

Application of Optical and SAR Microwave data for Mapping and Monitoring of Part of Coastal Area of West Bengal with Special Emphasis on Sundarbans Mangroves

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ABSTRACT

Coastal zone is the transitional area between land and sea. It includes highly productive and biologically diverse ecosystems. One of the most important and productive ecosystems of coastal zone is mangrove ecosystem. The study was carried out in the part of West Bengal coast using optical as well as microwave SAR data.

Through visual interpretation of Landsat 5 TM 1998 data, the geomorphology of the study area has been interpreted. This is composed of 4 main units like, alluvial, mixed / transitional, coastal, marine under which different classes like sea water, estuary / creek, river channel, channel deposit, beach, alluvial plain, coastal alluvial plain, dune complex, mud flat, salt flat, mangrove swamps has been identified.

IRS P6 LISS III data has been classified using supervised classification to produce the land use – land cover map of the study area. Different coastal land use – land cover elements were characterized in relation to ENVISAT ASAR multipolarization (VV, HH, and HV) amplitude data. From this study it has been concluded that, the mapping potential of individual land use – land cover classes from Envisat ASAR HH polarization backscattered amplitude image is highest.

An attempt has been made to distinguish major communities of mangroves of the study area, based on satellite data. The aim of the study was to develop a community zonation map through supervised classification using IRS 1C LISS III and IRS P6 (Resourcesat) LISS III optical data and to characterize the mangrove forest communities of the area in relation to ERS SAR and Envisat ASAR data. Finally it has been concluded that, among ERS SAR amplitude and coherence and Envisat ASAR amplitude images (VV, HH and HV polarization), HH polarization amplitude image has best potential and therefore, is best suitable for the mapping individual mangrove community classes.

Mangrove forest canopy density of the study area has been determined from Landsat TM, 1998 using FCD Mapper software. These forest canopy density classes were characterized in relation to ERS SAR average amplitude and coherence image. It has been concluded that, the

mapping potential of individual forest canopy density class from coherence image of ERS SAR tandem pair is highest.

Using supervised classification the mangrove forest was classified from IRS P6 LISS III data. It was possible to classify only two groups viz., medium height mangrove (5 – 9 m) and Low height mangrove (< 5 m). These mangrove height classes has been characterized in relation to Envisat ASAR multipolarization (VV, HH and HV polarization) amplitude images. As far as theory is concerned, VV polarization usually gives better separability of different height zones, but from this study it has been seen that, Envisat polarimetric (VV, HH, HV) data has no mapping potential of individual mangrove tree height classes.