

CURRENT STATUS AND CHALLENGES FOR CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY



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PREFACE

As the human population increases, so does the pressure on ecosystems, since we draw ever more resources from them. Our ecological footprint on the planet is unsustainable and will become unbearable unless we change our consumption patterns and our behavior in general. Use of biological diversity in a sustainable manner means to use of natural resources at a rate that the Earth can renew them. It's a way to ensure that we meet the needs of both present and future generations.

Today our only option is to manage productivity and resources in a sustainable manner, reducing waste wherever possible, using the principles of adaptive management, and taking into account of traditional knowledge which contributes to the maintenance of ecosystem services. Sustainable activities can also be applied in many sectors, including organic farming, environmental impact assessments, certification and eco-labelling, management of protected areas, productivity, etc.

The management and conservation of biodiversity has gained serious social concern during the past few decades both nationally and internationally. Educating youngsters is one of the major steps for conservation as they have to protect nature. In this context an international seminar was organized to highlight the importance of appropriate planning for solutions in some of the burning environmental problems which we face in the century.

This book presents unique information on various aspects of Environmental science, Environment and society, Biodiversity, Entomology, Fishery science, Toxicology, Molecular biology, etc. We sincerely hope that it will be of great asset to researchers, field scientists, policy makers, etc. in the conservation and biodiversity.

Editors

Dr.S. Sheeba.

Dr. N. Ratheesh.

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CHAPTER 26**CLIMATE CHANGE, NATURAL DISASTERS AND BIODIVERSITY:
REFLECTIONS ON UNINITIATIVES****Archa Arun**

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ABSTRACT

Biodiversity and nature's contribution to people are our common heritage and humanities most important life supporting "safety net", but our safety net is stretched almost to breaking point. The diversity within species, between species and of ecosystems, as well as many fundamental contributions we derive from nature are declining fast, although we still have the means to ensure a sustainable future for the people and the planet. While there is a growing recognition that biological diversity is a global asset of tremendous value to future generations, the number of species is being significantly reduced by certain human activities. Given the importance of public education and awareness about this issue, the UN decided to celebrate the international day for biological diversity annually on 22nd May. Climate change, natural disasters and habitat destructions change the number of plant and animal species that live in a habitat known as declining biodiversity. In its resolution 65/161, the General assembly declared the period 2011-2020 to be "The United Nations decade on biodiversity". UNDP is proactively addressing biodiversity loss and ecosystem degradation to maintain natural capital intact, through a large portfolio of over three hundred projects in more than 140 countries. The global biodiversity strategy is a set of guidelines to save, study and utilize the earth's biotic wealth, published by the world resources institute, IUCN-The world conservation union and the UNEP. The management of biodiversity is a complex matter that needs the involvement of many different partners ranging from governmental organizations to private companies.

Key words: Biodiversity, Climate change, Natural disasters, Challenges, Ecosystem restoration

Introduction

In the 21st century climate change and Natural Disasters are the most defining challenge that the world is facing. The increase in global temperature, Arctic meltdown, rises in sea level and excessive emissions of greenhouse gases are the main reasons. Climate change is caused generally by human beings or by countries. The temperature of the earth is becoming warmer day by day causing immediate effects on coastal areas, small islands, food security health etc. Disasters

and climate change are often associated with each other. Disasters are caused due to the severity of a natural hazard. The Natural Disasters are determined by the level of vulnerability and exposure of population. Natural Disasters can cause severe impact on societies, environment, Biodiversity and economic wealth of the affected area. Climate change can be due to natural causes like volcanic eruption earth's orbital change, Ocean currents etc. Human causes like deforestation, Industrialisation, burning of

fossil fuel etc. can also cause climate change. Most of the countries have formally acknowledged in joint statements and International Agreements that human activity is main reason for Global climate change.

Climate Change

Climate change occurs when changes in earth's climate system result in new weather patterns that remain in place for an extended period of time. The primary cause of climate change is the burning of fossil fuels, such as oil and coal, which emits greenhouse gasses into the atmosphere – Primarily carbon dioxide. Rising sea levels due to the melting of Polar Icecaps contribute to greater storm damage, warming ocean temperatures are associated with stronger and more frequent storms, additional rainfall particularly during severe weather events leads to flooding and other damage, and increase in the incidence and severity of wildfires threatens habitats, homes and lives and heat waves contribute to human deaths and other consequences across the globe.

Climate change has both direct and indirect effects on agricultural productivity including changing rainfall patterns, drought, flooding and the geographical redistribution of pests and diseases. The vast amount of carbon dioxide absorbed by the oceans causes acidification, influencing the health of our oceans and those whose livelihoods and nutrition depend on them. Scientists project that extreme weather events such as heat waves, droughts, blizzards and rainstorms will continue to occur more often and with greater intensity due to global warming. If current ocean acidification trends continue singly rare coral reefs are expected to become increasingly rare in areas where they are now common.

The effects of Global warming on the earth's ecosystems are expected to be profound. Many species of Plants and animals are already moving their range northward or to higher altitudes as a result of warming temperatures. Warmer temperatures will also expand the range of many disease causing Pathogens that were once confined to tropical and subtropical areas, killing off plants and animal species that formerly were protected from disease. Species worldwide are moving pole ward to colder areas. On land, species move to higher elevations, where as marine species find colder water at greater depths.

Climate Change and Biodiversity

Healthy ecosystems and rich biodiversity are fundamental to life on our Planet. Climate change is affecting habitats of several species, which must either adopt or migrate to areas with more favorable conditions. Each small changes in average temperatures can have a significant effect upon ecosystems. The interconnected nature of ecosystems means that the loss of species can have knock on effects upon a range of ecosystem functions. According to the Millennium ecosystem assessment, climate change is likely to become one of the most significant drivers of biodiversity loss by the end of the century. Climate change is already forcing biodiversity to adopt either through shifting habitat, changing life cycles or the development of new physical traits.

Conserving natural terrestrial, freshwater and marine ecosystems and restoring degraded ecosystems is essential for the overall goals of both the Convention on Biological Diversity and the UNs Framework Convention on Climate Change, because ecosystems play a key role in the global carbon cycle and in adapting to climate change, while also providing a wide range of

ecosystem services that are essential for human wellbeing and the achievement of the Millennium Development Goals.

Natural Disasters

Natural Disasters are Catastrophic Events with Atmospheric, Geological and hydrological origins (eg, Droughts, earthquakes, Floods, Hurricanes, and Landslides) that can cause fatalities, Property damage, and social environmental disruption. Thousands of people around the world lost their lives to Natural Disasters in 2018, a tragic reminder of how rapidly Natural Disasters such as the wildfires in California can become deadly.

Natural Disasters and Biodiversity

In light of recent Natural Disasters including the wildfires in Australia, the flooding of Venice and India Volcanic eruptions in Philippines and New Zealand, and the earthquakes rocking Puerto Rico, many scientists are worried about the effects of these events on Biodiversity. Species with wide distributions are more likely to find pockets of unharmed land in which to survive, but others with limited or restricted ranges are at greater risk of extinction. Species with small populations that produce few offspring will face greater challenges. The devastating floods and wildfires are a sober reminder of Climate change's destructive path. Healthy ecosystems not only play an important role in supporting recovery and reconstruction after a disaster, but in reducing future disaster risk.

Earthquakes, Landslides, Volcanic eruptions and natural bushfires all affect the many different ecosystems on our planet. Initially, these disasters negatively affect the Biodiversity of wetlands, Forests, and coastal systems by causing the spread of invasive

species, mass species mortality and loss of habitat. Disaster and Biodiversity (DAB 2013-2016) was one of the six scientific programmes directly supported by IUBS, The International Union of Biological Sciences, a non-governmental, nonprofit organization established in 1919, consisting of more than 30 countries and 80 academic societies all over the world.

Natural Disasters that affect Ecosystems

Earthquakes, Volcanic eruptions, landslides, Tsunamis and natural bushfires all affect the many different ecosystems on our planet.

Tsunami: Tsunami represents an extremely high wave of water that moves from out at sea towards land. Because of the enormous volume of water that moves from out at sea towards land. Because of the enormous volume of water and energy that travels inland, extended areas along the coast are immediately devastated as these natural disasters strike the coastal ecosystems. The height of the Tsunami waves rises dramatically, though as the Tsunami reaches land and the resulting damage to ecosystems can be cataclysmic. As coral reefs, Mangrove forests and wetlands are all dependent upon each other for nutrient supplies. The destruction of one will ultimately affect the overall coastal system. The destruction of coral reef fish populations leads to the elimination of other species that dependent on them as a food source, while on land the soil that was exposed to salt sedimentation becomes infertile resulting in the loss of biodiversity in the form of coastal forests and animal life that they supported.

Volcanic Activity: The eruption of volcanoes and subsequent lava flow has an immediate negative effect on surrounding ecosystems, but through the process of primary succession, the forest habitat begins

the process of re-colonization almost immediately. Many plants in the form of seeds and spores and animal species, particularly insect life such as crickets and spiders arrive from adjacent areas to take up residence. These life forms are specifically adapted to survive in the severe conditions following a lava flow and spearhead the succession process. The privacy of these pioneer species changes the original sterile conditions to the point where a new and a normally more diverse forest ecosystem has developed within a 150 year period.

Wildfires: These uncontrolled infernos, travelling at speeds in excess of 20km/h are capable of destroying everything in their path. Once these fires exist, they can burn for weeks and do great damage to the ecosystem that they travel through. Despite the initial destruction of habitats, Wildfires play an integral part in rejuvenation of an ecosystem by consuming decaying matter, destroying diseased trees and related vegetation, creating conditions for new seedlings to germinate and by returning nutrients to the forest floor.

Landslides: Large amounts of earth and organic materials enter streams as sediment as a result of Landslide and erosion activity thus reducing the portability of the water and quality of habitat for fish and wildlife. Landslides can wipe out large tracts of forest, destroy wildlife habitat, and remove productive soils from slopes.

Common challenges to biodiversity

Biodiversity is the living foundation for sustainable development. Now to make biodiversity sustainable is one thing and to practice sustainable use of biodiversity is another. Truly sustainable development requires entities to redefine their policies on land use, food, water, energy, employment, development, conservation, economics and

trade. Protection and sustainable use of biodiversity requires the participation of ministries responsible for such area as agriculture, forestry, fisheries, energy, tourism, trade and finance. Conservation of Biodiversity requires cooperation with many different actors such as regional bodies and organizations.

Population growth is creating increasing demand for biological resources, because it increases consumption creating pressure for using bio-resources more and more. World is losing its tropical forests at the alarming rate of almost 42 million acres per year. This means that nearly 1.3 acres of Tropical forest disappear every second. At the current rate tropical forest will be gone within 115 years.

Introduction of Biotic species is another major challenge to biodiversity conservation and its use in development. In Bangladesh some Plant and animal species have been introduced from different countries. These exotic species have hampered endemic species both in their population dynamics and in the position of their tropic levels. At the same time in many cases the importation has opted for changing ecosystem. In the aquatic ecosystem, the major introduced species those have changed a lot the ecosystem are African Magus and Red Piranha. In the terrestrial ecosystem the species are Tectona Grandis, Acacia spp., Eucaliptus spp. and Swletenia Mahagoni.

Another major threat to biodiversity is that result from human activity are habitat destruction, habitat fragmentation, habitat degradation over exploitation of species for human use, introduction of exotic species and increased spread of disease.

United Nations and Disaster Management

According to a United Nations Report, Asia Pacific located to be the most disaster prone region of the world, have been struck by 1625 disasters during the last ten years amounting to over 40 percentage of the global total, thereby calling for a collective political commitment from the regions leaders to mitigate risks posed by disasters. A new United Nation's flagship report launched on 30th June 2015 finds that solutions to the challenges to people and planet must build on clear scientific findings in order to be sustainable.

Since the early 1990s, United Nations has been advocating for policies and measures to reduce risks before such risks evolve into disasters and impact vulnerable communities. The United Nations platform for Space based Information for Disaster management and Emergency Response (UN-SPIDER), established in 2006 under the United Nations office for outer space affairs, aims to provide universal access to all types of space based information and services relevant to Disaster Management.

UNESCO's commitment to Biodiversity:

Biodiversity is currently being lost up to 1000 times the natural rate .Some scientists are now referring to the crisis as the earth's sixth mass extinction, comparable to the last great extinction crisis 65 million years ago. These extinctions are irreversible and pose a serious threat to our health and wellbeing .

Many protected areas are not functioning as effectively as originally intended, due to limited resources to maintain these areas or enforce relevant legal frameworks .In addition, current protected area networks may need to be realigned to account for climate change .For protected area to

contribute effectively to a secure future for biodiversity, there is need for measures to enhance the representativeness of Networks, and to improve management effectiveness.

Growth in Protected areas in many countries is helping to maintain options for the future, but sustainable use and management of territory outside protected areas remains a priority.

Measures to improve environmental status within conservation areas, combined with landscape scale approaches, are urgently needed if their efficiency is to be improved.

Lack of adequate technical and financial resources and capacity can limit the up scaling of innovative solutions, demonstrating further the need for regional and sub regional cooperation.

Capacity building is a key factor in the successful avoidance and reduction of land degradation and informed restoration.

Capacity development needs should be addressed at three levels, National, Provincial and local.

There is need for capacity building to enable sources outside government to inform relevant departments and policies on biodiversity.

UNESCO works on the conservation of biodiversity and the sustainable use of its components through UNESCO designated sites, including biosphere reserves, world heritage sites including biosphere reserves world heritage sites and global geoparks. In 2018, UNESCO designated sites protected over 10 million Km², an area equivalent to the size of China. These conservation instruments have adopted policies and strategies that aim to conserve these sites,

while supporting the broader objectives of sustainable development.

The mab programme and the world network of biosphere reserves connecting landscapes and reconciling conservation with development

Biosphere reserves are designated under UNESCO's Man and the Biosphere (MAB) programme and promote solutions reconciling the conservation of biodiversity with its sustainable use at local and regional scales. As of June 2018, the world network of Biosphere Reserves (WNBR) consisted of 686 Biosphere reserves in 122 countries, including 20 transboundary sites.

The dynamic and interactive network of sites works to foster the harmonious integration of people and nature for sustainable development through participatory dialogue, Knowledge sharing, poverty reduction, human wellbeing improvements, respect for cultural values and efforts to improve society's ability to cope with climate change.

UN decade on ecosystem restoration 2021-2030

The United Nations General Assembly declared 2021-2030 the UN decade on ecosystem Restoration. UN Environment and FAO will lead the implementation. Key ecosystem that deliver numerous services essential to food and agriculture including supply of fresh water, protection against hazards and provision of habitat for species such as fish and pollinators are declining rapidly. The UN decade on ecosystem restoration will help countries face against the impacts of climate change and biodiversity loss. Ecosystems are being degraded at an unprecedented rate.

The decade will accelerate existing global restoration goals, for example the BONN

CHALLENGE, which aims to restore 350 million hectare of degraded ecosystems by 2030 – an area almost the size of India. Currently 57 countries, sub national governments and the private organizations have committed to bring over 170 million hectors under restoration. This endeavor builds on regional efforts such as Initiative 20*20 in Latin America that aims to restore 20 million hectares of degraded land by 2020, and the AFRI African Forest Landscape Restoration Initiative that aims to bring 100 million hectare of degraded land under restoration by 2030.

Ecosystem restoration is defined as a process of reversing the degradation of ecosystems, such as landscapes, Lakes and Oceans to regain their ecological functionality. In other words to improve the productivity and capacity of ecosystems to meet the needs of society. This can be done by allowing the natural regeneration of over exploited ecosystems, for example, or by planting trees and other plants.

Ecosystem restoration is fundamental to achieving the sustainable development goals, mainly those on climate change, poverty eradication, food security water and biodiversity conservation. It is also pillar of international environmental conservations, such as Ramsar convention on wetlands and the Rio conventions on biodiversity, desertification, and climate change.

Convention on Biological Diversity, Key International Instrument for Sustainable Development (CBD)

The CBD is the International Legal instrument for “the conservation of Biological Diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources “that has been

ratified by 196 nations. Its overall objective is to encourage actions, which will lead to a sustainable future. The CBD covers biodiversity at all levels, ecosystems, species and genetic resources. It also covers biotechnology through the Cartagena Protocol on Biosafety. In fact it covers all possible domains that are directly or indirectly related to biodiversity and its role in development, ranging from science, Politics and education to agriculture, business, culture and much more.

The CBD's governing body is the conference of the parties (COP). This ultimate authority of all governments that have ratified the treaty meets every two years to review progress, set priorities and commit to work plans. The secretariat of the CBD that is (SCBD) is based on Montreal Canada. Its main function is to assist governments in the implementation of the CBD and its programmes of work, to organize meetings, draft documents and coordinate with other International Organizations and collect and spread information. The executive secretary is the head of (SCBD).

Nature is declining globally at rates, unprecedented in human history –and the rate of species extinctions is accelerating, with grave impacts on people around the world now likely, warns a landmark new report from the

Inter governmental science-policy platform on biodiversity and ecosystem services (ipbes). The IPBES global assessment report on Biodiversity and Ecosystem services is the most comprehensive ever completed intergovernmental report of its kind. Based on the systematic review of about 15000 scientific and government sources, the report also draws indigenous and local knowledge,

particularly addressing issues relevant to indigenous people and local communities.

The 2019 global assessment Report on Biodiversity and Ecosystem service called for transformative changes to restore and protect nature. It found that the health of ecosystems on which we and all other species depend is deteriorating more rapidly than ever, affecting the very foundations of our economies, livelihoods, Food security health and quality of life worldwide.

Deforestation and desertification caused by human activities and climate change pose major challenges to sustainable development and have affected the lives and livelihoods of millions of people. The health of our planet plays an important role in the emergence of zoonotic diseases that is diseases that are transmissible between animals and humans. As we continue to encroach on fragile ecosystems, we bring humans into ever greater contact with wildlife enabling pathogens in wildlife to spill over to livestock and humans, increasing the risk of disease emergence and amplification.

United Nations Environmental Programme (UNEP) and World Meteorological organization (WMO) has created the Intergovernmental Panel on Climate Change (IPCC) in 1988 to prepare, based on available scientific information, assessments on all aspects of climate change and its impacts with a view of formulating realistic response strategies. In 2007 IPCC projected that global sea level would rise 2 feet by 2100, but in 2013 it was revised to 3.2 feet and in 2016 it revised up to 6.6 feet. They have also predicted that Artic sea ice is declining dangerously.

In April 2002, the parties of UN CBD adopted the recommendations of Grand Canaria Declaration calling for a Global

Plant Conservation strategy and adopted a 16 point plan aiming to slow the rate of plant extinctions around the world by 2010

The Cartagena Protocol on Biodiversity of the Convention also known as Biosafety Protocol was adopted in January 2000. The Biosafety Protocol seeks to protect Biological Diversity from the potential risks posed by living modified organisms resulting from modern Biotechnology. The Biosafety protocol makes clear that products from new technologies must be based on the precautionary principle and allow developing nations to balance public health against economic benefits. It will for example let countries ban imports of a genetically modified organism if they feel that there is not enough scientific evidence the product is safe and requires exporters to label shipments containing genetically modified commodities.

UN General Assembly declared the period 2011-2020 as UNs decade on Biodiversity to promote the implementation of a strategic plan on Biodiversity and its overall vision of living in harmony with nature. The main goal is to mainstream biodiversity at different levels .Throughout the decades governments are encouraged to develop, implement and communicate the results of national strategies for implementation of the strategic plan for biodiversity.

The world Economic Forum (WEF) has consistently highlighted the loss of natural capital as a leading global risk with cascading impacts of drought, Famine, Conflict, involuntary migration and natural disasters UNDP is proactively addressing biodiversity loss and ecosystem degradation to maintain natural capital intact ,through a large portfolio of over 300 projects in more than 140 countries. These national projects

are supported by a range of innovative and crosscutting global programmes including

1. The biodiversity finance initiative (BIOFIN)
2. The Lion's share initiative and the nature for development programme.
3. Equator initiative
4. The NBSAP forum
5. New York declaration on forest secretariat
6. Green commodities programme (GCP) and
7. BES-Net facility

The GEF small grants programme (SGP) supports community based actions in 125 countries.

UNDPs work is directed by the (UNDP Biodiversity and ecosystems global framework) and enters around six thematic areas.

1. Mainstreaming biodiversity into development, fiscal planning and production sectors such as agriculture, fisheries, forestry, tourism and mining including increasing financing for nature.
2. Unlocking the protection of protected areas, including indigenous and community conserved areas, including strengthening wildlife and habitat management.
3. Managing and rehabilitant ecosystems for climate risk management including ecosystem based adaptation and mitigation.
4. Sustainable land management to safeguard essential ecosystem services

and towards achieving land Degradation neutrality.

5. Transforming the food and agricultural commodities systems to address multiple global challenges.
6. Sustain resilient forest ecosystems to benefit local economies, protect biodiversity and address climate change.

The UNDP work in partnership with governments, communities and civil society groups of all levels, the CBD and UNCCD, the UNFCCC, the GEF, Green climate fund and donor partners, sister UN agencies like the world bank and development banks, research and science organizations and private sector .

The United Nations Summit on Biodiversity will be convened by the President of the General Assembly on 30 september 2020 at the level of Heads of State and Government under the theme of “Urgent action on Biodiversity for Sustainable Development .

Biodiversity boosts ecosystem productivity where each species, no matter how small, all have an important role to play.

For example

A larger number of plant species means a greater variety of crops.

Greater species diversity ensures natural sustainability for all life forms.

Healthy ecosystems can better withstand and recover from a variety of disasters.

And so, while we dominate this planet, we still need to preserve the diversity in wildlife.

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