

# Mangrove success in a changing environment

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The importance of mangrove ecosystems as an ecological and economic resource is now widely recognized. This has stimulated considerable research into some of the unique characteristics of this tidal swamp community, including: 1. determination of the role that mangroves play in the coastal marine ecosystem, 2. elucidation of the physiological mechanisms that account for adaptations to the extreme ecological stresses posed by the tidal environment, 3. quantification of the dynamics of stand structure and development of one of the worlds most productive ecosystems and, 4. assessment of the interaction between human society and mangroves, particularly in the less developed world. Underlying these research efforts is the recognition that mangrove ecosystems have suffered severe degradation and loss over the last century, with an accelerated destruction in many parts of the world in the last 2 to 3 decades. As for many terrestrial plant ecosystems, past events, both anthropogenic and non-anthropogenic, have had major influences on the success and long-term viability of populations, through modifications of genetic resources. Whereas much is now known of these influences on temperate forest tree species, relatively little is known about gene resources in tropical tree species and particularly for species of the tropical tidal swamps.

De-forestation has resulted in fragmentation of populations of mangrove species. Population genetics theory predicts that fragmentation would result in smaller populations, having reduced genetic diversity and higher levels of inbreeding, leading to expression of deleterious genes. Has genetic diversity in fragmented populations of mangroves declined? Are adverse effects of elevated levels of inbreeding being expressed in lower rates of productivity and in lowered resistance to pests, disease and pollution?

If predictions for climate change prove to be justified, mangrove populations should migrate pole-ward and landward (with respect to present positions). Successful colonization of the new environments will depend upon favourable ecological conditions and upon an adaptable gene pool. Are populations at today's latitudinal limits capable of providing the gene pool necessary for colonizing the new environments? How will mangrove community structure change, as some species are more successful than others in exploiting the new environments?

These questions are just a few among many that need to be addressed in the 21<sup>st</sup> century. Most mangrove communities are in less-developed nations of the world. These are the nations least capable of assigning limited economic resources to ecological protection and restoration. These nations are also among those for which changes in human demographics is resulting in rapidly increasing pressure on coastal resources. Here, conservation must be in the form of sustainable use, not of monocultures, but of functioning ecosystems capable of supporting the broad ecological web for which mangroves are valued and capable of their own evolution in a world of change.