Mangrove Area Change Analysis for Coastal Environmental Management in Hai Phong city, Vietnam using Remote Sensing and GIS.

ベトナム・ハイホン市の沿岸環境管理のためのリモートセンシングと GIS を用いたマングローブの面積変化の解析

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Mangroves play an important role in protecting dyke systems and defending against the impact of big storms. However, these forests are under severe threat due to rapid population growth, insufficient governance, poor planning, as well as uncoordinated economic development. Hai Phong city is located on the Northern coast of Vietnam, where the mangroves are distributed within zones II and I; of the four mangrove zones in Vietnam. This city is vulnerable to rising sea levels associated with climate change and tropical cyclones, which are forecasted to become more prevalent and stronger as climate change intensifies.

This study analyzes mangrove change in Hai Phong city, Vietnam from 1989 to 2010 using different satellite sensors including optical and SAR imagery and examines the driving forces of these changes as well as proposes better mangrove conservation and management. The findings of this research showed that mangrove loss in Hai Phong was approximately 985 hectares and the annual rate of this loss was 50 hectares. The overall accuracy of satellite imagery processing for the years 2006/07 and 2010 were 89%, 82%, and the Kappa coefficients were 0.87 and 0.79, respectively.

A logistic regression model and field survey data were used to ascertain the driving forces of mangrove change. The results indicate that implementation of mangrove management instigated by the authorities, community or local people has affected mangrove change. In addition, the main driving factor of mangrove degradation in Hai Phong is over expansion of shrimp aquaculture. A typical example could be found in Trang Cat commune, Hai An district, the average size of shrimp ponds, where expansion is controlled by the local people, was approximately 12.81 hectares. This number is over 53 times higher than in Bang La, which was mainly converted from salt ponds. Extensive aquaculture in the former case is the main method of farming which provides low net benefits whilst the improved shrimp culture in the latter case brings higher net benefits. Local people in Bang La also cultivate jujube and tomatoes to sell in the market in order to ensure their livelihoods. Mangrove plantation programs funded by mainly Japanese organizations help the poor guarantee their lives in Bang La. In Trang Cat, the poorer households would like to participate in mangrove conservation more than richer families. On the other hand, in Bang La the upper and rich families engaged in mangrove plantation programs more extensively than the middle and the poor did. The poor families in Bang La were more dependent on mangrove forest.

Mangrove rehabilitation programs in Bang La have been successfully managed thanks to community-based forest management in cooperation with local authorities. The failure to convert shrimp ponds from mangrove forests is recorded clearly in Trang Cat. This commune needs to replant mangrove in abandoned shrimp ponds and follow the mangrove management mechanism used in Bang La.