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BIO-RESTORING DEGRADED PATCHES OF SUNDERBANS

Relevant for: Environment | Topic: Environmental Conservation, Sustainable Development, and EIA

Sturdy species: The site of restoration was first stabilised by planting four native, salt-tolerant varieties of grass, says Krishna Ray (left). | Photo Credit: Special arrangement

Increasing anthropogenic activities along with natural stresses have led to massive degradation of one of India's World Heritage Site — the Sunderbans. A team of researchers from West Bengal State University, Kolkata, set out with the herculean task of identifying the major reasons for the decline and also devising new restoration strategies. They surveyed 19 shoreline mangrove patches, collected soil and water samples and studied them. The results published in *Hydrobiologia* highlight that lack of essential nutrients and increasing salinity were the main problems in Sunderbans.

"Nutrient depletion especially phosphorus and nitrogen was found to be directly connected with the decline in forest cover. We are now trying to understand what is causing nutrient depletion. We have also planned to expand this analysis to a larger area, so as to cover the whole mangrove region and get a complete picture," says Rajojit Chowdhury, Ph.D. scholar at the university and the first author of the paper.

They also saw a change in the species distribution — salt-sensitive ones such as *Heriteira fomes, Xylocarpus* species and *Phoenix paludosa* were not able to cope up with the increase in the salinity and declined while the tolerant varieties thrived.

After understanding the state of the degraded region, the team started the bio-restoration process. "We initially stabilised the site of restoration by planting four native salt-tolerant varieties of grass. These grasses proved to exhibit the highest survival in the lower and middle intertidal zone. During the last five years (2014–2019) almost about one-hectare area of the degraded patch has been restored by the growth of these grasses," explains Krishna Ray, team leader of the Environmental Biotechnology Group of the university and corresponding author of the work.

The grass rhizosphere also provided a nutritive atmosphere to the colonizing mangroves because this root zone decomposes microbes and helps release more nutrients in the mudflat soil. In addition, these grasses also provided protection from high energy waves and subsequent erosion of soil. The team also used native plant growth-promoting bacteria to enrich the degraded land.

The team then established an on-site mangrove nursery and during each season collected mangrove propagules or buds and maintained in the nursery till transplantation. About 22 species of mangroves were restored in the region which included threatened, endangered and vulnerable species. High salt-tolerant varieties were planted near the shoreline and the moderate ones farther. The team notes that the present ecosystem in the studied patch is almost brought back to the original pristine condition.

"We have already identified many degraded mangrove patches in the western part of Indian Sundarbans and have planned to restore them by the application of this technology," adds Prof. Ray.

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