



Climate Change: Adverse Effects of Climate Change On Food Webs of Terrestrial and Aquatic Biodiversity

Bushra Abid*

Department of Botany, Government College University, Faisalabad

Abstract

Climate change is change in the annual weather pattern of an area due to anthropogenic activities. Climate change is a medium which reshapes the way of transferring contamination through the global environment, it has changed the chemistry of oceans. Freshwater bodies such as rivers, canals, lakes and ponds and affected the function and structure of food webs, and feeding ecology of marine biota. Phytoplankton is the base component of aquatic food webs as producers so a little bit Sea water temperature fluctuations affect all the occurring biological and ecological processes and cause the destruction of trophic level in marine ecosystem. While in terrestrial food webs producers are most essential element. But due to rapid consumption of forest which may leads to deforestation become the reason of disruption in many food webs. Also many anthropogenic activities such as hunting invasive species is also another factor of disturbance in any food web.

Keywords: Climate change; Food webs; Aquatic ecosystem; Terrestrial ecosystem; Phytoplankton; Trophic level; Biodiversity

Introduction

In 1927 Charles Elton used a terminology in his book “Animal Ecology” which was Food chain. Food chain is transferring of matter and energy from one organism to the next organism. While when more than one food chains are interlinked they form food webs. In the following century food webs are worst affected by climate change, climate change are long term shifts in temperature and weather pattern which has taken decades to occur, but it has long lasting effects on biodiversity, Increase in the concentration of heat trapping gases such as CO₂, CH₄, NO_x, SO_x and O₃ may lead to rapid increase in atmospheric temperature. This state leads to global warming; climate change is important factor which may leads to irreversible transformation of the natural habitats, rapid extinction of the species which disturbs the food chain of any ecosystem. Increase in the concentration of carbon dioxide cause dramatic changes in different communities, often it leads to extinction of specie which is the main causes of disruption in Food chain as well a food web [1, 2].

Methodology

In this review paper it is demonstrated that climate change us one of the major factor that effects the functioning of an ecosystem. Climate change is a complex amalgam of stressors that include temperature rises, altered atmospheric and hydrological conditions and species invasion. Global temperature has been increased by 0.3° C to 0.6° Cover last century, greater emission of Carbon dioxide, methane and other greenhouse gases have altered Phonologies and body size distribution within Food webs. Due to dramatic increase in concentration of Carbon dioxide and poisonous harmful gases, the proximity of a species to external thermo optimum will help out to determine the direction and magnitude of its responses to global warming [3].

By anthropogenic activities and other natural calamities, temperature will increase day by day, then each specie must have to leave that community, where it lives and have to migrate, adapt themselves according to its environment or face the consequences of warming, such species those are high, large and quite rare in food chain and disrupt the food web as an whole. Disturbance in food web especially vulnerable to extinction tropical species must have to

tend the narrower temperature do they must be susceptible to Global warming. A recent studies, clearly explained that climate change effect food webs because of a slight Change in temperature, this may lead to loss of biodiversity on larger scale, this loss also disturb the trophic level in an ecosystem, changes in abundance will disrupt composition and diversity of species, which will have implications for different tropics in food web stability and fluxes of food web as a unit [4, 5].

Marine pollution, anthropogenic activities and climate change are major threats, which are induced by human being. These stressors have altered the chemistry of oceans and become the major threats for the survival of marine species. Mercury, Polychlorinated biphenyl, Dichlorophenyl tricholoethanes, these are containments and effect the food webs directly. Mercury has become a matter of concern due to methylated form methyl Mercury is present in aquatic Food chain, because Mercury is heavy metal which block the gills of most fishes. More than 80% of Mercury which is deposited in oceans, remitted in the form of gas. Total amount of Mercury present in the global has been estimated round about 290 million moles(Figure 1).

Due to industrial revolution, average concentration of carbon dioxide has increased at dramatic level from 278 To 400 PPM, which is a reason for changes in ocean conditions, this also affect the average temperatures in the upper 75 meter has increased 0.1°c in each decade from 1971-2010. The increase in sea temperature surface ocean acidity also increases which is approximately 30%. While in the other hand, oxygen concentration in ocean is decreased 3-5 Amol/Kg per decade. Global warming is decreasing oxygen level and may cause hurricanes, flood and tsunami which are the reasons of extinction of many species in aquatic and terrestrial ecosystem. Climate change may increase PCB

*Corresponding author: Bushra Abid, Department of Botany, Government College University, Faisalabad, E-mail: bushraabid140@gmail.com

Received: 03-July-2023, Manuscript No: JEE-23-107324; **Editor assigned:** 05-July-2023, Pre-QC No: JEE-23-107324 (PQ); **Reviewed:** 19-July-2023, QC No: JEE-23-107324; **Revised:** 22-July-2023, Manuscript No: JEE-23-107324 (R); **Published:** 29-July-2023, DOI: 10.4202/2157-7625.1000425

Citation: Abid B (2023) Climate Change: Adverse Effects of Climate Change On Food Webs of Terrestrial and Aquatic Biodiversity. J Ecosys Ecograph, 13: 425.

Copyright: © 2023 Abid B. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

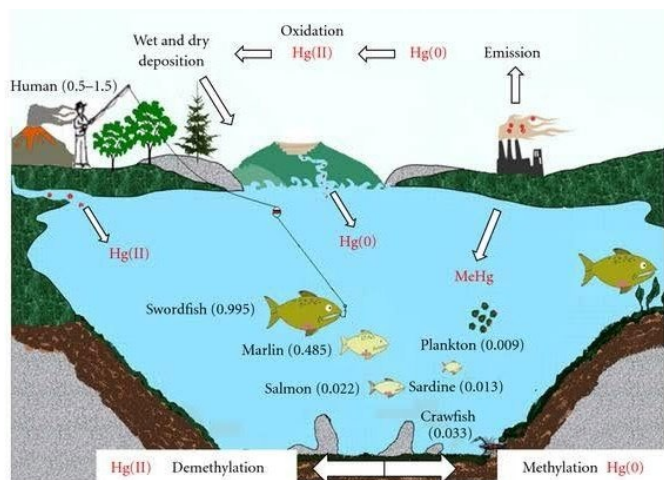


Figure 1: Cycle of Mercury, volcanic eruptions, anthropogenic activities and factories emit Mercury then it react with water vapours then in the form of rain drops, this oxidized Mercury reach to the water bodies and then effect the food chains.

accumulation in the whale by different processes. Due to their prey other species whale can survive in an ecosystem. Hence they affect the primary productivity of aquatic biota. Mercury affects trophic level and reduce the fish production. In short, aquatic food chain disturb completely. In marine ecosystem temperature is one of the key factor for the disturbance of species composition and selection of species for food web. We'll recall trophodynamic approach firstly coined by Lindemann (1942). This was given to observe the critical Impact of sea water temperature on continuity of biomass flowing in an ecosystem, from primary consumer to top predator. Trophic transfer efficiency and biomass residence time both these parameters summarize the biomass flow in food chain and changes the warming of ocean. Trophic transfer efficiency is the sun of energy transferring from primary producer to the next tertiary consumer and all loss in the food web. Biomass residue time is average time that is given to transfer biomass from a given trophic level before entering into the next [6].

Effect of climate change on terrestrial food chain& food web

Producers are the main component of any ecosystem as they absorb carbon dioxide greater amount, they are also very important to run a food chain as well a food web, but due to rapid growth of population of human being, man is cutting down trees and plants species for more than 2 to 3 decades. This lead to deforestation, forests is actually habitats of hundreds of species but due to deforestation habitat loss occurs on larger scale. Deforestation allows the gases remain in the atmosphere of that area and increase the temperature. Hence the increase in deforestation decreases the biodiversity. Rate of deforestation is quite high higher in Brazil, Indonesia, Bolivia, democratic Republic of Congo and Nigeria. Destruction of habitat of wild animals may leads to the extinction of that species. Over hunting, climate change and destruction of habitats of species are the main reasons of extinction of any specie. In any food chain producers are the base of that food chain while tertiary consumer are the top predator, climate change has effected in that manner that leads to destruction of wild habitats that disturb the food chain in that ecosystem .

Climate change is one of the most important factor which is continuously affecting the stability of food web, loss of biodiversity and decline of predator. Climate change and anthropogenic activities

both these stressors influenced the diversity of species, their habitats change chemistry of that ecosystem as species effect, so source of food may altered I. All these factors cause weak interactions among species slower the energy and cause declining of food web stability (Figure 2).

Diversity

Fundamental diversity is defined as average species trait space. Fundamental diversity supports and food web stability. So greater the loss of biodiversity and greater the loss of biodiversity and greater the loss of fundamental diversity effect the food web stability.

Habitat structure

In every food web, at each trophic level each organism have it's own habitat, due to anthropogenic activities effects the the habitat loss occurs on larger scale. So after habitat destruction, homeless species miserably migrate from one ecosystem to another ecosystem. This disturbs the stability of any food web.

Modularity

It is an important element of food web system which can be form active prey's selection, or it may be interaction framework discontinuity spatial habitat structure. This also gets affected by anthropogenic stressor. Compartmentalization and regulation of flow reduce temporal discontinuity.

Weak relationship

Relationship is also termed as interaction; interaction is relationship among two different species. For maintaining and establishing omnivores contribution in any food chain weak interaction is quite essential as omnivores depend upon more than one trophic level. Oxtogenetic shifts adaptive foraging abundance and interference among consumer affect the stability of omnivorous interaction. Anthropogenic activities have also affected importance of relationship [7].

Conclusion

As far as in my point of view, climate change is a key factor which is continuously disturbing each and every ecosystem, this disturbance leads to instability in ecosystem due to climate change affects. Many species are going to be extinct because of this factor. Due to species endangered problem many food chains and food webs are disturbed completely.

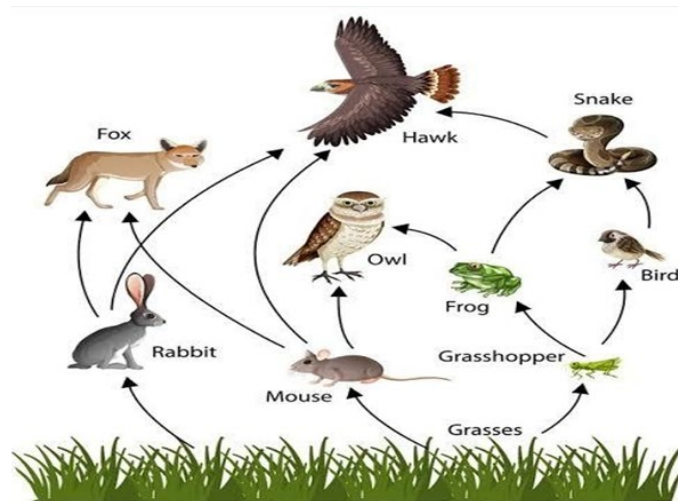


Figure 2: Food chain& Food web, little disturbance at any trophic level can disturb the food chain completely.

References

1. https://www.researchgate.net/publication/257569461_Phytoplankton_response_to_a_changing_climate
2. Kayla E kovalenko (2019) Interaction among anthropogenic effects on aquate on aquatic food webs.
3. Hubert du pontavice, Didier Gascuel, Gabriel Reygondearas, William Cheung (2019) Climate change undermines the global functioning of food web.
4. Juan Jose, Alabama William, Cheung Peters, Rass Rashid Sumaila (2017) Climate change contaminant interaction I marine food web towards a concept framework.
5. Daniel Michael, Porkens Julia Reiss (2016) Global change and food web in ruling waters.
6. David A, Groneberg, Ruth Muller (2020) Climate change: Does international research fulfill global demands and necessities?
7. Fakhra Shahid, Dr.Mubeen Adnan (2021) Climate Change: Impacts on Pakistan and Proposed Solutions.