Biodiversity and Food Security:

Two pieces of the same puzzle

By: Aparna Sundaresa

The second phase of the UN biodiversity conference, COP15, was held in Montreal in December 2022—with the agenda to form a new Global Biodiversity Framework to combat declining biodiversity. Biodiversity conservation is of utmost importance as there is a complex interdependency among issues of biodiversity loss, climate change, and development. Biodiversity loss can threaten the achievement of even basic development goals such as food security and further exacerbate the climate crisis and its impacts.

India is highly dependent on the agriculture sector for its food security, and biodiversity loss leaves crops vulnerable to pests and diseases, thereby lowering yields. It also leads to the increased occurrence of invasive species and reduces the pollinator population. Thus, the interlinkage between food security and biodiversity loss needs to be understood in its entirety.

Globally, it has been observed that with biodiversity loss, pollinating species—especially insect pollinators such as bees, moths, butterflies, and wasps—are declining. Habitat loss because of land-use change is a major driver for this decline. Such cases of decline have also been observed in India; for example, WWF India reports a reduction in honeybee population in the past five decades. However, causal studies for pollinator decline in India are very limited, a gap that needs to be plugged.

According to the Food and Agriculture Organization of the United Nations, about 35% of the food crops around the world, such as oil crops and many fruits and vegetables, rely on animal pollination. For these crops, biodiversity loss is essentially a loss of pollinator activity. This leads to reduced yields and a reduction in food availability, ultimately affecting food security.

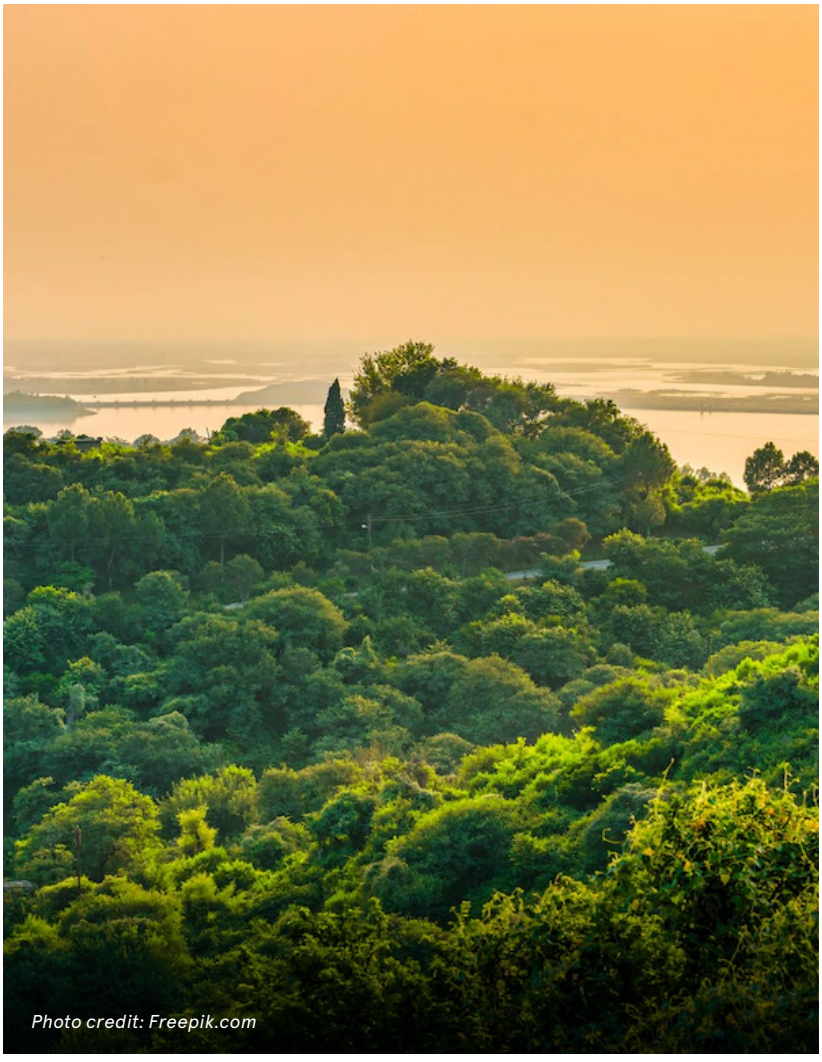

Photo credit: Freepik.com

Photo credit: Freepik.com

Apart from the population decline of pollinators, reduced pollinator diversity due to biodiversity loss can also pose a food security threat. However, among the many food security indicators in use globally, none consider the link between biodiversity and agricultural ecosystems, undermining the value of plant–pollinator interactions.

Moreover, meeting food security demands requires expanding agricultural land and increasing the intensity of agricultural activities on existing land. Agricultural expansion invariably leads to habitat loss for many pollinator species. In India, the demand for food is increasing with a growing population, which in turn increases pollinator dependence. Therefore, the loss of pollinator species due to habitat loss can have drastic impacts on agricultural yields. According to an Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) study conducted in 2016, the loss of pollinators can lead to a decrease in annual agricultural output by USD 235 to USD 577 billion globally. Further, to meet the growing food security demand, increased reliance on chemicals and pesticides for increasing yields can have catastrophic impacts—nutrients leaching away from soils, consequent biodiversity impacts as chemicals pollute the water bodies, and reduced soil health—exacerbating pressure on land for higher productivity.

Increasing agroforestry systems where crop fields are intermixed with tree cover can help in biodiversity conservation. Planting native trees in agroforestry systems maintains the diversity of pollinators, thus reducing the reliance on artificial methods of pollinating crops. These systems also serve as carbon sinks, storing carbon in biomass and soil. A study conducted by Ahirwal and group (2022) in Mizoram, India, reports that agroforestry in oil palm plantations positively impacts crop yield and carbon sequestration.

In the past year, when India faced one of its worst heatwaves, the country saw a huge outbreak in locust population, which led to almost 33% crop damage in Rajasthan. Such outbreaks can also be prevented under agroforestry systems, which have a cooling effect on the local climate. In a recent study led by the University of Washington, it was found that adding trees to pastureland in tropical regions can bring down local temperature by approximately 2.5 °C, depending on the density of trees.

With increasing temperatures and heatwave frequencies in India and more development-led land-use change, the vulnerability of biodiversity hotspots increases, especially in the Himalayan region and the Western Ghats, and with it increases the threat of biodiversity loss. Many small- and medium-scale farmers depend on organic farming, relying on natural pollinators for yield. Biodiversity loss for these farmers could lead to economic damage and social insecurity along with food security issues.

One of the goals of the Nationally Determined Contribution commitments of India is to create an additional carbon sink of 2.5–3 billion tonnes CO2 equivalent through the expansion of forest and tree cover while promoting biodiversity conservation. However, developmental goals including food security and renewable energy expansion require land, creating a trade-off in terms of land allocation. Coherent and holistic policy frameworks need to be developed to address and align targets across the nexus of biodiversity, climate change, and development. Systems thinking in developing these policy frameworks will ensure that crucial interdependencies are not ignored and trade-offs are minimised. Such frameworks could address the chronic underfunding in biodiversity conservation and discourage financial incentives that negatively impact biodiversity and climate.

Aparna Sundaresan is an analyst in the Climate, Environment and Sustainability sector at CSTEP.