

Application of Sentinel-2 Data to Evaluate the Role of Mangrove Conservation and Restoration on Aboveground Biomass

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Abstract : Mangroves are forest ecosystems located in the inter-tidal regions of tropical and subtropical coastlines that provide many valuable economic and ecological benefits for millions of people, such as preventing coastal erosion, providing breeding, and feeding grounds, improving water quality, and supporting the well-being of local communities. In addition, mangroves capture and store high amounts of carbon in biomass and soils that play an important role in combating climate change. The decline in mangrove area has prompted government and private sector interest in mangrove conservation and restoration projects to achieve multiple Sustainable Development Goals, from reducing poverty to improving life on land. Mangrove aboveground biomass plays an essential role in the global carbon cycle, climate change mitigation and adaptation by reducing CO₂ emissions. However, little information is available about the effectiveness of mangrove sustainable management on mangrove change area and aboveground biomass (AGB). Here, we proposed a method for mapping, modeling, and assessing mangrove area and AGB in two Global Environment Facility (GEF) blue forests projects based on Sentinel-2 Level 1C imagery during their conservation lifetime. The SVR regression model was used to estimate AGB in Tahiry Honko project in Madagascar and the Abu Dhabi Blue Carbon Demonstration Project (Abu Dhabi Emirates). The results showed that mangrove forests and AGB declined in the Tahiry Honko project, while in the Abu Dhabi project increased after the conservation initiative was established. The results provide important information on the impact of mangrove conservation activities and contribute to the development of remote sensing applications for mapping and assessing mangrove forests in blue carbon initiatives.

Keywords : blue carbon, mangrove forest, REDD+, aboveground biomass, Sentinel-2

Conference Title : ICEESD 2024 : International Conference on Ecosystems, Environment and Sustainable Development

Conference Location : Melbourne, Australia

Conference Dates : February 01-02, 2024