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Mangrove health assessment using spatial metrics and multi-temporal remote sensing data

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Abstract

Mangrove forest plays a very important role for both ecosystem services and biodiversity conservation. In Vietnam, mangrove is mainly distributed in the Mekong delta. Recently, mangrove areas in this region decreased rapidly in both quality and quantity. The forest became bare, divided and scattered into many small patches, which was a major driver of ecosystem degradation. Without a quantitative method for effectively assessing mangrove health in the regional scale, the sustainably conserving mangrove is the challenge for the local governments. Remote sensing data has been widely used for monitoring mangrove distributions, while the characterization of spatial metrics is important to understand the underlying processes of mangrove change. The objectives of this study were to develop an approach to monitor mangrove health in Mui Ca Mau, Ca Mau province of Vietnam by utilizing satellite image textures to assess the mangrove patterns. The research result showed that mangrove areas increased double by 2015, but the forest had become more fragmented. We can be seen those changes in land use mainly come from land conversion from forest to shrimp farms, settlements areas and public constructions. The conserving existing mangrove forest in Mui Ca Mau should consider the relations between mangrove health and influencing factors indicated in the manuscript.

Introduction

Mangrove forests are among the earth's most diverse and dynamic ecosystems [1]. They offer various ecosystem services and economic values in stabilizing shorelines, coastal habitat and biodiversity protection for marine and pelagic species, coastal protection from storm surges, fisheries and forestry products such as fuel, medicine, and food for local communities [2]. Despite their importance, mangrove forests have been rapidly disappearing at an alarming rate across the globe—at least 23% of mangrove forests have been lost in the past two decades [3].