Abstract. Big-leaf mahogany was studied on nine mixed-species stands that became established naturally between 2 and 75 years ago after catastrophic disturbances (hurricane blowdown, fire, or bulldozer clearing). More than 50% of adult big-leaf mahogany trees had survived a severe hurricane, leaving 2.8 seed trees ha\(^{-1}\). After fire, 29% to 100% of adult mahogany trees survived, leaving an average of 1.4 seed trees ha\(^{-1}\). Thirty or more years later, postdisturbance mahogany trees were found at densities of 18 ha\(^{-1}\) after fire, as compared to 6 ha\(^{-1}\) after a hurricane. In mixed-species aggregations, mahogany trees grew at densities as great as 47 trees ha\(^{-1}\), accounting for up to 10% of the individuals and 27% of the basal area. A chronosequence of postfire stands 15 to 75 years old revealed annual diameter increments ranging from more than 1 cm yr\(^{-1}\) between 15 and 30 years to 0.38 cm yr\(^{-1}\) between 45 and 75 years. Assuming constant growth, a big-leaf mahogany requires 122 years, on average, to reach the 55-cm minimum cutting diameter, although the fastest-growing trees may do so in 82 years. The current selective harvesting system, based on a 25-year cutting cycle,
cannot be expected to ensure sustainable harvests of big-leaf mahogany because extraction exceeds growth and adequate regeneration conditions are not provided. Harvest rates should be reevaluated and efforts made to increase the harvest of other species and implement silvicultural treatments, or shifting agricultural systems should be integrated into the forest management regime to provide for the regeneration of this valuable shade-intolerant species.

**Keywords:** Big-leaf mahogany, *Swietenia macrophylla*, Silviculture, Disturbance, Hurricane, Fire, Sustainability, Natural regeneration, Growth, Community forestry

**Introduction**

For centuries, the extraction of big-leaf mahogany timber has been one of the primary economic activities in the state of Quintana Roo, on México’s Yucatán peninsula (Fig. 9.1). Harvests have been maintained over this long period as changes in extraction technology and markets continuously redefined the mahogany resource. Between the seventeenth century and the early 1900s, the successive replacement of manual labor by draft animals and a combination of narrow-gauge railroads and crawler tractors increased the forest resource from a fringe of less than 100 m to a band 60 km wide along the Río Hondo, the perimeter of the Laguna de Bacalar, and other bodies of water in the region, along which logs were floated to ships or processing plants (Chaloner and Fleming 1850; Mell 1917; Record 1924; Lamb 1966; Napier 1973; Konrad 1988). Since then, road building and rubber-tired skidders have permitted logging of big-leaf mahogany from almost every area of the forest (Villaseñor 1958; Medina et al. 1968; Snook 1998).

Changes in markets have also contributed to maintaining big-leaf mahogany harvests. Until the 1940s, only select mahogany trees were harvested for the international log export market (Medina 1948). Huge trees were left standing because they were imperfect. From the 1950s to the 1980s, many of these trees were harvested for a local veneer mill (Medina et al. 1968). Now that big-leaf mahogany timber is being sawn locally into boards, trees of lower quality and smaller diameters can be processed. These changes in markets and transformation technologies have redefined the mahogany resource so that trees left behind in earlier logging operations—