A Study of Assessing Biodiversity Loss Due to Climate Change: A Research Study of Jaipur Rajasthan

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ABSTRACT

At the local, state, and federal levels, climate change impacts subnational, regional, and infrastructure as well as agricultural, water, forest, biodiversity, energy, and human health. A wide range of responses are required to lessen the impact of climate change because of its far-reaching consequences. There has to be coordination between federal goals and state-level programs since a lot of the things that need fixing are state-level and can only be handled at the state level. While national mitigation efforts are supported by state-level mitigation activities that may take advantage of opportunities or adopt a co-benefits approach, adaptation is always done at the local level. For this reason, it is critical to have climate change action plans at the state level in order to deal with present and future climate dangers as well as take advantage of opportunities. For this, state climate action plans are suitable. The first step in developing a SAPCC is to do research on the state's climate change risks, consequences, and opportunities. The next stage is to prioritise research and policy topics in light of present and future susceptibilities and the effects of climate change.

Keywords: Climate Change**,** environment, human health

INTRODUCTION

Climate change is one of the most pressing problems in the world today. Increasing atmospheric concentrations of carbon dioxide (CO2) and other greenhouse gases, along with the resulting warming of the planet, are mostly the result of human activities such as burning fossil fuels and cutting down trees. The proxies for temperature, precipitation, sea level, and severe weather events give further evidence of a changing climate on a worldwide scale. The results of climate change models and observations made on land and sea suggest that this global warming is having an effect on many other types of systems, including biological, economic, and social ones. Jaipur, India's biggest state by area, is situated in an extremely climate-vulnerable area. Changes in the weather are anticipated to have far-reaching effects on the state's demographics and economy. Jaipur has seen more severe and frequent droughts than any other city in India in recent times.

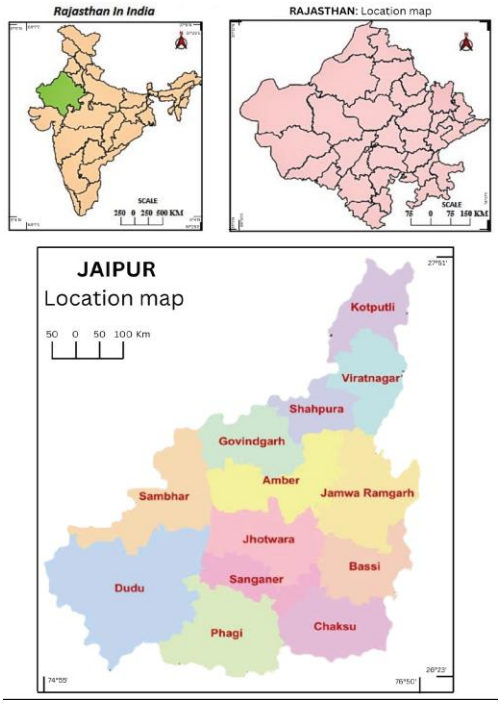
Climate change is now the greatest environmental threat on a global scale. Worldwide, it has piqued the curiosity of scientists, planners, governments, and politicians. It is risky and tough all at once. Sustainable development and the primary economic areas are going to feel the brunt of the predicted weather shifts. The consequences of global warming would hit poor countries harder. The many scientific evaluations and special reports released by the Intergovernmental Panel on Climate Change (IPCC) provide unmistakable proof that human actions influence the climate system. There is evidence that climate change throughout the last century and the present decade has altered physical and biological systems on several continents and in various places. Biodiversity is crucial to human survival, and climate change would harm it.

Biodiversity is defined as "the variety of life on Earth as it is now known from all known places, including but not limited to terrestrial, marine, and other aquatic ecosystems and the ecological complexes to which they belong" (Convention on Biological Diversity, 2015). Ecosystem diversity, species diversity, and interspecies diversity all fall under this category.

Biodiversity provides us with many important indirect functions and large direct economic advantages via natural ecosystems. Ecosystem stability and function are also greatly affected. Biodiversity, which includes all living things, ecosystems, and ecological processes, is essential to human survival and economic growth. Our understanding and record-keeping of biodiversity is shockingly inadequate, given that there are an estimated 13 million species on Earth, but only around 1.76 million have been named.

Study Area; Jaipur Rajasthan

Jaipur is the capital of Rajasthan. Jaipur city has got a nick name “Pink City” of India, It is one of UNESCO world historical Heritage Site. Jaipur district is surrounded clockwise Haryana state in the North, District Alwar & Dausa (East), Tonk (South & South-East), Ajmer and Nagaur (West) & Sikar (North-West). The Population of Jaipur District According to 2011 census is 66,26,178 persons. Jaipur is Located between 26°23' North to 27°51' North latitude and 74°55' East to 76°50' East longitude. Its total Geographical area is 11,143 km^2.



Global Warming

Climate change on a global scale

Science related to climate change is assessed by the worldwide group known as the Intergovernmental Panel on Climate Change (IPCC). According to the latest IPCC 5th Assessment Report (AR5), the thirty years from 1983 to 2012 were probably the hottest in the last fourteen hundred years (IPCC, 2014a). There has been an increase of roughly 0.8°C in global temperatures and an increase of about 20 cm in sea levels throughout the last century. It is "very likely" that human activity is the source of the observed temperature rise since the middle of the 20th century. According to the report, snow and rain patterns have shifted in a number of locations. Melting glaciers, permafrost, snow, and ice are a global phenomenon. Excluding glaciers located on the periphery of ice sheets, the average annual rate of glacier ice loss from 1971 to 2009 was probably 226Gt yr-1. A rise in ocean acidity is being caused by the increasing absorption of carbon dioxide. Observational evidence indicates that the frequency of extreme weather events is on the rise. As an example, heat waves are becoming more powerful and lasting longer. Forecasts of Future Climate Change

If emissions of greenhouse gases (GHGs) keep rising at their present rates, the world's climate system is projected to undergo a number of changes in the twenty-first century that are much more consequential than those seen in the twentieth. Projections for the future were given by the IPCC AR5, which used four different Representative Concentration Pathways (RCPs) scenarios. The Fifth Assessment Report (AR5), which focusses on concentrations of greenhouse gases rather than trajectories of emissions, was authored by the IPCC and made use of these RCPs. The four global climate scenarios are RCP8.5, RCP6, RCP4.5, and RCP2.6. The numbers show radiative forcing, also known as global energy imbalances, projected to occur by the year 2100, measured in watts per square meter.

The goal

1. Research on how climate change is influencing biodiversity, particularly in the Jaipur area.
2. To study the ecological effects of climate change?

REVIEW LITERATURE

Reed (2012) argues that the diversity of life on Earth is a measure of its vitality. Biodiversity provides tremendous direct benefits to people as biological resources constitute at least 40% of the global economy. Preserving biodiversity has many advantages, including increased food security, economic growth potential, and a firm groundwork for the development of novel medications and other medical innovations. Ironically, reducing climate change is dependent on preserving ecosystem function and biodiversity levels, even though humans can expect climate change to significantly disrupt Earth's ecological systems, resulting in a loss of biodiversity and a decrease in the goods and services available to them.

Dated 2021 by Melese Muluneh. Climate change is caused by both natural and human-induced

processes. There is a noticeable shift in agricultural productivity, food security, and biodiversity. There is a real threat to the survival of most indigenous and specially adapted species. Species extinction is a legitimate worry as it is essential for the survival of all living things and the main source of healthcare for about 60–80% of the world's population. Climate change has been recognised for its impact on biodiversity and food security, but despite its global extent, little action has been taken to address the problem. The objectives of this review are to identify the link among climate change, biodiversity, and food security; assess that relationship; and synthesise the results. 2022 GoR At both the national and subnational levels, climate change is having a wide range of impacts on many different industries, such as agriculture, water and forest management, biodiversity, energy, and infrastructure. To successfully adapt and enhance climate change preparedness, a number of strategies are necessary due to the vast range of ramifications. There has to be coordination between federal goals and state-level programs as most of the things under consideration are state-level affairs that require state-level implementation. While state-level mitigation strategies may take advantage of opportunities that benefit the state or embrace a co-benefits strategy while also supporting national mitigation efforts, adaptation is inherently localised. To effectively manage current and future climate challenges and seize opportunities via a range of response strategies, it is crucial to prepare state-level action plans on climate change.

In 2019, T. Amend and S. Eilng Climate change and the subsequent extinction of many species pose an existential danger to humanity. The worldwide decline in biodiversity poses a severe threat to the anthropological system. After looking at the present pattern and possible outcomes, it seems that this loss will keep happening for a while. Climate change, accelerated by human activity by many sources of pollution, poses a new danger to India's diverse biodiversity. This research proves that global warming is a major ecological problem that threatens the progress towards sustainable development. Climate change is the biggest environmental problem of our decade. Cutting down on fossil fuel consumption and increasing use of renewable and green energy sources is critical to lowering emissions of greenhouse gases and carbon from the transportation, energy, and industrial sectors. While governments seek ways to adapt to and mitigate the effects of climate change, protecting natural ecosystems is an essential part of these efforts.

METHOD

The elimination of grasslands and forests and their subsequent transformation into residential areas, as well as other forms of development that diminish biodiversity, also have a substantial influence. Forest cover is drastically reduced due to deforestation, which in turn contributes to global warming and impacts ecosystems worldwide. Additionally, it has a major impact on species richness and diversity.

Alterations to the natural environment are the primary driver of biodiversity loss's ecological consequences. The environment has a substantial impact on the distribution and function of organisms, among other aspects. Both now and in the future, environmental changes will remain a major factor affecting patterns of biodiversity. Changes in the environment climatic change, changes caused by overpopulation, overexploitation of natural resources, and deforestation are all considered.

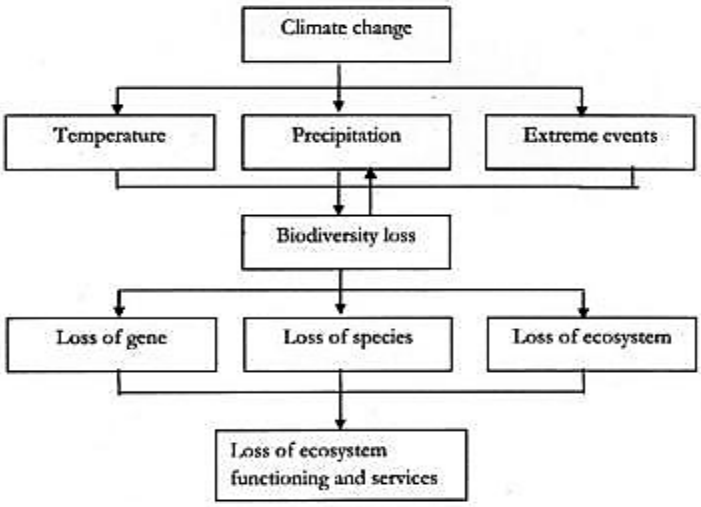


Figure 1: Link between climate change and its impacts on loss of biodiversity and ecosystem

DISCUSSION

The Impact of Environment-Related Shifts

The word "climate" is used to describe the long-term patterns of weather in a certain area. Typical weather conditions include things like average temperature, total precipitation, daily daylight hours, and other variables that are measurable everywhere. But changes to the planet's ecosystem may also affect weather patterns. The term "climate change" describes any shift in the natural or man-made environment. When a region's climate undergoes substantial and persistent changes, this phenomenon is called climate change. It might be decades, or perhaps millions of years, before these changes materialise. The whole ecosystem, including all the plants and animals that live there, is impacted by climate change.

Adaptations in plant and animal life are very temperature and environment dependent. There is evidence of organic evolution that suggests that abrupt shifts in global temperature were associated with the massive extinction of many plant and animal species. Disease outbreaks, land slides, and forest fires are all potential outcomes of accelerated climate change, which threatens the survival of flora and fauna alike. There is a spectrum of climatic adaptations that every living thing exhibits. The extinction of certain plant and animal species is a real possibility because of global warming. Environmental changes affect many species indirectly by interactions with others, even if not all species are directly affected. Some of the indirect impacts of climate change will determine how

plants respond to it. One example of how climate change is altering natural systems is the potential for one species to "invade" another's area, leading to a different kind of competition. So, we should expect more frequent and intense storms and rainfall as a result of climate change, and lower and higher minimum and maximum temperatures as a result. For the Indian subcontinent, scientists predict that summer monsoon precipitation would rise by 30% by 2050 and that winter precipitation will drop by 10% to 20%.Climate change has both natural and artificial sources.

Several natural processes impact the Earth's climate, such as changes in solar radiation, the Milankovitch cycle, volcanic eruptions, ocean circulation, plate tectonics, and earthquakes. Human activities from various sectors, such as energy production (25.9%), industry (19.4%), deforestation (17.4%), agriculture (13.5%), transportation (13.1%), urbanisation (7.9%), and waste (2.8%), are anthropogenic drivers, according to Rathore and Jasrai (2013), which are responsible for the alarming increase in atmospheric emissions of greenhouse gases like carbon dioxide, methane, and nitrous oxide.

Climate Change and Its Effects on the Natural World

The shifting climate The rising of the Earth's near-surface temperature is a result of greenhouse gases' influence, which is known as the greenhouse effect. The average global temperature has climbed by 0.6°C since the mid-nineteenth century, and by 2100, scientists predict it will have risen by a further 1.4-5.8°C. Because it changes their habitats and affects their physiological processes, global warming affects all living things. This indicates that the sea level has risen 10–20 cm and has the potential to climb an additional 88 cm. Endangered endemic species, such as ringed seals, emperor penguins, walruses, and polar bears, are under a threat from increasing sea levels, melting ice sheets, and temperatures that are around 5°C above normal.

bleaching coral One major effect of global warming is coral bleaching. Corals become white and lose their brilliant hues as a result of climate change and other environmental issues. Because of the negative impact that increasing ocean temperatures have on corals, reefs—widely recognised as one of the most biodiverse ecosystems—are dwindling in number.

Climate change is affecting water supplies because evaporation rates are going up. As evaporation rates increase, many areas should expect to see reduced water supplies. Soil moisture levels will drop and agricultural droughts will become more common and severe over the summer due to the greatest deficits forecast for the season. Global warming is going to causes droughts to become more often and more severe, which has big management consequences for those who rely on water. The cost of putting out flames and the depletion of natural resources like lumber are also affected by these droughts.

How Biodiversity Is Influenced by Climate Change

Changes in the weather, no matter how little, have a devastating effect on biodiversity because they alter species' habitats, which in turn threatens their existence and makes them vulnerable to

extinction. Climate change is the greatest threat to biological diversity, says the Millennium Ecosystem Assessment (MEA).

The rising temperature in Nainital has caused several plant species to relocate to higher altitudes. This includes Berberis sciatica, Taraxacum officinale, Jasminum officinale, and many more. Central India is expected to see the displacement of Sal trees by teak-dominated forests and conifers by deciduous plants. If the temperature were to rise by 3 degrees Celsius, a forest might move 2.50 km per year—ten times faster than its normal rate of movement—according to Gates (1990). that changes in weather may affect how a plant normally grows and matures. He went on to say that invasive plants like Lantana, Parthenium, and Ageratum conyzoides pose a threat to native species because of their increased resistance to climate change. The increased frequency of droughts and floods brought about by shifts in precipitation and temperature patterns may make native plants more vulnerable to pests and diseases.

When there is even a little shift in the weather, many animal species become extinct. Examples of species that have gone extinct as a result of climate change include the Monteverde harlequin frog and the golden toad. A melting Arctic ice cover threatens polar bears, and a possible extinction of the North Atlantic whale is linked to a decrease in plankton populations caused by climate change. New studies have shown that indigenous species, such as the Nilgiri, are more likely to go extinct due to climate change. However, more study is still required to determine how this phenomenon may affect India's natural resources. Also, as a result of the increase in average global temperatures, certain areas of the Shola woodlands are occasionally dying out, and there are indications that some species, such the Black-and-rufous Flycatcher, are moving to higher elevations.

Ecosystems and the Effects of Climate Change

The Millennium Ecosystem Assessment (MEA) found that ecosystems will be greatly affected by even a little shift in the temperature.

Marine and coastal ecosystems: The oceans encircle 70% of the planet and are home to a variety of unique ecosystems, such as sea grass beds, coral reefs, and mangroves. Climate change is causing a number of problems, including rising sea levels, more erosion of coastlines, floods, larger storm surges, intrusion of sea salt, hotter sea surfaces, acidity of the ocean, and bleaching of coral reefs. Sea level rise poses a serious danger to marine ecosystems because it threatens to alter the environments in which marine species live and the patterns of their survival. Wetland and coastal ecosystems are under significant threat from rising sea levels. Several communities have already become climate refugees as a result of the rising sea level. Among these states are the Sundarbans, Goa, Gujarat, and Maharashtra.

the coasts of India that are most vulnerable to the effects of global warming. These changes will definitely affect the distribution and composition of species. The Sundarbans, covering an area of 10,000 square kilometres, are the biggest low-lying mangrove ecosystem in the world. The mangrove ecosystem has been devastated, with 28% of it gone, due to the 40-year trend of rising sea levels.

Models indicate that within the next 50 and 90 years, the Sundarbans may see a 96% decline in the amount of suitable habitat for tigers.

The Himalayan Ecosystem Compared to the world average of 0.7°C each decade, the Himalayan ecosystem is seeing yearly temperature rises of 0.9°C. Because of these changes, mosquitoes have been detected for the first time in the cities of Lhasa and Tibet, which are about 3,490 meters above sea level. The Everest base camp in Nepal has also received complaints of insects. Malaria and dengue fever, which are spread by insects, may now be prevalent in areas where they were previously inevitable owing to lower temperatures, because of the existence of these insects.

The fresh water habitats of the Lotic and Lentic regions are part of the inland water environment, which has 6% of the world's species but just 0.8% of its surface area. They provide an abundance of resources, including food, cash, employment, and biodiversity. Changing weather conditions, such as precipitation and temperature, cause certain species, such as migrating birds and fish, to undergo changes in their physiology, phenology, and migration patterns.

As an ecosystem, forests are home to two-thirds of the world's terrestrial species and span one-third of the Earth's surface. They also serve as hubs for a plethora of plant and animal life. However, so far, only half of the first forest remains. Some forest types are expanding at an accelerated rate, some tree species are moving to higher altitudes, pests and invasive species are attacking at greater rates, and wildfires are becoming more common as a result of the greenhouse effect. The extinction of nine percent of the world's plant species and a great number of animal species, including primates, are directly attributable to these changes.

Heat stress, unpredictable rainfall patterns associated to heat, the spread of pests and diseases, and a shortened crop cycle are all ways in which climate change impacts plant growth and production in agriculture. It has an effect on both environmentally friendly and conventional farming methods. One of the many ways in which unsustainable agriculture upsets natural harmony is by destroying the framework for biodiversity. The dwindling biodiversity has harmed indigenous peoples' hunting and fishing practices, which can put their food supply at risk. In Central and South Asia, crop yields may fall 30% by century's end, while in East and Southeast Asia, they might fall 20%.

Climate change and its impacts on humans

More frequent and severe natural catastrophes such as floods, droughts, and cyclones are driving people to evacuate their homes as a result of rising temperatures and melting ice caps brought about by climate change.In example, warm temperatures facilitate the proliferation and survival of insect pests, vectors, and illnesses. The prevalence of pest insects and diseases like cholera, typhoid, and others will increase by 10% as a result of a 1°C rise in surface temperature. Tropical and vector-borne illnesses like malaria, dengue fever, and others will also spread, as will rodent-borne illnesses like plague. The incidence of several illnesses has been rising during the last half-century. As a result, human health is significantly impacted by global climate change. The distribution and prevalence of infectious illnesses transmitted by vectors, particularly bacterial infections, will

undoubtedly be impacted by changes in the environment. Changes in the environment are associated with complex biological changes, and changes in epidemiology may already be underway. Diseases caused by contaminated water and food are especially devastating in developing countries where sanitation is lacking and infection transmission is easy. The increase in carbon emissions caused by greenhouse gases hastens the onset of sickness. Viruses and illnesses affecting animals are on the increase due to the worrisome growth in carbon emissions. Rising sea levels have already inundated several islands, and the globe will soon have to find homes for millions of displaced people. Sea salt has infiltrated fresh water sources, making the land uninhabitable and eventually endangering our food supply.

Loss of Habitat, Excessive Population, and Excessive Exploitation: Their Impact

The dwindling variety of plant and animal life on Earth is mostly due to human activities other than climate change. Every year, scientists predict that some 27,000 species will disappear off the face of the earth. Should this trajectory persist, a third of the world's species may vanish by the year 2050. Compared to the natural rate, the present rate of extinction is one hundred to one thousand times faster. Overexploitation and depletion of natural resources, invasive species, pollution, and deterioration of habitats are further examples of human actions. The changing climate will open up new pathways for invasive species to spread to previously uninhabitable regions. More intense weather events, such as storm surges and high winds, are spreading invasive plant and insect species to new regions as the world warms. India is one of the primary taxonomic groupings that has spread over the planet. Among the most troublesome invasive alien plant species include Lantana camara, Eupatorium odoratum, Eupatorium adenophorum, Parthenium hysterophorus, Ageratum conyzoides, Mikania micrantha, Prosopis juliflora, and Cytisus scoparius.

Where plants and animals live. Loss of natural habitat is the leading cause of species extinction. Species face a grim prospect of extinction when they are pushed out of their native habitats and into places where adaptation is more challenging. Loss of habitat has a greater impact on bigger species, those that live in lower latitudes, woods, or seas. Human activities like deforestation, pollution, and overcrowding are the ultimate culprits when it comes to habitat deterioration. The introduction of foreign species also leads to a decline in biological diversity. Native species, including endemics and others, may not have a chance of survival if they are unable to compete with invasive species. Hunting plants and animals for their economic value is an example of overexploitation, which is a major cause of biodiversity loss. Illegal wildlife trade is the leading cause of biodiversity loss. Overpopulation and resource exploitation are the two main reasons for the extinction of all known species of plants and animals.

CONCLUSION

The Jaipur Action Plan on Climate Change (RAPCC) prioritises are in line with the state's grand vision for development. Extensive engagements with many stakeholders and ministries of the Jaipur government were part of the inclusive and collaborative process that resulted in this plan. The

formation of the Jaipur Regional Adaptation and Pollution Control Committee (Jaipur RAPCC) was prompted by the following documents: the Jaipur Environment Mission, 2010; the Jaipur Environment Policy, 2010; and the Climate Change Agenda for Jaipur. Jaipur is RAPCC's objective "to achieve sustainable development by reducing vulnerability to climate change impacts and enhancing resilience of ecological, economic, and social systems in Jaipur." Here is the mission statement of the organisation.

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