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ORIGINAL PAPER

Assessing the status of three mangrove species restored by the local community in the cyclone-affected area of the Ayeyarwady Delta, Myanmar

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Abstract This paper assesses the extent of success and failure of mangrove plantations in Myanmar, restored by local people with the help of foresters under a community forestry program initiated in 1995. The species of these restored plantations are *Avicennia officinalis*, *Avicennia marina* and *Heritiera fomes,* each of which was restored on two plots, one on low and one on high ground, yielding a total of six plots. These plots have been continuously monitored in order to investigate survival and growth rates. The plots were established on abandoned land that had been previously used for paddy cultivation. Cyclone Nargis hit these plantations during the monitoring period, at the beginning of May, 2008. As a consequence, the survival rates of *A. officinalis* on low ground and *A. marina* on high ground declined slightly, but the overall affect was not severe. Excluding individuals affected by the cyclone, height and diameter growth of *A. officinalis* and *A. marina* were significantly higher on low ground than on high ground, i.e. on sites thought to be consistently similar to the natural habitats of these species. Contrary to these two *Avicennia* species, the height growth of *H. fomes* was higher on high ground than on low ground; the diameter growth was not significantly different. As the growth of *H. fomes* was very slow, however, it is still not possible to describe the differences clearly. This study may provide useful guidelines for foresters and local people to establish successful mangrove restorations and to predict production from community-owned mangrove forests.

Keywords Restoration · *Avicennia officinalis* · *Avicennia marina* · *Heritiera fomes* · Ayeyarwady delta · Cyclone

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Introduction

Mangroves are a valuable economic resource, serving as important breeding grounds and nursery sites for birds, fish, crustaceans, amphibians, shellfish, reptiles, and mammals; a potentially renewable resource of wood; and accumulation sites for sediment, carbon, contaminants, and nutrients (Alongi 2009). Mangroves also offer some protection against coastal erosion and catastrophic events, such as tsunami. The average monetary value of mangroves has been estimated at $ 10,000 US ha^{-1} $year^{-1}$ (Costanza