

## The assessment of human impacts on the distribution patterns of mangroves: a comparative study between the Rewa and Ba delta, Fiji

\*Masahiko Fujii<sup>1</sup>, Jone Ravuci Sassen<sup>2</sup>

1. Faculty of Environmental Earth Science, 2. Graduate School of Environmental Science

Mangrove ecosystems are among the most productive ecosystems on this planet. They are sources of livelihood to many people, the first walls of protection from storm waves, and nursery grounds for some marine organisms. Unfortunately, mangroves in Fiji are observed to have decreased over the years due to human (induced) activities. Moreover, apart from human impacts, there are several other natural impacts like tropical cyclones that may influence the distribution patterns of mangroves. The aims of this study are: (1) to elucidate changes of the distribution patterns of mangroves and the causes, and based on the results, and (2) to provide practical suggestions for sustainable use of mangroves and saving the ecosystems in Fiji.

To estimate changes in the area of mangroves, satellite imagery data from Landsat 7 and 8 were acquired and analyzed by using Geographic Information System (GIS) to produce land use classification maps for the Rewa delta (in 2002, 2005, 2016 and 2017) and Ba delta (in 2004, 2007, 2010 and 2017) in Fiji. A total of five land cover classes, i.e. mangrove, non-mangrove, urban, barren land, and water were used to classify the land cover. To elucidate causes of the changes in the area of mangroves, social survey was conducted in three villages of Kiuva, Muana I ra and Kinoya in the Rewa delta and three villages of Natutu, Nawaqarua and Votua of the Ba delta, respectively.

The trend in distribution patterns of mangroves was different between the study sites. In the Rewa delta, the area of mangroves has increased from 2002 to 2016 and decreased by 5 km<sup>2</sup> from 2016 to 2017. In Ba delta, on the other hand, the area decreased from 2004 to 2007, increased from 2007 to 2010, and again decreased from 2010 to 2017. The difference is considered to be caused by the difference in the dependency of people on mangrove ecosystems in the two sites, i.e. higher dependency on mangrove ecosystems for livelihood in the Ba delta with less access to urban centers than in the Rewa delta. Impacts of tropical cyclones and subsequent floods to mangrove ecosystems were also examined as possible climate change stressors, but the impacts were not found clearly in this study.

This study suggests that anthropogenic factors have continuously been major causes of mangrove degradation in Fiji. Mangrove protection in Fiji can be improved firstly by raising people's awareness on the importance of mangroves to their lives. Secondly, amendment of current legislation might administer the protection of mangrove ecosystems by broadening its scope to monitor the domestic use as well as the commercial use of mangroves. Furthermore, mangrove areas are also required to be designated as "protected areas", which can be an effective way to guard mangrove ecosystems from human impacts.