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SEAL THE DEAL: Invasive species pose huge threat to ecosystems, UN says

Warmer temperatures have predisposed coniferous forest in western Canada to a severe outbreak of mountain pine beetle

11 November 2009 – It's no longer than a grain of rice. But the mountain pine beetle is an insidious environmental predator, laying waste to swathes of forest in north-western Canada and exposing the local ecosystem to what could be a devastating new front in the battle against climate change.

The beetle is one of hundreds of what scientists call invasive species – animals, plants and organisms that "arrive, survive and thrive" in previously inhospitable territory and damage their host environment.

Now, as global warming alters temperature and precipitation patterns around the world, the threat posed by invasive species is rising, and scientists and United Nations officials are calling on participants at next month's climate change conference in Copenhagen to agree to action to strengthen their ecosystems and to protect biodiversity.

"Climate change is creating some difficult conditions for a number of living organisms and most of the invasive alien species are more resistant, more opportunistic than the organisms in a given place," says Kalemani Mulongoy, the principal officer of scientific, technical and technological matters at the UN Convention on Biological Diversity (CBD).

The Montreal-based CBD, set up in 1993, is a legally binding agreement between 187 countries, linking traditional conservation efforts to the economic goal of using biological resources sustainably. It covers all ecosystems, species, and genetic resources, and provides technical advice to governments as they try to maintain fragile ecosystems.

The CBD considers the combined effects of climate change and invasive species to be the main drivers of biodiversity loss across the planet.

"It happens in all ecosystem types: freshwater, terrestrial, plants, animal, microorganisms, they span the gamut," adds Stas Burgiel, policy director at the Global Invasive Species Program (GISP), an international partnership of scientists, non-governmental organizations (NGOs), intergovernmental organizations and policymakers assists the CBD and the UN Environment Programme (**UNEP**) in decision-making.

Invasive species "can change whole ecosystems by altering hydrology, fire regimes, nutrient cycling, and other ecosystem processes," according to GISP. "Biological invasions by non-native species impose an enormous cost on agriculture, forestry, fisheries, as well as on human health."

"As the conditions are changing due to high temperatures, drought or abundant rain, a number of organisms will be outgrown by invasive alien species," says Mr. Burgiel.

According to the CBD, biological incursions by invasive species result in significant economic losses. In the United States alone, the yearly damage and control cost of invasive species is estimated to be more than $138 billion. Worldwide, it is estimated at $1.4 trillion annually.

For the mountain pine beetle, mild winter temperatures have led to increased survival, culminating in the largest epidemic in the history of the Canadian province of British Columbia. In recent years the beetle has also moved to higher latitudes, resulting in the infestation of an estimated 13 million hectares of pine forests, and forecasts predict that it will to kill up to 80 per cent of the pine volume in British Columbia by 2015.

Lodging itself in the inner bark of mature trees, the beetle lays eggs that will hatch into larvae and burrow out to the surface. The exit holes then leave the tree vulnerable to fungus which, once established, will overwhelm and kill the pine.

The rotting trees release tons of carbon dioxide as they die, boosting greenhouse gas emissions and nullifying the "sink effect" whereby large forests absorb and store carbon dioxide.

Invasive species are encroaching on fragile ecosystems across the planet. In the Western US and in North Africa, the tamarisk plant is an aggressive colonizer, able to survive in parched and saline soils for extended periods of time. As climate change decreases precipitation in these areas, the shrub sinks its roots deeper into the soil, depleting available water resources and out-competing indigenous plants for nourishment.

In West Africa, an average decrease of 40 to 60 per cent in the flow of major rivers – a result of global climate change – may be a factor contributing to the proliferation of the water hyacinth. The hyacinth clogs numerous lakes and rivers, threatening the survival of fish, and local plant biodiversity to the detriment of the communities and industries that profit from these resources.

Warmer air temperatures and longer growing seasons may also increase the geographic ranges of some diseases as tropical insects adapt to temperate climates, putting new populations at risk.

"Vector-borne diseases such as West Nile virus also have a link to invasives" says Mr. Burgiel, referring to the Asian tiger mosquito and its role in transmitting dengue fever and West Nile virus to Western countries. Since its introduction into Italy eight years ago, the mosquito has spread to 22 of the country's northern provinces.

"When a pathogen hitchhikes on an organism, you get public health issues," he says.

Given genetic programming that allows them to thrive in a multitude of environments, invasive species are more adept at survival than native species, raising serious concerns about the fate of indigenous organisms in environments where global warming precipitates seasonal change.

“Sea level rise will certainly favour those species that can deal with the change from a freshwater environment to a saltwater environment,” adds Mr. Burgiel, “while some plants may grow faster in rich carbon dioxide environments.”

Since the 17th century, invasive species have contributed to nearly 40 per cent of all animal extinctions, posing the greatest threat to biodiversity on isolated ecosystems, such as islands that lack natural competitors, and predators that usually control populations of the invaders.

In response to these threats, GISP supports implementation of Article 8 of CBD, which calls on parties to “prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats, or species.”

“Recently, there has been a call to think about climate change within a lot of the discussions about biodiversity conservation,” adds Mr. Burgiel. “We urge States at risk to use the precautionary approach, don't make unnecessary introduction of invasives, and prevent those that you can control.”

The biodiversity implications of climate change will be discussed at Copenhagen through the concept of ecosystem-based adaptation, which aims to strengthen ecosystems against climate change by making them as healthy as possible.

“We've starting to get a hand on what the potential impacts and dynamics might be, but in terms of translating that into policy guidance for governments, I think that's where we still need quite a bit more work,” says Mr. Burgiel.

“It's easy to say 'start with precaution,' but a little more detail about what they might need to do at a particular site or with national legislation is where we're struggling. We have some ideas but that needs to be improved.”

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