Acquiring geodata for coffee mapping using remote sensing data based on a pilot study in the Mbinga district Tanzania

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With 3 figures and 3 tables

Abstract: Remote sensing offers several possibilities for extracting geodata from the environment and its vegetation. It is especially useful for regions that remain unmapped or have undergone major geographical transformations. The former is the case in many rural agricultural areas of Tanzania where the landscape is dominated by small-hold farming. Mbinga, which lies in southern Tanzania, is a fast growing coffee region. However, data about coffee production in this area is scarce and there are no current maps available which are up to date. In order to improve coffee farming and planning, it is necessary to find an effective and reliable method for gathering data on coffee production in the region. This will be done by comparing GeoEye and RapidEye satellite imagery and applying remote sensing tools. A supervised and unsupervised classification will be applied on each image using ERDAS IMAGINE software. An accuracy assessment comparing groundtruth data with the classification results, reveals that the highest overall accuracy of 80.71% was achieved using the RapidEye imagery, whereby a supervised classification with the near infrared, red and blue band combination was used. However, a visual interpretation of the higher resolution GeoEye scenery in the band combination near infrared, green and red, proves to be more reliable for identifying coffee plantations. The aim is to explore for the most rewarding options and possibilities in obtaining data about coffee plantations in the Mbinga area and to implement this technique on a larger scale.

Keywords: Remote sensing, coffee farming, small-hold farming, geographical information system, Tanzania

1. Introduction

Improving coffee crops on small-holdings has two major benefits. Firstly there are the agricultural benefits that help improve the quality and quantity of coffee production if the trees are cultivated properly. This includes pruning, using fertilizers and pesticides and treating damaged trees. Secondly there are the economic rewards for farming communities and for the coffee companies who are able to maximize their production output. In Tanzania, the coffee industry plays a major role in the country’s economy (Gaede 2006: 1386) and accounts for 17.7% of total agricultural exports (UNESCO 2010: 167). Due to the present predicament of unmapped coffee territories, it is difficult to accurately assess coffee growing areas in both spatial and temporal context and forecasting important developments in Tanzania’s coffee industry remains a challenge. To resolve this problem, a method of data extraction is necessary, which can help map coffee plantations accurately and cost-effectively. Key to achieving these goals, is the use of high resolution