Column 4

The Effect of Climate Change and Natural Disasters on Mangrove Forests in Xuan Thuy National Park: Proposed Adaptation Measures for Mangrove Forests

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Xuan Thuy National Park (XTNP), the first Ramsar site in Southeast Asia, is located in a low-lying coastal region in Nam Dinh Province of Vietnam. Most of the core zone of the XTNP is comprised of mangrove forests, which are inhabited by 222 indigenous and migratory bird species, 202 plant species, 386 invertebrate species, and 154 fishes (Fig. C4.1). Many of these species are rare, including nine endangered birds that are listed in the IUCN Red List of Threatened Species, have been recorded and sighted in the XTNP. The endangered birds are Western Curlew, Black-faced Spoonbill, Saunders's Gull, Painted Stork, Asian Dowitcher, Spoon-billed Sandpiper, Spot-billed Pelican, Nordmann's Greenshank, and Chinese Egret (MONRE 2020).

The XTNP supports several key mangrove plants species, such as *Aegiceras corniculata*, *Sonneratia caseolaris*, and *Kandelia obovata* (MONRE 2020). Mangrove forests in the XTNP also help to protect the sea dykes and provide livelihoods for thousands of people in the buffer zone of the park. However, due to the impacts of climate change, sea level rise, and other natural disasters, mangrove forests in many areas of the XTNP have been degraded.

Lecturers and students in the master's program in Climate Change and Development (MCCD) at VNU Vietnam Japan University conducted fieldwork and surveys in the XTNP in October 2020 (MCCD 2020). The results of the survey indicated that many mangroves were damaged or killed by coastal erosion and waves along a 7.5 km coastal stretch of the XTNP (Fig. C4.2). The direct impact of the erosion and strong waves reduced the amount of soil under the trees; the trees' roots lost their grip and the stumps moved. In addition, the high tides also brought sand from the ocean into the mangrove forests, which buried the roots of mangrove trees for extended periods and causing the death of the mangroves.

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Fig. C4.1 Mangrove forests in the XTNP

Fig. C4.2 Dead mangroves caused by coastal erosion and waves

The loss of mangrove forests in the XTNP may be linked to climate change and the increased incidence of natural disasters. Interviews conducted with national park leaders, local government leaders, local residents, and statistical data show that the number and intensity of typhoons and extremely hot days has increased in recent years in the XTNP (MCCD 2020). The natural disasters and extreme weather have led to branch breakage and tree death, and indirectly reduced resistance to pests and diseases, resulting in widespread degradation and the loss of natural recovery capacity (Tran et al. 2019).

As the XTNP is located in a low-lying coastal region, the park could be at risk from sea level rise. Research conducted by Nguyen (2019) indicated that mangrove forests in the XTNP could be inundated by 1 m or 2 m of sea water due to sea level rise, and the affected mangrove forests could disappear in the future. As shown in Fig. C4.3, if the sea level rises 1 m or 2 m, the area of mangrove forests could be reduced by 21% or 52.2%, respectively (Nguyen 2019).

Fig. C4.3 Impacts of sea level rise scenarios on mangrove forests in the XTNP (left: 1 m; right: 2 m sea level rise)

In conclusion, mangrove ecosystems in the XTNP are threatened by climate change and natural disasters. Large areas of mangrove forests may disappear in the future due to sea level rise. Some adaptation solutions for protecting mangrove forests in the XTNP include: (a) casuarina trees should be planted extensively on sand dunes outside of mangrove forests to protect mangroves and other species from coastal erosion, storms, waves, and sea level rise; (b) mangrove species that are more resistant to the effects of extreme weather and natural disasters should be planted to replace degraded mangrove forests, or planted on bare land; and (c) long-term strategies and plans prepared by the local government and leaders of the XTNP in relocating and expanding mangrove forests to higher-elevation areas in the north and west of the park in order to mitigate against future sea level rise and other disasters.

References

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