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Climate Change and Bio-Diversity

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ABSTRACT

Climate change has become a common phenomenon now a days. Both natural as well as the human factors are responsible for it, but the changes have been accelerated by mainly human activities on large extent. Due to climate change the life of bio-diversity are under threat. Many species have already extinct and many are on the brim of extinction. Due to loss of habitat and food of the animals they are force to migrate at different places which may be not suitable for them. Here in this paper an attempt has made to identify the factors responsible for climate change and how far this climate change has affected the life of the plants and animals. The research is purely based on the secondary source of data collect through the internet.

1. Introduction

At present many problems are being faced by human beings and other living species due to climate change. The term climate change is very common now a day. Climate means average condition of weather over long period of time of an area usually 30 years or more. The elements of weather include rainfall, temperature, sun shine, humidity, cloud cover, wind direction etc. climate change mean shift of normal climate condition to abnormal over a period of time. This is the result of various factors caused by human activities such as changes in land use pattern, deforestation, excessive use of fossil fuel, use of automobile vehicles, rapid industrialization and urbanization. A warmer temperature due to climate change increases evaporation which leads to heavier rainfall and snowfall. An unevenly distributed rainfall resulting to heavier rainfall in some areas and droughts in other areas. Since climate change is taking place all living creatures have to either adopt that condition or die out.

Rich bio-diversity and a healthy ecosystem are very crucial on earth for survival of living species. Bio diversity, is the variety of plants and animals in a particular area or in the world. The biology dictionary defines every living organism within a single ecosystem or habitat including numbers and diversity of species and all environmental aspects such as temperature, oxygen and carbon dioxide levels and climate. On any scale it is harder to measure the level of bio-diversity. It can be measured globally or in smaller setting such as ponds. Bio-diversity can be seen within a species, between species, within and between the habitats. There is a common consensus among scientist that on our planet earth biodiversity is declining. There are three types of biodiversity which are genetic, species and habitat/ecosystem biodiversity. Maintenance of biodiversity can give greater food security and opportunities for advancement of economy. It also provides a foundation for new pharmaceuticals and other medical advances.

2. Literature Review

The link between climate change and biodiversity is not new. Rapid climate change affects the species of ecosystem and their adaptability. Some species may get benefit from the change but most may not be able to adapt the changed environment (Shah, 2014). The changes in climate has been affecting our planet in many ways like loss of species habitat, change in temperature, heavy rainfall etc. resulting if the area is not favourable for the species, they have to either adapt that condition or migrate in to some other favourable location because even a small change in the temperature can cause significant effect on the ecosystem.

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The extreme change in weather or climate such as forest fire, flood, drought, rise in sea level changes have already harmed the biodiversity on large scale (Gustin, Cushman & Shankman, 2019). According to Robert Watson dietary choice has huge impact on biodiversity and climate which uses excess energy and water and emit greenhouse gases to warm the climate (chair of the biodiversity panel and former chair of the UN's Intergovernmental Panel on Climate Change).

"Loss of Arctic sea ice threatens biodiversity across an entire biome and beyond. progressively more significant threat in the coming decades. The related pressure of ocean acidification, resulting from higher concentrations of carbon dioxide in the atmosphere, is also already being observed. Ecosystems are already showing negative impacts under current levels of climate change… which is modest compared to future projected changes…. In addition to warming temperatures, more frequent extreme weather events and changing patterns of rainfall and drought can be expected to have significant impacts on biodiversity.", Global Biodiversity Outlook 3, May, 2010.

Human as well as natural ecosystem is being challenged by climate change. So, Climate change is a part of global agenda sustainable development since 1992 Rio Summit. The East and South East African counties climate change related documents reveal that the bio diversity and wild life are declining. Most of the countries policies come after the Rio Summit 1992 and it has gained world concern. Many countries are integrating the different sectors to develop a plan for climate change. The paper talks about the international, regional and continental co-operation to deal with the issue of climate change. The policy specified that maximum degradation of bio diversity occur beyond the protected zone area and climate change intensify it further. Some countries used the term wildlife instead of bio diversity for the protection of their resources (Kupika & Nhamo, 2016).

The literature review shows that out of 98 papers very few papers on climate change and adaptation actually give concrete solution for implementation and many were implemented. Majority were theoretical review not related to the Marine protected areas. Countries like Fiji has redesign critical coral reef areas for its resilience and protection from bleaching.

The strategy may be hampered by limited availability of spatial explicit forecast of climate and ecosystem. The effect of climate change is dynamic although the area is static. One of the changes have seen in the north Atlantic Whales shifting their distribution in respect to climate driven changes for prey and environment (Tittensor et al., 2019).

The two factor that is land use and climate change has affected the richness of vertebrates on globe. The finding says that the Paris will have positive impact on biodiversity (Hof et al., 2018).

Since last over few decades many models such as Oceano atmosphere global climate model, bio climate envelop model, grid cell model, potential vegetation model etc. and different methods have developed to deal with the problem of climate change and its impact on bio diversity. The findings are not good as the loss of biodiversity is not confined to local or regional level but it has impacted on global scale (Willis & Bhagwat, 2009).

To deal with the climate change problem one of the great actions could be reduction in energy consumption, efficient uses of energy and by giving priority to technology prompting renewable energy. Because of climate change the glaciated region of Europe has retreated from 1850 to 1980. Rise in sea level and increase in extreme events such as drought, flood, heat waves etc. have been observed. The tree line in Alpine forest are raised by 233 to 677 m due to climate variation in Sweden (Reid, 2006).

The species of thermophilic plants have increased their numbers more that 60 percent in the last three decades in Netherlands as a result there has seen a declining trend of cold tolerance species In the last few decades, the movement of birds' species in northward. Declining trend in Arctic and Sub Arctic species due to high sea temperature. Shift in protected areas boundaries of ecosystem which were built to protect the species are no longer in any use. Dudly 2003, due to flooding and sea level rise the range of species in ecosystem, wetland and coastal areas are also being affected. Climate change has also affected the reproductive cycle of both plant and animals. The work of Permasar and Yolre says that over the last 50 years the timing of egg laying of birds and flowering of plants have changed (Reid, 2006).

3. Objectives

- To find the causes of climate change
- To see the effect of climate change on biodiversity.

4. Data Base and Methodology

The present research work is based on the secondary source of data which is collected from the different websites from internet. Many research articles have been downloaded for the literature review as well as to find out the different factors of climate change and its negative effects on the environment and ecosystem. This work is purely based on the qualitative work and comparative method has been used for the analysis part.

Effects of Climate Change

Many environmental changes have been seen since last few decades. Degradation of land was adversely affecting

3 billion people around the Globe. It was believed that about 31 % indigenous species in America have been lost since European Settler first arrived (Harvey, 2018). Others are losses in biodiversity for human security issue (change in food chain, medicine, water cycle etc.), rise in sea level, increase oceanic dead zone, increase in oceanic acidification and stratification, Coral bleaching, melting of ice in high latitude and loss of polar bears, threat to lizards.

The literature study reveals that about 10-30 percent of coral reef would shrink due to half degree Celsius global warming and which could be key survival for many ecosystems. The Report of Paris Climate Agreement warns that the even the range of 1.5°C to 2°C warming – most of the species of the world would shrink on the land and at 2°C of warming 5 percent species will be at the risk of extinction.

Under the Convention on Biological Diversity many countries' government have given emphasis to conserve the portion of their territories for bio-diversity. Plans were developed by the 164 countries to reach the target of the conservation and protection for terrestrial and inland water, marine and coastal area since 2010 ("Biodiversity Loss", n.d.).

Climate change may play a role in facilitating the spread and establishment of invasive species, which can have major impacts on ecosystem composition. Changes in species composition can lead to changes in the physical and trophic structure of ecosystems, with resulting further effects on system function and composition. One such change is the invasion of temperate grasslands by woody plants. In other systems, trees may disappear as a result of drought (UNEP-WCMC, 2008).

Glaciers are melting at higher latitudes as shown by satellites images. Less ice in Arctic means less reflection and more absorption of heat will increase the sea water temperature and salinity as well as air temperature. Which will further change primary productivity affecting biodiversity and large-scale oceanic circulation beyond Arctic (Shah, 2014).

Scientists have found that access amount of CO_2 released by human being are absorbed by the ocean which means more CO_2 in atmosphere more in oceans resulting acidification of ocean. Some of the creature play very important role in food chain and ecosystem. For example, tiny planktons are supporting system as they produce half oxygen, we breath and draw down surface CO_2 says world leader expert on Global ocean Boris Worn of Canada Dalhausie University (Shah, 2014).

Today changes are occurring too fast giving very little time to marine organism to adopt. Recent findings show that very tiny plankton absorb 25-50% of oceanic carbon and keep it at low level, are affected by oceanic acidification. On the other side less oxygen in ocean will increase the dead zone. Aquatic dead zone occurs near the high population density [NASA]. Dead zone is generally defined as low oxygen or hypoxic areas in the world's ocean and lakes due to increase in nutrients specially nitrogen and phosphorous coming from industries and agricultural fields, which cause eutrophication. Such dead zones were rare 40 years ago but today they are hundred in numbers. Charlie Veron an American Marine Biologist says that not only the Great Barrier coral are at risk but all of them are at risk. As we know that coral reef provides many free services to human. Decline in coastal plant such as mangrove are also important for carbon absorption (Shah, 2014).

According to IPPC working group assessment report 4, the global temperature has increase by 0.76 degree Celsius from 1850-2005. And global mean sea level rose by 12-22 centimetre during the last century (CBD, 2010).

A major report released by 150 experts of 50 countries reveals that nature is declining unprecedently. In the history of earth, major five mass extinction has happened but this time it is different because threat is being caused by human. About 40 percent of the vertebrate's population has reduced since 1970 for land base 84% for fresh water and 35 % for marine species (Bhardwaj, 2019).

More than 1.5 billion of hectare of natural ecosystem had converted to cropland up to 2014. 23% greenhouse emission is caused by agriculture, forestry and other land use. Due to habitat loss 1 million species of our planet has loss and many ecosystems are declining 4 percent per decade due to climate change. As the bio diversity will lost, our food, water, raw material and cultural service will be lost (Thiaw, Espinosa & Plamer, 2019).

According to one approximate up to 50% species has lost most of their suitable climate condition by 2100 under the highest greenhouse gas emission. In tropical ocean there is seen abrupt biodiversity loss due to marine heat waves that bleach coral reef and by coming decades this scenario will reach to the land to loss the biodiversity.

We rely on natural ecosystem for food. Beetle, Ladybug and Dragonflies pollinate many crops and plants. Conversion of land will reduce the pollinator population that will further lead to eliminate the availability of foods like berries, honey, nuts, chocolate and coffee. Bio diversity provides many benefits to people such as protection from storm surge, fossil fuel generation, carbon sequestration water filtration, oxygen, production and reaction opportunities without all these our quality of life may become threaten (Harper, 2018).

Lizard has already crossed their threshold for extinction caused by climatic change projected by global projection model by the scientist. Because due to rise in temperature lizard are unable to spend more time foraging for food, as they have to rest and regulate the body temperature (Shah, 2014).

In the Mandakini valley of Uttarakhand state in India, scientist report that the oak forests have been invaded by pine trees (between 1000m and 1600m) particularly on south facing slopes. Many sources of water like springs have dried up due to disappearing of oak trees and replace by pine trees. The annual flooding of the Brahmaputra River in the northeast corner of India has always been important to the health of the protected animals that live in Kaziranga National Park, including elephants, rhinoceroses, and tigers. In recent years, the increasing intensity of Asian monsoons has caused greater floods, displacing people and killing animals (Palita, 2016).

Therefore, a total integrated approach is required to achieve sustainable development climate change and biodiversity because all are inter-related and an isolated work for each is not going to work for human wellbeing. The G7 countries along with Chile, Norway, Mexico, Gabon, Niger and Fiji has announced in their community to protect the biodiversity (Bhardwaj, 2019).

Conclusion

Keeping in mind the fact that global temperature has been increasing and causing losses of biodiversity which is very crucial for the survival of the human being and other living species. There is an urgent need to work on that with good coordination among all the countries of the world. Although men are the main destroyer of our environment, however, human is a more intelligent than any other animal and he can see the past and compare it with the present and plan better for future. This can be done by both national and international bodies collaboration because climate change is a global phenomenon not a regional one. By creating more protected area for flora and fauna, using improve fishing gear, improved technology in waste management, recycling more and banning plastic, minimize waste material etc. we have to work together then it will work although the issue is biological but the cause and solution are social. The different sectors such as environmental agricultural trade and infrastructure need to be integrated.

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