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## Genetic diversity of black mangrove (*Avicennia germinans*) in natural and reforested areas of Salamanca Island Parkway, Colombian Caribbean

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**Abstract** The species *Avicennia germinans* in natural and reforested areas was analyzed to obtain information about its genetic diversity in a highly disturbed mangrove ecosystem and to generate a useful tool for determining the donor and receptor populations of propagules. Tissue of 149 individuals was collected in the protected areas of the Tayrona National Natural Park (Tayrona-NNP) and the Salamanca Island Parkway (Salamanca-IP). A total of 38 alleles were found in seven microsatellite loci, leading to the detection of high levels of heterozygosity in the two protected areas. The impact of the highway on the Salamanca-IP-south population was shown when the inbreeding coefficient from younger individuals was compared with older ones; inbreeding increased 4.2 times. The inbreeding coefficient in the reforested area was 2.2 times higher than that in the Salamanca-IP-south zone. Thus, for future reforestation in this area, the collecting of propagules should come from two sectors—one to the north of the highway including Tayrona-NNP and the other to the south. Finally, we consider that the viability of the reforested population in the short and medium term

would be improved if good reforestation practices are implemented for *A. germinans*.

**Keywords** *Avicennia germinans* ·  
Microsatellites · Genetic diversity ·  
Reforestation · Salamanca-IP · Tayrona-NNP

### Introduction

The mangrove ecosystems throughout the world are decreasing due to the constant conflicts over land use in the coastal regions. In Colombia, the change in land use and the hypersalinization of the soil have been occurring since the 1950s in the Caribbean zone (Sánchez-Páez et al., 1997). From 1956 to 1964, the Ciénaga-Barranquilla highway was built across the Ciénaga Grande of Santa Marta (CGSM) lagoon complex, which is located on the Caribbean Coast of Colombia and is bordered in the north by the Caribbean Sea, and in the southwest by the Magdalena River delta basin. In 1977, an underground polyduct was constructed, and it is assumed that these engineering works blocked the exchange of freshwater between the Magdalena River and the marginal lagoon system (VIPIS, 2004). The obstruction of the navigable channels between the sea and the CGSM, as well as the diminished water flow of the Magdalena River to the flood plains in the CGSM, has

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