Land Cover Mapping in the Volta Delta of Ghana: FAO Object based Approach

Benjamin K. Nyarko*, K. Appeaning Addo[1], Philip-Neri Jayson-Quashigah[1], Francisca Martey[2], Gianluca Franceshini[3]

*Department of Geography and Regional Planning, University of Cape Coast
E-mail: bnyarko@ucc.edu.gh

[1] Department of Marine and Fisheries Sciences, University of Ghana

[2] Ghana Meteorological Agency Ghana

[3] FAO of the UN Rome, Italy

Introduction

❖ The distribution of land cover types within the Volta Delta influence its ecological function and uses within the landscape. For development planning and research reliable information on land cover is needed to understand the transformational changes occurring within the landscape.

❖ Notably, existing land cover maps of the Volta Delta lack details that are required for environmental and agricultural sensitivity studies. This study looks at land cover classification within the Volta delta of Ghana using the FAO object based classification method.
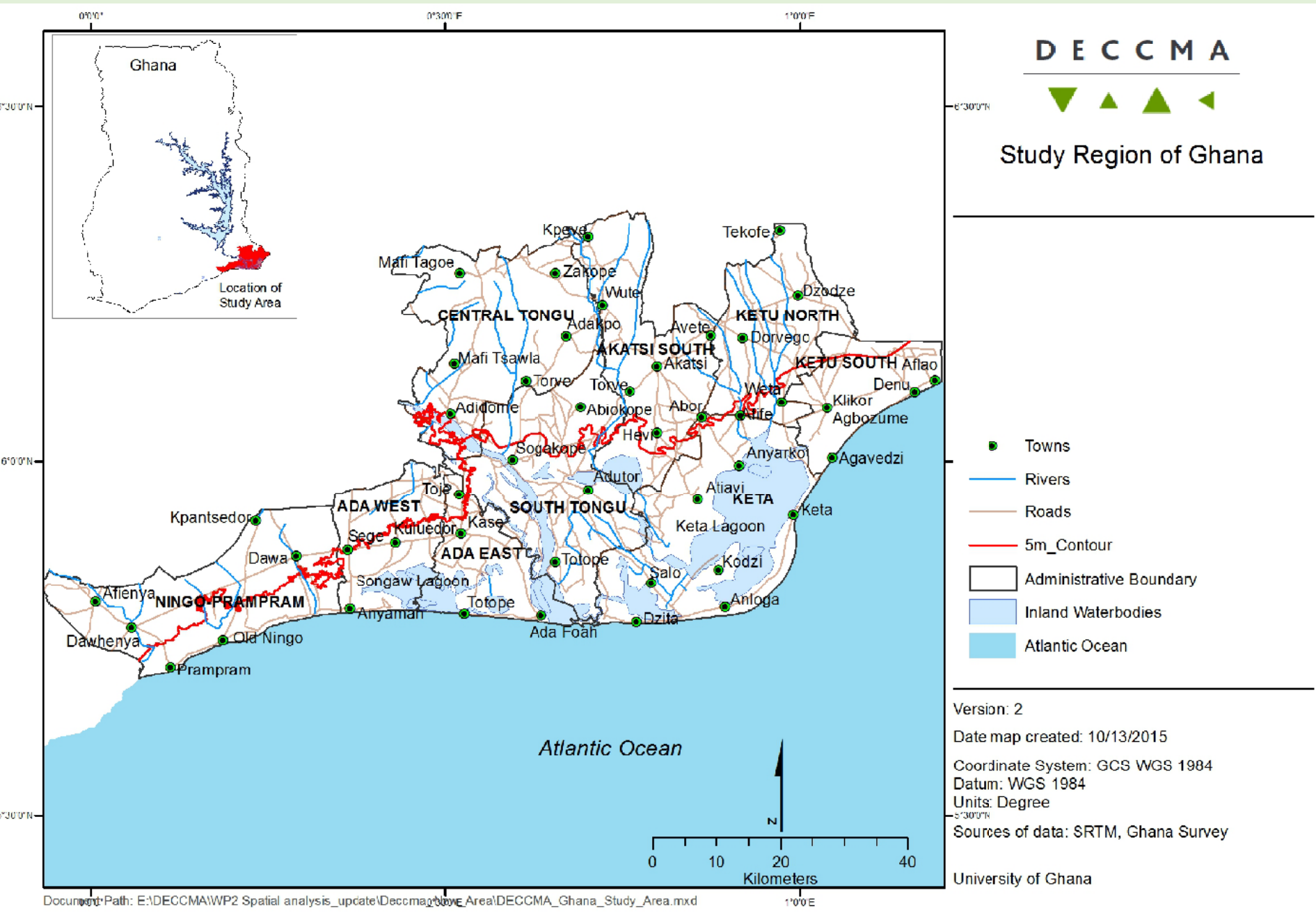
Methodology

Figure 1: Map of the Study Area

Data and Processing

❖ The FAO land cover classification system (LCCS) approach was adopted for this study

❖ 2015 Landsat satellite imagery covering the area was acquired and pre-processed. A multi-resolution segmentation approach, based on a fractal net evolution algorithm (see Baatz & Schaepe, 2000) was implemented in this project.

❖ Land cover types were pre-modeled based on, field knowledge (validation), google earth and existing historical land cover.

❖ Image interpretation was carried out using the LCCS plugin in Quantum GIS (QGIS). The process involved assignment of legends to individual segments using the Landsat imagery and google earth imagery as a guide
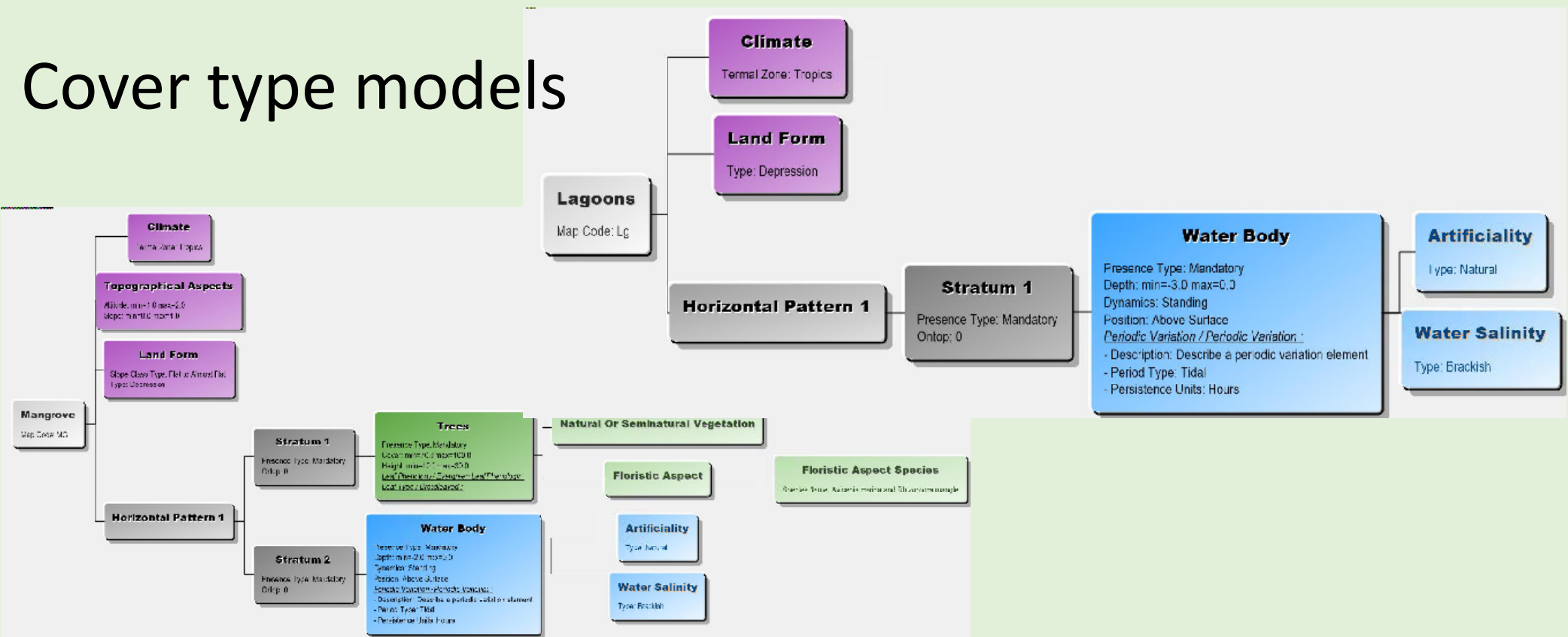
Results/Discussion

Cover type models

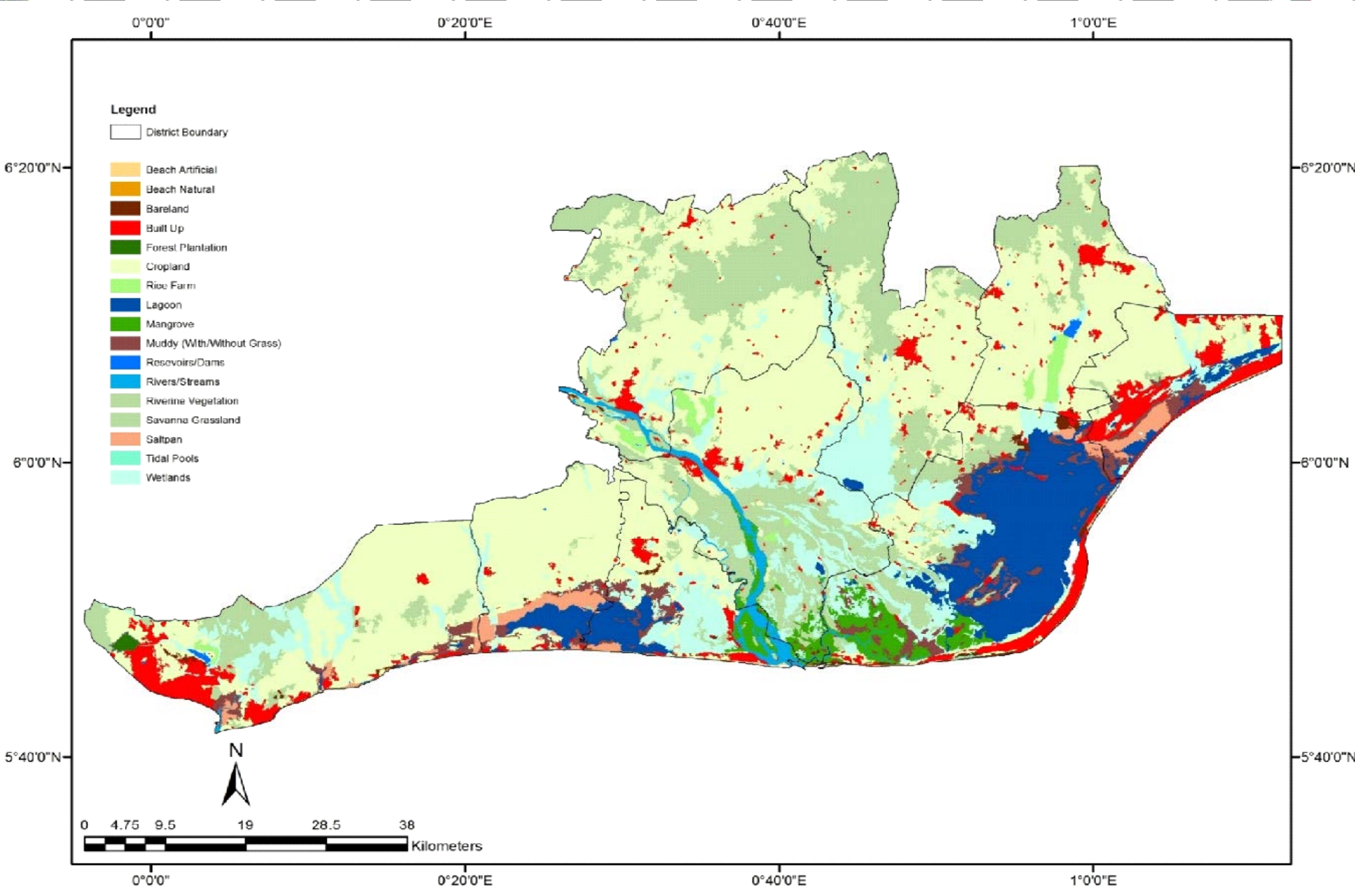Figure 2: Sample Class Models of Mangrove and Lagoons

Figure 3: 2015 Land cover of the Volta Delta
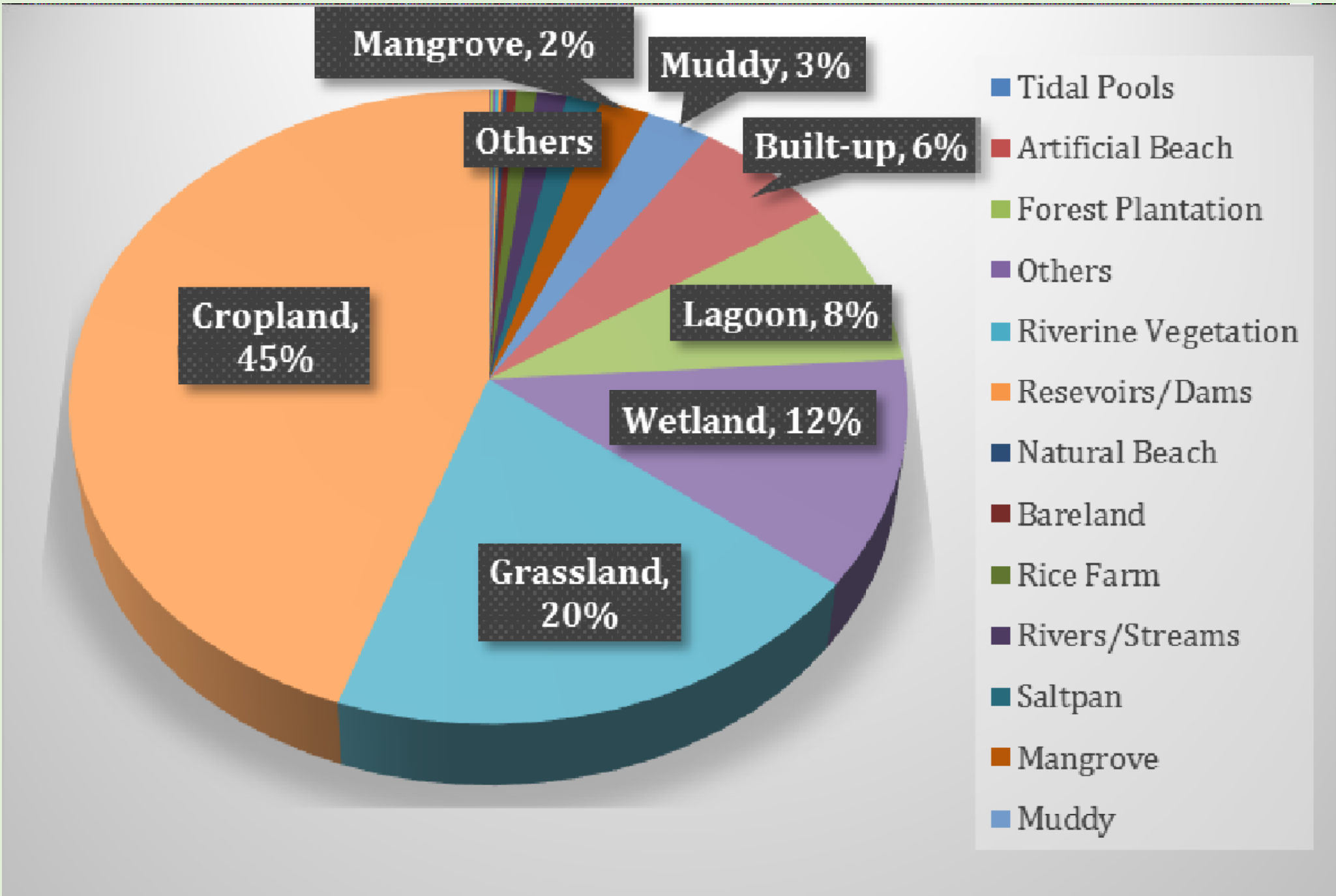

Figure 4: Pie Chart of Land cover types

Summary

❖ In all 17 classes have been identified and modelled (Figure 2)

❖ These classes were then validated in the field, sampling from over 30 points.

❖ The main classes identified include wetlands, savanna grassland, water bodies, mangroves and cropland being the dominant (45%) (Figure 3 and 4)

❖ Cropland comprises grasslands cultivated seasonally

❖ currently 2002 and 1986 images are being interpreted for change detection

Literature cited:

Baatz, M., and Schaepe, A., (2000), Multi-resolution segmentation. An optimization approach for high-quality multiscale image segmentation, In Strobl, J., Blaschke, T. and Griesebner, G. (eds.): Angewandte Geographische Informationsverarbeitung XII, Heidelberg: Wichmann Verlag: 12–23.