Mapping vital ecosystem services by integrating local knowledge and remote sensing data
Case study in the Barotse Floodplain, Zambia

1. Background and Research Objective

- Wetlands support high levels of biodiversity and provide vital ecosystem services to society.
- Wetlands are facing increased pressures from land degradation and agricultural expansion.
- The Barotse region, located in the western province in Zambia, experiences a four to five month “hungry” season with limited food access.
- Growing interest on: How land use configuration leads to providing the goods and services upon which human well-being is dependent? (TEEB 2015).

This study aims to integrate local and scientific knowledge by developing a land type map which is associated with vital ecosystem services for a dynamic landscape.

2. Methodology

- The study area corresponded to the Barotse floodplain and surroundings, located in the western province in Zambia (Figure 1).
- Using the local land type characterization based in local knowledge (Figure 2), this land type map was created using information from land types locations and management of farm plots and natural areas collected through interviews to smallholder farmers distributed in the region, participatory activities and fieldwork done in 2014 (Figure 3).
- Combining categorized water and vegetation categorized rasters, we used the previously collected field measurements and the land types characteristics of water content and vegetation cover to identify and map 11 classes corresponding to main previously identified land types.
- Additional ground truthing data (91 plots of 100 m² and 70 waypoints) was used for the accuracy assessment (Figure 4).

3. Results

- The integration of local and scientific knowledge with remote sensing resulted in a map that displays the distribution of land units which are relevant to their users (the Barotse inhabitants) (Figure 5).
- Understanding the local use of different land units in agricultural landscapes is essential to support effective decision making and is vital to untangle the complex interactions between people, nature and agricultural landscapes.
- Ground truthing measured the land type map’s overall accuracy and a Kappa value of 82.1 and 78% respectively.
- Soil fertility and the seasonal risk of flooding or droughts are the main land type factors that determine the what, where and when of crop selection and management. Therefore, this land type map represents a useful guide that supports decisions for sustainable development in rural areas (Figure 6).

Mapping vital ecosystem services in dynamic floodplains considering the local knowledge is a promising tool that supports effective decision and planning for food and nutritional security.