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'Ecological mangrove restoration' trumps one-size-fits-all approach to forest loss

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A mangrove forest in Kubu Raya, West Kalimantan, Indonesia. Coastal wetland ecosystems are the most effective carbon storehouse on earth. Image: CIFOR, CC BY-NC 2.0

The vast tangled mangrove forests that sweep along so many tropical coasts are one of the world's most biodiverse ecosystems. They also play crucial roles in protecting coastlines from erosion and providing communities with resources from food to firewood, and are one of our most effective carbon sinks.

Yet they continue to be destroyed and degraded. In their Global Forest Resources Assessment (FRA) for 2020, the Food and Agriculture Organization of the United Nations (FAO) estimated the loss of 1.04 million hectares (2.57 million acres) over the last 30 years. However, there is some cause for some optimism.

According to figures from the FRA, the rate of global mangrove loss has more than halved over three decades, from 46,700 ha (115,400 acres) of loss per year between 1990 and 2000, to 21,200 ha (52,400 acres) per year between 2010 and 2020.

However, not all regions have experienced a reduction in mangrove deforestation. The FRA found that in Asia, there has been a huge increase in mangrove loss: from 1,030 ha (2,550 acres) per year to 38,200 ha (94,400 acres) over the same 30-year period.

Now conservationists hope that a process called ecological mangrove restoration (EMR), which is proving far more successful at restoring these forests than previous well-intended but often ill-conceived efforts, will help turn the tide once and for all in the battle to save the mangrove.

Vanishing blue forests

There are about 70 species of mangroves, with the greatest biodiversity in Asia, followed by Brazil, Australia, Nigeria and Mexico. They grow from the land toward the sea, and inhabit an intertidal zone where a unique filtration system makes them one of the few plants that can survive in brackish or salty water.

Because of their proximity to water, mangroves are often called “blue forests.” Their masses of roots extend above and below the water line, helping to slow the movement of water, stabilise coastlines and reduce the impacts of waves and storm surges.

They also serve as important nursuries for a vast array of fish, as well as habitat for a range of animals from hippos (Hippopotamus amphibius) and dugongs (Dugong dugon) in Tanzania, to the Atlantic humpback dolphin (Sousa teuszii) in Senegal. In Panama, pygmy sloths (Bradypus pygmaeus) clamber through the canopy, while Bengal tigers (Panthera tigris tigris) patrol the swamps of the Sundarbans in India and Bangladesh. Everywhere, the forests attract huge flocks of birds.

Through photosynthesis, mangroves absorb huge amounts of carbon. Research indicates a hectare of mangrove can lock away four times more carbon than the same area of tropical rainforest.

Only seagrass meadows and mudflats are more effective at sequestering carbon, both of which also have fascinating symbiotic relationships with mangroves. While they help to reduce the power of waves crashing into the mangroves, the mangroves reciprocate by helping to protect these offshore habitats from being smothered by silt and other runoff from the land.

Wetlands International (WI) is one of the key champions of EMR, running projects across Asia and Africa. Its Mangrove Capital Africa initiative is restoring large mangrove deltas across that continent, including the Rufiji Delta in Tanzania, and Senegal’s Saloum Delta, the largest mangrove deltas in East and West Africa, respectively.

Hundreds of thousands of people depend directly on these forests for resources such as building materials, fish and oysters, and firewood, says WI technical officer Menno de Boer.

“In both sites, we work with the communities and local government to protect and restore mangroves, and help them to adopt sustainable approaches to mangrove resource use,” said de Boer, who works on WI’s deltas and coasts team. This includes using data and the latest technologies to identify where mangroves are disappearing, and allowing patrols to better target their efforts.

“Threats in these deltas come from several sides,” he says. “Mangroves are being cut for firewood [and construction] and to make space for farming. On top of that, upstream developments [such as the Stiegler dam in Tanzania] threaten the freshwater and sediment flow, which is essential for the mangrove ecosystem.”

Other threats to mangroves worldwide include oil spills, as was seen earlier this year when the MV Wakashio bulk carrier sank off Mauritius, leaking fuel oil that devastated the country’s mangroves. Elsewhere, mangroves are being cleared to make way for aquaculture, one of the world’s fastest-growing food sectors, as well as for oil palm plantations and rice paddies. They are also being cleared for houses and hotels, developments that are associated with pollution.

Wetlands International first trialed EMR in Guinea-Bissau’s Cacheu River Mangroves Natural Park in 2015. “It’s an approach that came up due to all the failing projects,” de Boer says. “Many projects

that try to restore mangroves through just planting are not effective … they plant in the wrong place, the wrong species, the wrong density."

While a gnarled forest of mangroves may look tough and resilient, different species need different conditions to thrive. Many have evolved special adaptions that make them suited to very specific environments, governed by factors such as salinity and sediment flow. Some mangroves, for instance, absorb oxygen through roots that grow out of the soil, and which can be smothered by too much sediment.

De Boer attributes the breakdown of many restoration projects to a lack of planning and a preference for species that are easy to plant over native species that would do better in the long term. Some mangroves produce viviparous seeds called propagules, which mature on the tree before they drop off.

They can then be planted by simply pushing them straight into the mud. De Boer says that because of this, they became popular with planting schemes run by NGOs and private organisations; but these efforts failed to take into account the suitability of a species to a certain site, and as a result failed to restore functioning, self-sustaining forest.

Governments have often been part of the problem too, de Boer says, often pressing ahead with planting programs to meet targets but without ever really considering the outcomes.

Rethinking reforestation

Rather than simply planting thousands of mangroves in the hope that they will grow, EMR looks at the environmental conditions, and takes into account factors than have changed the hydrology of an area, such as fish ponds or rice paddies. It also encourages natural restoration, opening up deltas and allowing site-specific species to take hold, resulting in better survival rates, faster growth, and a more diverse, resilient forest.

In Guinea-Bissau, the hydrology of an area targeted for restoration had been disturbed by dikes and now-abandoned rice fields, which were preventing any tidal influence. Initial replanting efforts also used the wrong type of mangrove species.

But once the dikes were broken, seeds from a different species were brought in on the tide and the forest started to grow back by itself. It was simply a case of letting nature take over, de Boer says. Not planting actually proved more successful, more efficient and much cheaper.

It was a similar story in Senegal's Saloum Delta. Here, salt flats had developed within the mangrove, but by cutting channels, water was able to flow in to restore normal salinity levels while also bringing in seeds that germinated and helped the forest to regrow.

In Southeast Asia, Wetlands International is working along the heavily eroded northern coast of Java in Indonesia. Before they stared replanting, large fish ponds were breached to allow sediment to flow again. A series of barriers were then built just off the coast, made from twigs and branches, to take some of the power out of the waves while at the same time allowing sediment through to help the mangroves reestablish. "It's understanding the wider context that makes this approach work," de Boer says.

But de Boer cautions that while EMR has been shown to work, success can be short-lived if there's no community buy-in. "You can restore an area, but if it's in someone's backyard, they'll dig it up again as soon as you plant it," he says.

Mikoko Pamjoa ("Mangroves Together") is a community-led restoration project along Gazi Bay, on Kenya's south coast. Established in 2014, it's one of the world's longest-running such projects, and has now become the first to use mangrove carbon credits to protect its blue forests.

Mohammed Bomani, Mikoko Pamjoa treasurer, says fishing is crucial to everyone who lives around the bay, and that seafood is their only source of protein. "Mangrove forests provide the best environment for fish breeding," he says.

In 2014, deforestation spiked along Gazi Bay and the mangrove lost around 2% of its tree cover, according to satellite data from the University of Maryland. Bomani says he and his colleagues began the restoration project because they realized they were the only ones who could save their mangroves.

People were quick to buy into the project, Bomani says, which has created more than 150 jobs. An influx of money from carbon credits, managed by international carbon credit regulator Plan Vivo, has helped the community make changes in "some important areas in their daily life," he says. These include improvements to the local water supply, the renovation of primary schools, and the stocking of the local medical dispensary.

Around 2.5 million trees are protected through Mikoko Pamjoa along with a second program it inspired called Vanga Blue Forest. The project's secretary, Harith Suleiman, says that with climate change causing more extreme weather events, not having the protection of the mangroves meant the village was at constant risk of flooding.

Like many villagers, Suleiman comes from a fishing family, inheriting his knowledge of where to fish and his respect for the mangroves from his ancestors.

"The mangrove contributes to the ecosystem balance," he says. "Where there is mangrove there is seagrass, there is coral and a biodiversity of marine life."

But, he says, "People have over-exploited the resource," and cut down large areas to build houses. To combat this, they are encouraging more young people to join in the restoration work. To date, Suleiman says, more than 750,000 seedlings have been planted. "This is their resource," he says. "Nobody from outside will come and protect this; they are the ones." Satellite imagery from Planet Labs shows mangrove cover has expanded in the past several years.

Last year, the Save Our Mangroves Now! alliance, which brings together the German Federal Ministry for Economic Cooperation and Development (BMZ), WWF and the IUCN, issued a new report called "Tangled Roots and Changing Tides."

The report looked into the legal and institutional frameworks governing mangroves, and the complications caused by the fact that mangroves cut across different ecosystems, sectors and governments.

According to Diego Jara, legal officer at the IUCN's Environmental Law Centre, because of their position at the intersection of the land and the sea, more often than not, mangroves are subject to a fragmented legal framework where it's rarely clear whose jurisdiction they come under.

"Many countries don't have a specific approach on how to protect these ecosystems," he says. "Sometimes there are laws that contradict each other … or sometimes governments simply don't have the capacity to monitor what's going on and ensure that these vulnerable ecosystems are protected."

Jara says he believes enacting legislation aimed at specifically protecting mangroves isn't necessarily the solution; what's more important, he says, is clarifying how existing legislation applies to mangroves.

The report also highlighted the fact that mangroves don't respect national boundaries, and its authors call for more region-specific approaches along with the creation of protected areas or corridors.

Jara says he agrees that community involvement is at the heart of successful restoration. "It is important that local communities can learn how to sustainably exploit these resources and that they can also learn how to protect it in the long run," he says.

What he doesn't want to see, he says, are traditional subsistence activities, such as cutting mangroves for firewood, becoming illegal overnight. "The protection has to be aligned with livelihoods of local people," he says.

Jara says education is key to protecting mangroves, and the IUCN is also hoping to promote local mangrove conservation by training community leaders.

"The recognition of mangroves in the law alone is not sufficient," Jara says, adding that a lack of will and a lack of resources can make the law toothless. Instead, he says, through "education at all levels, particularly the local level, you can ensure that mangroves are used sustainably."

Source: https://www.eco-business.com/news/ecological-mangrove-restoration-trumps-one-size-fits-all-approach-to-forest-loss/