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Detection of the Extent, Distribution, and Use Patterns of Small Wetlands in East Africa by Remote Sensing

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Abstract

Small wetlands are estimated to cover some 15–45 million hectares in East Africa. With demographic growth and emerging land shortages, these wetland areas are viewed as potentially productive alternative sites for crop production and are increasingly converted from natural vegetation into agricultural land. Documentation of these resources is crucial because of their role in the ecosystem and for the livelihoods of people. However, their area extent and distribution, and their share under agricultural land use are largely unknown. Surveying and mapping of small wetlands requires high spatial resolution data. Such data are unavailable for the small wetlands of East Africa in particular. We studied all wetlands of <500 ha within four pre-selected 16 km² areas, located in the Usambara highlands and the Pangani flood plain in Tanzania, and the Mount Kenya highlands and the Laikipia flood plain in Kenya. Data obtained from aerial photographs, field mapping and Rapid Rural Appraisal were complemented with time series satellite imageries to identify, characterise and detect changes in these wetlands. An automated spectral mixture classification of the landsat data allowed a rough differentiation of pristine wetlands from cultivated areas. A more detailed differentiation of various land use types and crops was achieved by a manual classification based on aerial photographs. The detection and quantification of wetland cover, the current use, as well as land use change and its key driving forces will be presented for selected wetlands. The mapping work on the one hand and the improved understanding of change processes on the other hand is seen to contribute to a decision support for a sustainable use of wetlands.

Keywords: Aerial Photography, Kenya, Land use, Landsat, Tanzania