

Monitoring Land Use Change in the Densu River Basin, Ghana Using GIS and Remote Sensing Methods

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ABSTRACT:

Population growth and increasing development pressures are rapidly transforming the river basins across Sub-Saharan Africa. Planning decisions to monitor these landscapes and develop sound environmental management practices will require access to geo-technologies that permit the compilation of multi-date data for land use inventories and detection of change across space and time. This study demonstrates the functionality of these tools using multi-temporal satellite images, 1990 and 2000, acquired for the Densu River basin in Ghana. Change detection methods, based on image differencing and image regression, were used to evaluate the rates of change and identify the areas of significant change over the ten year period. The results show that residential land uses grew substantially during the study period, accounting for nearly two-thirds of the observed changes that occurred in the river basin. The expansion, involving farmland conversion, occurred mainly around Accra and its peri-urban areas. The analysis also confirms the conversion of agricultural land uses from tree crops to food crop farming to meet the demands of the burgeoning urban population. Overall, the findings demonstrate the growing importance of remote sensing and GIS approaches in tackling land use problems in Sub-Saharan Africa.

INTRODUCTION

Land use change within watersheds and the factors that continue to drive them are lingering areas of concern within the Sub-Saharan region of Africa. Over the years, several authors have acknowledged the increasing impacts of anthropogenic activities within the region and the environmental, social and economic consequences that far outweigh the benefits to local communities (Lambin et al. 2003; Kasperson et al. 1997; and Turner 1994). Among the adverse consequences of such activities are land degradation, biodiversity loss, depletion and pollution of water resources, food insecurity and global climate change.