

**Land and water management in Southeast Asia for the sustainability of the society;
An analysis of change in land-use and its integration into land and water management**

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Objective

Soil erosion and sedimentation have a number of significant impacts on agriculture and are therefore the principal body of land management. The Asian Development Bank in 2002 expressed concern in their Environmental Policy in 2002 that 'Soil erosion is Asia's most serious natural resource problem, and is equally severe in Southeast Asia, South Asia, and the People's Republic of China.' Some social scientists have argued that there is an insufficiency of scientific assessment on such troublesome soil erosion and offsite sedimentation. They claim that scientific analyses that disaggregates the soil erosion and sedimentation processes are required to see where problems are caused and how they may best be addressed. Encouraged by the need for research identified by those social scientists, the author, in a previous study, has reconstructed sediment budgets in a catchment of a lake (Lake Inle) in southern Shan State, Myanmar, to disaggregate the soil erosion and sedimentation processes. This study focuses on the change of land-use of the lake catchment and combines results with those, particularly on sedimentation rates, of the former study.

Method

Landsat MSS data in 1973, Landsat TM data in 1989, and ALOS AVNIR-2 data in 2008 were used for the analysis. An analysis was made by producing false color images and calculating the normalized difference vegetation index (NDVI).

Results

False color images show vegetation in the catchment had been already cleared extensively by the time of 1973. Vegetation cover generally decreased from 1973 to 1989, but slightly increased from 1989 to 2008, although differences of resolution may have affected the color expression. Results of the NDVI calculation indicate similar characteristics of the false images. Dense vegetation cover is observed only in limited areas in 1973. A slight, gradual increase can be found from 1973 to 1989, and also from 1989 to 2008; however, the use of extensive areas most probably for agriculture has not been changed since 1973.

Discussion

Although signal corrections, necessary to remove a series of effects (e.g. atmospheric and soil effects) that alter the original reflection signals or reflection characteristics of materials, did not perform, it is still clear that overall land-use in the catchment has not been significantly changed since 1973. The former study on sediment budgeting reported that temporal changes of the sedimentation rates in three cores (river mouth, marsh, and delta) showed higher sedimentation rates over the last 50 years compared to those in the previous period. Qualitative observation further suggests sedimentation rates have been accelerated even within the last 50 years. If this is the case, land-use history and sedimentation history do not agree because accelerated sedimentation rates are thought to be basically a consequence of an acceleration of soil erosion rates, which is, particularly in the case of mainland Southeast Asia, normally caused by land-use change (i.e. deforestation). This disagreement seems to tell us an important nature of soil erosion and its relationship with land-use change: soil erosion as a site-specific process. Acceleration of sedimentation is not necessarily attributed to change of catchment-scale land-uses.

(This study is under preparation for publication with additional land-use analysis.)