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Animal biodiversity loss limits plants' ability to adapt to climate change globally: Experts

India

By Rohini Krishnamurthy (https://www.downtoearth.org.in/author/rohini-k-murthy-202474)
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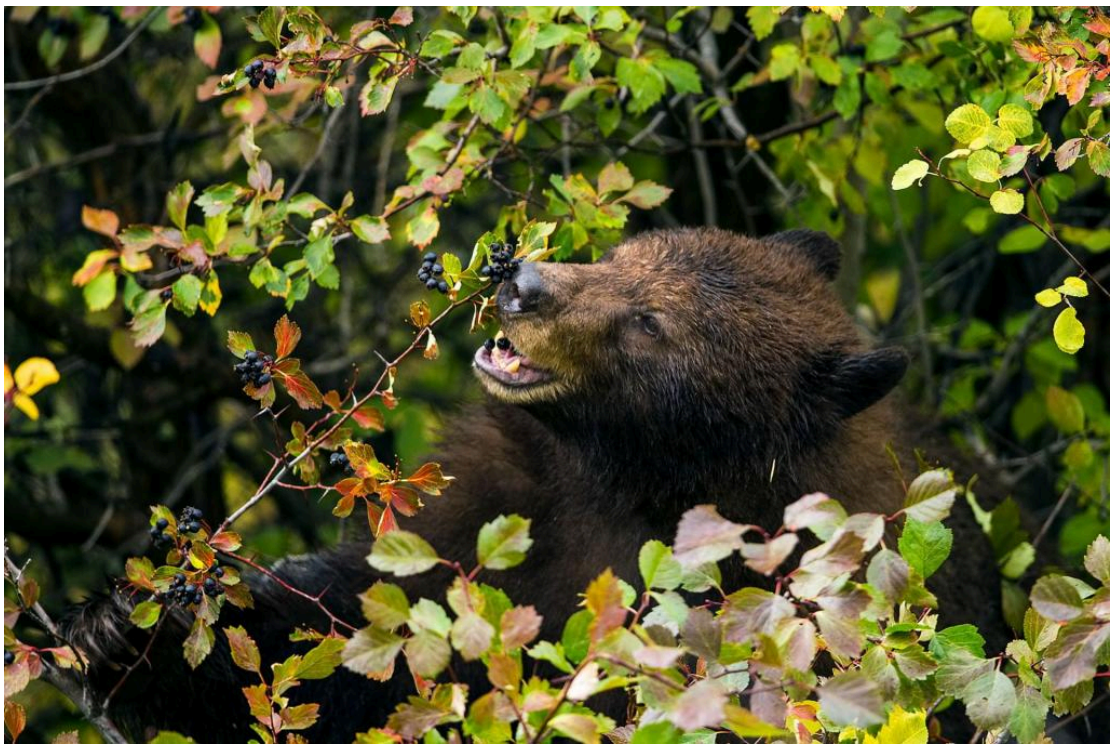

Plants worldwide have a 60 per cent lower chance of adapting to climate change due to the declining numbers of birds and mammals, according to a new study.

Plants and seed dispersers such as birds and mammals share a mutually beneficial relationship. The former provides food and in return, the latter distributes seeds miles away.

"A key way that plants can adapt to climate change is through 'migration' — the movement of the species to areas that become suitable for growth under an altered climate," Evan Fricke (https://www.evanfricke.com/), the study's first author and ecologist at Rice University, told *Down To Earth (DTE)*.

"While adult plants that are rooted down can't migrate, their seeds can," he added.

More than half of the plant species depend on animals and plants for seed-dispersing.

But the number of mammals, birds, fish, plants and insects has dropped to an average of 68 per cent from 1970 to 2016, the Living Planet Report 2020 (https://www.downtoearth.org.in/news/wildlife-biodiversity/land-use-change-major-cause-behind-biodiversity-loss-finds-wwf-report-73315) revealed.

With declining animal biodiversity, fewer seeds will reach new grounds. Consequently, plants might lose their ability to migrate to a newer and more suitable environment.

In their new study, Fricke and his colleagues quantified the magnitude of seed-dispersal loss worldwide and identified the most-affected regions.

First, they scoured data from published studies to identify bird and mammal seed dispersers and the fruits they feed on, how far they distribute the seeds and whether their digestive systems help or hinder seed germination.

An animal, for example, can either destroy the seeds or disperse them a few meters or several kilometres away after eating the fruit.

But available data do not capture the seed dispersal habits of all species. So, the team turned to machine learning, a type of artificial intelligence and computer modelling, to bridge this gap.

Next, the scientists used computer models to draw comparisons between seed dispersal in the real world and a simulated world with no extinctions and range shrinkage of birds and mammals.

They found that seed dispersal function globally has "declined sharply" from its natural level, with 60 per cent fewer seeds travelling far enough to keep pace with climate change.

The seed-dispersal losses were especially severe in temperate regions across North America, Europe, South America and Australia, the study found.

This could be because, in the past, large seed dispersers — which move many seeds to great distances — have disappeared from the temperate regions in many cases.

"Most of the large seed dispersers that still exist today are present in tropical regions," Fricke (https://www.evanfricke.com/) explained.

This, however, does not mean that the tropics have nothing to worry about. Up to 90 per cent of tree species (http://dx.doi.org/10.1079/9780851994321.0000) in tropical rainforests rely on animals for seed dispersal.

"If endangered species go extinct, tropical regions in South America, Africa and Southeast Asia would be most affected," the researchers predicted.

Large mammals and birds are particularly important as long-distance seed dispersers and have been widely lost from natural ecosystems," Christian Svenning (https://scholar.google.com/citations?user=we7WLk8AAAAJ&hl=en), the study's senior author as well as professor and director at Aarhus University's Center for Biodiversity Dynamics in a Changing World, said.

The study only talks about long-distance dispersal and not the entire kernel, Sowmya Prasad, Research Associate at The National Science Initiative, told *DTE*:

"The work presented here is a broad-scale analysis done at a global level," she added. Prasad was not involved in the study.

Effects on India

India is home to over 45,000 species of plants (https://www.iucn.org/asia/countries/india#:~:text=India%2C%20a%20megadiverse%20country%20with,and‘ and 91,000 species of animals.

Over the last five decades, India has lost 12 per cent of its wild mammals, 19 per cent amphibians and 3 per cent birds, Sejal Worah, programme director of World Wide Fund for Nature, India, said (https://www.downtoearth.org.in/news/wildlife-biodiversity/land-use-change-major-cause-behind-biodiversity-loss-finds-wwf-report-73315) while launching the Living Planet Report 2020.

In northeast India, seed dispersers such as elephants and bats are heavily hunted. This loss limits the movement of seeds in the region, she added.

The rest of the country, on the other hand, has a higher density of elephants, hornbills and other fruit-eating animals, Prasad pointed out.

But the region is witnessing fragmentation and habitat degradation, which impact seed dispersal.

India has smaller patches of forests. This means animals are likely to drop off seeds on the rooftops. "Livestock grazing in forest areas impacts seed dispersal. Invasion is another major issue," she explained.

The situation in Brazil, for example, is quite different. They have large patches of forests and relatively lower animal biodiversity. "India is in a peculiar situation compared to the rest of the world," Prasad said.

वन्य जीव एवं जैव विविधता (https://www.downtoearth.org.in/hindistory/wildlife-biodiversity) से जुड़ी सभी खबरें हिंदी (https://www.downtoearth.org.in/hindistory) में पढ़ें।

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Thar she blows: An ice-free Northwest Passage has enabled the Gray Whale's return to New England

Last seen in the age of commercial whaling, an ice-free Passage enabled the species to travel from Pacific to Atlantic

By Rajat Ghai (https://www.downtoearth.org.in/author/rajat-ghai-2362)
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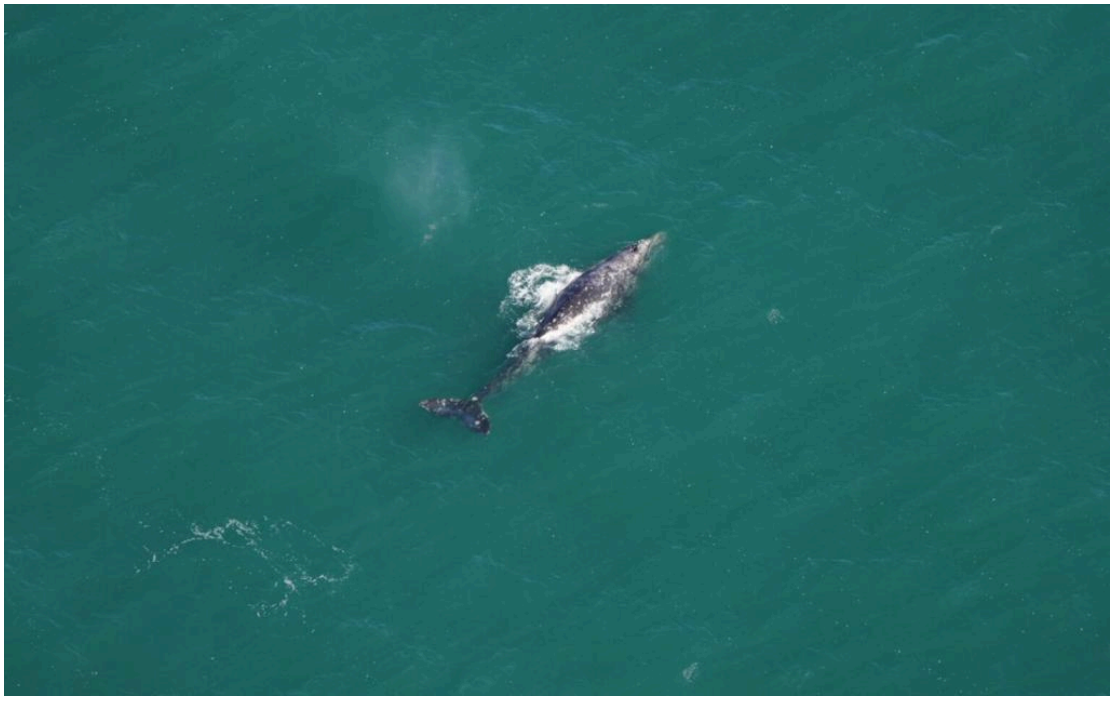

The gray whale seen south of Nantucket on March 1, 2024. Credit: New England Aquarium

The Gray Whale (*Eschrichtius robustus*) was last seen in the Atlantic Ocean in the 18th century. But now, it has appeared off the coast of the United States' New England region, courtesy climate change.

A survey team from the New England Aquarium in Boston, Massachusetts sighted a gray whale off the New England coast last week, according to a statement (https://www.neaq.org/about-us/press-room/press-releases/gray-whale-seen-in-southern-new-england-waters/) by the Aquarium on March 5, 2024.

"Aquarium scientists were flying 30 miles south of Nantucket on March 1 when they sighted an unusual whale. The animal repeatedly dove and resurfaced, appearing to be feeding. The aerial survey plane circled the area for 45 minutes, allowing observers to capture additional photos. After the encounter, the observers reviewed the images and confirmed their suspicions: It was a gray whale," the statement read.

The gray whale, according to the Aquarium, is regularly found in the North Pacific Ocean. It can be easily distinguished from other whale species as it usually lacks a dorsal fin, has mottled grey and white skin and a dorsal hump followed by pronounced ridges.

The New England sighting is the latest in a series of observations — there have been five in the last 15 years — of gray whales in the Atlantic and the Mediterranean.

This includes a sighting off the coast of Florida in December last year and the Aquarium believes the animal sighted in New England is the one that was seen in Florida.

Hub of whaling

Humans have had a long history of hunting whales. However, commercial whaling reached its apogee in the 17th, 18th and 19th centuries. "Many populations of whales were hunted to dangerously low levels in the 19th and 20th centuries," the International Whaling Commission notes on its website (https://iwc.int/about-whales/lives).

Read Once upon a time whales walked liked us; here's what happened next (https://www.downtoearth.org.in/news/wildlife-and-biodiversity/once-upon-a-time-whales-walked-liked-us-here-s-what-happened-next-82801)

New England was a hub of commercial whaling in the United States. According to Energy History Online (https://energyhistory.yale.edu/harvesting-light-new-england-whaling-in-the-nineteenth-century/), a free educational website for teachers and students of energy history supported by Yale University:

> By the middle of the nineteenth century, the commercial whaling industry was primarily an American one; of the approximately 900 ships whaling the world's oceans in the late 1840's, over 700 flew the U.S. flag. Nantucket and Martha's Vineyard in Massachusetts and Mystic Connecticut all emerged from the American Revolution and the naval battles of the Napoleonic wars with substantial fleets.

It adds: "But by the 1840s and 1850s, when whale commerce peaked, the industry was concentrated in New Bedford, Massachusetts. With a deep harbor and access to lumber for shipbuilding, New Bedford put to sea hundreds of ships per year. Whaling

was one of the state's most important industries."

Herman Melville's classic *Moby Dick* was set in Nantucket. It was inspired by the real-life story of the *Essex*, a whaler which was attacked and sunk by a sperm whale on November 20, 1820 in the South Pacific, with horrific consequences for the crew.

Climate change to blame

Human-induced global warming is responsible for the gray whale swimming in New England waters, according to the Aquarium.

The Pacific and Atlantic Oceans are connected through the Strait of Magellan and the Drake Passage at the southern end of South America. The human-constructed Panama Canal also connects the two bodies of water. But there is a third route between the two: the fabled Northwest Passage in the far north.

"The Northwest Passage, which connects the Atlantic and Pacific through the Arctic Ocean in Canada, has regularly been ice-free in the summertime in recent years, partly due to rising global temperatures. The extent of the sea ice typically limits the species range of gray whales, experts say, as the whales cannot break through the thick winter ice that usually blocks the Passage. Now, gray whales can potentially travel the Passage in the summer, something that wouldn't have been possible in the previous century," the statement by the Aquarium notes.

"These sightings of gray whales in the Atlantic serve as a reminder of how quickly marine species respond to climate change, given the chance," Orla O'Brien, associate research scientist in the Anderson Cabot Center for Ocean Life at the New England Aquarium, was quoted as saying in the statement.

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