

sustained damage, they later showed recovery visible as sprouts on bare trees and seedlings on the ground. Natural stands (of *Sonneratia alba* and *Avicennia marina*) generally showed less damage and greater recovery compared to plantations (of *Rhizophora* spp.), so priority should be given to protecting the former. Moreover, science-based protocols of planting the right species (*S. alba* and *A. marina*) in the right sites (middle to upper intertidal) should be followed in rehabilitating the few devastated areas. The default mode of government and NGOs alike of planting *Rhizophora* on seagrass beds – more for convenience than ecology – should be stopped. With increasing storm frequency and intensity associated with climate change, there is need to maximize protection by coastal vegetation. Energy reduction of wind and swell waves by 13-60% and 50-99% will require greenbelts 100 m and 500 m wide, respectively (McIvor et al, 2012). Coincidentally, a 1986 government regulation requires the expansion of mangrove greenbelts from 50 m to 100 m along shorelines in storm surge areas. A mangrove band of only 20-50 m can be rehabilitated in most seafront areas due to a steep intertidal slope caused by continuing erosion. Therefore the required 100-m band can be completed by restoring supratidal beach forests which can tolerate salt spray, strong winds, low nutrients, and grow up to 200 masl, making them suitable for lowland reforestation as well.

15.30 POSTER SESSION (TEA/COFFEE)

16.00 Costa Rica Térraba-Sierpe Ramsar site: successes and challenges of mangrove conservation through ecotourism

Daisy Arroyo Mora, Universidad de Costa Rica, Costa Rica

Email: darroyom.ucr@gmail.com

Privileged by its geographic position, CR is home to 5% of the world's biodiversity within its 51.000km². This treasure is protected by the National System of Conservation Areas, and represents 26% of the total land area. Thanks to its extensive mangroves, Térraba-Sierpe was recognized as a National Wetland in 1994 and a Ramsar site in 1995. Located in the Southern Pacific it safeguards two major areas bordered by the Sierpe, and Térraba rivers, and has characteristic tropical plants and animals. The Southeastern wetland (9723.5 ha) comprises a unique lacustrine palustrine vegetation, while the Northwestern area (14637 ha.) is mostly composed of the largest mangrove in the country (6 species and 4 families). The South Pacific area is also a socioeconomically depressed area with the fewest job opportunities in the country. Most economic activities include extensive agriculture activities (oil palm, banana, rice and extensive livestock), tourism, fishing, and occasional work. Among fishers, there are three groups that belong to different counties and represent more than one hundred men and women (with families: approx. 4000 people); these groups fish and collect bivalves of commercial value.

To achieve social and ecologically sustainable conservation objectives, our project TC-581 offers environmental education to school children, youths and organized groups, and promotes alternative economic activities. A multidisciplinary group facilitates community characterization, organization and management through home surveys, workshops and activities. Subsequently with the project ED-3025, ecotourism training started in 2013 with two of the groups. All sessions with fishers were undertaken in their local meeting places and the methods included active and participatory teaching strategies considering their low education level. The topics were: tourism legislation, concepts and types of tourism, types of tourists and guides, heritage tourism, attitudes and conflict management with visitors, processing and components of a tour, a map and a tour, environmental interpretation, assertive communication, leadership, technical guidance and customer service, mainly.

To date, a total of 18 workshops and three field practices have been developed in Ajuntaderas, and 14 workshops and one practice in Coronado, with an average of 16 participants per group. Many benefits have been obtained: fishers are much more aware of the importance of

skills to use the available resources in an appropriate way through conservation and wetland protection and reforestation; they have improved their communication skills and contributed in the rescue of traditions, and they now report practices not allowed in the wetland. They have also recognized the advantages of teamwork, and improved tourism research and sustainability issues. They have also provided folk knowledge useful for the creation of new materials for mangrove tours. There is a positive empowerment of the groups and their training should continue in coordinated support from governmental/non governmental organizations. Ecotourism practices have formed a valuable path to reach sustainable integrated conservation of the wetland.

Co-author: Stefany Forester Delgado, Universidad de Costa Rica, Costa Rica

- 16.30 PANEL DISCUSSION**
- 17.30 POSTER SESSION with cash bar. Symposium end of day one (18.45)**
- 19.00 SYMPOSIUM DINNER – tickets to be booked in advance**