

Mangrove forestry only sustainable when conservation zones respected: Study

by Carolyn Cowan on 1 May 2024

- *The need to preserve mangroves and the ecosystem services they sustain, while also providing for the social and economic needs of the people who depend on them, is one of coastal conservation's greatest conundrums.*
- *New research based on long-term data from a mangrove production forest in Malaysia suggests that, in some cases, it is possible to reconcile mangrove protection with resource needs — but only when the correct management is implemented and enforced.*
- *The study highlights the need for well-protected conservation areas within forest production landscapes to boost natural forest regeneration, sustain wildlife and balance overall levels of carbon storage.*
- *The authors also warn that management models that seek to maximize profits at the expense of such sensitive conservation areas could undermine the resilience of the overall landscape and diminish sustainability over time.*

Mangroves are recognized globally for their impressive carbon storage potential (<https://www.nature.com/articles/ngeo1123>) and plethora of social and ecological benefits. Beyond their outside role in buffering the world against greenhouse gas

tropical forests also have a long history of exploitation. Mangrove timber has sustained local livelihoods for generations.

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Now, new research based on long-term data from a mangrove production forest in Malaysia suggests that, in some cases, it is possible to reconcile mangrove protection with resource needs — but only when the correct management is implemented and enforced.



Mangrove timber pile at a forest thinning site in Matang Mangrove Forest Reserve in Malaysia. Image courtesy of Behara Satyanarayana.

The study (<https://www.sciencedirect.com/science/article/abs/pii/S1617138124000311>), published in *Journal for Nature Conservation*, evaluated more than a century of 10-year forestry management plans from Matang Mangrove Forest Reserve, one of the world's longest-managed reserves of its kind, to investigate the drivers behind recent changes in mangrove biomass and productivity.

"Matang Mangrove Forest Reserve is a unique case demonstrating that mangrove exploitation does not need to result in degradation, or at least not within a century," Behara Satyanarayana, an associate professor at the University of Malaysia Terengganu and a co-lead author of the study, told Mongabay.

Spanning some 40,000 hectares (99,000 acres) of Peninsular Malaysia's west coast, 80% of Matang Mangrove Forest Reserve is managed on a 30-year cutting rotation for timber and charcoal production under the Perak State Forestry Department, while the remaining 20% is set aside for conservation. Besides serving as a natural seed bank for

endangered milky stork (*Mycteria cinerea*).

Timber poles from *Rhizophora* mangroves like those in Matang Mangrove Forest Reserve are in high demand in Southeast Asia and Africa, the study says, due to their durability, pest resistance and utility as a building material. Most of the timber poles produced at the reserve are distributed to local markets in Peninsular Malaysia and roughly 80% of its total charcoal production is exported to Japan for use in barbecuing, tea making and water purifying.



A charcoal kiln in Malaysia. Image courtesy of Behara Satyanarayana

Clearance of mangroves for charcoal and timber production has historically been one of the major drivers of the sweeping loss of these precious coastal ecosystems across Southeast Asia. While poor oversight and enforcement contribute to illicit deforestation in countries such as Myanmar, where huge areas of coastal forest have been illicitly cleared for charcoal (<https://news.mongabay.com/2019/04/illegal-charcoal-trade-threatens-myanmars-remaining-mangroves/>), sources say efforts to sustainably manage (<https://doi.org/10.1038/s41598-021-91502-x>) mangroves for timber in other parts of the region are paying off.

"Mangrove plantations in West Papua, Indonesia, for example, conduct rotational forestry operations in small patches and leave sufficient trees unharvested to ensure natural regeneration," Dan Friess, a professor of Earth and environmental sciences at Tulane University in the U.S., who was not involved in the new study, told Mongabay in an email.

levels of tree regeneration in the reserve. But they wanted to investigate why recent studies (<https://doi.org/10.3390/rs14122920>) of the reserve have indicated diminishing levels of mangrove biomass and ecosystem quality.

Several recent studies have documented reduced bird diversity and species richness in productive forest patches, for instance, as well as fewer crab species and fish growth impacted by pollution and habitat disturbance. To get to the bottom of why the mangrove system is struggling, the team scrutinized 115 years' worth of forest management plans dating between 1904 and 2019.



A mangrove thinning site at the Matang Mangrove Forest Reserve. Image courtesy of Behara Satyanarayana.

Concerningly, they found that over the past two decades, timber and charcoal yields have been sustained in part by encroaching into the environmentally sensitive protected areas of the forest reserve, where no harvesting should take place. Furthermore, other studies have indicated the margins of the reserve are under threat from a variety of pressures, including encroachment from oil palm plantations and illegal agriculture on the landward margins, and coastal erosion and aquaculture on the seaward side.

Given the increasing pressure on the reserve's conservation areas, the study authors call on the Forestry Department to increase the vigilance of its monitoring and mapping programs to help them assess and address the risks to Matang Mangrove Forest Reserve.

They also caution that the prevailing management approach that they say appears to be "inclined greatly toward the financial outcomes of timber-based products" at the expense of sensitive conservation areas could prove increasingly less sustainable over

Above all, the study highlights the importance of integrating and strictly protecting conservation areas within the overall production landscape. Doing so not only enhances natural forest regeneration in production areas, but also sustains local wildlife and balances out carbon sequestration levels across the landscape.

For Friess, the long history of management at Matang Mangrove Forest Reserve clearly demonstrates that if harvesting is done correctly, it can be possible to balance the sustainable management of mangrove resources with their ability to maintain other ecosystem services and biodiversity.

"While mangroves are a top conservation priority, they are also super important for people and local livelihoods," Friess said. "Sustainable forestry practices exist that can support both a healthy ecosystem, and local livelihoods and resource needs."



Debarked logs earmarked for charcoal production. Image courtesy of Behara Satyanarayana.

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Banner image: River transport of mangrove logs harvested in Matang Mangrove Forest Reserve destined for the charcoal kiln. Image courtesy of Behara Satyanarayana.

Citations:

Chen, D., Satyanarayana, B., Wolswijk, G., Abd Rahim, N. H., Amir, A. A., Hugé, J., & Dahdouh-Guebas, F. (2024). Historical ecological monitoring and appraisal for extractive uses and other values in Malaysia unveils consequences of regime shifts in 120 years of mangrove management. *Journal for Nature Conservation*, 79, 126582. doi:10.1016/j.jnc.2024.126582 (<https://doi.org/10.1016/j.jnc.2024.126582>)

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