MANGROVE CHANGE IN THE MEKONG DELTA BY USING LANDSAT DATA Tran Thanh Dan and Susumu Ogawa

Department of Science and Technology, Graduate school of Engineering, Nagasaki University, Japan Email: ttdan@ctu.edu.vn; ogawa susumu phd@yahoo.co.jp

Abstract

In the three past decades, land cover has changed in the Mekong delta, Vietnam with difficulty for stable and sustainable management. Therein, mangrove has significant changed during that period. Mangrove changed due to conserve mangrove forest to shrimp pound and coastal erosion. To contribute better management for mangrove and coastlines in the area, this research used Landsat data to detect changes in mangrove from 1991 to 2015. The results showed the largest changes: bare land to mangrove with 11607.3 ha (6.7%), agriculture to mix mangrove and shrimp pound with 4.9% (8418.8 ha), and 4.5% (7806.1 ha) to mangrove. However, mangrove was conserved to mix mangrove and shrimp pound with 3.1% (5402.2 ha), and it was lost by 4683.6 ha (2.7%) due to erosion. Hence, the results would assist the local government having appropriate adjustment for the land use planning under climate change condition.

Keywords: Coastline erosion, Climate change, Mekong delta, Mangrove detection, Landsat data

1. Introduction

The Mekong delta is one of the largest delta in Southeast Asia. It is known as one of the widest and richest delta in Vietnam. It is considered as the biggest granary of Vietnam (the second one is Red River delta in the North of Vietnam) and it provides 60% of domestic rice. However, the Mekong delta was faced with many challenges under climate change conditions. Thus, our objective was monitoring and detecting changes in mangrove in the Mekong delta under economic and climate change conditions. The results provided important information for the local government to make a decision for land use planning in the future.

2. Methods

This research was used Landsat data from 1991 to 2015 to interpret land uses in the Mekong delta. The land use maps, the administrative map and ancillary data were used for validation of classification results. The data was processed through out four main steps: (1) data pre-processing, (2) image classification, (3) accuracy check, and (4) change detection.



Fig. 1 Study area. a) Vietnam map, b) Mekong delta Administrative map, and c) Landsat data in 2015.

3. Results and Discussion

Fig. 2 shows land cover maps which were interpreted from Landsat data in 1991, 2001, and 2015. The result classified into urban, mix shrimp-mangrove, shrimp, mangrove, cultivation, water bodies, mix built up-fruit tree, bare land, and cloud. The overall accuracy was 81.1% and kappa coefficient was 0.68 in 2015. The accuracy check was not so well agreement compared with classification results and the ground truth data due to image quality and ancillary data (land use maps).





As the results, the land covers were changed from 1991 to 2015, and the most changed was agriculture, bare land and mangrove. During the research period, agriculture was changed to shrimp pound about 7.7% (13260.9 ha), and mix mangrove and shrimp and 4.9% (8418.8 ha), respectively, while mangrove was changed to mix mangrove and shrimp about 5402.2 ha (3.1%). Moreover, mangrove was lost about 4683.6 ha (2.7%) due to the coastal erosion.









From 1991 to 2015, because of economy, native people changed land uses from agriculture and mangrove forest to shrimp ponds or mix mangrove and shrimp pound in this area. Moreover, the coastline was directly and indirectly effected by the erosion. Thus, about 4700 ha of the coastal area disappeared during three past decades. Besides, the government's budget was limited. Hence, it was difficult to protect the coast. The spatial changes of coastlines is shown in Fig. 4.

4. Conclusions

This research demonstrated that Landsat data could be used to detect land uses, land covers in the zone scale, especially the Mekong delta. The result showed agreement with the overall accuracy of 81.1% and Kappa of 0.68. Bare land and agriculture was the most changed, followed by mangrove. Research results would provide important information for the local government for their decision on land use planning. Hence, freely Landsat data could be applied to other regions.

References

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