

Health of mangroves and landing crab in Brazilian Ramsar site and its surroundings

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The southeast-southern region of Brazil holds one of the most contiguous fragments of the Atlantic rainforest. This region has scattered mangroves protected by several conservation units, building a mosaic of Protected Areas called Lagamar across two federal states: São Paulo and Paraná. Since 2017 the area is recognized as a Ramsar site (number 2305). Despite their importance for the health of the coast and the ecological connection between mangroves and the two states, the mangroves have been monitored only in São Paulo. The vegetation is composed of *Rhizophora mangle*, *Avicennia schaueriana*, and *Laguncularia racemosa*, and harbors several endemic species such as *Ucides cordatus*, a landing crab that builds burrows and feeding on mangroves leaves, aerating the sediment and contribute to the nutrients cycle.

In this study, we presented the main results from two years of mangrove monitoring in Paraná state (25°30'S), specifically in three well-conserved sites inside protected areas (ESEC, PARNA, RPPN), compared with an urban site (PGUA), close to one of the major Brazilian ports and a city with the inadequate sewerage system. Plant patterns along with density and size of landing crab (*U. cordatus*) were evaluated as an indicator of the degree of site conservation. For vegetation assessment, 16 permanent plots, along four transects were delimited in mangrove forests. Data of mangrove species, Diameter at Breast Height (DBH), and height of mangrove trees were collected in March 2019 and October 2020. Thereafter, average DBH, relative density, and relative dominance of alive and dead trunks were calculated. An optical refractometer was used to verify interstitial salinity in sediment samples, which were collected at 10 cm and 50 cm depths. The size of crabs was estimated by the width of the burrow's opening, converted into animal sizes by a regression equation, whereas its density was estimated inside ten 25m² plots in each site, at the fringe and the basin of mangrove forests. The immediate extractive potential of this economically important species was also calculated by the fraction of the population with sizes larger than the minimum allowed for capture (Carapace Width > 7 cm). The three mangrove vegetation species in the study areas were recorded, and according to the environmental factors of each transect, a given plant species was dominant. In 2019, the dominance of the basal area of dead trunks did not exceed 20%, over the four transects studied. According to the literature, conserved mangroves monitored in permanent plots on the southeastern coast of São Paulo (25°02'S) show a similar result, indicating a good state of conservation, considering vegetation approach. In 2020, there was an increase of 40% in the dominance of the basal area of dead trunks in the mangroves of the fringe inside one transversal (PARNA1), due to an extreme event that occurred on 1 July 2019. According to interstitial salinity, the results at 10 cm depth ranged from 16 to 26 ppm, while at 50 cm depth they ranged from 18 to 26 ppm. The salinity results were similar to those found in the permanent plots studied in the conserved areas of Cananéia (São Paulo coast). The densities of landing crabs were higher in legally protected mangroves, just like the largest animals, and high values of immediate extractive potential. The minimum extractive potential was found at PGUA, with less than 5%, and the maximum at RPPN with 80%. It is possible to observe as a preliminary result that mangroves in protected areas present better

conditions, both in aspects related to the mangrove forest and concerning landing crabs population. It demonstrates the need to continue monitoring the areas and values the importance of regional protected areas.

Keywords: Integrated monitoring; Permanent plots; Crab population; Conservancy; Protected areas