**Project Update: March 2022**

**Activity period: January- March 2022**

## Introduction

Uzungwa-scarp forest reserve form part of the Eastern Arc and Coastal Forests of Tanzania and Kenya. The reserve is a reservoir of species heritage in Tanzania and the world at large hosting rare, endemic and endangered flora and fauna. Various studies highlight wildlife hunting practices for local markets and household consumption, continuing anthropogenic disturbances and illegal activities related to timber production and trade, collection of firewood, charcoal pits, poaching, bush-meat hunting and small-scale agricultural encroachment are major threats facing the forest reserve. In this implementation period, we analyzed remote sensing data to identify forest cover changes for the past ten years (2010 to 2020) and conducted forest survey in order to identify type and extent of forest disturbances.

## Remote Sensing Data

In order to monitor forest vegetation cover changes and identify most degraded sites. We studied overall vegetation cover changes between 2010 and 2020 identifying spatial distribution of disturbance incidences as well as most affected regions. We obtained high resolution (30m X 30m) multispectral satellite images for year 2010 and 2019 from https://earthexplorer.usgs.gov/ archive.

**Table 1: Landsat imagery characteristics downloaded for forest vegetation cover in Uzungwa scarp forest reserve.**

| Year | Sensor | Path/Row | Acquisition date | Cloud cover (%) |
|---|---|---|---|---|
| 2010 | Landsat 7 ETM | 166/064 | 23/10/2010 | 0.42 |
| 2020 | Landsat 8 OLI | 167/064 | 19/5/2020 | 0.37 |

Prior to classification, the Landsat images were re-projected to UTM 1960, Zone 37S. Images were pre-processed for more direct association between the biophysical phenomena on the ground and the acquired data (Coppin et al., 2002). We performed radiometric calibration to convert per pixel value to radiance and to convert radiance to reflectance which were performed in Environment for Visualizing Images (ENVI) version 5.3 software (Key and Benson, 2006). Pixel based vegetation cover classification was used to delineate various vegetation cover classes. We used multispectral bands in the classification which are 2–7 for Landsat 8 OLI images. RGB (red, green and blue) colour composite was used, true colours composite used band 4,3 and 2 of landsat. Training samples were drawn using region of interest (ROI and developed three forest cover classes using the semi supervised support vector machine namely Moist montane forest (1), Lower Forest cover (2) and Grass land (3).

## Forest Vegetation Cover

Remote sensing data indicated that there was a substantial decrease in forest cover particularly towards the eastern parts of the reserve as compared to 2010 (Figure 1). We found an increase of grass land vegetation cover from 201 ha in 2010 to 287 ha in 2020. This could be attributed by increased pressure of anthropogenic activities and impacts of climate changes.

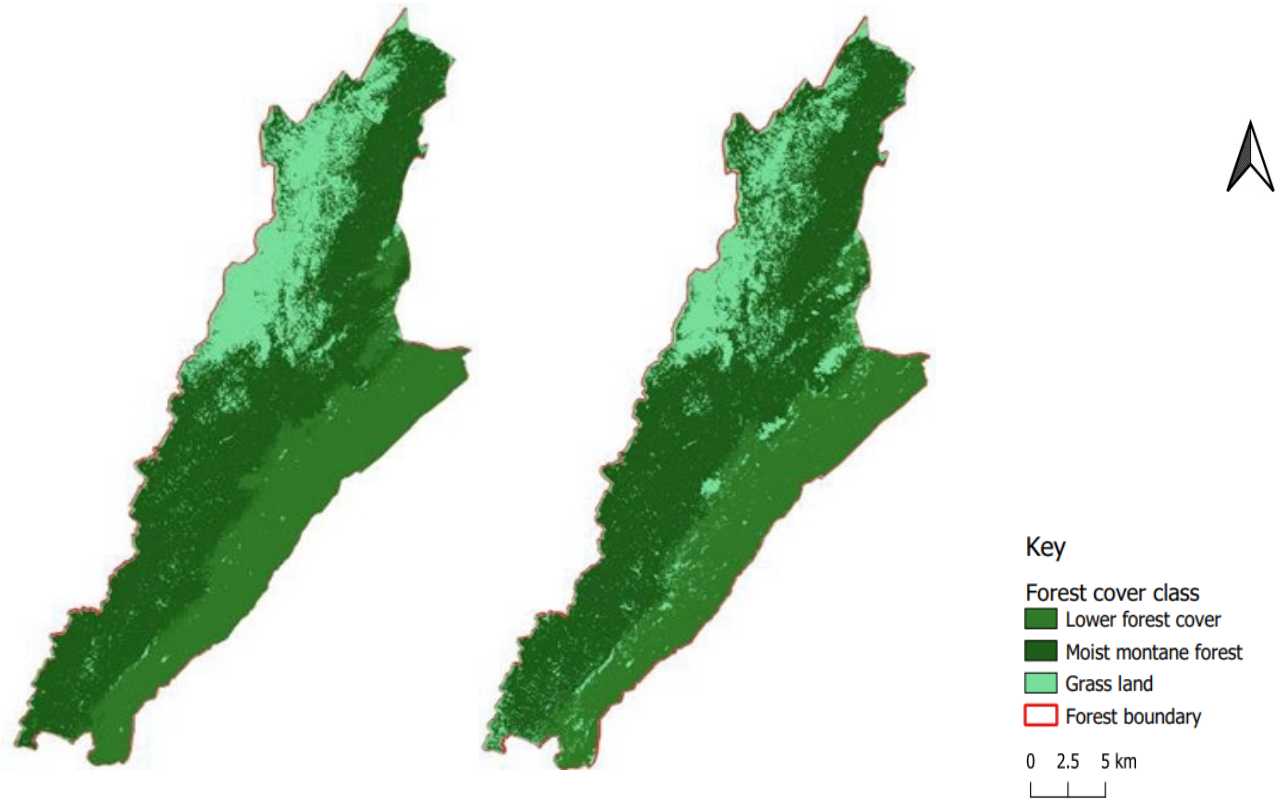


**Fig 1: Uzungwa scarp forest vegetation cover maps for 2010 and 2020 – Left: Forest vegetation cover in 2010. Right: Forest vegetation cover in 2020.**

**Forest Vegetation Survey**

Forest vegetation survey was conducted using permanent tagged line transects was established 900m from each other and sample plots 40m x 20m after every 450m similar to Zilihona et al (1998). We laid sample plots and transects based on the remote sensing findings. Signs for forest disturbances such as the number and location of trees felled, evidence of pitsawing, charcoal burning, fire, encroachment, grazing, hunting and poaching, animal traps, presence of beehives and trees debarked for making beehives were collected. We also recorded and counted evidence for hunting and poaching, animal traps, beekeeping and honey harvesting. The survey was conducted from the east, along the elevation gradient.

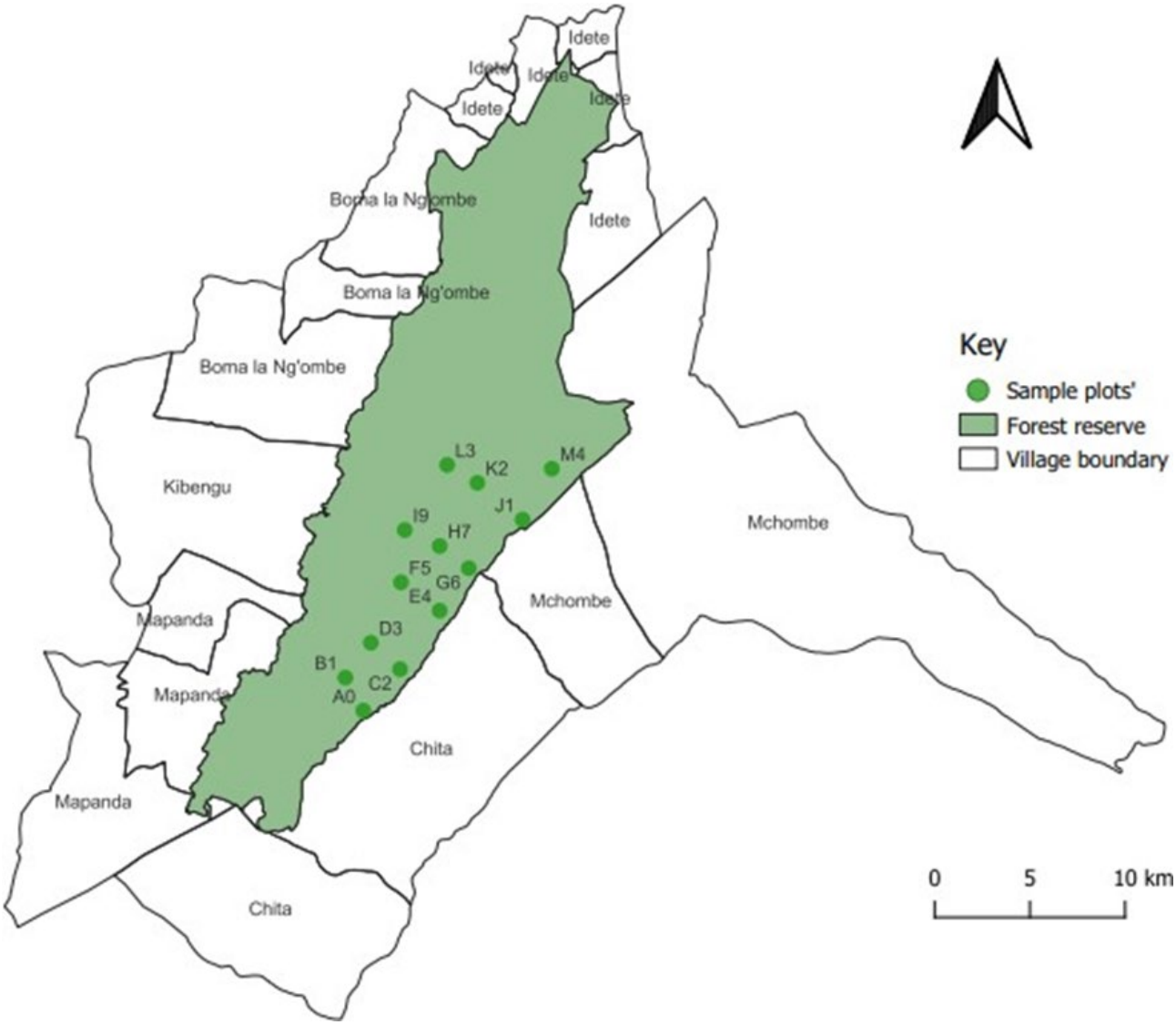


**Fig 2: Position of survey sample plots during forest vegetation survey**

Hunting and animal traps were the most prevalent disturbance incidence recorded in 5 transects and 11 sample plots covered. Most of these were recorded in moderate elevation bordering eastern villages of the forest reserve. Other disturbance activities included tree cutting, fire incidences and encroachment as indicated table 1.

**Fig 3: Project team making sample plots during forest vegetation survey**

**Table 2: Summary of the forest disturbance incidences during forest vegetation survey**

| Disturbance incidence | Frequency (N = 133) | Percentage (%) |
|---|---|---|
| Tree cutting | 24 | 22 |
| Hunting and poaching | 37 | 35 |
| Animal traps | 19 | 18 |
| Fire incidences | 15 | 14 |
| Charcoal burning | 13 | 12 |
| Tree debarking | 11 | 10 |
| Honey harvesting | 9 | 8 |
| Encroachment | 5 | 5 |

**Scale and Reasons Bushmeat Hunting**

During this work, bushmeat hunting was found to be a key threat facing Uzungwa scarp forest reserve. Same finding was reported by Rovero et al (2010) who ascertained that hunting practices for local markets and household consumption is the greatest threat to biodiversity in the forest reserve. Similarly, Channinf (2006) reported continuing anthropogenic disturbances and illegal activities related to timber production and trade, collection of firewood, charcoal pits, poaching, bush-meat hunting and small-scale agricultural encroachment.

**Fig 4: Project leader (standing in right photo) with participants during UCT survey**

The project used Unmatched Count Technique (UCT) to quantify the scale and reasons for bushmeat hunting. The method was preferred in order to increase respondent's willingness to answer and reduce bias by making it impossible to directly link incriminating data to an individual. A total of 97 participants were involved, drawn from six villages namely Kipanga, Makutano, Uhafiwa, Itongoa, Ching'anda and Lufulu. 11 individuals (non-response rate < 2%) refused to participate. Our total sample was 86 participants where the respondents in the control group were 41 (N=41) and treatment group 45 (N = 45). The groups did not differ on the basis of background and socio-economic characteristics. During this survey, we found that 39 % of the households are currently involved in bushmeat hunting particularly in the villages eastern and south-eastern of the Uzungwa forest reserve.

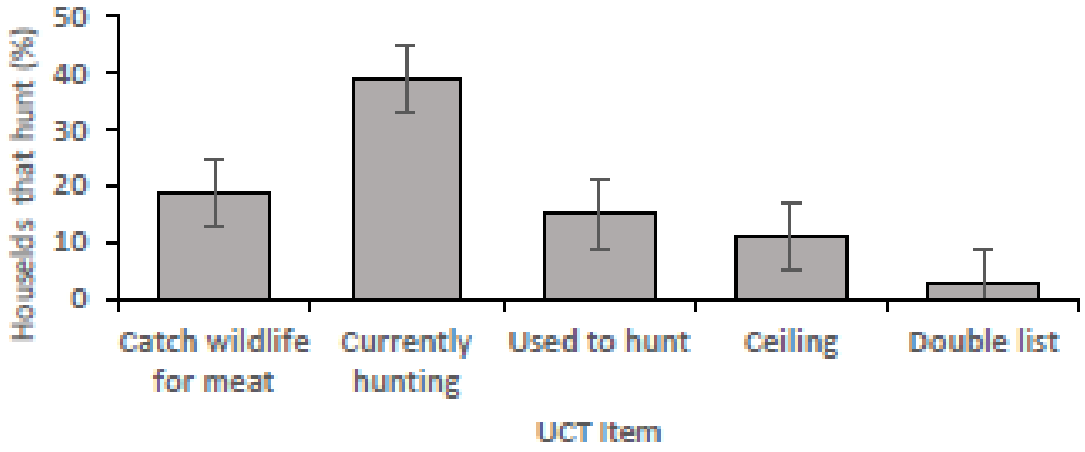


**Figure 5: Triangulated estimates of household participation in bushmeat hunting in Uzungwa scarp forest reserve with 95% confidence interval (Control N= 41, Treatment N=45)**

During this survey, participants reported that bushmeat hunting were mostly done during the dry season than in the wet season. The reason could be because during this period

there are no agricultural products such as maize, beans and vegetables hence bushmeat hunting predominately aimed at generating cash income. The main reason for bushmeat hunting reported by both retired and current hunters was source of household income. Other reasons reported included source of household food (15%) and protecting agricultural crops in the household farms (5%). Another interesting reason reported was the use of bushmeat as an honour and cultural appreciation reported by 4% of the respondents.

**Table 3: Reasons given for hunting and consuming bushmeat among both retired and current hunters**

| **Hunting reasons** | **Participant's response (%)** |
|---|---|
| Protecting crops | 7(5) |
| Household food | 19(15) |
| Source of cash (income) | 27(25) |
| Honor and cultural appreciation | 7(4) |
| Taste and luxurious preference | 5 (3) |

Our survey indicated that Colobus monkey is the most hunted wild animal, reported by 36% of the participants. Other hunted animals included bushbuck, wild boar and duiker as indicated in table 4.

**Table 4: Animals hunted by forest communities adjacent Uzungwa forest reserve**

| **Local name** | **Common name** | **Scientific name** | **Frequency (%)** |
|---|---|---|---|
| Nungu | Porcupine | *Hystrix africaeaustralis* | 15 |
| Mbega | Colubus monkey | *Procolobus gordonorum* | 36 |
| Pongo | Bushbuck | *Tragelaphus scriptus* | 17 |
| Mindi | Duiker | *Cephalophus spadex* | 12 |
| Nguruwe pori | Wild boar | *Sus scrofa* | 12 |