

## An Overview on Mangrove Forests Distribution in Colombia: an Ecosystem at Risk

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### EDITORIAL

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Mangrove forests are an interdependent and unique ecosystem developed on saline soils, situated in the middle of tropical dry forest, freshwater wetlands, watersheds and marine ecosystems (López-Angarita et al., 2016). Mangroves, which strictly include 9 genera and 34 species (Lugo & Medina, 2014), play a very important role in the contribution of matter and energy to other systems, have a great value as evapotranspirators and natural CO<sub>2</sub> sinks, and are effective detoxifying agents (Lee et al., 2014; Polidoro et al., 2010). Mangrove forests constitute a refuge, a place of feeding and nesting of various species of insects, crustaceans, amphibians, reptiles, birds and mammals (Nagelkerken et al., 2008; Walters et al., 2008) and also play an important role in protecting the coast against erosion and flooding since slow down the energy of wind and impacting waves (Lee et al., 2014; Sandilyan and Kathiresan, 2015; Walters et al., 2008). Last, mangroves are the basis of the economy of many coastal regions and contribute US \$ 1.6 billion per year in eco-systemic services (Barbier, 2016; Giri et al., 2011; Hamilton and Casey, 2016).

Approximately 150,000 km<sup>2</sup> of mangrove forests exist worldwide, whose largest extensions are recorded in Asia (42%), Africa (20%), North and Central America (15%), Oceania (12%) and South America (11%) (Barbier, 2016; Giri et al., 2011). Annual rates of mangrove forests losses worldwide have been estimated at around 0.16% between 2000 and 2012. If this rate continues, mangrove forests

will lose their functionality in less than 100 years (Lee et al., 2014; Lewis, 2005; Rönnbäck et al., 2007). On the western side of South America, largest mangrove forests are located in the tropical zone of the Colombian Pacific coast and in northern Ecuador (Palacio & Cantera, 2017). Colombia is the only South American country with coastlines on the Pacific Ocean (1,200 km) and the Caribbean Sea (1,800 km) (Polanía et al., 2015). Precipitation and tidal patterns vary between these two coasts, along the Caribbean coast the average rainfall does not exceed 2,500 mm year<sup>-1</sup>, while heavy rains (>3,000 mm year<sup>-1</sup>) predominate along the Pacific coast. These conditions favour nearly continuous strips of mangroves along the Pacific coast, whereas in the Caribbean, this ecosystem is closely linked to freshwater sources (Polanía et al., 2015).

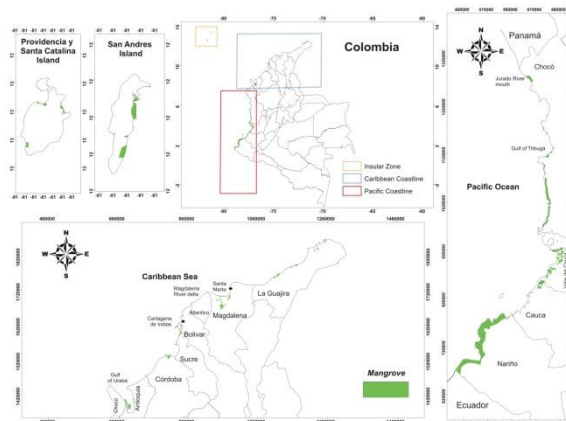
In Colombia, eight mangroves species are observed and cover an area of approximately 379,954 ha, with approximately 292,724 ha on the Pacific coast and 87,230 ha in the Caribbean coast (figure 1) (Palacio & Cantera, 2017).

In the latter, five species are observed (i.e., *Avicennia germinans*, *Rhizophora mangle*, *Laguncularia racemosa*, *Conocarpus erectus* and *Pelliciera rhizophorae*), which form different forests; the most healthy one is located in the Department of Córdoba and the largest one at the delta of the Magdalena River and, last, they are also recorded at the Archipelago of San Andrés, where they have a small coverage (Casas-Monroy, 2000). Along the Caribbean Coast, the most studied and extended mangrove forest is located in the lagoon complex (named “Ciénaga Grande”) of Santa Marta (figure 2), which is sadly famous for the loss of more than

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half of its mangroves extension since the 1950s (equivalent to > 25,000 ha) and the unfruitful efforts carried out to recover this ecosystem (Polanía et al., 2001 and 2015). Species along the Colombian Pacific coast include those observed in the Caribbean coast as well as *Rhizophora harrisonii*, *R. racemosa* and *Mora oleifera* (Andrade et al., 2002; Álvarez-León, 2003). At the Colombian Pacific coast, mangrove forests are developed at the Jurado River mouth, at the Gulf of Tribugá and in the southern area of the department of Chocó and, especially, at the departments of Valle del Cauca and Nariño, close to Ecuador (Casas-Monroy, 2000). Colombia, with 18% of the region's mangrove cover, exhibited, for the 2000-2005 period (Blanco et al., 2012), the largest annual deforestation rate (0.6%) versus the average value (0.18%) recorded at the other eight South American countries that have mangrove forests. It is estimated that in the last 30 years approximately 40,000 ha of mangrove forest in Colombia have been altered by activities such as the construction of roads, docks, tourist infrastructures, expansion of

urban, agricultural and industrial borders, pollution by hydrocarbons, plastics and deforestation (Valero et al., 2011, Blanco et al., 2012). According to Blanco et al. (2012), the Urabá Gulf represents a deforestation hotspot since in 2003 it presented an extension of 6,993 ha and, in 2009, it covered only an area of 4,908 ha, with a reduction of 2,085 ha at an average rate of 4.9%/yr. Blanco et al. (2013) established that the mangroves in the Uraba Gulf are mainly being affected by the increase of cultivation areas and its conversion into paddocks carried out by different actors, with various economic motivations. On the other hand, Lema and Polanía (2006) established that one of the factors associated with the loss of regeneration capacity of the mangrove forest in La Guajira was the continuous use of the forest to feed goats and sheep. The protection of mangrove forests should be a priority for the Country since its destruction in Colombia gives rise to the loss of the multiple benefits that this ecosystem offers to the Nature and to human beings, such as its important function in the adaptation strategy to global climate change processes.



**Fig1.** Distribution of mangrove forests in Colombia. Modified from “Informe del estado de los ambientes y recursos marinos y costeros de Colombia 2017” (<http://www.invemar.org.co/inf-ier>, accessed January 2019).



**Fig 2.** Aerial view of mangrove forest at Ciénaga Grande, a protected area at the Magdalena River mouth.

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