APPLICATIONS OF DRONE TECHNOLOGY IN MAPPING MAU FOREST SPECIES

1.1 Introduction

Forestry is the science, art and practice of sustainably managing of forest resource. Various techniques such as remote sensing have widely been used in the forestry sector within the areas of mapping, management monitoring and evaluation.

The emergence of the unmanned aerial vehicles, informally known as drones has enabled the acquisition of high resolution aerial images that can be utilized in mapping and analysing different forest species. During the period of June to september 2018, Kenya Forest Service (KFS) contacted Orbital Africa to conduct Mapping of Mau Forest tree species.

1.2 Methodology

i. **Selecting the Drone:** The first thing is to select your UAV. eBee SQ Drone was chosen for the exercise since it comes with Infrared band other than the RGB Spectrum. The eMotion software was also idela for flight planning.

ii. **Selecting your drone mapping ecosystem:** Once we got the eBee drone ready we chose a "mapping solution" that comprises of a smartphone app and a web platform. The app helped to plan your flight properly, and it took over the control of your DJI drone to automatically complete the survey. After the flight, you will have to transfer the data from your UAV to a computer. To do that you need to take the micro SD card out from your drone, connect it to a computer and upload collected data to a web-based tool that will process the data and let you view and analyze the final output.

iii. **Flight Planning:** Our main concern when flying a drone should be safety. For our mapping project we selected an area without trees and high structures and didn't fly above people. The area of the project large i.e. 800 ha. Once we selected the area we've installed Data Mapper on our smartphone, it was time to make use of the app and planned the flight.

iv. **Take Off:** To take off we needed to connect a smartphone to our eBee drone and simply tapped on "Fly". Confirmed and took off.

v. **Reviewing of Drone Images:** It was important to review the images while still in the field. Particularly, in the beginning, it saveed us a lot of time. During our flight, we had to go back

to the field twice to get the effect we wanted to have. We used that time to remove irrelevant images with noise e.g. poor overlap before processing. Photos of the sky or taken at a strange angle had negatively influenced the final effect of the orthomosaic and 3D model. These were all taken care off.

vi. **Uploading Images for Processing**: It was time to upload our data. To do that we needed to go to datamapper. com and created Orbital account. The drone images were uploaded for processing.
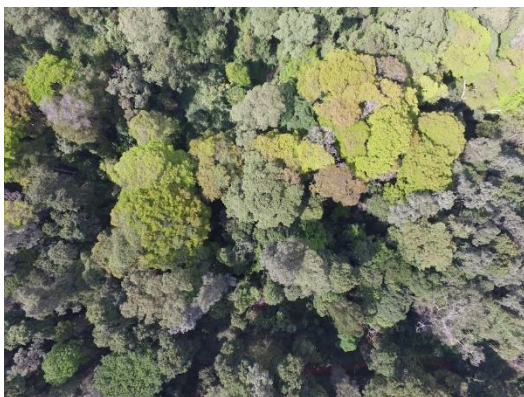
1.3 Final Products
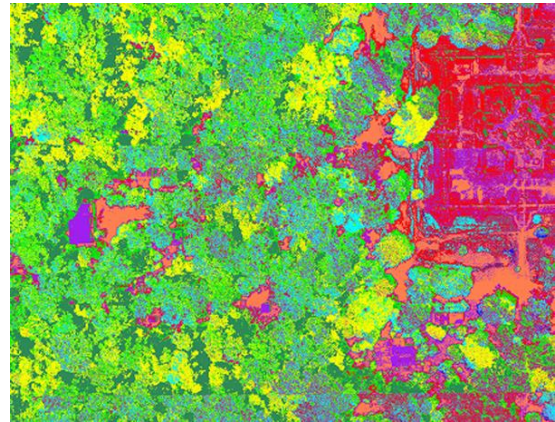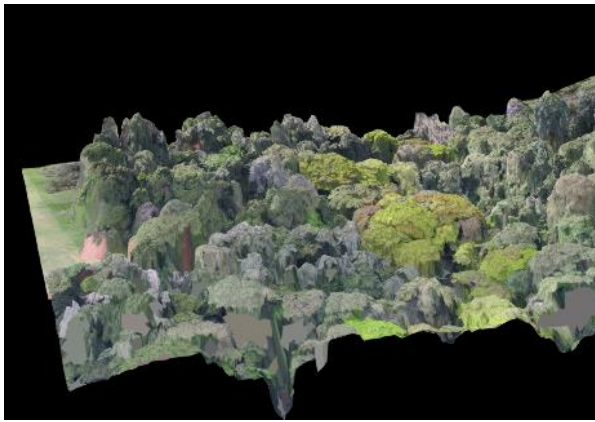
1.4 Applications of Drone in Forestry

Below are examples of application areas within the forestry industry:

- **Mapping of forest tree species and biodiversity** is now capable with increased accuracy due to drones having a flight height with proximity to the ground. Tree species can be identified while on the maps.

- Sustainable **forest management and planning** has been made possible due to the impeccable ability of the drones' systems to store and manage data used for inventory. Data acquired during mapping is well stored sequentially consequently allowing a systematic acquisition of records.

- Drones can easily spot **diseases and infestation** on forest species by the use of their multi-spectral scanners which can enable calculation of NDVI using the red and near-infrared bands.

- **Harvest and re-plantation monitoring**: They help monitor tracts of land that have been replanted and harvested to ensure responsible harvesting while monitoring the next generation of trees.
- Drones can aid in the **monitoring of active logging** by taking videos below their flight path.
- Drones aid in the **monitoring of forest fires** by establishing the rate of spread using their thermal imaging camera.