Biodiversity - The strongest natural defense against climate change

Biological diversity is the variety of life on Earth, in all its forms, from genes and bacteria to entire ecosystems such as forests or coral reefs. The biodiversity we see today is the result of 4.5 billion years of evolution, increasingly influenced by humans. Biodiversity forms the web of life that we depend on for so many things – food, water, medicine, a stable climate, economic growth, among others.

CLIMATE CHANGE AND ITS IMPACT ON BIODIVERSITY

Climate change refers to the long-term changes in temperature and weather due to human activities. Increase in average global temperature and extreme and unpredictable weather are the most common manifestations of climate change. In recent years, it has acquired the importance of global emergency and affecting not only the wellbeing of humans but also the sustainability of other life forms. Enormous increase in the emission of greenhouse gases (CO_2, methane and nitrous oxide) in recent decades largely due to burning of coal and fossil fuels, and deforestation are the main drivers of climate change. Marked increase in the frequency and intensity of natural disasters, rise in sea level, decrease in crop productivity and loss of biodiversity are the main consequences of climate change. Obvious mitigation measures include significant reduction in the emission of greenhouse gases and increase in the forest cover of the landmass. Conference of Parties (COP 21), held in Paris in 2015 adapted, as a legally binding treaty, to limit global warming to well below 2°C, preferably to 1.5°C by 2100, compared to pre-industrial levels. However, under the present emission scenario, the world is heading for a 3–4°C warming by the end of the century. This was discussed further in COP 26 held in Glasgow in November 2021; many countries pledged to reach net zero carbon emission by 2050 and to end deforestation, essential requirements to keep 1.5°C target. However, even with implementation of these pledges, the rise is expected to be around 2.4°C. Additional measures are urgently needed to realize the goal of limiting temperature rise to 1.5°C and to sustain biodiversity and human welfare.

Increase in atmospheric temperature has serious consequences on biodiversity and ecosystems, and human wellbeing. The most important evidences of climate change is the long term data available on the CO_2 levels, global temperature and weather patterns.

Increase in temperature impacts two aspects of growth and development in plants and animals. One of them is a shift in distributional range of species and the other is the shift in phenological events. Plant and animal species have adapted to their native habitat over 1000s of years. As the temperature gets warmer in their native habitat, species tend to move to higher altitudes and towards the poles in search of suitable temperature and other environmental conditions.

Climate change induced shifts in species would threaten their sustenance even in protected areas as they hold a large number of species with small distributional range. The other impact of climate change on plant and animal species has been in their phenological shift. Phenology is the timing of recurring seasonal events; it is a sort of nature's calendar for plants and animals. In flowering plants, various reproductive events such as the timing of flowering, fruiting, their intensity, and longevity are important phenological events, and in animals some of the phenological events include building of nests in birds, migration of animal species, timing of egg laying and development of the larva, pupa and adult in insects. Phenological events of both plants and animals are generally fixed in specific time of the year as they are based on environmental cues such as temperature, light, precipitation and snow melt. Phenological timings of species are the results of adaptations over 100s of years to the prevailing environment.

Human activity has already altered over 70 per cent of all ice-free land. When land is converted for agriculture, some animal and plant species may lose their habitat and face extinction. But climate change is playing an increasingly important role in the decline of biodiversity. Climate change has altered marine, terrestrial, and freshwater ecosystems around the world. It has caused the loss of local species, increased diseases, and driven mass mortality of plants and animals, resulting in the first climate-driven extinctions.

Climate change affects the health of ecosystems, influencing shifts in the distribution of plants, viruses, animals,

and even human settlements. This can create increased opportunities for animals to spread diseases and for viruses to spill over to humans. Human health can also be affected by reduced ecosystem services, such as the loss of food, medicine and livelihoods provided by nature.

MITIGATION MEASURES

The principal mitigation measures against climate change are obvious; they include significant reduction in greenhouse gas emission, prevention of deforestation and increase in the forest cover. To reduce greenhouse gas emission, use of coal and fossil fuels needs to be reduced markedly. As climate change is a global challenge, local solutions confined to one or a few countries do not work; we need global efforts. Many attempts are being made to achieve these objectives at the global level since many decades. Mitigation measures are largely at the level of diplomatic negotiations involving states and international organizations, governments and some nongovernmental organizations.

When human activities produce greenhouse gases, around half of the emissions remain in the atmosphere, while the other half is absorbed by the land and ocean. These ecosystems and the biodiversity they contain are natural carbon sinks, providing so-called nature-based solutions to climate change.

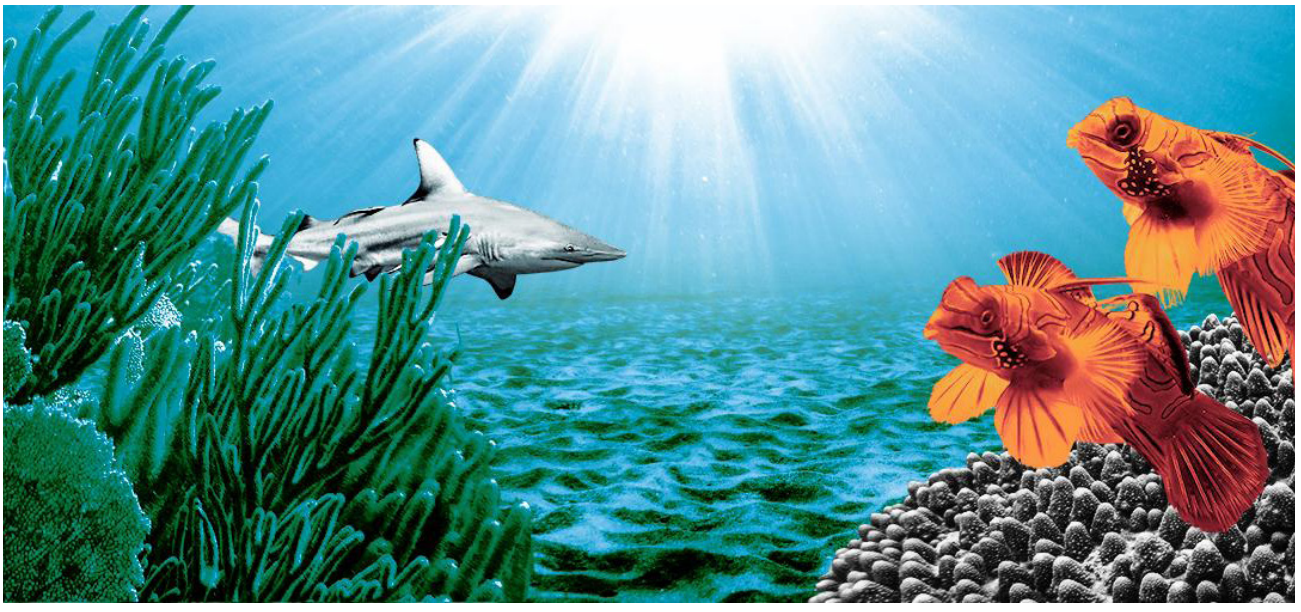
Protecting, managing, and restoring forests, for example, offers roughly two-thirds of the total mitigation potential of all nature-based solutions. Despite massive and ongoing losses, forests still cover more than 30 per cent of the planet's land. Preserving and restoring peatlands means keeping them wet so the carbon doesn't oxidize and float off into the atmosphere.

Ocean habitats such as seagrassess and mangroves can also sequester carbon dioxide from the atmosphere at rates up to four times higher than terrestrial forests can. Their ability to capture and store carbon make mangroves highly valuable in the fight against climate change.

Conserving and restoring natural spaces, both on land and in the water, is essential for limiting carbon emissions and adapting to an already changing climate. About one-third of greenhouse gas emissions needed in the next decade could be achieved by improving nature's ability to absorb emissions.

Effective implementation of the pledges made by different countries in COP 26 and actions to be taken in the coming COP meetings are going to be crucial and determine humanity's success or failure in tackling climate change emergency. COP 26 climate pact to cut greenhouse gas emissions, end of deforestation and shift to sustainable transport is certainly more ambitious then earlier COPs. There are also many other positive signals for reducing fossil fuels. Scientists have started using more precise monitoring equipment to collect more reliable environmental data, and more options are being developed by researchers on renewable and alternate energy sources, and to capture carbon from industries or from the air.

People are becoming more conscious to reduce carbon emission by following climate-friendly technologies. Human sufferings associated with an increase in natural disasters throughout the world have focussed public attention on climate change as never before. They also realise the benefits of improved air quality by



reducing consumption of coal and fossil fuels on health and ecosystems. The demand for electric vehicles is steadily growing. Reforestation is being carried out in a large scale in many countries. Recent studies across a range of tree plantations and native forests in 53 countries have revealed that carbon storage, soil erosion control, water conservation and biodiversity benefits are delivered better from native forests compared to monoculture tree plantations. This has to be kept in mind in reforestation programmes. Hopefully the world will be able to realize the goal of limiting the temperature rise to 1.5 °C by the end of the century and humanity would learn to live in harmony with nature.

SOLUTIONS FOR PROTECTING BIODIVERSITY

Human-caused threats to biodiversity, like habitat degradation and overfishing, require people-centered solutions that meet the needs of wildlife and local communities. To protect biodiversity and the prosperity of local communities worldwide, we must adopt and spur demand for more responsible and sustainable practices that safeguard soil, water, forests, and wildlife.

Rare is the global leader in developing, implementing, and scaling behavioral science for conservation. Building upon our deep experience in biodiversity conservation, our social marketing approach cuts across fisheries, regenerative agriculture, innovative finance, climate action, and other pressing environmental issues to foster individual and community action that helps people and nature thrive.

Solutions for protecting biodiversity must come from the local communities stewarding those resources. Rare balances conservation with human use, centering local communities in solving natural resource challenges. Through its people-centric approach to biodiversity conservation, rare deploys behavior change campaigns that help individuals and communities develop sustainable practices for protecting wildlife, using land, and managing coastal fisheries.

Taking account of nature will allow us to identify who benefits and how from the services that nature provides. And who would suffer and how if those services are no longer available. It also allows us to see how by making efforts to preserve and protect nature, we are in fact preserving and protecting the livelihoods and incomes of hundreds of millions of people who depend on nature. This is where we can start to formulate much more informed policies that can benefit groups that are otherwise disadvantaged.

One of the reasons we can insist on climate action is that the nature of the problem is clear. We can put a number on how much global warming we can live with before we are really in danger of irreversible problems.

We do not have that for biodiversity. The biodiversity of one ecosystem is entirely different to the biodiversity of another. So it is very hard to come up with one single number that can mobilize the entire world.

If every country measures their ecosystems and the value they get from them, it will be much less important that there are differences between types of ecosystems. What will be important will be the value that human beings derive, and understanding what we need to do to protect them. That will give a great boost to the global biodiversity agenda ▪

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(Source: https://www.un.org)