Academicia Globe:
Inderscience Research

ISSN: 2776-1010 Volume 4, Issue 3, Mar., 2023

EFFECTS OF CLIMATE CHANGE ON PLANT DIVERSITY IN KASIBEH RESERVE IN AL-MADAIN / EAST OF BAGHDAD

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Abstract
As the study sites' dominant plant kinds have been recorded, it was done in May 2022 in ten stations primarily from the Al-Madain Reserve. Results The climatic effects that are associated with a decrease in precipitation and an increase in air temperature, especially in the Iraqi environment, are significant dangerous to water resources and the vital environment due to the lack of precipitation and the high evaporative energy lurking. In this research, the general trend of diversity in protected plants in Kasibeh Reserve in Al-Madain / East of Baghdad was identified. By evaluating the general trend of the vegetation bio-cover areas, five sites were used to find out through the balancing plants accounts for the upper section of the soil that there is a significant drop of about 0.8 mm/per meter. This is an indicator of negative effects on agricultural resources. The results also indicate an increase in soil salinity with a very large increase in the area of barren land. It increased by 150%, and this indicates that climate change has devastating repercussions and effects on large investments in plant cultivation.

Keywords: climate change, plant balance, plant growth index.

INTRODUCTION

Iraq has suffered from high temperatures, the effect of dry winds, and the recurrence of dust storms in the central and southern regions in particular. This requires many studies and an understanding of its environmental, economic and social effects at the present time and in the future, in order to reach successful means to reduce the negative effects and achieve tangible results in reducing the increase in temperature(1). The increasing global warming, dust and dust storms that have a negative impact on all aspects of environmental, health, economic, social and even political life in Iraq and between neighboring countries on the one hand, and the advancement of the environment and human employment and the investment of the results achieved economically, socially and environmentally on the other hand(2).

Climate change, such as natural disasters such as severe drought and dust storms that hit Iraq and the heat wave, and other manifestations are all indications of the occurrence of climate change, so the vegetation cover is an important factor in maintaining the balance of gases in the atmosphere, the most important of which is oxygen, and it also has a positive

ISSN: 2776-1010 Volume 4, Issue 3, Mar., 2023

effect in mitigating the phenomenon of global warming. thermal. Plant covers nearly 20% of the planet, which is a very small percentage compared to the proportions of water and land (3).

The vegetation also increases plant production resources, preserves the soil from wind erosion and erosion, helps increase organic matter, improves the physical and chemical properties of the soil, preserves the capacity of productive lands, and reduces the risk of salinity and drought through the great shading of the soil surface and its reflection on reducing evaporation / transpiration and thus reducing the intensity of heat caused by The sun's rays or reflected from the surface of the earth, as well as affect the movement of winds and increase the rainfall (4). The presence and growth of vegetation cover and forests in particular contribute without any doubt to the emergence of local climatic environmental systems that affect the climate of Iraq positively, because of their important role in building biomass and vegetation and its wide range, density and activities in vital processes, including photosynthesis and the resulting effects. Absorption of carbon dioxide, evaporation and transpiration, the vegetation cover is not only environmentally friendly, but also represents the cornerstone of its construction (5). The best example and evidence of this is the negative effects resulting from the draining of the marshes, the removal of forests and the cutting down of trees, and their reflection on the high temperature, the dry winds accompanied by the blowing of dust storms, and the lack of rain in different regions in Iraq. Forest trees absorbs 140 kg of carbon dioxide, which is the primary contributor to global warming (6).

The corresponding production of oxygen and water vapor, in addition to absorbing 3-5 tons / of dust annually, purifying the air, softening the atmosphere, reducing the impact of pollutants and lowering temperatures, and is reflected as a result on human life, health and all components live. Hence its significant positive role in climate changes (7).

Therefore, this work was for the role of vegetation in plant reserves and the various benefits it reflects for humans and the environment, and in order to reduce the temperature and achieve a reduction in the effects of dust storms and mitigate the climate, it was necessary to reach quick and fundamental solutions to reduce these natural phenomena and reduce them through the work of a field study of the distribution of Vegetation cover in Kasibeh Reserve in Al-Madain / East of Baghdad.

2. Experimental

2.1. Sampling:

In this investigation, samples were taken from three different places, one of which was the Al-Madain Reserve, whose coordinates were 33.0999996 44.583331 and whose area and height were taken from the World Database on Protected Areas . In May 2022, the sample procedure was carried out. To achieve the objectives of the study, it was necessary to search for sites containing areas with the following characteristics: Areas not affected by fire,

ISSN: 2776-1010 Volume 4, Issue 3, Mar., 2023

Areas that were burnt, were not razed artificially, and were naturally renewed by themselves and Areas that were burnt and were later afforested. Five sites were selected and the dominant plants in the original reserve were: *Eucalyptus australis, Pinus canariensis , P. radiate, Ceratonia siliqua , Acacia cyanophylla*

2.2. Climatic data:

The complex topographical nature of the region requires the presence of climatic stations within each location to represent the region's climate However, due to the lack of these climatic stations, the climatic data (annual and seasonal) available at the nearest climatic station to the study sites contain complete climatic data from the General Authority of Meteorology, Baghdad (8).

2.2. Graphical analysis of climate time series:

This analysis aims to determine the pattern and behavior of the time series of an element with time in terms of a general trend for it, and to know the size of the change that occurs in this series from the beginning of the time period studied until its end. This was done so that the first order straight line equation reveals the rate of decay using the simple trend line Or the ± increase of the studied climatic component over time. It also determines the extent to which the values diverge or converge from the general trend line during a complete climate cycle (9).

The first-order regression line equation takes the following form:

5- Y = b + cx: Relationship 2

The value of precipitation or temperature = Y, where

equation constants. = (b,c)

time. = X

So that the positive values indicate an increase in the studied climatic component over time, while its negative values indicate a decline in the studied climatic component over time.

2.3.Determine the significant or non-significant trend line: Mann-Kendall test

In this study, to test the importance of change trends, the Mann-Kendall test for the studied climatic elements is used to detect the presence or absence of a significant linear trend for the studied values. The method of this test was formulated by the scientist Henry Mann. All plant species present in each list were recorded within the studied groups, and each plant species was assigned. A list of its own containing the list number, the names of the plants in it, and the coverage of each plant. The plants of the species present in each list were collected, and the names of the known ones were recorded in the list. The abundance of each plant species found within the studied groups was estimated according to the type of plants (10).

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For rare and very rare species with very poor coverage, according to the following criteria: Its types are rare or very rare, and its coverage is very weak.
1) Its species are relatively abundant, and its coverage is less than 5% of the detection area 25% of the detection area.
2) The types of its members are very abundant, and its coverage is between 5) 50% of the detection area.
3) Types of unspecified number of members, and coverage between 25 - 75% of the detection area.
4) The number of types of members is not specified, and their coverage is between 50)
5) Species whose number is not specified, and their coverage is more than 75% of the detection area.

2.4 Estimation of plant biodiversity:
The plant biodiversity in the groups was estimated using some known and current indices, In biodiversity research, namely: species richness, Shannon's guide, and Sorenson's guide (11).

2.4.1 Species Richness :
It is evidence that depends on the number of species found in a specific list absolutely, and it represents a good indicator of biological diversity. Therefore, the species richness was determined directly by recording the presence of different species (9), and giving a final numerical value to it as evidence of its existence, i.e. the number of species. Recorded This guide, despite its frequent use, does not take into account the species and their coverage, and therefore it is not sufficient on its own. Therefore, other indices based on abundance and relative abundance of species were used (12).

2.4.2 Shannon Index:
It is one of the most widely used indices of variation for its ease of calculation, and it is considered a good environmental indicator in estimating plant biodiversity. This evidence differs from the direct method for calculating specific richness in that it takes, taking into account the number of species and their abundance within the lists according to the following equation (13):

$$H = - \Sigma_{i=1} pi * \log(pi) \quad :12-$$

Shannon = H: where (Pi = ni / N) the proportion of individuals of the species within the lists = Pi
The total number of species = S
The number of individuals of the species = ni
The total number of individuals of all species = N

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The high values of this index indicate that the dominance is distributed among several species, and that the specific richness is high. Comparing the diversity in forest groups, the greater the diversity the greater the value of this evidence, and as for the values means that the dominance is concentrated in a few species, and that the species richness is low(14).

2.4.3 Sorenson Index:

This evidence expresses the qualitative richness in the groups studied, and gives, in addition to that, a score. The similarity in the content of each of the two groups of species in the form of a percentage and its presence in more than one group. It is calculated from the following equation(15):

C= 2C/(S1 + S2)*13 : 100- Relation 2
Sorenson proof = CC: where
Number of species common to groups = C
Number of types of the first group = S1
The number of types of the second group = S2

4. Results and Discussion

The drought period extended from about April until the end of September, and therefore it appears that there was an increase in the duration of the drought period for about half a month in the period of the study year(16). This increase by preceding the date of the period, in addition to an increase in the severity of drought, is explained by the increase in the difference between during the dry period, this period can be increased with the continuation of the climate trend towards drought. It is likely that the drought will increase due to a natural cause, or because of negative human interventions that may accelerate or increase these droughts, and there is greater damage to biodiversity (17).

By studying the values of the coefficients of variation for average temperatures, their value exceeded (0.09-14.69)%. This confirms that the effect of the seasonal and annual changes therein increases in the less rainy seasons, according to meteorological reports in Baghdad for previous years, and in the less rainy years, which confirms the severity of these changes is greater in terms of decreasing amounts of precipitation (18).

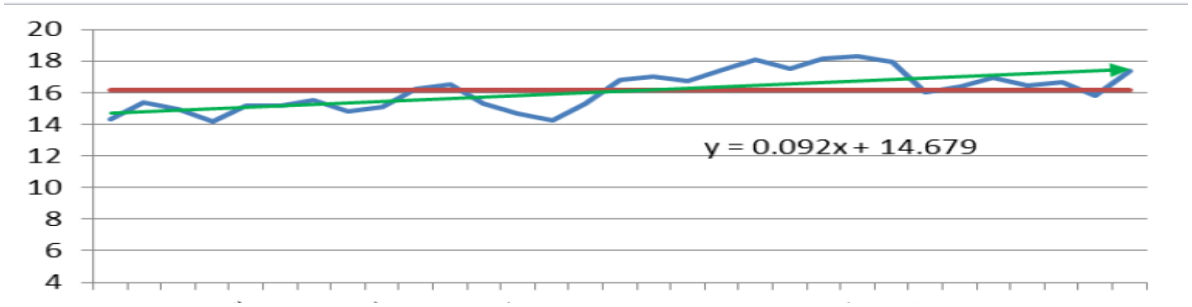

Fig (1) The average temperature for this study with rain, according to the meteorological report in Baghdad

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Table (1) The Mean and average values of properties under the study

	Air Temp. °C	**Raining level**	**Cond. (ms/cm)**
Max.- Min.	42.02-34.9	18.2-12.4	16.5-5
mean	38.21	11.69	9.60
SD	0.91	1.196	3.930
LSD	0.257	0.268	1.248
P < 0.05			

Since the coefficient of change is inversely proportional to the values of the climatic elements studied, it is confirmed to us that there is a dange(19)r. As a result of climatic changes, its coefficient of change has increased, and this will increase its impact on plant biodiversity. From the above, it appears from an analysis of the climatic elements that there is a change , It is clear in them, and this change was, in general, increasing with temperature, and this is what contribute to the impact on the plant species richness in the studied sites, especially those that were exposed to human interventions(20).

The mean varied having a *Eucalyptus australis, Pinus canariensis , P. radiate, Ceratonia siliqua , Acacia cyanophylla* less while it is not native compared to other plant varieties, it is more prevalent. This may be due to the various ways that plants can adapt to environmental changes and nutrient shortages throughout the year, as well as the varied methods that plants can grow and thrive in their surroundings (21). Its diversity is used as a monitoring tool despite .

Thus, there is an impact on the vegetation cover due to the climate trend towards drought, and this is consistent with many studies. The previous climate of Iraq, which confirms the region's tendency towards drought, was affected by global climate change in terms of high temperatures and decreased precipitation rates, and this was also mentioned by reports and the research of many scientists and those interested in the field of climate during the last period. To determine the significance of the trend line, the Mann Kendall test was applied, and the results of this test were presented in Fig(2)

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ISSN: 2776-1010 Volume 4, Issue 3, Mar., 2023

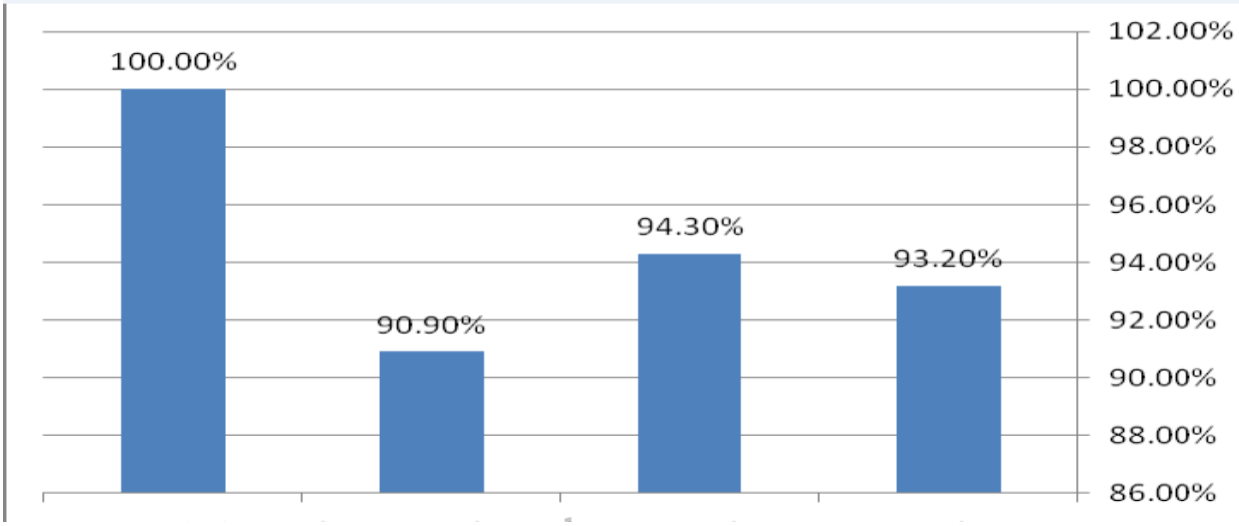

Fig (2) The specific richness was greater in the naturally renewable group data

From the figure that the number of species in the lists of the cultivated group amounted to (100-90)% species. The specific richness was greater in the naturally renewable group data, and this means that the sites that lose their vegetation cover due to natural damage regain their cover after a period, and it may be with plant diversity, this is consistent with the results of a previous study, one of which was in North America (1992). Their content is that the drought led to the richness of the sites with plant species. (22).

Conclusion and Recommendation

Comparing the values statistically confirmed that there were no significant differences between the average values of the Sorenson index in the groups selected for the study, and that the numbers confirm the great similarity between the three groups studied, and this is consistent with what was shown by the previous evidence.

From the foregoing, it appears that there is a good biological diversity in the study site according to Shannon coefficient, and that the similarity between them is great according to Sorenson coefficient, and this means that the species that originally existed will return in the future to occupy their place in nature after any emergency disturbance, but it may take a long time, and this The period relates to the availability of prevailing climatic conditions after drought or dredging, and methods of protection and prevention of human intervention in that.

Acknowledgment

The authors would like to thank Mustansiriyah University (www.uomustansiriyah.edu.iq) Baghdad – Iraq for its support in the present work and extremely grateful to all the people help us to get our data.

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