# UNDERSTANDING THE BEHAVIOUR OF SALAMIS PARHASSUS AND PRECIS TUGELA (BUTTERFLY SPECIES)



BY

CHARI MWAMKUU

# STUDY OBJECTIVES

- To observe movement patters  of the two species
- To estimate population density of the named species

Other objectives

- Study their habitat requirements



# METHODOLOGY

- Capturing and coding
- GPS – to record the coordinates of the point of capture
- Parameters of study
  - Species
  - Sex
  - Wing condition
  - Behaviour



| DATE | CODE | SPECIES | SEX | WING CONDITION | BEHAVIOUR |
|---|---|---|---|---|---|
| 2nd September | A 1 | Protogoniomorpha parhassus | Male | 3 | Resting, closed wings |
| | A 2 | Precis tugela | Female | 3 | Resting, closed wings |
| | A 3 | Precis tugela | Female | 3 | Resting, open wings |
| | A 4 | Precis tugela | Male | 2 | Resting, open wings |
| | A 5 | Precis tugela | Female | 3 | Flying |
| | A 6 | Precis tugela | Male | 1 | Flying |

# PARHASSUS AND TUGELA SPECIES

# STUDY SET UP

Chawia forest

- Covering the whole forest in search of the named species
- Capturing, Coding and Recupturing

# CHALLENGES

- Weather
  - Butteflies hide under leaves
  - Coding any captured butteffly
- Getting butterflies flying high
- Capturing limited in areas around streams/rivers

Thank You

# DETECTION, MAPPING, AND ASSESSMENT OF CHANGE IN SACRED FOREST SHRINES, LANDUSE, AND RECENT WATER SOURCES IN CHAWIA FOREST, TAITA HILLS IN TAITA TAVETA COUNTY, KENYA USING REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM.

**BY:**

**ROBERT MOKUA NYANG'AU**

**(MG 20/PU/36039/20)**

**MSC STUDENT**

## INTRODUCTION

- Water sources are very sensitive to changes in ecosystems dependent on multiple environmental and social-cultural systems.
- With the rising global water demand and decreasing sources, a dilemma arises for both water users and managers. As part of the Taita water project, I will study the water resource in the current status of springs and wells and their function in the Chawia and Fururu forests and surrounding area around the Ngerenyi campus in Taita hills.
- The study will assess the spatial distribution of springs and importance to the local and lower regions of Taita hills, the analysis of the current status of the sacred forest shrines and their potential threats in the Chawia forest in Taita hills.

## Problem statement

- Deforestation activities and encroachment of springs and wetlands.

- The increase in human population has caused considerable pressure on water-related environmental services especially around the Ngerenyi campus used to be very favorable for agricultural production and thus they are densely inhabited.

- Land consolidation and privatization process that started in the 1960s during the demarcation of land, land was assigned to private owners despite their earlier communal uses.

## Research questions

I. What is the Spatial distribution of cultural sites (sacred forest shrines -fighis) and their potential threats in the Chawia and Fururu cloud forest in the Taita hills?

II. What is the spatial distribution and status of historical and recent/active springs and wells of Chawia, Fururu and lower regions around the Ngerenyi campus (massif)?

III. What is the current land use and land cover in areas around Chawia, Fururu forest and surrounding areas?

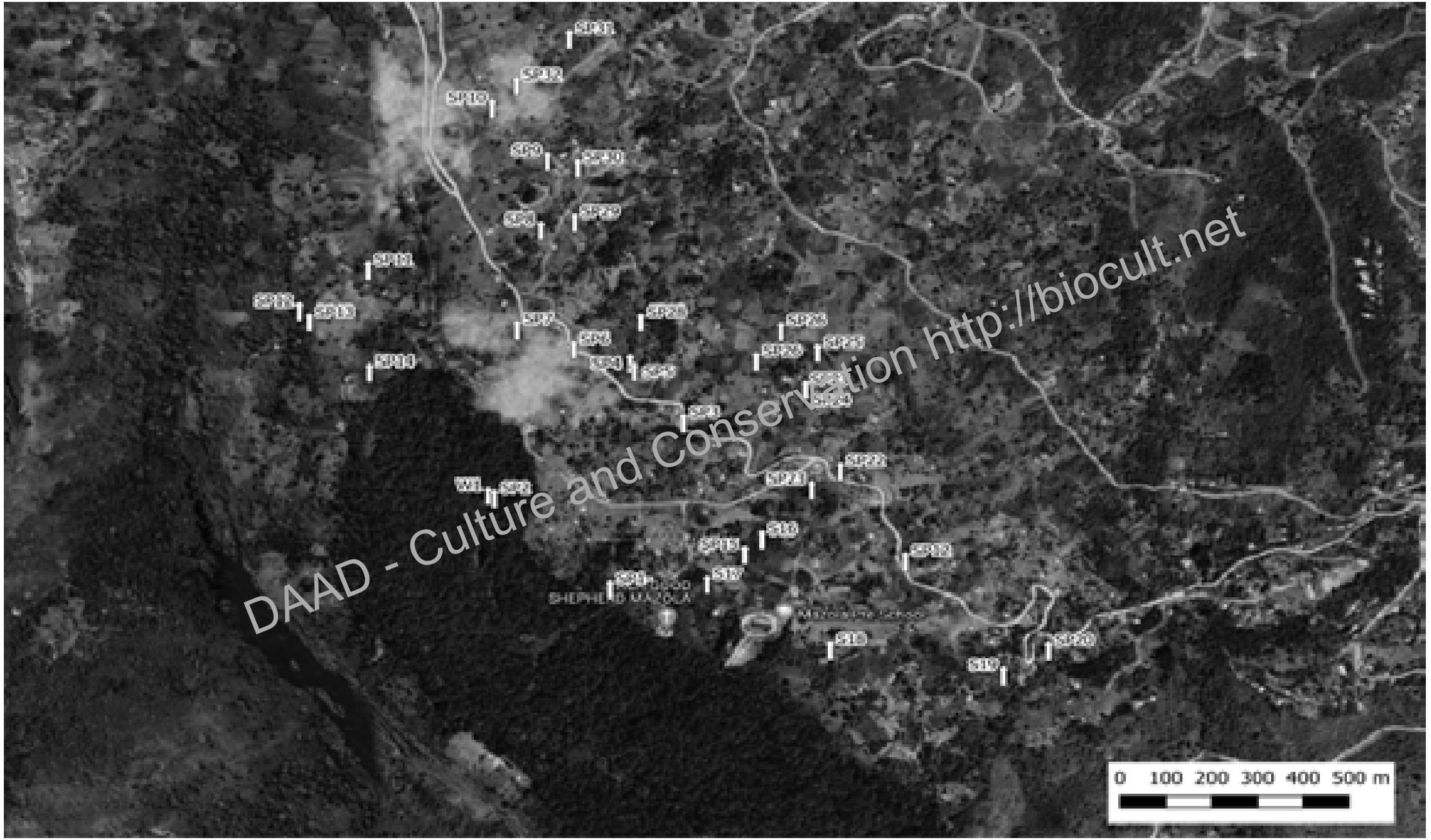
IV. What is importance of springs and wells and their agro-ecological value to Taita hills community?

## MATERIALS & METHODOLOGY

### Study Area:

### Description of the study Area

- ✓ The Chawia and Fururu Cloud forests are one of the forest patches of Taita hills
- ✓ It covers (86.0 ha) and lies between 38° 20' 62E", 3° 29' 00" S
- ✓ Fururu covers(5.0 ha)
- ✓ It offers a unique venue for land change studies



## Research design & Methodology

- ❖ Primary data will be generated from the field data collection and satellite imagery from the Landsat map center.

- ❖ Detection of recent and historic springs/wells and sacred forests(fighis)
- ✓ By talking to villages elders and people who might know historic springs/wells and fighis

- ❖ The fieldwork started with the site visits and reconnaissance survey of the study area to obtain the basic information needed for fieldwork

- ❖ Data will be collected on the Sacred forest shrines cover, land use/land cover type, Springs/wells and the topography of the study area with the use of the Global Positioning System (GPS) in taking coordinates at several locations. Important for analysis with current and historic land coverage to identify former watersheds and to understand pathways of consequences due to drying up of springs

- ❖ Photographs will be taken to capture lineages significant to the study.

## Data analysis and presentation

- ✓ The geographically accurate data including various information on traditionally sacred forests sites and land-use change and water sources will be handled and analyzed by using Arc map 10.8 and Arc view.

- ✓ The temporal-spatial change in forest cover will be analyzed by the real change, percentage change, and by trajectory analysis of satellite imageries i.e. by studying the changes occurring from one forest class to another (undisturbed forest, disturbed forest, and open ground).

- ✓ Beneficial GIS knowledge to create overview maps on coverage and to analyze potential pathways

## Expected outputs/Achievements

The study will be expected to show that:

- ✓ The majority of the sacred protected forest shrines and sites are not gazetted and are located on private plots; trust land or on public land thus their management and conservation is mainly in the hands of the residents,

- ✓ The location and boundaries of the current springs/wells as well as water towers and sacred forests known and GPS readings taken.

- ✓ Awareness is created among the local community living around the forest and local support will be generated for the conservation of water sources.

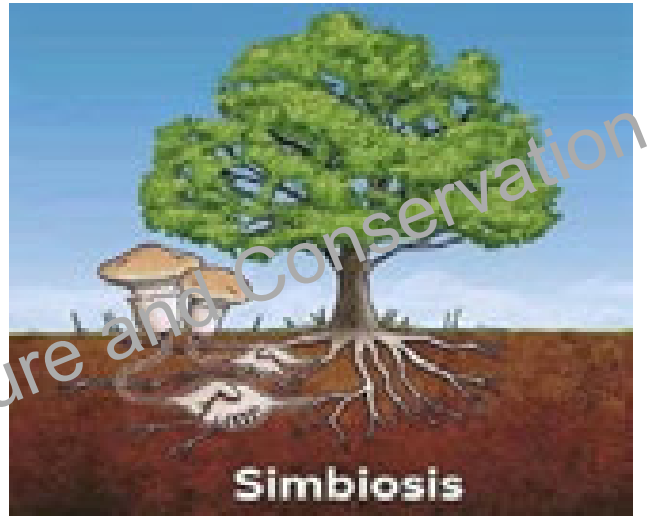
- ✓ Masters thesis

## ACKNOWLEDGMENT

I would also like to express my sincere appreciation to DAAD –German Academic Exchange services for their Research Grant to support my Research expenses and fieldwork through Financial and professional expert support throughout the research period.

1. Dr. Melckzedeck Osore , Dr. Stanley Nadir,(University supervisors)
2. Prof.Jan Christian , DR. mike Teucher &Tobias
3. Finally, I want to thank all my colleagues for the wonderful experience we are going through.

# DIVERSITY OF ARBUSCULAR MYCORRHIZA FUNGI IN ASSOCIATION WITH TREE SPECIES OF TAITA HILLS FOREST, KENYA






KORIR JEBIWOTT MERCY

# INTRODUCTION

- Tropical forests are inhabit 50% of total biodiversity in the world
- Taita hills forest is classified among the thirty four biodiversity hotspots in the world
- Threatened by anthropogenic activities thus loss of biological diversity
- Fungi provide ecosystem services e.g. regulation and supporting services.
- Arburscular mycorrhizal fungi associates with 90% of plant species

# PROBLEM STATEMENT

- Arbuscular mycorrhizal fungi are the main drivers to these biogeochemical processes
- The main focus is always been on above ground with well documentation on plants and animals
- The richness and composition of Arbuscular Mycorrhizal fungal species tend to shift due to changes in plant diversity
- 
- Moreover, less has been done on the ecological relationship between the below ground diversity with tree species diversity
- 
- Therefore, it needs careful inventory and documentation in view of conservation strategies

# OBJECTIVES

- To evaluate the arbuscular mycorrhizal status of tree species in Chawia and Fururu forests
- To establish the diversity of Arbuscular Mycorrhiza fungi in Chawia and Fururu forests
- To assess the inter-relationship between the tree species richness and composition, the diversity of AMF and soil nutrients characteristics in Chawia forest

# RESEARCH QUESTIONS

- Is there any association between tree species and Arbuscular mycorrhizal fungi in Chawia and Fururu forests?
- How diverse are Arbuscular mycorrhizal fungi in the two fragments of Chawia and Fururu forests?
- Is there any relationship between tree species, AMF diversity and soil nutrients in the Chawia and Fururu forest fragments?

# METHODOLOGY

## Study site

- Conducted in Chawia and Fururu fragments f the Taita Hills forest which lies within (3°20$^{I}$ S, 38°28$^{I}$ E)
- Covers an area of 86ha and 5.0ha respectively
- Threatened by high levels of disturbance

# Study design

- Circular plots of 15m radius will be laid in Chawia and Fururu fragments
- 4 Soil samples per plot will collected at 10m using soil auger at depths of 30cm
- Ecological data such canopy cover, the abundance of tree species, slope, disturbances
- Fine roots of Seedlings from individual tree species will be collected in three replicates
- Preserved in 70% ethanol

# Data analysis

- Shannon Wiener Index of Diversity (H) will be used to calculate the diversity of Arbuscular Mycorrhiza species in Chawia Forest and Fururu forest shrines

- Correlation analysis will be used to calculate the relatedness between the AMF with the diversity of the tree species in the site

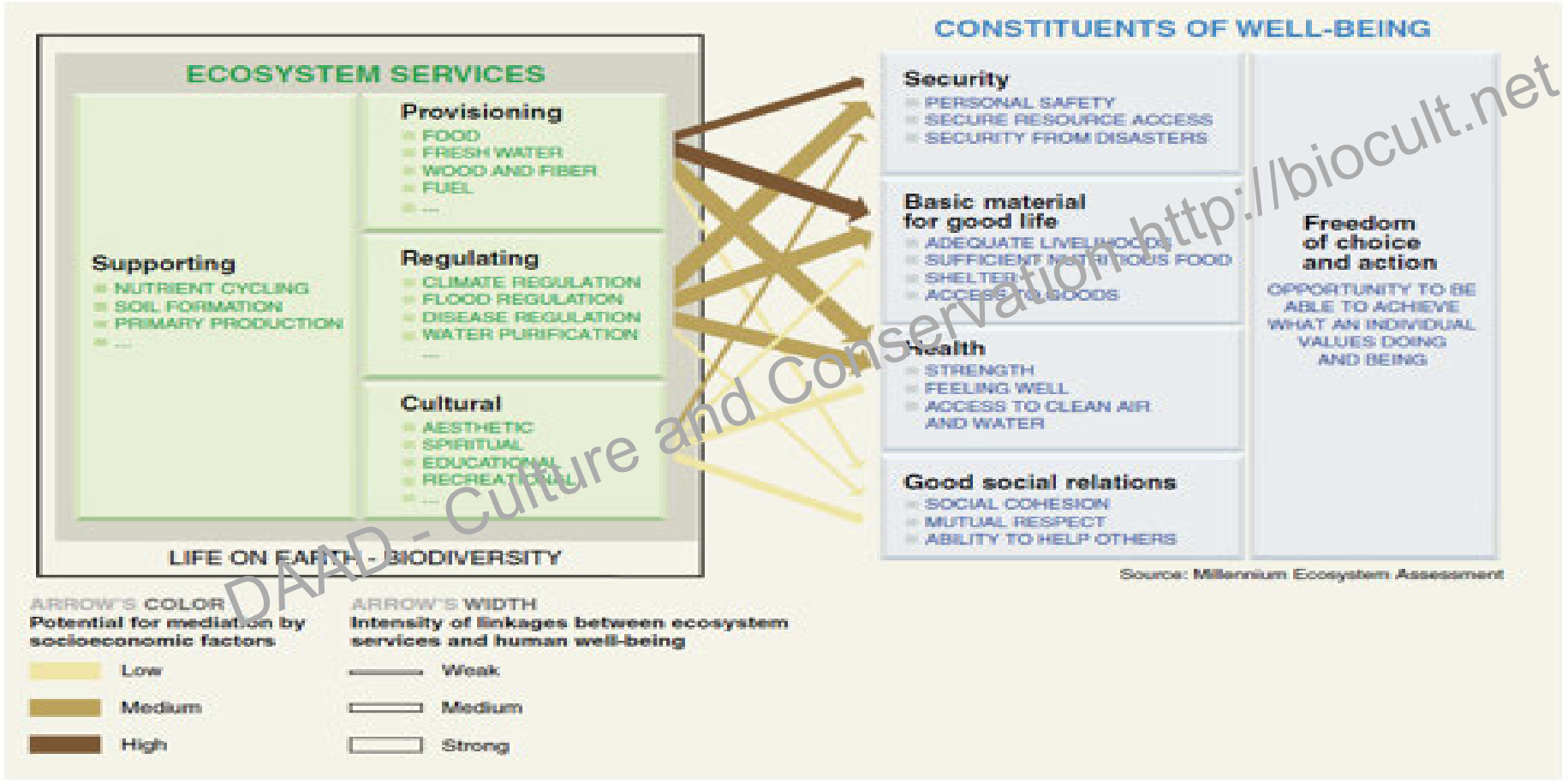
# EXPECTED OUTCOMES

- Information on diversity of Arbuscular mycorrhizal fungi in the forest
- Status of tree species with Arbuscular mycorrhizal fungi
- Publications
- Masters thesis

Thank you

# RAPID ECOSYSTEM FUNCTION ASSESSMENT AT THE CHAWIA CLOUD FOREST IN TAITA HILLS

# Ecosystem functions and ecosystem services






Ecosystems and human well-being – Synthesis report (2005)

# Research questions

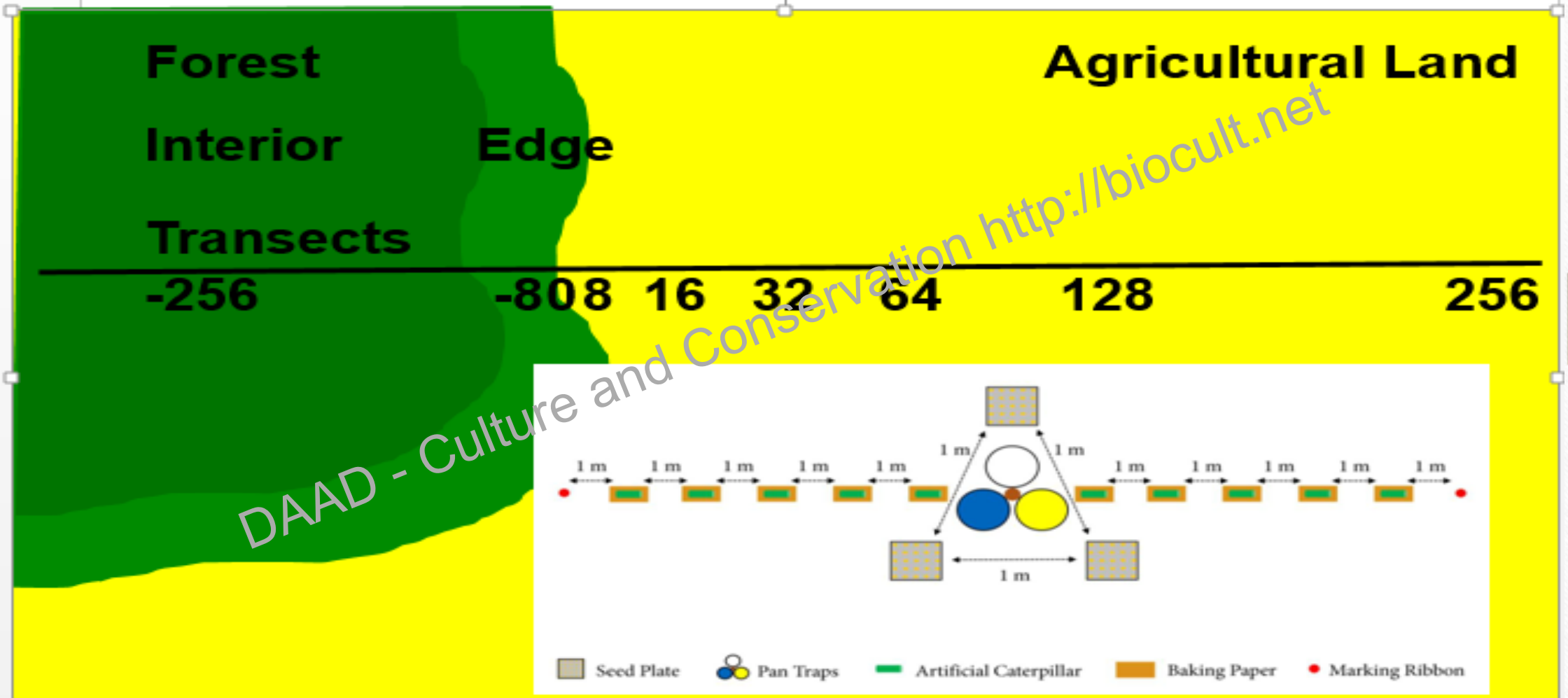
The study answers the following questions;

- Do ecosystem function differ between intact forest, disturbed forest and partially degraded agricultural ecosystem?
- Are there positive spill over effects from the forest interior towards Agricultural lands?
- Does variation of vegetation structure influence ecosystem functions?
- Are seed dispersal and predation rates more pronounced under forest canopies more than the agricultural landscape?

# Ecosystem functions measurement Proxies

- Predation
- Pollination
- Seed dispersal

# Study set-up



# Expected outcomes

- The predation rates are more pronounced in the forest than in the Agricultural ecosystem.
- The pollination activities are expected to be higher in the Agricultural land than the forest ecosystem.
- The seed dispersal activity is expected to be more in the forest than in the agricultural land.

# Challenges

- Weather changes- disrupting the experiment set up.
- Terrain –very rugged and deep valleys.
- Disruption by domestic animals – chicken, cows etc.

# Acknowledgements


- We thank the whole biocult program.
- Special thanks to our supervisors- Prof Jan, Dr. Mike and Mr Tobi.
- Not forgetting Mr. Kioko(NMK).
- Thank you all. Asanteni Sana.

# SOCIAL SCIENCE WORKING PACKAGE

## Field activities

- Surveys (300)
  - Probability & Non Probability
  - Household Interviews
- Key informant interviews
  - 👉 Sacred places
  - 👉 NDMA
  - 👉 CG

**SSWP Objectives**

- Analysing the medical use of plants (SDG 15.1);
- Evaluate the level of disturbance of natural and human made environments (sacred sites vs. surrounding agricultural land) (SDG 15.2);
- Mapping land use intensities, assessing the spatial distribution of cultural sites, using recent and historical aerial pictures and satellite imagery (SDG 2.4);
- Assessing and compiling traditional / indigenous knowledge (traditional medicine, one-health-approach) (SDG 4.7);
- Social science studies to analyse cultural beliefs, attitudes and behaviour, the role of modern life, future life concepts in the focus of sustainability (SDGs 4.7 & 13.3).
- Role of sacred shrines on biodiversity conservation

Part 1:Socio-demographic data

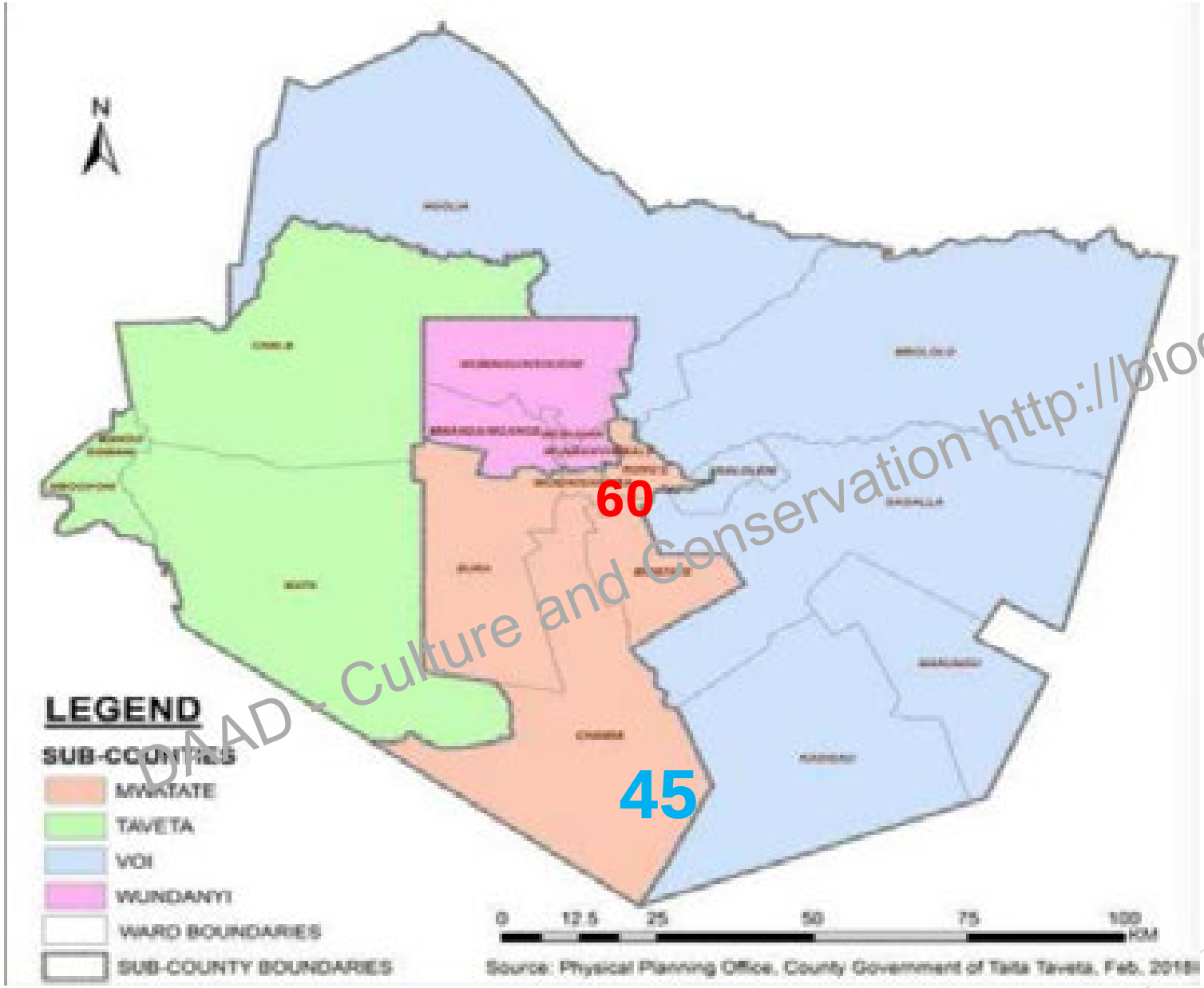
Part 5: Awareness and Attitudes

Part 3 Land-use



Part 4: Management and governance of sacred places


Part 2:Food security



# THE INTERSECTION BETWEEN CULTURE AND CONSERVATION: RESOLVING THE CHALLENGES OF INDIGENOUS AND MODERN GOVERNANCE SYSTEMS OF THE SACRED KAYA FORESTS IN KWALE AND KILIFI COUNTY, KENYA

Timothy Musa

Supervisor: Prof Halimu Shauri

# Introduction

- '*Kaya*' means homestead.
- The *Kaya* Forests are situated in the Coastal plain and hills of Kenya, in East Africa.
- They form residual patches (av.10ha - 200ha) of the once extensive diverse lowland forest of Eastern Africa
- Many within these forests, more than half of Kenya's rare plants are found in the Coast Region.
- In addition to being small, they are distributed irregularly over an extensive range (appr 250km.) along the coastal strip according to the 9 coastal tribes.
- Over 40 patches have been identified in three contiguous coastal districts of Kwale, Mombasa, Kilifi, and Malindi.

- The small forested sites of the original *Kayas* were protected in varying degrees by the communities, led by their local *Kaya* Elders **(Indigenous governance systems).**
- However, over the past few decades, declining knowledge and respect for traditional values combined with rising demand for land for agriculture and development, mining, and forest products has lost and damaged these small forests and associated sacred groves.
- Growing concern about the *Kayas* in recent decades among local *Kaya* elders, conservationists, and scientists culminated in an initiative by the National Museums of Kenya (NMK) to have the *Kayas* provided with some protected status as National Monuments (NMs) and established Coastal Forest Conservation Unit (CFCU) **{modern governance system}**

- Consequently, it becomes clear that without attending to governance issues in a concerted way, there will be little hope of sustaining practical locally driven conservation and management activities in the long term.
- As a result, there is need to reflect on governance systems, socio-economic, geographic, and other factors relevant to forming enabling structures and environment for *Kaya* conservation.
- Such structures would offer a reasonable resolution for various prevailing challenges of the *kaya*'s indigenous and modern governance systems.

# Problem statement

- Over recent years *Kayas* have been brought under the protection of National Laws which implies state protection. Still, these laws are felt to carry weak sanctions or penalties, and enforcement has proved difficult.
- The management has clashes between the *Kaya* elder (indigenous governance system) and the CFCU (modern governance system) hence threatening the conservation of Kayas.
- This further raises questions of access to *Kaya* sites by community members in some cases.
- Therefore, how can we resolve the challenges of indigenous and modern governance systems of the sacred *kaya* forests to conserve these forest patches?

# Objectives

- Examine the current structures of governance systems in sacred *kaya* forest in Kwale and Kilifi County.
- Evaluate the challenges facing governance systems of the sacred forest in Kwale and KILIFI County.
- Determine how these challenges governance of sacred forests can be resolved forest in Kwale and Kilifi County.

# Methodology

- This will be a survey research design, conducted in the sacred *Kaya* forests in Kilifi and Kwale County.
- Primary data will be obtained from interviews, observation,
- Key informant interviews and
- Focus Group Discussions.
- Secondary data will incorporate reviews of legislation on sacred forests and other documents from the Nation Museum of Kenya Through the CFCU.

# Thank You

# EFFECTS OF HABITAT FRAGMENTATION AND DEGRADATION ON HOMERANGE AND HABITAT USE OF PLACID GREENBUL


BY: LINDA ALILA

# INTRODUCTION

- Placid Greenbul (*Phyllastrephus placidus*) is an insectivorous forest specialist
- This species has strong filial ties or social cohesion.
- They live in pair or small groups during breeding. The groups comprises of 2-7 individuals.

NOTE: **Only two individual, one male and one female breed per group while the rest of the members help in feeding the young and offer protection.**



- **The breeding pairs characteristics**

✓High site fidelity

✓Cooperate behavior; only 1 dominant breeding pair. Rest are helpers.

# Objectives of the field session

- Determine home range of Placid greenbuls in different territories - through radio telemetry
- Determine vegetation structure in each territory; scoring the vegetation levels in each point.
- Determine habitat use – the level of forest vegetation strata utilized by the greenbuls

# Hypothesis/predictions

- ✓Placid Greenbuls in degraded habitats may have large home ranges due to the uneven distribution of resources: may have to fly far and wide within the territory to look for food

- ✓Placid Greenbul in occupying high quality territories are likely to have small home range because the intact vegetation may also hold enough insect prey for the greenbuls

# Ringing sites

- Fragments to be covered: Ngangao and Chawia
- Six pre-selected ringing plots/sites in chawia
- Nine 9 plots in Ngangao.
- A total of 4 days spent per plot - with two full ringing days in each plot.

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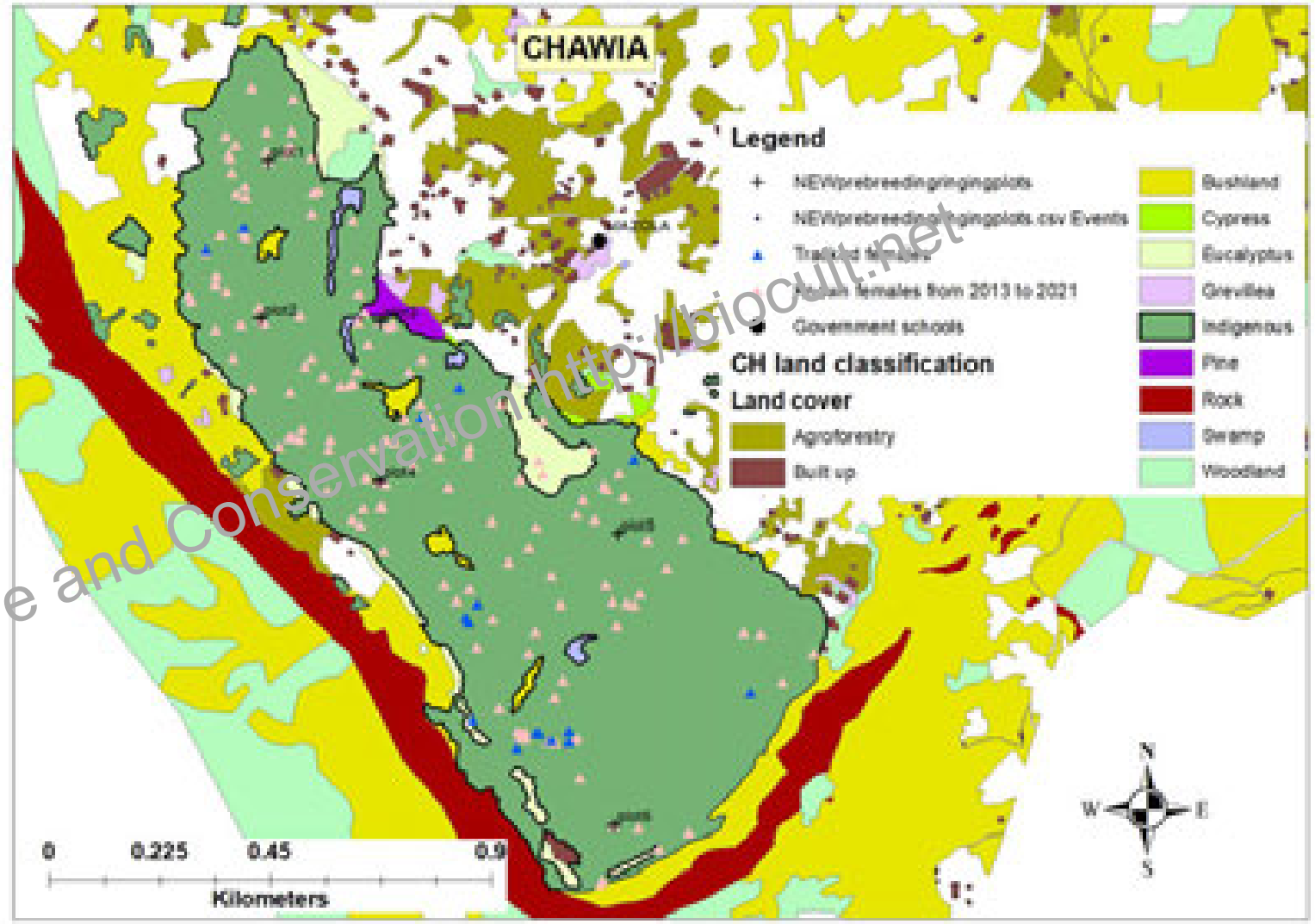
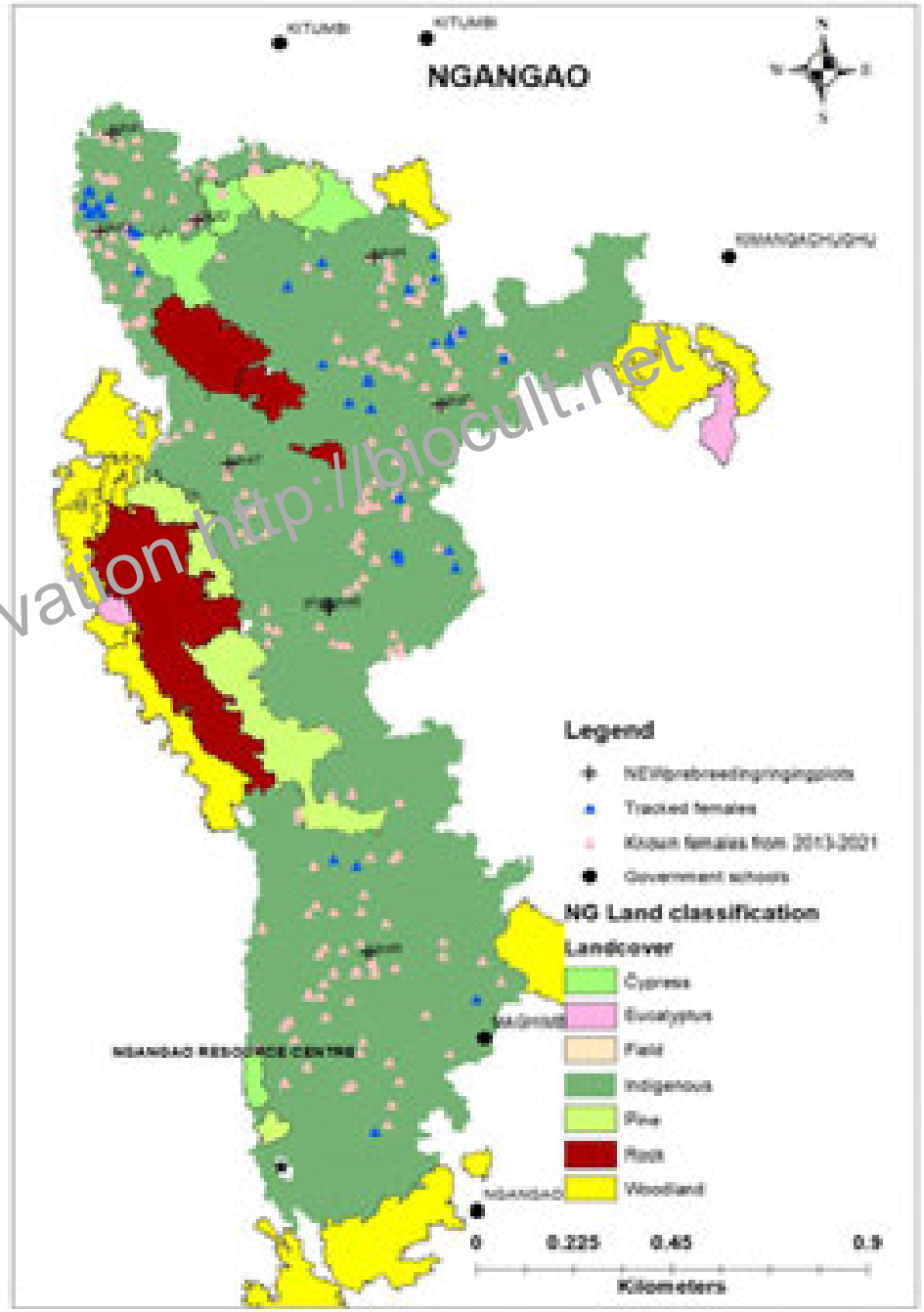


# Ringing sites….

- Target to track a minimum of 8  females per fragment
- Each individual will be tracked for a minimum of “three sub-folds of the day – that is 08:00-11:00hrs, 11:00-14:00hrs and 14:00-17:00hrs.
- Individuals are to be tracked as long as they have a sender/transmitter as well as signal.

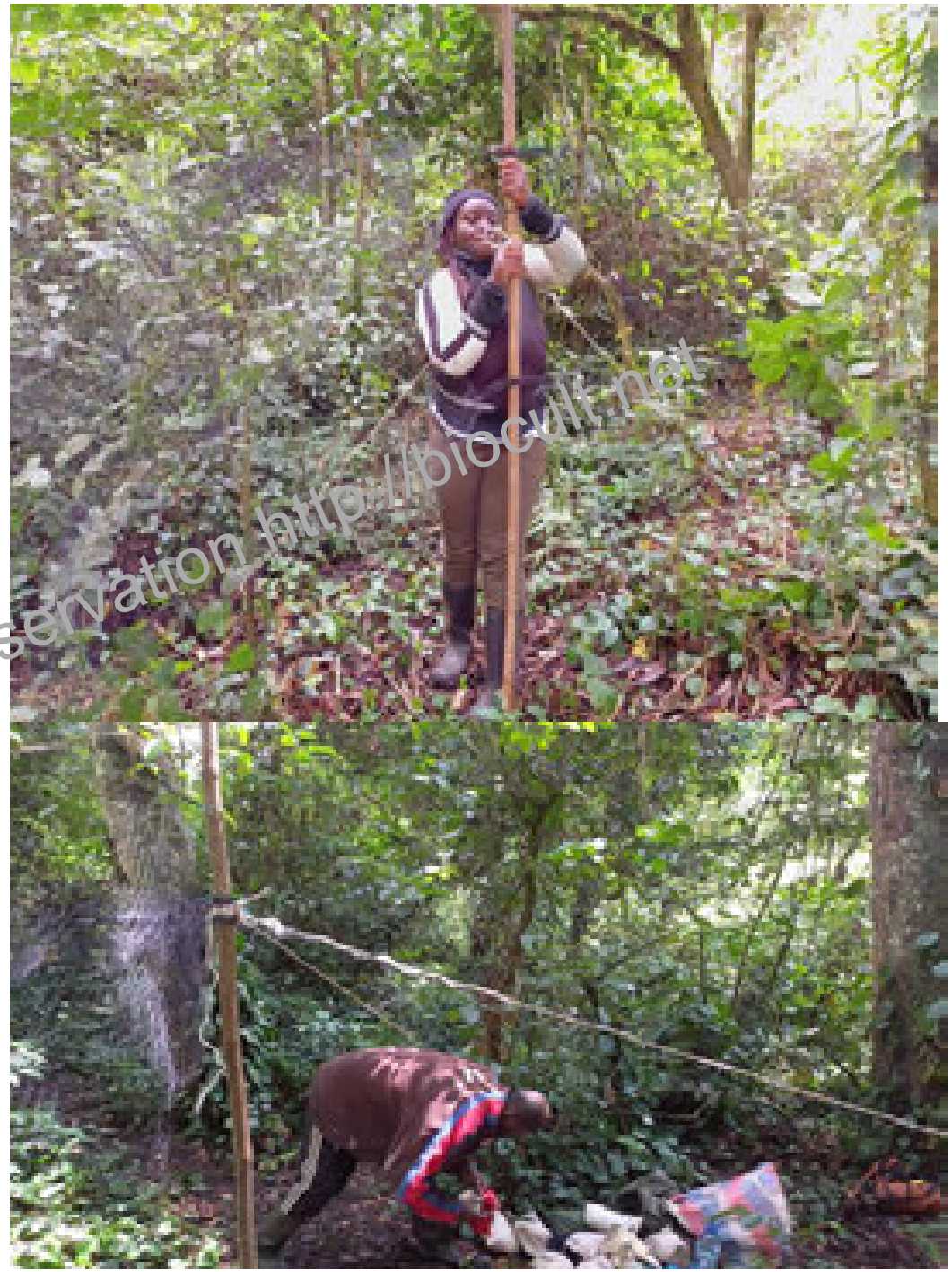
N/B **The battery life of the transmitters is approximately 30 to 40 days.**





# Mist-nets setup

- A combination of nets that will be set up in each plot include: **4*18m**, **4*12m**, **4*9m.**
- Every evening mist-nets are carefully valved to avoid any trapping overnight.
- Nets are to be opened from 06:00am - 18:00pm.



# Ringing and tagging with a transmitter

- **Transmitters are fitted on dominant/breeding female only**
- Any un-ringed Placid greenbul are fitted with colour bands plus an aluminium ring on their tarsi
- Faecal, blood sample, tail feather and body feathers  samples are collected as well.

NOTE: Placid greenbuls are not sexually dimorphic, therefore identifying the sex of an un-ringed individual is quite challenging during the non breeding season.

- **New/ un-ringed dominant female is only tagged with a transmitter only if there is an evidence of an old brood patch**
- Re-trapped dominant females are identified using their ring numbers or colour bands combination


# Transmitter fitting

- Transmitters are placed on the back of the individuals
- Tracking starts 1 hour after its release (depending on the time of the day) or the following day
- A bird is tracked for as long as the transmitter is still sending a signal
- Tracking a specific bird stops when it drops the transmitter or when the signal cannot be traced anymore

# Data coding during tracking…

| Date | | Fragment | | Observer: |
|---|---|---|---|---|
| Female CLR | | Nest area | | |
| Start | | Time 1. signal | | weather |
| End | | Time last signal | | |

| Waypoint | Time start | Time end | Min/ max ind. | CLR | Pullis? | Activity / behavior | Height (m) | Ground (0m), undergrowth (<1m), shrub(1-5m) understory (5-9), lower canopy (9-15m), upper canopy (>15m)? | Forest, edge, outside | Exotic ? | predators | notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

# Thank you!

# Comparison of tree species diversity in various forest fragments of Taita Hills

Ephie Lumumba
Benard Adwar
Michael Gichuru
Robert Tarus
James Mwangi

# Research question

- Is there variation in trees species composition in the different fragment?
- How does carbon stock vary among the fragments?
- How does carbon stock vary among the tree species?
- How does carbon stock varies with canopy layer?
- How does the level of disturbance contribute to tree species diversity?

# Data collection

- Circular plot of 15m radius.
- GPS coordinates And elevation.
- Calculation of slope.
- compass for exposition.
- Vegetation data-observation, taxonomist, measurement.
- Disturbance-observational and photos
- Presence of wildlife-observational and photos of dung, wildlife itself, foot prints and lair

# What have we done so far?

- Fururu 3 plots
- Chawia 12 plots

**What have we noticed so far?**

In Fururu the dominant tree species are: *Phoenix reclinata* and *Tabernaemontana stapfiana*

In Chawia, the dominant tree species are: *Newtonia buchanani, Dracaena afromontana, Pleiocarpa pycnantha* and *Macaranga kilimascharia.*

In Chawia we have noticed in one plot that there is succession taking place.

# Challenges

- Unfavourable weather conditions-unpredictable.
- Measuring tree height using indirect method?
- Terrain change.
- Possible accidents caused by natural disturbance.
- Ants stings

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# THANK YOU!!!