Review to Reasons and Desertification Control in Iraq

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Abstract. Desertification is the loss of land for its green cover and the inability of the soil to produce agricultural crops. The causes of desertification are either erosion of the soil surface by water and winds, or the high concentration of salts, as well as the high level of ground water or the lack of sufficient water for agriculture. In addition to human activities, and for these reasons, we often talk about failed agricultural management or inappropriate environmental conditions. Desertification control lies by using modern irrigation methods such as drip and sprinkler irrigation, and that using these methods can provide water for cultivating of new lands and reclaiming desertified lands. Experience shows that modern irrigation methods can save about 50% of water and increase agricultural production by about 60% compared to convention irrigation methods. The study recommends training farmers and encouraging them to follow modern irrigation methods and introducing them to the danger of desertification and its economic, environmental and social impacts. The study also proposes the establishment of two rivers parallel to the Tigris and the Euphrates, one of which stems from Samarra and ends in the south of Kut, and the second stems from the Anbar Governorate and ends in the south of Najaf Governorate. This project will increase the efficiency of irrigation. Finally, controlling desertification leads to preventing environmental pollution, creating too many job opportunities, achieving food security and raising the standard of living for people.

1. Introduction

Desertification is a disaster that leads to the deterioration of productive agricultural lands and forces the farmer to leave his land. Judy (1980) stated that the United Nations Environment Programme (UNEP) estimated in 1980 that the disaster of desertification had befallen 61% of the 3257 million hectares of productive land in dry areas. The Food and Agriculture Organization also estimated that desertification threatens 35% of the world's land and 19% of the world's population, among the most important factors of desertification is the mismanagement of agricultural lands and pastures, especially in arid and semi-arid regions of the world, including the Arab world [1];[2]. Poor agricultural management can expose the soil to waterlogging and thus turn into saline soil, as well as dry land as a result of the interruption of rainfall and the inability to irrigate it, and eventually it turns into a barren land. Soil is also degraded as a result of erosion factors with running water, wind and rain, in addition to the poor use of soil that leads to destruction of its structure and erosion, such as cutting forest trees, overgrazing, random irrigation, and failure to drain excess water from the soil [2]. The causes of soil degradation and its transformation into desert land can be attributed to a lack of water or more than the need for plants. This reminds us of the importance of water, which is the mainstay of life, the issue of water and attention to it has emerged throughout the world, and the issue of rationalizing water and developing its sources has become the concern of the United Nations in order to maintain soil

productivity and prevent its desertification, and directing the priorities of regulated water use has become priority in many agricultural plans and programs and human use.

It shows the noble verse (and we made every living thing from water), the importance of water, as well as recommending people to preserve this blessing and not spoil it, and therefore it is necessary to pay attention to irrigation water during irrigation of crops, especially in dry season, to maintain soil productivity and prevent desertification, beside irrigation of the crop more than it needs causes salinization of the soil. Modern methods of irrigation must be followed in order to provide the plant with the water it needs only, as it has been shown from some studies that a little less than half of the water added to the plant by regular methods is wasted by evaporation, transpiration and leaching. It has also been found that adopting modern irrigation methods can save about 50% of irrigation water or more compared to using the convention methods. This proves that water can be provided to cultivate new lands, stop the desert attack on existing agricultural lands, and reclaim degraded lands [1];[3];[4]. In conclusion, it can be said that the resistance to desertification depends on managing water and providing it in a standardized and scientific way, and this will greatly help in the sustainability of the greenness of the earth, because the green of the earth helps not only to prevent desertification, but also helps to prevent pollution as it reduces the percentage of carbon dioxide in the atmosphere [5].

The problem of the study lies in the following: -

- The scarcity of water in Iraq, especially in recent years, has led to the desertification of many agricultural lands, in addition to the failure to follow modern scientific methods in agriculture and irrigation, which has led to the deterioration of agricultural lands and has become a major obstacle to confronting the needs of population growth in terms of food and thus the inability to achieve food security.
- The sources of water in nature are constant, while the population increase continues, and in order to face this increase, agricultural production must increase, Otherwise, the sovereignty of the country will be subject to diminution as a result of this condition by the food-importing countries. Therefore, water use must be rationalized and the largest possible area should be cultivated in order to prevent desertification and increase agricultural yields.
- Desertification means removing the greenness of the earth, which leads to an increase in the percentage of gases in the atmosphere, including carbon dioxide.

The study is designed to answer the following questions:

- What is desertification.
- What are the causes of desertification.
- How to control desertification.

This study is an indicative study that is concerned with controlling desertification and preserving the greenness of the Iraqi land. Thus, it attempts to make important proposals to solve the problem of desertification facing Iraq, which has serious damage to the environment and the economy, in addition to the social impacts. The second importance of the study is to attract the attention of officials in the Ministry of Agriculture and Irrigation and all departments related to agricultural development towards averting the risk of deterioration of agricultural lands, which has lost its green cover. Preventing this danger is only possible by identifying the causes of desertification in order to develop solutions to these causes. The importance of green cover for the land is very great for the economy and preventing environmental pollution. In some studies, the concentration of carbon dioxide increases in the atmosphere in the winter due to the slow growth of plants or their stopping growth, so how is the percentage of carbon dioxide when there is no green cover (Figure 1).

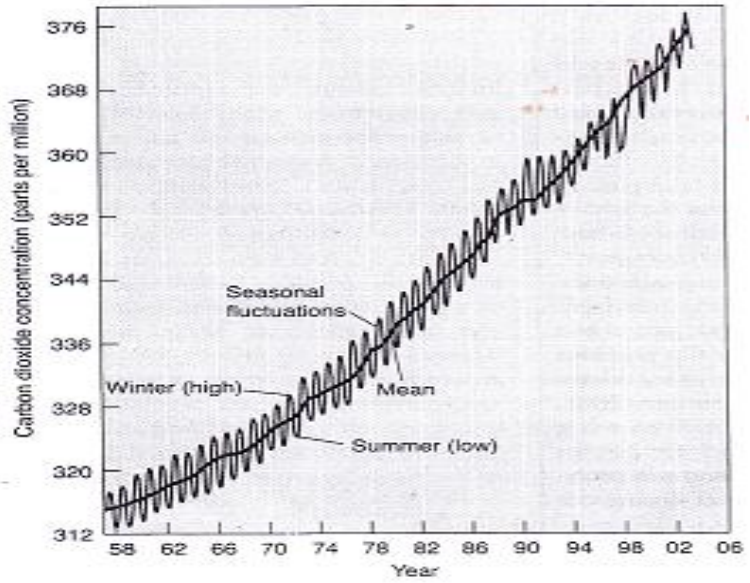

Figure 1. Shows that the percentage of carbon dioxide increases in winter more than summer, because plants are less effective in winter (Environment Magazine, Fifth Edition of John Lee & His Sons 2006, pp. 476-504)

2. Discussion

This study is a desk study where research and books explaining the causes of degradation and desertification of agricultural lands and pastures were used, as well as reading the Iraqi agricultural reality at the present time. The study also shows the importance of preserving water and increasing the efficiency of irrigation channels, noting that the study began in September 2009 and ended in February 2011.

2.1.The first objective of the study is to define the meaning of desertification. It turns out that the word desertification meant sand creeping from the desert to the farm, and that the first person to use to break up desertification was Aubreville in 1949. Also, COFDA used the term drought and dehydration to include several processes in the ecosystem. Darren believes that desertification is the degradation of the ecosystem under the pressure of human activity, which can be measured by the decrease in the yield of the desirable plants. Saba Dell and others defined "desertification" as the deterioration of the continuous biological productivity in the land of arid and semi-arid regions resulting from the pressure of human activity that is sometimes accompanied by severe natural phenomena. If it is not stopped, it will not only lead to desertification, but also lead to an increase in some gases in the atmosphere, such as carbon dioxide (Table 1).

Table 1. Shows the increase in the percentage of some gases in the atmosphere before and after the global industrial renaissance (Environment Journal, Fifth Edition of John Lee and His Sons 2006, pp. 476-504).

Gas	Estimated Preindustrial concentration	Present concentration
Carbon dioxide	288 ppm*	375.61 ppm-
Methane	848ppb**	1.783 ppb+
Nitrous oxide	285 ppb	315 ppb+
Chlorofluorocarbon- 12	0 ppt***	541ppt+
Chlorofluorocarbon -11	0 ppt	262ppt+

*Ppm= parts per million
**Ppm= parts per billion
***Ppm= parts per trillion
+2003 annual average
+1999 values

The United Nations Program defines the environment (desertification) as the spread and increase of desert conditions that result in a decrease in the productivity of living matter, thus reducing the production of agricultural crops. The International Conference on Desertification was defined as the decrease and degradation of the Earth's vital energy, which may lead to conditions similar to the desert. The desertification map defines the world (desert) as a region with little or no vegetation cover due to poor rain and drought [2, 6].

It appears from the previous definitions of desertification that desertification is the deterioration of agricultural soil, its loss of green cover, its transformation into soil unfit for agriculture, and its inability to agricultural production.

Desertification is not a stop to the areas adjacent to the desert or close to it, which are vulnerable to sand encroachment. Rather, the lands far from the desert may be subjected to desertification more than those close to it, for example in irrigated lands, if the excess water is not disposed of, this water will turn it into a saline land which is free of plants [2-5].

2.2. The second objective of the study is to determine the causes of desertification: The main goal of irrigation is to prepare the plant with the water it needs. Therefore, a good farmer or farm manager must deliver irrigation water to the plant's root zone with the least possible loss, otherwise the soil will deteriorate and lose its green cover, which leads to desertification. Irrigation also has risks and caution that must be taken into account, because using irrigation in a non-scientific way will be a factor in soil degradation. Irrigation success is fully achieved only when it meets the real need for soil and plants, because increased water, in addition to economic waste, can lead to damage to crops, as mentioned previously [4, 7-10] From the foregoing, we conclude that the water necessary for agriculture must be provided, otherwise the soil will turn into a desert land, the causes of desertification in Iraq can be limited to the following factors:

- Desertification has started in Iraq since the end of the last century, due to the lack or reduction of the share of water coming to Iraq from neighboring countries, especially Turkey and Iran, and part of these imports have been cut permanently.
- Many farmers were ignorant and did not feel that they were responsible for providing food for the people.
- Favoritism, favoritism, and mediation in the distribution of the services of the Ministry of Agriculture and Irrigation and the relevant departments such as the distribution of fertilizers, equipment, seeds and the water share, as the powerful get the aforementioned services while others do not obtain them, which causes the deprived peasants to hate their land and thus abandon agriculture.
- The economic factor, the deterioration of the prices of agricultural products and the increase in the prices of materials used in agriculture led to the failure to cultivate the land or the reluctance of the villagers to cultivate and leave the farmer to his land in addition to the import of most agricultural products from neighboring countries, which led to a great loss for the farmer.
- Not introducing technology in irrigation and agriculture despite the scarcity of water, as irrigation technology contributes to saving water and increasing agricultural production.
- Environmental pollution and wars have destroyed large areas of agricultural lands, losing their green cover.
- The high level of salinity in the soil as a result of the high level of ground water resulting from the use of excess water in agriculture, in addition to the lack of conscious agricultural management.

2.3. The third objective of the study is methods of combating desertification. In the past, people paid attention to irrigation and irrigation, and to water and store it in order to prevent desertification and increase agricultural production. Irrigation and land reclamation operations were carried out in ancient times, as 4500 years BC ago, land reclamation operations were discovered in Babylon / Iraq through irrigation. The Assyrians also modified and repaired the Tigris and Euphrates streams and the water of

reservoirs and dams in order to reserve water for use in irrigation. The pharaohs and the ancient Chinese also built lakes and dams, used industrial irrigation and cultivated forests. The people of Yemen were the pioneers in controlling and storing rainwater, and they built a great civilization before Islam, and the famous people of Saba were popularized, and the Holy Qur'an was mentioned about them (there were no two paradises in their dwelling on the right and the left). In addition, the Marib Dam has a role in bringing life to fresh fields, and if the ancient Arabs had merit in teaching people how to cultivate the land on a small amount of rain, today they have to make a great effort to achieve what their ancestors achieved at least to reconstruct the land and prevent its desertification [1, 2]. Today, the Arab region is permanently exposed to desertification, and if this desertification is not controlled, the desert will extend and cover most of the grassland and green fields [6]. Baligh says [1] The fight against desertification in the Arab countries must go in two directions : The first is through the reclamation of uncultivated lands, such as desert lands that are covered with salt, and this part depends on providing water for irrigation. As for the second part, it is the maintenance of land and water in the rainy agricultural areas, improving pastures, planting trees as windbreaks, stabilizing soil and sand dunes, and replanting removed forests. This part also needs water for irrigation [2, 7، 9].

From the above, we infer that controlling desertification must be accompanied by the provision of water needed for irrigation. Since the quantity of water is stable and insufficient for agriculture at the present time, it is imperative to follow scientific methods in agriculture and irrigation, especially in the developing countries, including Iraq, also, it has been proven from experience that there is a 42% loss of irrigation water as a result of using primitive irrigation methods [1, 4, 8]. As for controlling desertification in Iraq, and according to the difficult water conditions that have emerged in recent years, desertification can be resisted in two ways, the first is short-term and the other is long-term.

2.3.1. The short-term method includes the following programs:

- Raising the cultural and economic level and national awareness of farmers by holding educational and extension courses in order to inform them of the seriousness of desertification and its impact on the public life of people in economic, health and social terms.
- The introduction of modern methods in agriculture and irrigation, using drip and sprinkler irrigation, as it has been proven that these methods save about 50% of irrigation water and increase agricultural production by about 60%.
- Providing agricultural services and the agricultural needs of seeds, fertilizers, agricultural machinery, and making sure that they reach all farmers who need them in a just and easy way.
- Controlling the prices of agricultural materials and stopping the import of the materials produced by the farmer in order to allow the farmers to market this crops and raise his standard of living.

2.3.2. The long-term method for controlling desertification includes the following programs:

- Building factories that serve agriculture, such as fertilizer and pesticide plants, irrigation equipment manufacturing plants, agricultural machinery, as well as building laboratories that depend on agricultural products such as paste, juices, and pastries, freezing and drying of fruits and vegetables, and textile factories.
- Establishing reserves in arid and semi- arid areas to make room for the creatures of God Almighty to grow and multiply in order to maintain the ecological balance because the environmental imbalance leads to pollution and then to desertification.
- Propagation and breeding of desert plants in order to stabilize the soil and stop desertification.
- Cultivation of windbreaks, planting forests and organizing grazing in the desert and pastures in order to stabilize the soil and stop desertification.
- The most important way to combat desertification is to establish and develop new irrigation projects in central and southern Iraq, as these projects will irrigate agricultural lands in the two regions by building or constructing two rivers. The first flows from the upper Euphrates somewhere in Anbar Province and runs in desert lands and extends to the south of Najaf

Province parallel to the Euphrates. As for the second river, it originates from somewhere near the city of Samarra and carries water along the Iranian borders to the south of Kut. These two rivers have a special and great characteristic in terms of irrigating agricultural lands because they distribute water from high lands to low lands (11). That is, they carry water from near the eastern and western borders of Iraq towards the Tigris and Euphrates rivers, and thus both the Tigris and Euphrates rivers become natural drains, and in this way the salinity of the soil will be eliminated and the greenness of the land will be preserved (Figure 2). It is also necessary or preferable to line these rivers to reduce the loss through leaching and evaporation and to increase the efficiency of irrigation. These rivers can be covered, similar to the artificial river in Libya, which was built by making concrete pipes, as the length of this river is 2,500 km and its diameter is 4 m, while the proposed rivers for Iraq are no more than 800 km in total.

2.4. The implementation of projects to combat desertification have very great benefits, and among these benefits are:

- Preserving soil moisture as a result of vegetation that changes the air over its surface, so wetland reduces the temperature of the air in contact with it [9].
- The vegetation cover that will extend and cover the central region and part of the southern region, this cover will absorb part of the heat, so the temperature of the soil covered with vegetation decreases more than the open soil. Therefore, this agricultural project helps to reduce the temperatures in Iraq, especially in the summer from two to ten degrees Celsius [9].
- Preventing or stopping dust storms that blow on Iraq in the event of eliminating desertification as a result of cultivating the soil and preserving the greenness of the land.
- Preventing environmental pollution and raising the standard of living and health of the population.

3. Recommendation

Encouraging and assisting farmers and peasants to dig or build water basins or lakes of appropriate sizes and lining them with cement and bricks in order to store irrigation water and use it in the case of drip and spray irrigation, because irrigation in these two methods needs water almost continuously.

Reducing the loss of water when transporting it from the well or from the river to the farm, by lining the furrows or using pipes for transportation. Planting forests, caring for pastures, and preventing overgrazing to preserve the green cover of the soil Raising the agricultural awareness of farmers and peasants and demonstrating the importance of using technology in irrigation to combat desertification.

Reviving old irrigation projects and designing them in a manner consistent with the current reality for cultivating new agricultural lands. Issuing the necessary laws that encourage farmers to use modern irrigation methods in agriculture, such as drip and springular irrigation, and others.

4. Conclusion

Desertification control lies by using modern irrigation methods such as drip and sprinkler irrigation, and that using these methods can provide water for cultivating of new lands and reclaiming desertified lands. Experience shows that modern irrigation methods can save about 50% of water and increase agricultural production by about 60% compared to convention irrigation methods.

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