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THE ENVIRONMENTAL REALITY OF DESERTIFICATION IN IRAQ / 2022: A REVIEW ARTICLE

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Abstract:
The world is well aware that the increasing environmental effects of desertification and leaving it without bringing about any natural or human changes will eventually lead to environmental disasters with unimaginable consequences, and will incur many losses for human achievements and threaten many of their energies. And portends the end with a threat to human existence, we pay attention to this subject because of its importance and what the desertification reality in Iraq during the year 2020 constitutes.

Keywords: Climate change, Desertification, Iraq, 2020

Research problem:
The research problem is represented in the extent of the climatic changes that Iraq is witnessing in the expansion of the phenomenon of desertification and the extent of the great difference in the increase in decertified areas in the seventies of the last century, i. In temperatures and are there treatments taken by the government to mitigate this environmental phenomenon or to confront it in the best ways.

Research hypothesis: Climate changes, especially the decrease in the amount of rain falling and the rise in temperatures, have a major role in increasing the desertified areas in Iraq, more than they were in the previous time.

Research objective: This article came in order to reveal the role of climatic changes that Iraq is witnessing today on the expansion of desertified areas, and then find appropriate solutions to avoid its environmental danger and take the necessary measures to mitigate its effects.

1- INTRODUCTION

The term desertification entered the environmental dictionary in 1972, then five years later the first conference on desertification was held in 1977 in Nairobi, and this term can be defined by several

definitions, but the simplest one is that which describes it as a lack of biological capacity of lands, which leads to the creation of semi-desert conditions due to a combination of factors. Desertification can occur in one of the four degrees, which are: Mild desertification. Medium to moderate desertification. severe desertification. Severe desertification (National Action Program, 2020). In iraq, the medium desertification is the most, as it occupies an area of 99.95 thousand dunums, while the very severe desertification is the least, as it occupies an area of 4,828 thousand dunums of decertified lands, while light and severe desertification occupy 45.13 thousand dunums and 21,908 thousand dunums, respectively (Naama, 2003). Distribution of desertification areas in Iraq the United Nations Environment Protection Organization (UNEP) estimated in 1997 that 1,035.2 million hectares of land are desertified, and that only 370.3 million hectares are within the continent of Asia. The role of desertification is not limited to the destruction of plant life only, but also causes a decrease in plant and animal groups, and thus causes a loss of biodiversity in arid and semi-arid regions, which applies to Iraq, as it annually loses vast areas of agricultural lands, especially in the center and south It is estimated that the increase represents 50% annually as a result of the draining of the marshes and the increasing neglect of agriculture and irrigation. The desertified land area in 2009 is estimated at 760,560 dunums in Basra, 15,000 km2 in Maysan, 130,678 dunums in Babylon, 8,000 dunums in Muthanna, and 1385 km2 in Dhu tar and 95585 km2 in Anbar (Salman, *et al.* 2013).

The causes of desertification are due to the fact that a group of factors are responsible for causing the phenomenon of desertification, including natural factors. The climate factors come at the forefront of these natural factors, and they include the continuous increase in temperatures on the one hand and the decrease in the rate of rainfall on the other hand, and thus to the decline of green areas, especially Depends on irrigation. Also, other natural factors such as soil erosion and others can interfere. And since Iraq is located between latitudes 6.29 and 27.37), which makes the climate of Iraq semi-tropical, and thus affects the type of prevailing winds in it on the one hand, and the influence of the neighboring water bodies on the other hand, as well as the geographical nature of Iraq and its neighboring countries. Especially in the western side, making it more vulnerable to the influence of winds, contributing to the increase in the desertified area (Al-baz, 1986). This site also affected the amount of atmospheric pressure and its distribution in the regions of Iraq, and thus to the decline of rain in the areas adjacent to water bodies. Human factors, and they include a wide range of activities that are the most responsible for desertification in Iraq, such as not taking advantage of the water falling from the rains in most regions of Iraq, if most of them move in grooves, which reduces the chances of increasing the level of groundwater level (Gouda, 1980). The rapid population increase and the resulting destruction of agricultural land and its conversion into a residential facility. Overgrazing for long periods. Continuous cutting of trees and shrubs either for personal purposes or as a result of burns and some policies, adopting poor irrigation systems that include excessive irrigation and the absence of drains to rid the soil of salts, which contributes to the destruction of agricultural lands. Increasing emissions of CO2 and other gases that lead to a change in the amount of solar radiation arriving and trapping heat. Absence of complete environmental awareness, including the dangers of desertification (Shakhatra, 1987).

1-1 Traits that overcome lands when land degradation occurs (Convention to Combat Desertification, 2007; Faraj, *et al.* 2017).

1- Lack of organic matter and moisture.

2- The disappearance of natural plants and the disappearance of wild animals.

3- Soil loss of the surface layer rich in nutrients, which is the clay and silt layer, leaving sand that threatens other areas with flooding.

4- The decrease in the biological activity of the soil and the disintegration of its structure.

All these characteristics lead to a decrease in the productivity of the land and the difficulty of exploiting it, and thus desertification.

The threat of desertification is a global problem that occurs in many environments around the world, where large lands are transformed.

With the passage of time to desert or semi-desert lands, this causes economic and health risks.

By taking a simple look at the natural map of the region, you can estimate the extent of the desertification problem and by monitoring and evidence of it.

Among these signs and evidence of desertification, we mention the following:

1- The presence of barren sandy areas in the middle of agricultural lands

2- Irrigation canals, drains, trees, buildings and external roads are covered with dust

3- Lack of natural plants and wild animals

4- The increasing phenomenon of dust storms and their health risks, air pollution and dust accumulation on furniture and lighting devices.

trees in cities

5- The presence of a muddy and silty layer under the sand dunes, which indicates that these sands have recently crept over them.

Factors causing desertification in Iraq:

Iraq is exposed to a serious desertification problem, and this problem has worsened after 1992, represented by the increase in land areas affected by salinity and waterlogging, and the significant deterioration that occurred in the vegetation cover and the increase in the areas covered by the moving sand dunes, which came as a result of land degradation and erosion.

There is a group of overlapping natural and human factors that have contributed to the exacerbation of desertification such as wind and water erosion, crawling sand dunes, salting and waterlogging and human mismanagement of land, water and natural resources.

In general, we can diagnose two groups of factors related to the occurrence of desertification, namely:

1- A group of natural factors such as soil properties, climate and others

2- A group of factors related to man and his misuse of natural resources

1-2 The natural conditions that contributed to the occurrence of desertification in Iraq:

About 90% of the area of Iraq lies within the arid and semi-arid climate zone, where the drought coefficient is less than the fixed coefficient by about 20 degrees. And the summer temperatures rise to the limits of 52 m, with the high rate of evaporation, especially in the sedimentary plain, 3000

mm, as well as the high number of sunny days, reaching an annual average of 260 - to reach 2000 days annually (Central Statistical Organization, 2007).

The decrease in the rate of precipitation, as it is less than 150 mm in most regions of Iraq, and the average rainy season does not exceed 40 days in the south and 7-0 in the north. Accelerating the occurrence of desertification. The prevailing winds in Iraq are dry and hot northwestern winds that spread local dust, accompanied by a long, dry and hot summer that has an important role in the occurrence of desertification in Iraq (Majeed, 1991).

The factor of the topographical and natural properties of the soil is one of the most important factors of desertification, as about 60% of the land of Iraq is the western plateau and the island, where erosion factors appear clear due to the above-mentioned conditions, and the soils of this region are dry, shallow and poor soils, such as calcareous soils, cerusem soils, and rocky soils There are some valleys that are flooded with sand. As for the sedimentary plain, it constitutes one-fifth of the area of Iraq, and this region is exposed to two phenomena that push them towards desertification. The first phenomenon is its exposure to coarse sandy deposits coming to it from the neighboring sandy areas. The second phenomenon is the high level of groundwater and then salinization due to its poor drainage and the low level of the land, causing swamps and marshes, which cause soil deterioration and loss of its productive properties. As for the northern regions, the phenomenon of water erosion appears due to its steep decline and the high rate of erosion precipitation and surface runoff (Convention to Combat Desertification, 2007; Deserification Caused by Human Activity, 2019).

1-3 Erosion and drift by wind:

70% of the lands of Iraq are exposed to the dangers of wind erosion, and it causes the loss of the fine, fertile soil particles, which are the basis of soil fertility, leaving the coarse sand particles that threaten neighboring areas with burial and the difficulty of compensating and reconfiguring the lost soil, the factors that helped the occurrence of wind erosion, such as poor land and water management (Gouda, 1980; Desertification: Facts, causes and Effects, 2019). The presence of desert areas that contain sand that is easily transported by winds surrounding the agricultural areas, stronghold of vegetation cover, the factor of drought and soil disintegration, and due to the presence of strong and dry winds, and the failure to take the necessary measures to reduce this phenomenon.

The danger of wind erosion is increasing and threatening vast areas of the land, in addition to the difficulty of taking measures to reduce it and the weakness of the capabilities and scientific means in that. Wind erosion can be classified according to its severity as follows (Desertification, 2019).

1- Erosion due to dust storms, which is the most dangerous type, as it causes the loss of a few centimeters of the surface layer.

2- Local wind erosion, which occurs gradually and continuously over long periods of time, as a result of which the soil loses the minutes that make up the fertile surface layer, which leads to its continuous deterioration and abandonment, then it turns into a sandy desert and becomes a source of moving sand that buries the neighboring lands.

It is possible to estimate the extent of this problem, as we learned that there are about 3 million dunums of sand in Iraq, of which 600 thousand dunums are covered with effective and movable sand dunes that constantly threaten cities and agricultural areas [14].

How is the soil preserved from wind erosion (Faraj, *et al.* 2017; Desertification risks, 2019).

1- Reducing the first critical speed of the wind by making natural barriers by cultivating the land or barriers industrial.

2- Do not leave loose soil that is easily carried by the wind by adding materials that improve the cohesion and structure of the soil, such as adding organic materials, glycerol, or polymers.

The establishment of windbreaks and protection belts is one of the most efficient measures taken, which leads to reducing wind speed, purifying the air from suspended matter, and increasing the humidity with the increase of organic matter and soil moisture. This prevents surface runoff and lowers groundwater. it is a shelter for animals and a source of food and activates the biological cycle in nature so that it is an important economic source such as firewood, wood, fruits, and others.

Windbreaks are used in arid and semi-arid regions to reduce wind speed. The efficiency of windbreaks depends on the type of trees, their size and height, planting intensity, arrangement of tree lines and their number, intensity and direction of the wind, season, humidity, and the amount of suspended matter, with the resistance of trees to wind speed and their failure to break in most.

The middle three lines are tall, strong trees with dense leaves as for the peripheral lines, they are gradual in length, as they take a pyramidal shape. It must be maintained continuously. Of the trees used in windbreaks: Casuarina / tamarisk / wild grapefruit / eucalyptus / conifers / berries / bitter orange / buckthorn and others. Surrounded by public roads, villages and places within reach of the population (WHO, 2013; Desertification risks, 2019).

1-4 Human factors

Human intervention in meeting the unlimited needs of natural resources has a great impact on the exacerbation of the problem. Desertification in the region is caused by the indiscriminate cutting of forests, where the locals in the mountainous areas used to cut trees and shrubs to use them in building Housing, making agricultural equipment, and fuel for cooking and heating, and the demand for charcoal prepared from wood has increased forests due to the increase in population, which encouraged more deforestation, the ease with which it was carried out operations of transporting huge quantities of wood and its products, and as a result of the continued cutting of trees for a long time, and the lack of effective legislation to protect them, most of the shrub cover was removed from lands surrounding public roads, villages and places within reach of the population(Who, 2013; Ajmi, 2018). When fires occur in forests, the fires come on hundreds of hectares, which leads to the elimination of them partially or completely, and no organized and effective measures have been taken so far to extinguish the fires, and fires are considered a destructive factor for forests that prevent their renewal and natural reproduction. The over-exploitation of natural pastures for a long time led to their depletion, as the vegetation cover deteriorated. It is natural in quantity and quality, and this deterioration reached a very serious stage, which led to the disappearance of most of the

good species of plants in most of the sites and was invaded by thorny species of a desert nature, and the possibility of restoring the desired plant species became very difficult (Ajmi, 2018; Deserification Caused by Human Activity, 2019).

The most important harmful practices that led to the deterioration of pastures are the following:

Overgrazing: which is manifested by the excessive exploitation of pasture resources without concern for the deterioration and depletion of these resources:

- Indiscriminate grazing: by practicing grazing in all months of the year and with large numbers of animals, which leads to the gradual disappearance of most of the pastoral cover plants, especially the desirable ones(Central Statistical Organization, 2012; Ati, 2022).

Logging: This phenomenon has become a common practice in most areas of natural pastures, and the intensity of logging has reached in some places a degree of depletion, so that most of the pastoral shrubs that constituted the dominant plant groups in the past have been removed, leaving the soil unprotected and exposed to water and wind erosion.

- Marginal agriculture: by exploiting many of the lands located in the steppe region of the Jazira desert, for agriculture after removing its vegetation cover, and since this agriculture is not economically feasible, the land is deserted, but after it has lost its natural vegetation cover and has been exposed to various desertification factors.
- Extensive erosion of the surface soil layer rich in nutrients and carrying it towards depressions, valleys and rivers (Desertification risks, 2019; Damage to desertification, 2020).

1-5 The Problems and solutions

The scarcity of river water and rain water and the problem of high temperatures due to the phenomenon of global warming are natural reasons behind the widening of the phenomenon of desertification, and the phenomenon of desertification has led to an increase in sand storms, environmental pollution and water pollution (Shakhatra, 1987; Desertification: Facts, causes and Effects, 2019).

Iraq is not immune from negative influences, but rather it is at the heart of the major climatic problem that the world is facing, and one of its consequences is desertification and water shortage. While we find the percentage of desertification in the irrigated lands in Iraq 71%, while in Turkey, Lebanon and Syria 13%, 7%, 17%, respectively.

So the problem is bigger in Iraq, and it is a problem that can be expanded, and if it worsens, it will generate catastrophic effects, including the depletion of river water, then citizens will have to dig wells, and the migration of citizens from the countryside to the cities will increase, or the migration of citizens from the country to neighboring countries, due to drought and bad climate And environmental pollution, and the local livestock production market will witness a significant deterioration, the plans of the concerned ministries to confront this phenomenon that produces several phenomena.

One of the best plans and solutions is the cultivation of palm trees, and the purpose of this is to stabilize the soil, moisturize its climate, and produce the fruit of dates. The other plan is the rain-seeding technology, but this technology must be done in a targeted manner, coinciding with

cultivating the lands and preparing them for growing plants, and then activating the rain-seeding to irrigate these vast lands (Deserification Caused by; Human Activity, 2019; Desertification, 2019; Damage to desertification, 2020).

There is a plan that can be turned into a tangible reality, to save the country from this problem, which is to create large lakes distributed among the desert lands and fill them by means of a canal that starts flowing from the Tigris and Euphrates rivers down to the Shatt al-Arab, the gathering center of the two rivers, and flows into these lakes, and this desert can also be cultivated. And irrigating it from groundwater, as there is a giant reservoir of water, and specialists in the field of agriculture support the cultivation of strategic crops, such as palm trees, olives, pistachios, and wheat, which enjoy low water consumption in places where there is an abundance of groundwater, in addition to the fact that these crops bear environmental conditions And help to stabilize the dunes (Convention to Combat Desertification, 2007; Central Statistical Organization, 2012).

The activation of these solutions will lead to the employment of the unemployed, the increase in agricultural and animal production, the rehabilitation of abandoned villages, the encouragement of immigrants to return to their villages, and the creation of new villages in the desert to work in the field of agricultural and animal production.

One of the most prominent of these solutions is the establishment of a canal that extends from the Gulf to the desert, and extends through Syria and Jordan to the Mediterranean Sea, to achieve economic and commercial goals, as it is suitable for transporting goods through these two countries, and at the same time it is suitable for filling the lakes that are created in this desert, which is achieved By establishing several purposes, including humidifying the atmosphere and creating vegetation cover from forests and jungles as fodder for pets, and at the same time, these great lakes will moisturize the weather, which will lead to the occurrence of depressions that will contribute to precipitation. And do not forget that these projects will lead to the employment of unemployed hands and are administratively considered a profitable economic project that contributes to the material income of the country (Ati, 2022; Ati, *et al.* 2022).

2- Conclusions and Recommendations

The first decade of the twenty-first century, during which all regions witnessed an unprecedented increase in temperatures, as the highest annual rates were recorded during this decade, especially the year 2022, which was the hottest year. And the general trend of rain went downward for all stations in the region. In Mosul, the amount of rain decreased by 11 mm from the annual total, and in Baghdad it decreased by 29 mm, while it decreased in Basra by an average of 11 mm, the current century witnessed a decrease in the amount of rain for all stations in the region.

For the year 2019, the areas of sand dunes TM for the year 1976 and Landsat TM-4 images showed that the results of the analysis of Landsat satellite images constituted an area of 4245,889 km 2 in the year 1976 in all regions of Iraq. This area, decertified by sand dunes, expanded during the first decade of the current century to form an area of 22,411,732 km2. Also, the largest creep of sand dunes appeared in the first zone (west of the Euphrates River), as it constituted 876,672 km 2 in the century. In the past, its area became 14,288,884 km2 during the current century due to the desert

creeping east due to the decrease in rainfall, the high temperatures that led to the decline of the vegetation cover and the fragmentation and drying of the soil.

In this article, we strongly recommend establishing a climate change department in cooperation with the Iraqi Ministry of Environment, Higher Education, Meteorology and relevant authorities. So Its mission is to monitor climate changes and related phenomena to control and mitigate them. It also collects and provides data on. The level of small areas in Iraq or neighboring countries and presenting them to researchers and academics specialized in this aspect with attention to processing such a proposed circuit with the latest devices measuring climatic phenomena, soil and air pollution, with early warning about its danger and work to establish natural reserves distributed over the northern, central and southern regions of Iraq in an integrated manner that includes numbers of animals and birds, fish, insects, and reptiles that are exposed to extinction, both wild and domestic, and plants that are exposed according to their natural environments, while providing all environmental conditions to be able to cope with harsh climatic changes, and a museum should be established in every province for plants.

Perennial trees include all kinds, such as different types of palm trees, citrus fruits, and various types of fruit trees, with a focus on spreading environmental awareness among the various classes of society and disseminating it in the various stages of education, from primary education to university education by allocating curricula in this regard and establishing and holding environmental seminars at the level of neighborhoods, especially the popular ones, concerned with the environmental aspect.

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References

1. Al-Baz, Farouk 1986. Food Research and Desert Development, Arab Researcher Magazine, Center for Arab Studies, Issue 6 January-April.
2. -Ati, E.M., Abbas, R.F., Ajmi, R.N., Zeki, H.F. (2022). WATER QUALITY ASSESSMENT IN THE AL-MUSAYYIB RIVER/EUPHRATES SYSTEM USING THE RIVER POLLUTION INDEX (RPI). European Chemical Bulletin, 2022, 11(5), pp. 53–58.
3. -Ati, E.M., Abbas, R.F., Zeki, H.F., Ajmi, R.N.(2022). TEMPORAL PATTERNS OF MERCURY CONCENTRATIONS IN FRESHWATER AND FISH ACROSS A AL-MUSAYYIB RIVER / EUPHRATES SYSTEM. European Chemical Bulletin, 2022, 11(7), pp. 23–28.
4. Central Statistical Organization. Environmental statistics for Iraq for the year. 2012.
5. Convention to Combat Desertification, Methodologies for Evaluating Desertification at the Global, Regional and Local Levels, Eighth Session Madrid, September 2007.
6. Deserification Caused by; Human Activity; study.com,Retrieved 17-12-2019.Edited.
7. Desertification:Facts, causes and Effects; WWW. Livescience.com,Retieved, 17-12-2019.Edited.
8. Deserification; WWW.Wikiwand.com, Retrieved 17-12-2019.Edited
9. Damage to desertification, a brief book. Com 2020.

10. Desertification risks and negative desertification results, Arab Weather 2019.
11. Faraj, Sakan Jahia and Muhammad, Taghreed Qasim 2017 Desertification and salinization in Iraq and its economic effects, with special reference to Basra Governorate for the period (2004-2015).
12. Gouda, Hussein Gouda 1980 Ice age and rain ages in the deserts of the Islamic world, the Arab Renaissance , Beirut.
13. Majeed Hameed, 1991. Data Bank. The second part. Agriculture and livestock in Iraq.Ministry of Agriculture and Irrigation. Baghdad.
14. National Action Program to Combat Desertification in Iraq, 2020.
15. Naama, Hashem 2003 The phenomenon of desertification and its environmental, economic and social dimensions in the Arab world.
16. Reyam Naji Ajmi . Estimation Free Cyanide on the Sites Exposed of Organisms Mortality in Sura River /November 2018. Journal of Global Pharma Technology|2019| Vol. 11| Issue 03 |100-105.
17. Salman, Salah Dawood and Najm, Hassan Ali 2012 The effect of desertification on diminishing agricultural areas and the deterioration of agricultural production, Professor No. (203) for the year 2012.
18. Shakhatra, Desertification in the Arab World: Its Causes and Consequences in the Arab Organization for Education, Culture and Science, Halting Desertification in North Africa, Tunis,Organization, 1987.
19. UNEP,1997. World Conservation Monitoring Centre,&International Union for Conservation for the Nature and Natural Resources.List of Protected Areas. http://wedocs.unep.org/20.500.11822/8471.
20. World Health Organization, Ammonia in drinking water-background document for development of WHO guideline for drinking water quality, 4th Ed., Geneva, 2013.