

Assessment of Mangrove Ecosystem Services in the Mekong Delta, Vietnam, based on Remote Sensing and Household Surveying

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ABSTRACT: The Mekong Delta in Vietnam is an area experiencing the negative effects of rapid urbanization and industrialization, as well as climate change; the latter mainly expressed via ongoing sea level rise. Sea level rise in the Mekong Delta leads to increased flood danger from the ocean side (especially during typhoons), increased coastal erosion, land-inward directed salinization of river water, soils, and aquifers, as well as the need for climate change adaptation and mitigation measures. Mangrove ecosystems along the coast of the Mekong Delta – as they can be found in the provinces of Kien Giang, Ca Mau, Bac Lieu, Soc Trang, Tra Vinh and Ben Tre – have an immense value for coastal protection of the provinces exposed to the ocean's forces. The concept of ecosystem services postulates that ecosystems have direct and indirect use values. For mangroves direct values result from economic trade of the local people with mangrove wood, or medicinal products amongst others; indirect use values characterize the mangrove's function as coastal protection barriers reducing erosion, acting as water filters, breeding places for fish and shrimp, and places fostering eco-tourism. In many studies worldwide it could be demonstrated that ecosystems are more likely to receive protective status through government decisions, if the actual value of an ecosystem can be depicted. Here remote sensing is a powerful tool. We combine the analyses of remote sensing data with the statistical analyses of household surveys to create ecosystem value maps. Based on SPOT-5 optical and TerraSAR-X radar data, precise maps of mangrove distribution (even differentiating individual species) and mangrove-aquaculture fragmentation were created. The resulting classifications, for which the TWOPAC approach (Twinned Object and Pixel based Classification Chain) was used, were validated via in-situ field sampling. Furthermore, statistical analyses of direct and indirect values of mangrove ecosystems were performed for over 300 households surveyed during field campaigns, based on a questionnaire with over 150 questions. These two pillars were used for the derivation of a model to retrieve relative and quantitative value maps of the mangrove ecosystems along the Mekong Delta coast. In our contribution we will present all the above mentioned, and in depth the remote sensing data processing undertaken – including geo- and atmospheric correction, TWOPAC sampling, segmentation, classification, validation, and combination with the statistical data.