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Decline in vegetation cover due to human growth and activity in Al Zulfi city

Globe Teacher
Swaeid Mohammed Albatel

Responsible Student
Mazin Ahmad AlMlhem

Other students
Hamad AlBadr
Abdullah AlSiqian

Phone : +966554224433
Email : s.m.albatel@gmail.com

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Summary of the research :

The aim of the current research is to identify the effect of earthy plankton on the growth of plants in the desert city of Zulfi, and follow the descriptive analytical approach, where data, statistics and illustrations related to the phenomenon of dust and its relationship to the density of vegetation in the desert city of Zulfi during the year 2020 were described and analyzed. The occurrence of the phenomenon of dust is frequent in the summer and spring seasons, and that human activities have a prominent role in raising the proportion of dust plankton, as it has been observed that there has been a remarkable increase in the amount of dust during recent years due to several factors, the most important of which is logging, and this affects the amount of vegetation cover. The percentage of pastures in the desert of Al-Zulfi city is about (30%) degraded, and that they suffer from overgrazing pressure that led to the deterioration of vegetation cover, as the research shows that vehicle landlines have greatly affected the soil texture so that these paths have no growth in plants. And the dust is not limited to specific times, but we may find it in several seasons, due to the deserted fields and farms with less vegetation, and the introduction of types of livestock Which is not compatible with the quantity and nature of the vegetation cover contributed to the disappearance of weeds and shrubs and the decrease in the number of trees, which leads to desertification and gradually erosion of the soil, and finally we find that the urban expansion has led to the decline of vegetation cover that appeared as a result of high population growth rates, and weak coordination and control between government agencies in In conclusion, the researcher proposes to reduce the percentage of soil plankton, which has become a major influence on the growth of plants: Activating the governmental decision that limits the degradation of vegetation cover, such as preventing logging and overgrazing, reducing the ground paths of vehicles, and preventing the introduction of species of animals that are not compatible with the nature of Vegetation cover and requiring industrial establishments that emit dust to install a filter in their chimneys to trap and reduce the amount of dust emitted from them, create belts of plants around their surroundings, encourage environmental volunteers to plant plants and spread awareness of the importance of plants and their role in purifying the air.

Introduction

Dust storms are one of the most important climatic manifestations in Al-Zulfi Governorate, as this phenomenon represents an environmental problem, the damage of which worsens day after day as a result of human intervention due to human activities such as overgrazing, logging, urbanization, etc. Crawling leads to many environmental problems that have negative effects on the biosphere, including vegetation.

Thus, we find that dust and dust-laden storms negatively affect the health of plants, as the dust works to block the stomata of plant leaves and prevent them from the photosynthesis process (Al-Wakeel, 2017). We all know the important role of vegetation in the biological community and the resulting biochemical processes of absorbing carbon dioxide and producing oxygen. Vegetative cover is not only environmentally friendly, but it is the cornerstone of its construction. A good example of this is the negative effects that result after logging and the disappearance of plants, as this is reflected in the migration of animals, high air temperature, dust storms, weak soil construction and ease of disintegration (Ali, 2017).

Therefore, human activity is responsible for about 25% of global dust emissions, and among those activities is the expansion of land use for agriculture, which requires excessive extraction of water for irrigation purposes, which leads to dry water bodies or a decrease in groundwater. And from deforestation and unsustainable agricultural practices that expose soils to erosion, and in dry lands, when agricultural soils are plowed many times and in great depth and crop residues are removed, soils are exposed, and overgrazing leads to loss. Soil cover, and when the soil loses its cover, the winds carry the smallest particles that contain a large amount of soil nutrients and organic matter to drive them away. Simulation models show that global dust emissions have increased by 25% to 50% for a range of land use and climate change since 1900 AD (Mahowald et al, 2010).

The danger of dust storms lies in their work as they work to degrade the components of the ecosystem, as studies have shown that these dusts help spread many chemical and biological pollutants on plant growth, and they also have a major role in affecting the rate of agricultural production. Soil, the rate of its production decreases as a result of the deterioration of the quality of the soil and the decrease in its fertility rate

Research problem

The city of Al-Zulfi is located in a desert environment characterized by a significant decrease in the rate of rain in the winter and a significant increase in the temperature in the summer, and thus the ecosystem is weak and easily changeable and prone to shattering, and despite the difficulty of measuring or controlling these changes, it can be controlled by treating the expected effects. Through previous research and studies that aim to understand the reality of the change in the general trend of how suspended dust affects vegetation, and then determine the negative role of humans in the desert environment, which in turn increased the proportion of suspended dust as a result of performing some activities such as logging, overgrazing and the abundance of land lines. Abandoned fields, and the introduction of new breeds of livestock.

Many previous studies, such as Salem study (2018), the Kazem, Makki and Karim study (2015), the lami and older study (2012), and the Al-Halaiqa study (2010) indicate that vegetation in general has a clear effect in reducing and reducing the severity of environmental pollution resulting from dust. , As plant parts such as branches and leaves act as filters to purify the air from dust, and when planting trees, they act as windbreaks; It works as a filter of dust, thus reducing its effects on human health and the plants planted behind it. Dust is one of the main components of air pollutants, as they are tiny irregularly shaped particles suspended in the air and most of them are small in size. And the winds carry them very far.

Research questions

In light of the research problem, the researcher seeks to answer the following main question:

"How do dust storms degrade vegetation in the desert city of Zulfi?"

The main question is divided into the following sub-questions:

(1) What are the annual seasons in which the dust phenomenon occurs more frequently than others in the air of the desert city of Zulfi?

(2) What is the role of human activities such as logging, overgrazing, supplying land lines, abandoned farms, bringing in livestock whose feeding is not compatible with the amount of vegetation cover, and urban expansion in raising the percentage of soil plankton?

(3) What are the methods used to reduce the percentage of dirt plankton in the air of the desert city of Zulfi that resulted from human activities?

research aims

The main objective of the current research seeks to identify the effect of soil plankton on plant growth in the desert city of Zulfi by achieving the following objectives:

(1) Highlight the annual seasons in which the phenomenon of dust occurs more frequently than others in the air of the desert city of Zulfi.

(2) Clarifying the role of human activities such as logging, overgrazing, supplying land lines, abandoned fields and farms, bringing in livestock whose feeding is not compatible with the amount of vegetation cover, and urban expansion in raising the proportion of soil plankton in the air of the desert city of Zulfi.

(3) Determining the methods used to reduce the percentage of dusty plankton in the air of the desert city of Zulfi, which resulted from human activity.

research importance

The importance of the current research stems from the identification of human activities that affect raising the proportion of dust plankton, which in turn reduces the amount of vegetation cover in the city of Zulfi, and from here the importance of the research crystallized in the following points:

(1) The research area “Al Zulfi City” is considered one of the cities in which the proportion of dust suspended in the air increases, as a result of the presence of dust storms that remain for about three months of every year, as they affect the amount of vegetation cover in which the negative effects are highlighted through Crushers for rock making and crushing.

(2) It opens the way for human development service and proper planning to preserve human health by raising human awareness and taking appropriate preventive measures to reduce the impact of the phenomenon of dust plankton, in addition to the recommendations reached that contribute to supporting environmental and agricultural development in the research area.

(3) It enriches Saudi libraries to reach a comprehensive theoretical background on the human role, such as logging, overgrazing, supply of land lines, abandoned fields and farms, bringing in livestock whose feeding does not match the amount of vegetation cover, and urban expansion and its impact on raising the proportion of soil plankton in the desert city of Zulfi air.

(4) It contributes to determining the relationship between the role of human activities and the phenomenon of dust plankton in the air of the city of Zulfi and its impact on the amount of vegetation cover, in light of the scarcity of studies, especially in the area of this research.

The theoretical background of the research

First : the theoretical framework

It is no secret to everyone that human activity is one of the causes of suspended dust. An example of this is that some companies that discover rocky sites for use in construction purposes create pits that dump their waste outside them in the form of piles of dust and thus provide materials for dust storms, this is in addition to what the crushers do From breaking up rocks of large sizes, separating the rough from the fine and leaving the latter to be manipulated by the wind, and the cars that transport sand and rocks when they move from the sites of crushers in the desert to the urban areas, they work to break down the vegetation that is exposed on their way and work to soften the sediments of the cohesive soil that drives Thus, it would have made the path easier for winds to affect these sediments and carry them to form dust storms. The animal also has a role in this field, where herds of sheep feed on the natural plants in the desert that work to stabilize the soil and thus this cover is destroyed by the presence of these herds, exposing soil deposits to the wind to form a material of dust storms.

First : the earth plankton

They are clusters of dust particles (1-50 microns in diameter) or sand (50-500 microns in diameter) raised by the winds from the surface of the earth to different heights (more than 100 meters in the case of dust and less than that in the case of crawling sand). These phenomena often occur over areas covered with loose, dry sediments.

Where these particles or particles are transported by the rapid winds to areas far from the areas they generate, causing the erosion of the surface soil, adversely affecting agricultural lands and plant production, as well as leading to urban air pollution, visual pollution and low visibility. Which hinders the practice of any outdoor activity during storms, and leads to an increase in cases of respiratory diseases, allergies, asthma, etc., and also causes disruption of traffic, air and maritime navigation, which leads to many economic losses (General Authority of Meteorology and Environmental Protection, 2018 AD, p.68)

It is possible to calculate the frequency of sand and dust storms according to the months of the year and find the total frequency for each year, and the following table (1) shows that.

Table (1): The frequency of the sand and dust storms phenomenon in the Kingdom of Saudi Arabia during the years (2010-2018)

Months	Years								
	2010	2011	2012	2013	2014	2015	2016	2017	2018
January	4	1	4	8	0	14	2	2	9
February	11	11	78	5	0	10	4	4	14
March	16	26	37	6	11	11	13	24	16
April	38	26	32	20	28	50	23	20	52
May	27	39	17	25	17	26	9	22	26
June	17	14	22	12	5	13	2	8	21
July	11	8	5	18	1	7	9	5	19
August	9	7	3	2	4	14	14	7	5
September	4	3	7	2	2	14	5	4	7
October	9	0	4	4	7	25	1	0	11
Nov.	0	2	3	4	6	10	1	1	5
Dec.	5	0	0	1	2	1	12	1	0
Total	151	137	212	107	83	195	95	98	185

(Source: General Authority of Meteorology and Environmental Protection, 2018)

It is evident from the previous table (1) that the year 2012 AD was the most frequent year for the phenomenon of sand and dust storms, with a number of 212, as most of them were in the months of February and March (winter and spring seasons).

Followed by the year 2015 AD with 195 times and the most were in the months of April and May (season Spring), followed by the year 2018 AD with 185 times, most of which were in April and May (spring semester), and the least of which was in the year 2014 AD with a frequency of 83 times, and most of them were in April and May (spring semester).
Figure 1 shows the frequency of the sand and dust storms phenomenon in the Kingdom of Saudi Arabia during the years (2010-2018).

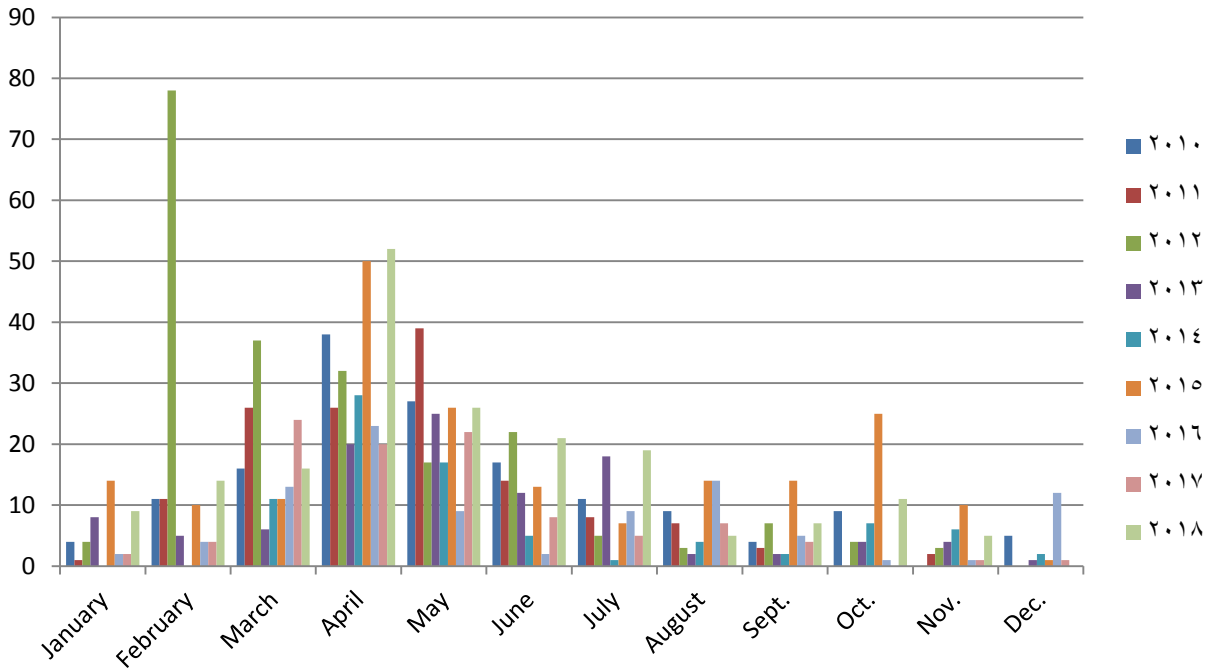


Figure (1): Frequency of sand and dust storms phenomenon in the Kingdom of Saudi Arabia

It is worth noting that there is a clear change in the vegetation cover of the extended study area "Al-Zulfi City" from the end of the urban area in the city of Al-Zulfi and its reefs and pastoral areas in it, It shows a comparison between the change in vegetation cover in 2018 AD, and compared to it in 2010, The reasons may differ for the decrease of this cover, due to overgrazing and other human practices that led to its deterioration, taking into account that the area is of a desert nature and is covered by seasonal desert weeds.

Second: the rock crushing industry

The accelerating rate of urban development and population growth in the Kingdom of Saudi Arabia has contributed to the acceleration of the requirements for the integration of infrastructure and construction in various public and private services, and the increase in the expansion of residential and urban areas, land uses, the establishment of economic cities and various developmental projects has led to a significant increase in the demand for the exploitation of the necessary natural resources. Accordingly, the facilities specialized in extracting and manufacturing raw materials and basic materials needed for construction, construction and paving work have increased in various cities and governorates of the Kingdom of Saudi Arabia (Figure 2)

Figure (2): (Source: Ministry of Petroleum and Mineral Resources, 2011) Raw material quarry locations in the Kingdom of Saudi Arabia

Table (2): The number of mining licenses in the Kingdom of Saudi Arabia.

Years	Numbers of mining licenses
2000 A.D.	1179 licenses
2008AD	1408 licenses, including 1148 licenses for building materials quarries (at a rate of 2.4% per annum) distributed over 180 crushing complexes in the Kingdom.

(Source: Ministry of Petroleum and Mineral Resources, 2011)

The competition between rock crushing enterprises and the production of asphalt and ready-mixed concrete to provide these materials to consumers was the main reason for creating them randomly in some governorates and villages. This was accompanied by many negative environmental impacts that were contained in the mining investment system issued in 2004, which requires intensifying operations Field inspection and follow-up of quarrying sites, monitoring and measuring various pollutants in petrification areas, especially air pollutants, and encouraging the use of environmentally friendly technology during extraction, manufacturing and production processes. It should also be noted that the Ministry of Energy, Petroleum and Mineral Resources has adopted a policy of rock-crushing complexes and excavation activities, so that they are far from valleys And cities and environmentally sensitive areas, which facilitates the process of controlling and controlling them and curbing the pollution resulting from them (General Authority of Meteorology and Environmental Protection, 2018 AD, p.70).

The researcher believes that the "quarries" that are located in (Umm Athar) in Al Majmaah governorate near the city of Al Zulfi, have a severe impact on agricultural lands and pastures, as their residues and pollutants resulting from them lead to damage to the plant and weaken its growth, as these pollutants deposit on plant leaves and close The pores necessary for the continuation of its life without which it is difficult for the plant to resist and continue, which exposes it to drought and death, leading to the phenomenon of desertification in that city, and the imbalance of vegetation growth is also followed by a defect in the ecosystem of some wildlife creatures that cannot live without a food source, in addition to He pointed out that the noise of equipment and the volatility of dust that displaces many of these organisms from their environment to different environments and the associated impact on the ecological balance, see Figure (3)

Figure (5): Crushers for the rock industry in Umm Azir, near the desert city of Zulfi.

Third: human activities in raising the proportion of earthen plankton

● Lumbering :

Local residents or others carry out the process of logging permanently, in order to heat or cook, or to remove tree cover in order to establish agriculture instead, which causes the elimination of vegetation cover, especially perennial trees, and causes the disruption of the soil ecosystem, making it easier to erode and expand the area Desertification (Al-Hader and Salem, 2018, p. 398).

In spite of the availability of electric and petroleum energies, there are still a number of the Kingdom's residents who use firewood for heating and some other purposes, which led to the removal of already scarce trees. The efforts of the Ministry of Agriculture helped a lot in reducing the phenomenon of logging by applying the regulations and instructions for preventing logging except with a license that allows Only benefit from dead trees and dry parts, based on the forest and pasture system issued by Royal Decree No. M / 22 dated 5/3/1398 AH, and in cooperation with the Ministry of Interior and its various agencies, but the infringement continues (Al-Allula, 2017, p. 27).

Recent studies revealed that the vegetation cover in the Kingdom of Saudi Arabia has been subjected to a marked deterioration as a result of illegal logging, and that it drains annually about 120 thousand hectares, and the use of modern technologies such as mechanical saws and SUVs contributes to the expansion of logging operations due to the increase in demand for firewood.

Which increased the size of the deterioration. In the vegetation cover, and the response to logging operations is going firmly through the efforts of several government departments that tighten control over the practice of logging in all its stages and prevent it throughout the region, monitor sites where logging is frequent and punish those who violate it (Al-Watan Newspaper, 1435 AH).

Table (3): The magnitude of the deterioration of greenhouse trees in 2012 in Al-Zulfi city

Types of trees	Magnitude of degradation in 2012
Samar (Acacia tortilis)	3376 hectares
Ghada (Haloxylon ammodendron)	4,623 tons
Arte (Calligonum)	4188 tons

(Source: Al-Watan Newspaper, 1435 AH, King Abdulaziz City for Science and Technology Study)

Consequently, logging is one of the most dangerous processes that lead to rapid degradation of vegetation cover and biodiversity, as well as the occurrence of air and water erosion of the soil, and a decrease in the quantities of water that nourish the subterranean layers, Pointing out that it is one of the most important reasons that lead to sand encroachment and burial of vast areas of cities and farms, as well as eliminating the seeds that trees throw out, which are the basis of reproduction and one of the important sources affecting the natural vegetation cover.

● Overgrazing :

Overgrazing is a common feature in the Kingdom of Saudi Arabia, and is due to the lack of pasture lands due to the expansion of the presence of crushers for the manufacture of rocks and building materials. This led to a decrease in pastoral productivity and the deterioration of the desirable species or their extinction and their replacement with low nutritional, toxic or thorny species, and in many areas the vegetation cover was completely removed and pastures turned into lands covered with sand and dust, see Figure (4).

Figure: 4
Overgrazing in
the city of Zulfi

Overgrazing is an important factor in vegetation degradation; This is due to the presence of a number of animals that exceed the capacity of the pastures, which affects the environment, whether permanently or temporarily, and overgrazing that exceeds the grazing load leads to the deterioration of vegetation cover, the decline of weeds, and the emergence of endemic plants other than the original plants (Al-Hader and Salem, 2018 AD, pp. 395-396) .

And that most of the pastures of the Kingdom of Saudi Arabia are scattered desert grasses and shrubs with little density and little coverage of the surface of the earth. That is, in the winter and overgrazing of these plants, shrubs and herbs in the spring.

Table (4): Distribution of pastureland area according to rainfall.

Average precipitation mm / year	The area is one million hectares	The total percentage of pasture area
Less than 100 mm	117	68.4%
Between 100-200mm	48	28,1%
More than 200 mm	6	3,5%
Total	171	100%

The previous table (4) shows that the persistence of overgrazing and the phenomenon of transferring sand and soil at the expense of the finest pastoral areas and sites have contributed to the reduction of pastoral resources, the decline in the productivity of pastures, the decline of animal diversity, the emergence and expansion of problems of erosion, desertification, sand encroachment, and dust storms, etc.

In light of this, the researcher calculated the percentages of the extent of pasture degradation in the desert of the city of Zulfi due to the phenomenon of dust, as shown in Table (5) the following:

Table (5): The state of the pastures in the city of Zulfi due to the dust phenomenon

Pasture condition	Very good	Good	Moderate	Poor	Degraded	Very degraded
Pasture percentage	6.5%	25.4%	5.4%	17.1%	30.1%	15.5%

Figure (5) shows the percentages of the extent of pasture degradation in the desert of Al-Zulfi city due to the phenomenon of dust.

Figure (5): The extent of pasture degradation in the desert of Al-Zulfi city due to the phenomenon of dust.

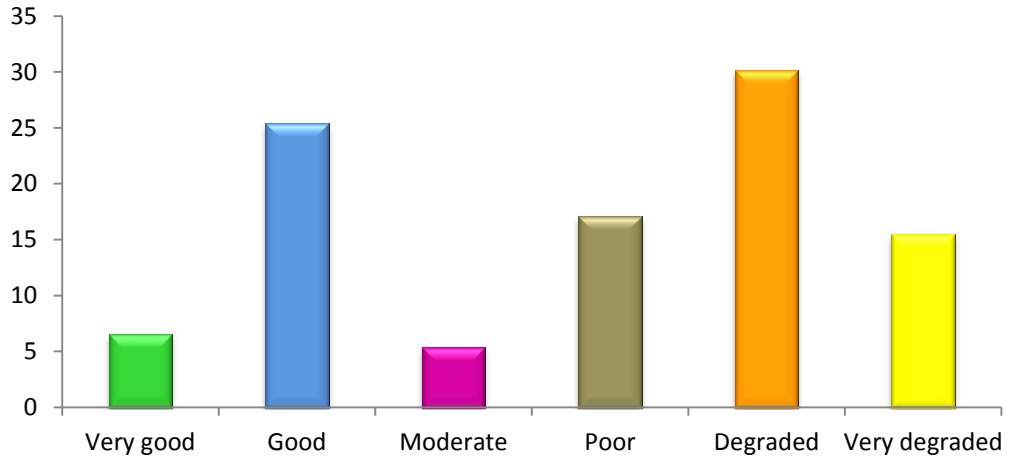


Table (5) and Figure (5) show that the state of the pastures in the desert of Zulfi city, due to the dust phenomenon, is that it is mostly (30%) degraded, that it suffers from overgrazing pressure and that its productivity is decreasing. Overgrazing is one of the major factors leading to the destruction of natural tree cover.

● Landlines (light and heavy ground vehicle paths)

Landlines are the ratio of the area of leaf shadow on the surface of the soil if perpendicular light is shone on the soil surface from above the plant, and it equals the shaded coverage minus the gaps that are not covered by the leaf. It is a good indicator of environmental sovereignty and knowledge of the composition of the plant community.

It is considered mainly in classifying vegetation cover into societies and in evaluating vegetation cover, and it is considered a good indicator in studies of soil protection from erosion, and it is a balance between the contribution of small with high abundance and that of large rare plants, in which it does not need to identify plant individuals. Figure (6) shows that.

Figure (6): Views from landlines in Al-Zulfi city

In addition, the importance of forests and what they need to sustain their bid is to confirm their survival at all times to complete their cycles of growth and renewal. Their areas must be entered into the kingdom's land use plan - which is protected by the system - to avoid changing the purpose of those lands in the various stages of development.

The need to increase the area of vegetation appeared long ago in order to stop sand encroachment and to protect farms by lowering the temperature as well as limiting wind speed to reduce evaporation and transpiration and to combat soil erosion the impact of rain, which is often in strong showers that occur in torrents and erosion of the soil surface. The need to improve the residential environment by afforesting the streets in cities and villages and creating places for recreation and leisure, and the human being deliberately removed the vegetation cover for possession of agricultural lands, especially after the development boom that swept the kingdom, which raised the value of land and facilitated investment transactions, and increased pressure on land and extended it to land lines.

● Abandoned fields and farms

The fields, abandoned farms and neglected lands in Al Zulfi city as a result of low soil fertility or because of the high costs of extracting groundwater or greatly weak production, thus naturally leads to a decrease in the vegetation cover.

Which means that it has become poor in vegetation cover and thus desertification appears in it, see figure (see figure).

Figure (7): The abandoned fields and farms in Al-Zulfi city

As a result, the Saudi Geological Survey established a program of "desertification studies" to examine its causes, work to enumerate and assess all the abandoned lands and farms that suffer from it, and to monitor the extent of its extension on it.

Also, afforestation in desertified areas such as fields and abandoned farms contributes to stabilizing moving sand dunes by choosing types of trees and shrubs that are resistant to drought and high temperatures and helping them to grow by increasing the amounts of rain water that reach them using different water harvesting methods and preserving soil moisture, either with a mechanical jacket such as agricultural waste or organic fertilizers or By chemical emulsion or germination of some weeds and pioneer plants. Shrubs most of the time need watering in the first years of germination. They must be helped by reducing the temperature and the speed of the drying winds by erecting mechanical fences or even small obstacles such as stones near the seedlings (Ministry of Agriculture, 1426 AH).

To combat desertification and sand encroachment and reduce the amount of dust that affects vegetation and emanating from farms and abandoned fields, windbreaks are created from fast-growing trees that are environmentally appropriate to the conditions of the region and are planted perpendicular to the direction of the winds, and irrigation is provided from the same source that the farm uses or the water reaches

From the leakage of surplus to it. For more protection, bumpers can be planted at a distance of twenty times the height of trees from the farm in the side where the sand moves, and such an external belt needs a hierarchical design that increases its effectiveness, it also needs a source of irrigation, and windbreaks and tree belts are used around cities, roads, and railway lines to stabilize the sand. Which leads to combating it in a scientific, logical way.

- Bring in types of livestock whose nutrition is not compatible with the amount of vegetation

Livestock, such as camels and sheep, is one of the important components that have received a lot of attention and encouragement by state institutions to encourage breeding, and investment in the field of livestock and camel raising in general through facilities in the lands in order to face the increasing and continuous numbers of demand that resulted from the population increase This greatly increased the percentage of meat consumed, and led to a large gap that led to the need to import from abroad, see Figure (8).

Sweetened

imported

Figure (8): Bringing livestock whose nutrition is not compatible with the amount of vegetation

Al-Harbi believes that the huge quantities of livestock that the Kingdom imports annually from abroad, and there are no pastures that can absorb them play a role in the decline of pastures: “The frightening amount of herds scattered in the lands came based on import permits.

Either for trade or for breeding and fattening. As for Nasser Al-Subaie (52 years), he affirms that overgrazing is caused by sheep and goats only, while camel grazing does not affect pastures absolutely: “When we move from one region to another seeking pasture wherever it is, the camels move away from their original place for long distances that may exceed Hundreds of kilometers, during which you eat bites from the tops of the plants you care for, and leave parts of the branches and leaves to grow again. " As for sheep and goats, they eat large quantities of pastoral plants, especially the newly grown herbs that are difficult to regrow. It plows the ground with its pointed tips during grazing, which leads to the uprooting of plants from the soil or their wear and tear as a result of trampling on them (Al-Anzi, 2008).

The pastoral production in the city of Zulfi is characterized by the diversity of its practices and the composition of the herds according to the pastoral areas, and the percentage of animals raised under the pastoral animal production pattern is about 33%, 57%, and 70% of the total numbers of sheep, goats and camels respectively. And pastures contribute about 20-25% of the annual forage ration, The financial value taken from pasture plants in the Kingdom is estimated at 420 million riyals, assuming a four-month grazing period, and the nutritional value of pastoral plants is equivalent to 40% of the nutritional value of barley grains (Ministry of Agriculture, 1435H).

And based on Cabinet Decision No. (66) dated 2/25/1437 AH to stop planting green fodder to ensure the preservation of natural resources, and Ministry decision No. (74/1) dated 10/2/1439 AH, which includes the approval of the implementation mechanism to stop the cultivation of green fodder, And based on the veterinary quarantine system in the countries of the Cooperation Council for the Arab States of the Gulf and its executive regulations in the Kingdom, it is possible to adhere to the standard weights of livestock that ensure that quantities of feed are not consumed by entering the Kingdom according to the following table (6):

Table (6): Bringing livestock that are compatible with vegetation cover

Type		Average weight
Lamb	Sawakni	35
	Awassi	35
	Berberi	25
Goats		20
Cows		280
Camel		200

(Source: Ministry of Environment, Water and Agriculture, 1439 AH)

In the event that the imported livestock is less than the established standard weights, the importer undertakes to import the sufficient quantity of fodder (alfalfa, Rhodes, hay, etc.) sufficient to reach the standard weight according to the following table (7).

Table (7): The amount of green fodder required to increase one kilogram of live weight to import livestock

The amount of green fodder required to increase one kilogram of live weight	Animal type
2.4	Lamb
1.8	Goats
2.8	Cows
3.2	Camel

(Source: Ministry of Environment, Water and Agriculture, 1439 AH).

It should be noted that bringing in livestock that is not suitable for vegetation will directly affect the percentage of soil plankton, including dust. Because livestock imported from abroad eat a lot of weeds, shrubs and trees, which may lead to desertification as well as a lack of vegetation cover in the city of Zulfi, and from here the Kingdom began to import livestock that dealt with fodder and plants in a simple way in order to address this matter.

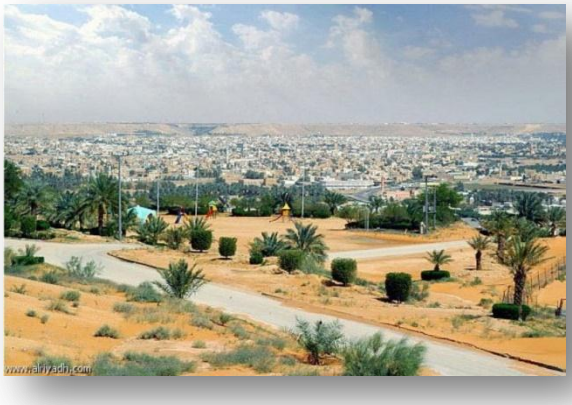
In light of the foregoing, one of the determining factors for the type of animal suitable for the use of plants of the type of vegetation in a pasture is mainly due to the nature of the preference of different animal species

For grazing over certain special types of vegetation cover, as cows always prefer grazing over tall grasses, and the preference for sheep for grazing On short grasses, leguminous plants, as well as broadleaf plants, forbs, and the preference of goats over shrub and shrub plants, juicy branches, and dry parts of shrubs and woody parts may resort to uprooting the roots to feed on them, which may lead to deterioration of the pasture, and camels usually prefer grazing over shrubby plants And halophytes and thorny plants.

● Urbanization

The human-induced urban expansion needs to reduce the vegetation cover in the city of Al-Zulfi, and this may increase the proportion of dusty plankton, see Figure (9).

Figure (9):
Urban expansion in the desert city of Zulfi



Due to the increase in urbanization and the lack of residential plans that are characterized by the presence of parks and gardens, which meet the needs of the population of entertainment, which leads them to build tents and design vehicles for camping in pastoral areas to benefit from them for hiking and raising livestock, which requires removal of vegetation cover in order to establish these communities, Thus, the pressure on vegetation increases, and then causes the loosening and erosion of the soil, as a result of random entry and exit of cars (Al-Hader and Al-Salam, 2018 AD, p. 398).

With the beginning of the Five-Year Plans, which accompanied the period of the economic boom (1970-1980 AD), rapid growth appeared in Saudi cities and the rates of migration from villages and small cities to major urban centers increased. The Zulfi region has witnessed population

Growth during the past two decades and a decline in agricultural activity in the region as a result of the population's tendency to work in commercial and economic activities. With the rise in the level of income, the per capita consumption of goods and services increased, the demand for land increased, and some turned to real estate investment. Many residents have also become able to use modern means of transportation to reach mountainous and rugged places, which facilitated their exploitation and the expansion of urbanization to them, and consequently the vegetation cover was affected, so that the problem of urban sprawl emerged as a negative phenomenon that requires studying and searching for ways and means to solve it in cooperation between all the parties involved in view of what it constitutes Of harmful effects and consequences on the natural environment.

Table (10) shows the total area of urban expansion in the city of Al-Zulfi during the years (1975-2004)

Table (8): The total area of urban expansion in the city of Al-Zulfi in the years (1975-2004 AD)

Years	The total area of urban expansion
1975 AD - 1395 AH	351 hectares
1982 AD -1403 AH	735 hectares
1986 AD -1407 AH	865 hectares
2004 AD-1425 AH	3091 hectares

(Source: Al-Kulaib, 1423 AH)

Accordingly, modern technologies have contributed to increasing the ability to change the topography of the land by filling in some areas or removing some of them and using them for urban expansion. As a result, small cities and villages expanded horizontally at the expense of agricultural lands, which posed a threat to the natural environment in the Kingdom of Saudi Arabia.

In light of the foregoing, the urban expansion has had negative effects on agricultural areas and vegetation cover in Al Zulfi city. The manifestations of urban sprawl have been the exploitation of many agricultural lands and open lands as residential plans or industrial

Establishments, In addition to the requirements of those plans of paved roads and government facilities, as there are many factors that have contributed to the increase of urban sprawl on agricultural and natural areas in the city of Zulfi, perhaps the most prominent of which is the high population growth rates and the need for lands for industrial establishments.

Second: Previous studies

The researcher found some previous studies that focused on human activities and their effects on vegetation through dust and sand storms such as dust, where the researcher listed some of them as follows:

A Xinhua study (2020 AD) aimed to reveal that human activities were the main factor affecting Asian sandstorms two thousand years ago, according to a new research article published in Nature Communications. The enhanced Asian monsoons facilitated the development of Chinese civilizations, thus Destabilizing the topsoil and thus increasing the frequency of sandstorms. This indicates that human activities that began at least two thousand years ago have begun to replace natural climate change as a major factor affecting sandstorms in eastern China, and it is expected that the results of the research will provide scientific support for the development of policies for organizing human activities and afforestation in arid and semi-arid regions. In northern China.

The study of Mushabab Al-Hader and Yusef Salem (2018 AD) aimed to study the phenomenon of desertification and its environmental effects in Al-Ayyinah Governorate in the Riyadh region, which shows the role of natural factors such as temperature, humidity, lack of precipitation and evaporation, in exacerbating the phenomenon of desertification in the region, and the study showed the high rate of evaporation throughout the year. The study also highlighted the role of the human factor represented in overgrazing, logging, and land use for hiking or for agriculture, which played a major role in the expansion of the phenomenon of desertification. The study also reduced vegetation cover based on satellite visualizations.

The study of the shadows of Kadhim, Munira Makki and Ibb Karim (2015 AD) aimed to identify the effect of dust storms on increasing

The manifestations of desertification in the Qadisiyah governorate, Its results were evident in the fact that the natural characteristics in Qadisiyah governorate, represented by the surface, climatic characteristics and soil, work with dust storms to increase the manifestations of desertification in the study area represented by wind erosion and sand dunes, The effect of these combined factors varies from one season to another, as their effect increases in the summer while their impact decreases in the winter season.

The study of Hoda Al-Lami and two older forecasters (2012 AD) dealt with the phenomenon of dust that occurs in Iraq from phenomena that cannot be controlled completely or partially treated in a short time, because they arise locally in large areas or from outside Iraq (from the Sinai desert, the Arabian Peninsula, and the Sahara ...) However, its impact can be reduced or its spread partially limited through factors that require great effort or time in addition to the economic aspects of that, and the results indicate that Iraq in general is affected by stuck dust, followed by the number of occurrences per year, rising dust and the third degree. Dust storms, and that 50% of the dust cases in the Baghdad region are associated with the southeast winds and 20% from the rest of the directions, and on the other hand, 75% of the cases are associated with winds exceeding 5 m / s. The phenomenon of dust from one year to the next due to the variation in climatic conditions, and there is an inverse relationship between rain and dust phenomena (suspended dust, rising dust, dust storms), as the less rain during the year, the higher the temperature, and in turn the dust phenomenon increases.

Also, Abd al-Wahhab Mashat's study (2011 CE) aimed to study dust storms on the Kingdom of Saudi Arabia, during the period from January to March 2008 CE, and the results of the research showed that most of the local cases were the cause of their formation related to the topography of the area on which they occurred, while the widespread and transmitted cases The reason for their occurrence is due to the movement of pressure systems, especially the passage of high-speed depressions over the north of the kingdom, and the extension of the Siberian high over the kingdom.

The study of Hassan Al-Halaiqa (2010 AD) sought to determine the economic, social, environmental and health impacts of stone quarries and saws in the Hebron governorate, and the results of the study concluded that there are positive economic effects represented in providing job opportunities, stimulating the local economy, increasing the level of income, rising land prices, and the presence of effects Social aspects related to improving the educational level in the region, and that stone quarries and saws have environmental impacts, as 57.8% of the study sample stated that these quarries and saws have a set of negative environmental effects, which are the effect on soil, air, agriculture, plants and water, changing the land surface features, and impacts on The health of the neighboring population and workers, which necessitates reconsideration of all activities of quarries and stone saws, their method of work and places of spread, in order to avoid their environmental and health impacts.

Michel's study (2002) revealed that Botswana is suffering from the depletion of a wide range of vegetation cover, many changes, especially around water points, and accelerated soil erosion by winds, in addition to the increasing pressures in communal grazing areas crowded with large sectors of livestock, And moving from east to west, resulting in the degradation of savannah tree ranges.

Commenting on previous studies

It is possible to benefit from previous studies by preparing the theoretical background for the research, choosing the research methodology, and determining the appropriate statistical methods, To answer his questions, to know how to interpret and discuss his results, and to formulate his recommendations and suggestions.

Research Methodology

The researcher follows the descriptive analytical approach, as he described and analyzed data, statistics and illustrations related to the phenomenon of dust and its relationship to the amount of vegetation cover in the desert city of Zulfi as a result of the impact of human activities (logging, overgrazing, supplying landlines, fields and abandoned farms, bringing in livestock whose feeding is not suitable for The amount of vegetation cover, urban expansion).

As well as some available statistical data on highlighting the annual seasons in which the occurrence of the phenomenon of dust is more frequent than others, and it should be noted that the data sources and statistics were applied by the researcher in the field during the year 2020 AD.

Search area location

The search area is determined in the desert of the city of Al-Zulfi, as it is najid by the nature of its topography and represents an extension of the desert, and is devoid of some complex mountain formations, and next to the province of Zulfi there is the Nafud desert, or as the revolutionaries are called, and from the west the Qassim region, from the south the Al-Ghat governorate, and from the East Artawiyah, The area of Al-Zulfi Governorate is about 5400 km2, and the population of Al-Zulfi Governorate reaches more than 72,000 people. The current research focuses on the desert of influence or the influence of revolutionaries in Al-Zulfi Governorate. Figure (10) shows the location of Al-Zulfi city in the Kingdom of Saudi Arabia:

Figure (10): Al Zulfi city map, search area

Figure (11): An aerial photo of the city of Al-Zulfi

It is worth noting that the city of Al-Zulfi, its land is a low and extending plain between Jabal Tuwaiq and Al-Nafud, as it extended to include the lands east of Mount Tuwaiq, and its fertile agricultural land is with sedimentary soil interspersed with many valleys sloping from the Mount Tuwaiq chain and its waters are abundant, especially on the sides and at their estuaries, Among the most important natural landmarks are (Shuaib Samnan, Shuaib Markh, Wadi Al-Nom, Shuaib Urira) and other valleys and reefs. Among the most prominent natural features in the governorate are Al-Muttal Al-Sharqi Park, Al-Muttal Al-Gharbi Park, Rawdat Al-Sabla and Al-Kassar Winter Lake).

Research background applied

The results of the first question, which states: "What are the annual seasons in which the occurrence of dust phenomenon is more frequent than others in the air of the desert city of Zulfi?"

The researcher answered the first question by calculating the frequency of the phenomenon of dust in the desert of the city of Zulfa during the months of the year 2020 AD, and the following table (9) shows that.

Table (9): The frequency of the dust phenomenon in the desert of Al-Zulfi during the months of 2020 AD

Month	Jan	Feb	Mar	April	May	June	Jul	Aug	Sept	October	Nov	Dec	Total
Frequency	4	6	7	9	11	14	16	18	11	8	6	5	115

Figure (12) below shows the frequency of the dust phenomenon in the desert of Zulfi city during the year 2020 AD

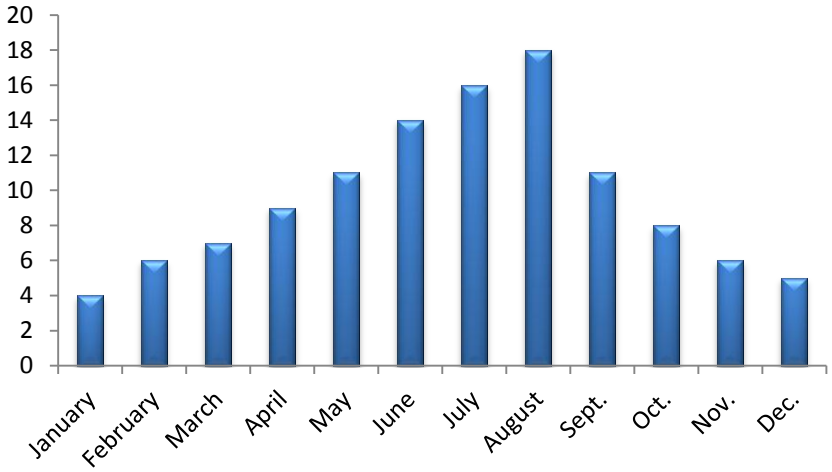


Figure (12): The amount of dust in the desert of Al-Zulfi city during the year 2020 AD

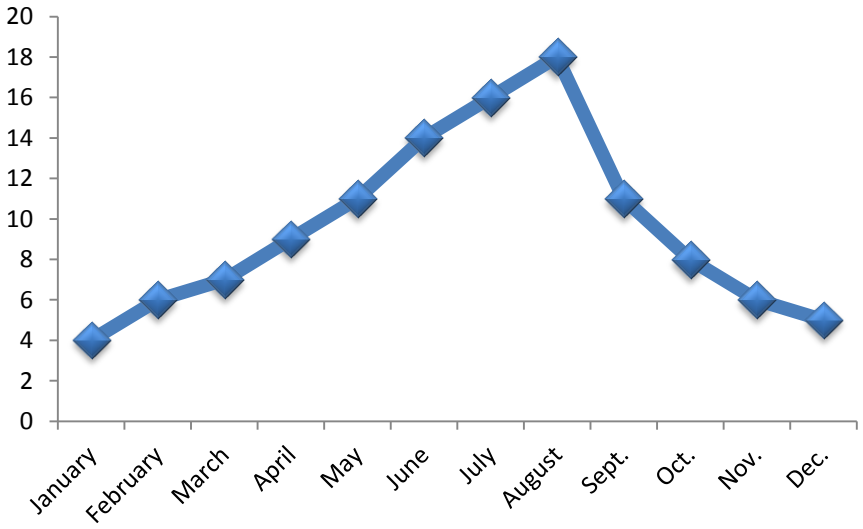


Table (9) and Figure (12) show that the year 2020 AD had the phenomenon of dust storms with a number of 115 recurrences, as the most frequent of them were in the summer seasons.

Because in the summer the soil disintegrates due to drought and low humidity, and thus the proportion of dust increases, In addition, the proportion of dust decreases in the winter season, due to the rains, which work to hold the soil together and reduce dirt and dust in it.

In light of this, Figure (13) shows the phenomenon of suspended dust in the air of the desert city of Zulfi as follows:

Figure (13): the phenomenon of suspended dust in the air of the desert city of Zulfi

The researcher explains the existence of the dust phenomenon in the city of Al-Zulfi specifically, due to:

- The large difference in temperatures indicates a sharp difference in the atmospheric pressure values over a small area, which means an increase in the speed of the winds dramatically, as they move from high pressure to low pressure areas very quickly, causing huge amounts of dust.
- In the summer season, drought increases, soil moisture decreases, vegetation cover decreases, and soil disintegrates easily, as happened in the 2014/2015 season during which a dark storm was formed, and this matter differed during the 2015/2016 rainy season in which the dust waves decreased due to the abundance of rain and the increase in vegetation cover.

The results of the second question, which states: What is the role of human activities such as logging, overgrazing, supplying land lines (roads), abandoned fields and farms, bringing in livestock whose nutrition does not match the amount of vegetation cover.

And urban expansion in raising the proportion of dirt plankton in the air of the desert city of Zulfi?

The researcher answered the second question by calculating the average number of days of dust in the desert of the city of Zulfa during the summer months of 2020 AD due to various human activities such as logging, overgrazing, supply of land lines, fields and abandoned farms And bringing in livestock whose nutrition is not compatible with the amount of vegetation cover and urban expansion, and the following table (12) shows that.

Table (12): The average number of dusty days in Zulfi city desert during the summer months of 2020 attributed to human activities

Month	June	July	August	Total
Total Hours	11.4	13.9	14.8	40.1
Average number of days	3.7	4.1	4.3	12.1

This is done by calculating the average concentration of suspended dust as an air pollutant according to the summer season caused by the crushers used by humans, as well as the geographical location and weather conditions in Zulfi city in the year 2020 AD, as shown in Figure 14 below.

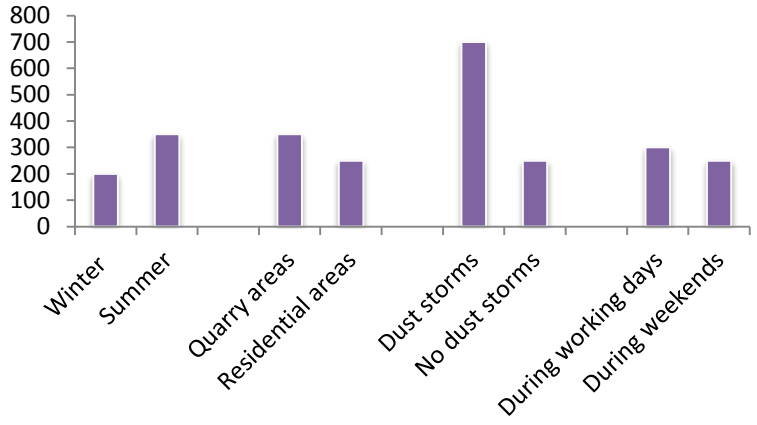


Figure (14) Concentration of suspended dust according to summer season, location and weather conditions in the desert of Zulfi city in 2020.

Table (10) and Figure (14) show that the phenomenon of dust is one of the prominent climatic features in the desert city of Zulfi.

Especially in the summer, which is about 120 days, Where the phenomenon of dust clearly affects the environment, and its effects extend to all facilities related to human activity, leading to the deterioration of the quality of vegetation cover.

Thus, soil moisture can greatly affect the quality of vegetation cover, so the researcher calculated the percentage of soil moisture on Thursday at 12 noon of every month throughout the year 2020 AD, and the following table (11) shows that:

Table (11): Calculation of soil moisture frequencies in the desert of Zulfi city during the months of 2020.

Month	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Frequency of soil moisture	6	4	3	2	3	0	1	0	4	7	6	7
At 12 noon on Thursday of each month in the year 2020												

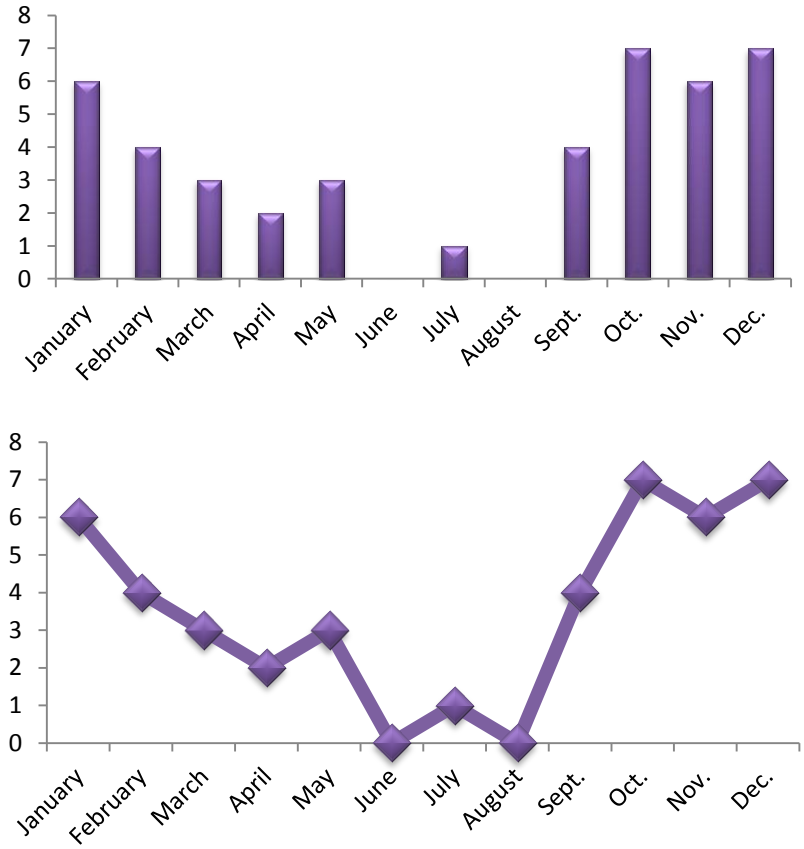


Figure (15): Repetition of soil moisture in the desert of Al-Zulfi city during the months of 2020

Table (11) and Figure (15) show that the frequency of soil moisture increases in the winter due to frequent rain, and decreases in the summer due to the decrease in the amount of air humidity and consequently the dryness of the soil, which contributes to its weak cohesion and then its disintegration. It is worth noting that the fertility of the soil of the city of Al-Zulfi and the abundance of its groundwater has a great role in making the region one of the regions famous for producing a number of agricultural crops, the most important of which is dates, as it is a sedimentary area that helps its soil to cultivate it, as for the cultivation of fodder it is very poor, and therefore this is reflected in the introduction of Livestock from outside, and overgrazing affects the amount of weeds, shrubs and trees that sprout in the winter in large quantities in the lands of this city. As for the rest of the seasons, we find that the percentage of pasture is very low compared to the percentage of livestock raised in the desert, and it is worth noting that logging also affects Greatly on the vegetation cover, especially the artemisia plant, which is largely targeted by humans due to its availability in the desert areas surrounding the city of Zulfi, as well as its quality as fuel and its high value upon sale, and this has greatly affected the disappearance of that plant and its scarcity in recent years.

Figure (16): Artemisia desert plant (Calligonum comosum)

The negative effects of the role of human activities on the soil and the resulting disintegration of the soil in various forms lead to the formation of dust, the decrease in the levels of visibility and the threat of maritime.

land and air transport operations, and its effects on residential facilities and rock formations, as it works to irrigate it due to the collision of sand grains. Also, sandstorms in particular fill roads, and it should be noted that the large number of dust storms may be due to human development that does not take into account the preservation of the environment, its system and components, as it has contributed to and contributes to dismantling the soil and stripping it of its plants through various human activities, due to grazing. And unfair logging and urban expansion, among others.

In addition, the soil, like other environmental elements, is affected by pollution resulting from the establishment of quarries and their activities, which is represented in sweeping large areas for their establishment and paving multiple roads as paths for transporting their products taking into account the fuels and oils that leak from those machines or the solid waste that results from their maintenance or in large quantities From the dust resulting from their work or the random movement of heavy equipment or transport vehicles that accumulates on the leaves of plants surrounding those quarries with an area of \ u200b \ u200bthe diameter that may exceed several kilometers and change their color from green to gray due to the accumulation of large quantities of dust on the leaves of plants, which causes the pores to close Its leaves, and this in turn negatively affects the process of transpiration, respiration, photosynthesis, and the action of chlorophyll necessary for the continuation of plant life, as it is difficult for these plants to continue and consequently their destruction, and the process of collecting soil from the surrounding area leads to the removal of vegetation cover and contribute to soil erosion. The hard rocks present in the valleys of these quarries contribute to soil loss; By facilitating the processes of water and wind erosion, which leads to the increasing effects of torrential torrents that the region is exposed to in the rainy season.

The results of the third question, which states: What are the methods used to reduce the percentage of dusty plankton in the air of the desert city of Zulfi that resulted from human activity?

A number of methods can be used to mitigate the effects associated with dust plankton in the air of the desert city of Zulfi that affect vegetation as a result of various human activities using a number of local measures and environmental control strategies, Whereas, it is illogical to avoid them and prevent their occurrence because they are natural phenomena, but necessary measures can be taken to reduce their effects as follows: (Swain, 2020).

(1) Using mechanical methods in quarry stacks, such as installing specific filters to reduce dust emission.

(2) Reducing the paths of cars and heavy equipment in the desert and surrounding them with belts of plants as possible.

(3) Establish controls and laws for the mechanism for disposing of solid and liquid wastes from industrial establishments.

(3) The use of natural barriers such as plants, which are characterized by being evergreen and with low water consumption in industrial areas and main roads.

(4) Expanding the establishment of parks and green spaces in the city.

Summary of search results

In light of the above, the researcher summarizes the results of the current research in the following points:

(1) A person works to reduce the vegetation cover in the desert city of Zulfi through his various activities, the most prominent of which is the logging process, which greatly helps to expose the soil as there is a marked increase in the amount of dust in the summer season, which in turn affects the vegetation. Most of the pastures in the desert of Zulfi city are degraded and suffer from a great shortage of shrubs and trees, and overgrazing and vehicle paths (land lines) are among the main factors that have led to the deterioration of vegetation cover, and therefore we find that there is a marked increase in the amount of dust in the summer, as well. Abandoned fields and farms are places that contribute to raising the dust percentage due to the disintegration and drought of their soils, and the import of types of livestock whose feeding nature does not match the scarcity of vegetation cover is one of the factors that lead to desertification.

And finally we note that urban expansion has had negative effects on vegetation cover, due to High population growth rates at the expense of agricultural land.

(2) That the annual seasons in which the phenomenon of dust occurs more frequently than others in the air of the desert city of Zulfi is the summer season as a result of lack of rain, low soil moisture, lack of vegetation, and thus ease of soil disintegration.

Recommendations

In light of the previous research results, the researcher recommends the following:

(1) Activating the Ministry of Environment and Agriculture's decision on preventing logging and overgrazing to prevent the elimination of vegetation cover and soil erosion.

(2) Work to bring in livestock that are compatible with the amount of vegetation cover in the Kingdom of Saudi Arabia.

(3) In the event of importing types of livestock whose feeding nature is not compatible with the amount of pasture in desert areas, in this case the breeder shall ensure the use of feed imported from abroad that covers the needs of these animals.

(4) Enactment of laws and legislations by the Ministry of Environment and Agriculture in the Kingdom of Saudi Arabia that work to prevent camping and the establishment of parks at the expense of lands covered with plants, to preserve them from extinction.

(5) The necessity to establish and define industrial zones for the establishment of crushers for the manufacture of rocks in them and to reduce the aggression on vegetation cover, grazing and areas designated for housing.

(6) Planting forest trees on the sides of roads and around crushers for the manufacture of rocks, and in this way, it is possible to reduce the transmission of dust and gases to the surrounding areas.

(7) Spreading environmental awareness in the community about the danger of human activities in raising the percentage of dust plankton that affect vegetation cover and harm plants.

(8) Work on paving and paving roads for land lines, especially in the areas surrounding the kindergartens and agricultural areas, in order to reduce the amount of dust that accumulates on the leaves of plants.
(9) Expanding the establishment of gardens and green spaces and taking care of the types of evergreen plants with low water consumption whenever possible, as this helps stabilize the soil.
(10) Taking care of planting large-sized perennial desert trees that act as windbreaks and reduce the speed of surface winds that raise dust.
(11) Supporting research and publishing studies that support the preservation of vegetation cover in desert areas, limit environmental degradation and reduce desertification.

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