Introduction

Africa is the world’s leading producer of cocoa with Ghana being the second after Côte d’Ivoire. Cocoa farming in Ghana has a long history. Tetteh Quarshie of Mampong Akwrinti is believed to be the person to introduce the crop to Ghana in 1879 (Hammond 1902; Mckelvie 1962). The crop later aroused the interest of farmers and led to the birth of the industry. Cultivation spread rapidly along the Akwrinti ridge and through out the Eastern region of Ghana, got to its peak in early 1950’s, taking over the extensive oil palm plantations. Ten years later the production declined due to sever outbreaks of capsid pests and cocoa swollen shoot virus disease (CSSVD). Re-planting of new farms was made difficult due to degradation of the environment and loss of soil fertility. The cocoa farms were replaced by food crop farming centred on maize, cassava, plantain and vegetables. From that time, this area is characterized by decline in cocoa production, environmental degradation and out migration of farmers in search of virgin forest to cultivate cocoa. The western region where this research is being conducted is the current cocoa frontier. (As shown below)

Purpose of this study

To examine the spatial dynamics of cocoa farming by assessing the land use change between 1986 and 2003 using satellite imagery with the focus on cocoa farms.

Methodology

Two Landsat ETM+ scenes were used taken into consideration data quality and availability. These were path 195 row 55 and path 195 row 56 of Landsat Enhanced Thematic Mapper (ETM+). These were downloaded from the internet. Ideally, a mosaic of these 2002 and 2003 scenes, window out the study area would have been appropriate but a false colour composition (bands 5,4,3, RGB) and critical examination of reflectance value of each band in each scene shows variations which will affect the accuracy level of the classification if mosaic. However, the 1986 imagery were alright to mosaic. However, the 1986 imagery were alright to mosaic.

<table>
<thead>
<tr>
<th>Class</th>
<th>Reflectance Value</th>
<th>RGB Value</th>
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<tbody>
<tr>
<td>Reserved forest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cocoa farms</td>
<td></td>
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<tr>
<td>Generated farms</td>
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Due to the homogeneity of the vegetation in the area, it was difficult to differentiate between the natural vegetation and cocoa farms after examining a false colour composite of the imagery. Faced with such a complex situation, both unsupervised and supervised classification was performed on each of the imagery. For 2002 image, six unsupervised classes were generated using the broad classification module in Idiosi. Whereas for 2003, eight clustered generated.

Analysis

The main analysis was change detection. CROSSTAB module was used to compare the two images above because of the qualitative nature of the images. Classification classifies the logical AND of all possible combinations of land cover categories on two maps with two different dates with the focus on whether areas fall into the same class on the two dates or whether a change to a new class has occurred (Eastman et. al 2003).

Results

The kappa statistics generated shows that between 1986 and 2003/0, the area has undergone drastic land use/cover changes (Overall Kappa 0.5288) with agriculture being the most pronounced (KIA = 0.1068).

Conclusion

From the analysis, it is evident that tremendous changes in the land use/cover has occurred in the district and with remote sensing mainly satellite imagery and GIS techniques one is able to assess these changes in terms pattern and quantity.

Acknowledgement

I wish to express my sincere gratitude to all my supervisors: Dr. Yelena Ognovna Hammelhierhger; Prof. E. A. GyasiProf; P. W. K. Yankson; Prof. Niels Fold, Prof. Lasse Moller Jensen and my adviser Prof. George Ellmore. Also to Melanie St. James for taking us through the professional way of presenting a poster.