arose as a result of the sediments of the Euphrates River during its successive floods, so the large particles gathered near the river, while the small particles were deposited far from it, as they consist of Clay, sand, silt, with a high percentage of coarseness ⁽¹⁾ It has an area of kotouf soil The rivers in the center of Nasiriyah district 54.6 km ² ⁽²⁾.

Soil of river basins

These soils are considered the second formation of the processes of accumulation of water sedimentation of the Euphrates River in the study area. Its texture tends to be soft in general, consisting of a mixture of clay, silt and sand, and as a result of its decrease, which led to a rise in the groundwater level and the activity of the capillary property due to evaporation, which accumulated salts on its surface and

cracked for this. It is considered saline soil ⁽¹⁾, with an area of 363.4 km² in the study area. ⁽²⁾ Through the results of the laboratory analysis of the proportions of these soil formation (the proportion of sand particles was 19%, the proportions of clay particles 33% and the proportions of silt particles 48%), so according to the soil texture triangle, it is considered a soil a mixture of alluvial clay and silt. , as for the porosity, it was estimated at 14.8%, while the real density was 2.51 g/cm, and the bulk density was 1.46 g/cm, table. The soils of this region also differ from the previous region in terms of high salt concentrations, which reached 66.2 ⁽³⁾ and this is a very high percentage when compared to the international standard for salinity table, so they are classified among the soils with very high salinity, this increase comes as mentioned previously. The decline in that area and the rise in the level of groundwater in it, which led to the accumulation of salts on its surface. The study of soil and knowledge of its types is one of the basic matters when studying the problem of its contamination with solid waste to determine the effect it has on it due to its accumulation and leaving it for several days without raising it, thus changing its composition, physical and chemical properties, its fertility and the concentration of pollutants in it, especially toxic heavy elements and what leaks from them to the surface layers of the soil through. Through the decomposition of waste juice, which may settle in the soil for many years without decomposing and thus harm the soil and damage its tissues, then it is transmitted to humans through the food chain. As well as the bacteriological activity on it, represented by the activity of pathogenic bacteria and fungi, and the provision of a suitable climate for their reproduction.

Table 8 Some of the results of physical and chemical analysis of the soil of Nasiriyah district center in the study area for the year 2020

EC ds/m	true density g/h	Bulk density g/hr	porosity (%)	tissue				river shoulder soil
				Fabric name	green %	Clay%	sand %	
6.8	1.58	2.6	39.2	sandy mixture	42	28	30	
66.2	2.15	1.46	14.8	Alluvial clay mixture	48	33	19	river basin soil

Source: The results of the laboratory analysis of the studied soil models. The tissue type was extracted by the researcher based on the tissue triangle.

Table 8 Classification of soils according to their salinity according to the American salinity standard of 1954

soil class	EC ds/m
brackish	4-0
medium salinity	8-4
high salinity	15-8
very high	more than 15

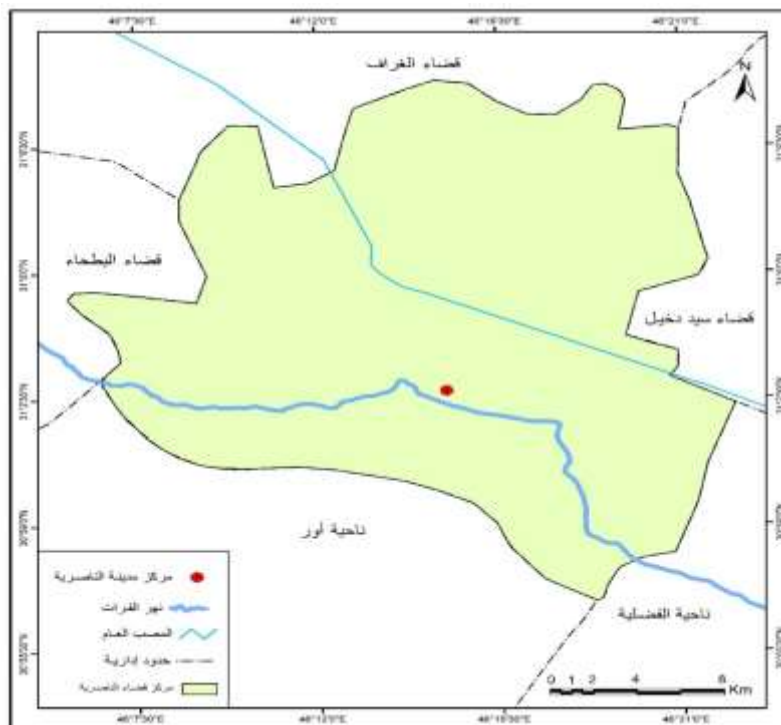
Source: USD Definition and abbreviation for oiA Description Berkeley, California 1960.P5

Fourth: Water Resources

Through the map () it is clear that the concentrated water resources in the study area are represented by the Euphrates River water and the general downstream project only, and the study of water resources comes in terms of its connection with the issue of solid waste through the pollution of the shoulders of the river with many pollutants and the throwing of solid waste of various kinds on the shoulders of that river, which pollutes Soil and water together have many toxic concentrations, as well as bacteriological contamination, such as pathogenic bacteria and fungi. Therefore, surface resources can be divided as follows:

Euphrates River

The Euphrates River is one of the main rivers in the study area and the only one in it, as it enters Dhi Qar Governorate at **The western** parts are on the Batha side, from which 71 streams branch out in the governorate, of which 39 are streams on its right side.



Map 4 Water resources in the center of Nasiriyah district

Source: Republic of Iraq, Ministry of Water Resources, General Authority for Survey, Map Production Department, topographic map of Dhi Qar Governorate, at a scale of 1/100.000

The other (32) streams on its left side and continues to flow towards the south and southeast ⁽¹⁾, its length in Dhi Qar Governorate is 180 ⁽²⁾. The river continues to flow in the city of Nasiriyah. He divides it into two parts, towards Shamiya And the island, as its length in the study area is 28.5 km ⁽³⁾, while its slope rate in the study area is (2.7) cm / km, and the river is in an old age, this came to its slow flow, especially in the middle parts of its course and the lower part of the river. Its course, which carries out the sedimentation process, especially the larger and heavier particles ⁽¹⁾

General downstream

It is one of the important development projects in the study area, established for the purpose of draining sewage water for agricultural lands and reducing salinity from the Tigris and Euphrates rivers. Its total length is about (565) km and extends from the north of the city of Baghdad at Al-Ishaqi to its mouth at Khor Al-Zubayr and parallels the city of Nasiriyah from its northwestern side ⁽²⁾

It enters Dhi Qar governorate from the direction of Al-Fajr and is parallel to the Al-Gharraf stream in the path to enter the city of Nasiriyah at Al-Sedinawiya area south of Nasiriyah and intersects with the Euphrates River and takes a path west of the Euphrates River to walk in agricultural lands inhabited by people. Only the Great Gharraf Dutch drainage located north of the city of Nasiriyah, which is an extension of the Great Gharraf drainage that passes in Dhi Qar Governorate and ends at the downstream drainage and is one of the rivers that affected the groundwater levels of the city of Nasiriyah, especially in the northern parts of it, such as the Eridu neighborhood, Al-Shuhada and Al-Fida ⁽¹⁾

Results

Natural factors are among the factors affecting soil pollution affected by solid waste through a number of natural factors that interact with these wastes, causing a significant impact on the soil through its impact on its physical, chemical and biological properties. The surface of the area has a great impact on the accumulation of soils with solid waste. The more flat the surface is with less slope, it helps the concentration of the population to carry out various activities, including commercial, industrial and medical activities, as well as the household. Thus, it is considered a tool or a cause for the generation of waste on it, so it is easier to do the wind by transporting those Waste from one place to another, causing pollution to places that may have previously been free of waste collection.

Conclusions

Climatic factors have a special effect on increasing the impact of waste on the soil, especially that the study area is characterized by a rise in temperature, intensity of solar radiation and evaporation, which would decompose waste, causing pollution to the soil and the formation of leachate through which chemicals flow over the soil layers, thus polluting the water. In addition to the influence of other factors such as the intensity of wind, rain, humidity and dust storms in varying proportions.

References

- A personal interview with (Younis Abdul Rahman Al-Taei), a resident of the industrial district (at the entrance to the industrial housing) on 12/20/2020
- Ahmed ,Ziyad Wahhab, an environmental analysis of the geographical factors affecting the quantity and quality of air precipitation in Dhi Qar Governorate a study in environmental pollution) Master's thesis, College of Education, University of Basra, 2007, p. 52.
- Al- Ziyadi, Hussein Aliwi Nasser, The Land of Civilizations Geography of Dhi Qar Governorate, first edition, Dar Al-Fayhaa for Printing and Publishing, Beirut, 2017, p. 171
- Al-Abdali, Maan Mohie Sharif, Solid Household Waste in the City of Al-Baghdadi and its Environmental Effects, Tikrit University Journal for Human Sciences, Volume 20, Issue 6 2013, p. 302
- Al-Askari ,Kawthar Abdullah Saadoun, Geographical Survey of Soil Fertility in Nasiriyah District and its Impact on Agricultural Production, Master's Thesis, College of Arts, Dhi Qar University, 2018, pg. 67
- Al-Husseinawi ,Heba Sahib Dakhil Odeh, Hydrological Map of Nasiriyah City and its Environmental Effects Using Geographic Information Systems, Master Thesis ,College of Arts, Dhi Qar University, 2019, p. 44.
- Al-Mudhaffar, Safa Sahib Abdul Majeed, Spatial Variation of Soil Pollution in Najaf Governorate, Master Thesis, College of Arts, University of Najaf, 2007, p. 38.
- Fahd, Kamil Kazem, Study of some physical and chemical properties of the general estuary river in the city of Nasiriyah, Al-Taqni Journal, Volume 19, 2006, p. 2
- Republic of Iraq, Ministry of Transport, General Authority for Meteorology, Climate Department (unpublished data). 2020
- USD Definition and abbreviation for OIA Description Berkley, California 1960.P5
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