Climate Change, Biodiversity and Environmental Challenges

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Abstract: The link between climate change and biodiversity has long established. Although throughout Earth's history the climate has always changed with ecosystems and species coming and going, rapid climate change affects ecosystems and species ability to adopt and so biodiversity loss increases. From a human perspective, the rapid climate change and accelerating biodiversity loss risks human security e.g. a major change in the food chain upon which we depend, water sources may change, recede or disappear, medicines and other resources we rely on may be harder to obtain as the plants and fauna they are derived from may reduce or disappear, etc.

Keywords: Climate changes, Environmental challenges;

I. INTRODUCTION

The term climate can be defined as average whether which includes temperature, rain, snow, seasons, wind and humidity. These patterns of climate i.e. temperature, humidity and others play a fundamental role in shaping natural eco-systems, human economics and cultures. Climate is rapidly changing with disruptive impacts, and that change is progressing faster than any seen in the last so many decades.

Change in climate is a change in the statistical distribution of weather patterns when that change lasts for an extended period of time. Climate change may refer to a change in the time variation of weather around longer-term average conditions i.e., more or fewer extreme weather events. Climate change is caused by factors such as biotic processes, variations in solar radiation received by Earth, plate tectonics, and volcanic eruptions. Certain human activities have also been identified as significant causes of recent climate change, often referred to as "global warming".

II. BIODIVERSITY AND ENVIRONMENT

Biodiversity change affects the flow of environmental services—the benefits that people get from ecosystems. These benefits include the Millennium Assessment's provisioning services i.e. production of foods, fuels, fibers, water, genetic resources, cultural services recreation, spiritual and aesthetic satisfaction, scientific information, and regulating services i.e. controlling variability in production, pests and pathogens, environmental hazards, and many key environmental processes.

Amongst the ecosystem services supported by biodiversity is climate regulation. One effect of the conversion of forests to agricultural production, for instance, is an increase in carbon emissions from land clearance and a decrease in sequestered carbon. Both effects increase the rate of climate change. At the same time, our ability to adapt to climate change depends on the diversity of species within functional groups. Biodiversity loss increases both the severity of climate change and our ability to adapt to it. Neither effect is signaled in current prices. Both are external to existing markets. The economics of biodiversity-climate linkages deals with these externalities. There are two tasks. One is to identify the causal connections between biodiversity change, climate change and the production ofecosystem services. A second is to identify the marginal value of climate related changes in biodiversity. The role of living organisms in the production and sequestration of greenhouse gases is reasonably well understood. The consequences for climate of changes in the extent of tropical forests, or phytoplankton in the oceans are already incorporated in general circulation models. Ecologists also agree that climate change is already changing the world's biota. It is affecting species distributions and abundance, the timing of reproduction in animals and plants, animal and bird migration patterns, and the frequency and severity of pest and disease outbreaks. Species are moving from lower to higher elevations, and from lower to higher latitudes. Species that are unable to move are at risk. At the same time, changes in the world's biota from other causes are affecting the ability of ecosystems to adapt to climate change. The simplification of many ecosystems to make them more 'useful' to people reduces their flexibility. By eliminating species that are 'redundant' given current climatic conditions and current uses, we have reduced the capacity of many ecosystems to function if climatic conditions change.

III. CLIMATE CHANGE, BIODIVERSITY AND ENVIRONMENT

Climate change is both a cause and an effect of biodiversity change. Along with anthropogenic dispersion, climate change is the main driver of change in the geographical distribution of both beneficial and harmful species—crops, livestock, harvested wild species, pests, predators and pathogens. And the capacity of ecosystems to adapt to climate change depends on the diversity of species they currently

support. Climate change is also a consequence of the way which biological resources are converted into useful goods and services, and especially of the way in which grasslands and forests are converted into croplands. The production of biological resources for foods, fuels and fibers, and the conversion of forests and grasslands for agriculture both directly affect emissions of several greenhouse gases (GHGs). Changes in stocks of biomass also affect the volume of sequestered carbon.

It follows that options for the mitigation of climate change include the management of bothGHG emissions from productive processes and carbon sequestration, while options for adaptation to climate change center include the management of biodiversity for ecosystem resilience. This paper considers the connection between climate, biodiversity and environment challenges. The impact of climate change on human wellbeing is measured by the change in ecosystem services caused by climate related change in biodiversity. Similarly, the role of species richness and abundance in climate change mitigation or adaptation is measured by the change in the climate-related services of biodiversity. The categories of ecosystem services are those applied in the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2005a). The paper first considers how climate and biodiversity have been linked in recent attempts to link the two things. From the side of the natural sciences, this covers the consequences of climate change for various dimensions of biodiversity. From the side of the social sciences, it covers the value of biodiversity in the carbon cycle. It then uses insights from the economic treatment of the relation between biodiversity and ecosystem services to re-evaluate the connection between biodiversity and climate change, and to draw conclusions for climate policy.

IV. EFFECTS OF CLIMATE CHANGE ON ENVIRONMENT

Rising levels of carbon dioxide and other heat-trapping gases in the atmosphere have warmed the Earth and are causing wide-ranging impacts, including rising sea levels; melting snow and ice; more extreme heat events, fires and drought; and more extreme storms, rainfall and floods. Scientists project that these trends will continue and in some cases accelerate, posing significant risks to human health, our forests, agriculture, freshwater supplies, coastlines, and other natural resources that are vital to Washington state's economy, environment, and our quality of life. Because so many systems are tied to climate, a change in climate can affect many related aspects of where and how people, plants and animals live, such as food production, availability and use of water, and health risks. For instance, a change in the usual timing of rains or temperatures can affect when plants bloom and set fruit, when insects hatch or when streams are their fullest. This can affect historically synchronized pollination of crops, food for migrating birds, spawning of fish, water supplies for drinking and irrigation, forest health, and more. The impacts of climate induced biodiversity change on human animal and plant health are of concern because of the potentially high cost associated with both emerging zoonotic diseases, and changes in the distribution of existing disease vectors. Changes in agricultural practices have been strongly implicated in the emergence of a number of zoonotic diseases (Daszak and others 2004, Daszak and others 2006). The IPCC's fourth assessment report highlighted the impact of climate change on the distribution of a number of infectious disease vectors, and the seasonal distribution of some allergenic pollen species (Confalonieri and others 2007). For example, the climatic basis for changes in the distribution of the main dengue fever vector Stegomyia has been modeled, and turns out to map well into the observed disease distribution (Hopp and Foley 2003).

Diseases that were previously limited to low latitudes have spread to higher latitudes. Insectborne diseases such as trypanosomosis and anaplasmosis are now found in parts of the world where their vectors have never been found in the past. Climate, in association with land use change, has been associated with global increases in morbidity and mortality from emergent parasitic diseases. Other diseases affected by climate change include leishmaniasis, cryptosporidiosis, giardiasis, schistosomiasis, lariasis, onchocerciasis, and loiasis. Changes in the distribution of diseases and disease vectors are problematic because they involve a disassociation between the pathogen and its natural controllers. The disruption of the community of organisms that keeps a pathogen in check allows it to spread rapidly. For the same reason, climate change is expected to increase the frequency with which species across a wide range of taxa are able to spread outside their home range. A recent study of the implications of climate change for the potential invasibility of all terrestrial ecosystems concluded that a high proportion of existing ecosystems will become vulnerable to invasion by species from elsewhere under even moderate climate change scenarios. Using the Hadley HadCM3, B1 scenario, for example, (Thomas and Ohlemuller 2010) identified the areas of the world sharing a common climate but not sharing the same pest controllers (being more than 1,000 km distant) in 1945 and 2045.

V. FOLLOWING ARE SOME OTHER EFFECTS OF CLIMATE CHANGE ON ENVIRONMENT

- **Climate change could have severe consequences to human health** and is likely increase the number of people exposed to illness and injuries due to declining air quality and more frequent and severe heat waves, drought, wildfires, and flooding.
- **Our communities and transportation, energy, and other infrastructure could face increased damage costs and disruptions**

from more frequent and severe flooding, wildfires, changes in energy supply and demand, and other climate impacts.

- **Coastal communities and ecosystems could face increased risks from sea level rise and storm surge.** Increasing ocean acidity poses risks to our shellfish industry and could alter the marine food web.
- **The quantity and quality of water available** for communities, irrigation, fish, hydropower generation, recreation, and other uses are affected by declining snowpack, changes in seasonal stream flow, and increases in summer demand for water.
- **Fish, wildlife, and natural systems** will face increased stress. Climate change will more likely damage and destroy certain types of habitats, increase threats to certain species such as coldwater fish, alter natural patterns such as animal migrations or flower blooms, and alter the presence of pests and invasive species

VI. MAJOR CHALLENGES, BIODIVERSITY AND ENVIRONMENT

Major environmental issues are forest and agricultural degradation of land, resource depletion (water, mineral, forest, sand, rocks etc.), environmental degradation, public health, loss of biodiversity, loss of resilience in ecosystems, livelihood security for the poor.

The major sources of pollution in India include the rampant burning of fuelwood and biomass such as dried waste from livestock as the primary source of energy, lack of organised garbage and waste removal services, lack of sewage treatment operations, lack of flood control and monsoon water drainage system, diversion of consumer waste into rivers, cremation practices near major rivers, government mandated protection of highly polluting old public transport, and continued operation by Indian government of government owned, high emission plants built between 1950 to 1980.

Air pollution, poor management of waste, growing water scarcity, falling groundwater tables, water pollution, preservation and quality of forests, biodiversity loss, and land/soil degradation are some of the major environmental issues India faces in the present time.

VII. CONCLUDING REMARKS:

'Global warming' is the recent example of climate change and its effect on environment. However the economic losses of climate change are calculated, a very substantial part of those losses are biodiversity related. Biodiversity is much more than the macro fauna and macro flora that attract the attention of the conservation community. Every environment depends on some combination of species. The number and diversity of species associated with particular services varies widely, but in almost all cases greater species diversity means that the supply of ecosystem services may be maintained over a wider range of conditions. Hence, the value of functional diversity under climate change is the capacity it gives to adapt successfully.

Both the climate and ecosystem assessments have emphasized that current trends are likely to impact people in poor countries more than people in rich countries (Pachauri and Reisinger 2007, Millennium Ecosystem Assessment 2005a). This is partly because of the regional distribution of changes in temperature and precipitation, but is more directly because people in poor countries have fewer resources to support adaptation.

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