BOSWELLIA AND COMMIPHORA TREE HEALTH PROJECT
Study Plan

US Team

- Dr Anjanette DeCarlo, PhD, Project Director
- Dr Marta Ceroni, PhD ,Lead Scientific Advisor
- Stephen Johnson, BA, Research Associate

Somaliland Team

- Ahmed Derei Elmi, Lead Forest Ecologist
- Ali Abdi Hure, President of Sanaag University of Science and Technology
- Aidid Xasan Abdi, Project Coordinator

Core Partners

Sanaag University, Somaliland Biodiversity Foundation

Advisory Partners

University of Hargeisa, Somaliland Ministry of Environment and Rural Development, Candlelight: Ahmed Awale

Funding Partners: Lush SLush Fund

Goals of the study

The main objective of our applied research is to save the frankincense and myrrh economies from collapse, as both are culturally, economically, and ecologically important for the communities of the Sanaag region in Somaliland. We approach this work with the need to understand how locals have traditionally used the trees, how trees have responded to the use and how current pricing and demand are affecting both the wellbeing of people and trees in the region. Ultimately we hope to find the “sweet spot” between healthy trees and secure communities. We realize that a new factor has added to the relation between trees and people in this semi-arid region: a less predictable weather pattern due to climate change. As dry and wet seasons change, we expect that both trees and people will be affected. This makes our work of quickly finding smart ways of making a living with resin trees even more urgent.

In this project we work with academic partners at Erigavo University and the harvesters community in the Sanaag region to achieve these main goals:

1. Exchange knowledge as an international team and develop capacity of faculty and students at the University to foster conservation and a sustainable resin economy of the Cal Madow

2. Evaluate the effectiveness of payments for ecosystem services to study and protect the *Boswellia* trees as key species of the Cal Madow ecology and economy

3. Understand how current and historical management and tapping methods affect the health of *Boswellia* and *Commiphora* trees

4. Develop best practices for sustainable management and harvest that guarantee long term economic opportunities for local harvesters and long term health for trees

5. Establish a baseline of current resin supply and availability for the global markets

6. Establish partnership between academic, government, nonprofit, and business that can develop a success model of researching tree health

Understand the relationships between the frankincense trees and their supporting ecosystem that might be critical for the long-term health of the frankincense forest ecosystem and the resin economy

7.

Study sequence

A local frankincense organic supplier and his family have partnered with the project team and have designated 60 *Boswellia carterii* trees that can be rested for one tapping season and set aside for studying the effects of different management and tapping approaches on the health of the trees. It has been our priority to make sure that our partners will not lose revenue in this project.

1. Tree Survey and Interviews (September- October 2016)

First Site Visit (Somali Team)

The goal of the first visit is to connect and meet with local landowners who have access to the study site, locate the 60 trees that are part of the study, mark them, and assess the approximate area of the study site.

Second Site Visit (Somali + US Team)

The Somaliland Team and the USA Team lead by Dr. DeCarlo will meet with local harvesters to gather information on traditional practices and on resin production with different harvesting methods.

Goals of the second visit by both project teams are:

- Capacity building and training for University personnel
- Understand the harvesting practices at the study site and the history of other uses
- Record general environmental conditions (such as altitude, soil type, dominant vegetation)
- Record frankincense stand structure and measure diameter of each study tree and their general health conditions

2. Best Practices (Jan-Mar 2017, Somali + US Team)

After visiting the trees at the study site, interviewing local harvesters, and after reading articles about the effects of site management and tapping methods for other *Boswellia* species, we will produce a few recommended practices that we are going to share with the landowners for feedback and test at our study site. We expect that other landowners in the organic cooperative might be interested in testing some of these practices outside of the study site with external support.

3. Test Best Practices (2017 and 2018 Harvests, Somali Team)

We will test the different practices on the 60 trees at the study site for two subsequent harvesting seasons.

4. Revise Best Practices (End of 2018, Somali + US Team)

We expect that after two years of testing and receiving feedback from harvesters and research partners, our practices might change and we will therefore include our new learnings and ensure ample distribution and adoption among harvesters.

First Site Visit – Field Guide

GOAL OF FIRST VISIT TO STUDY SITE

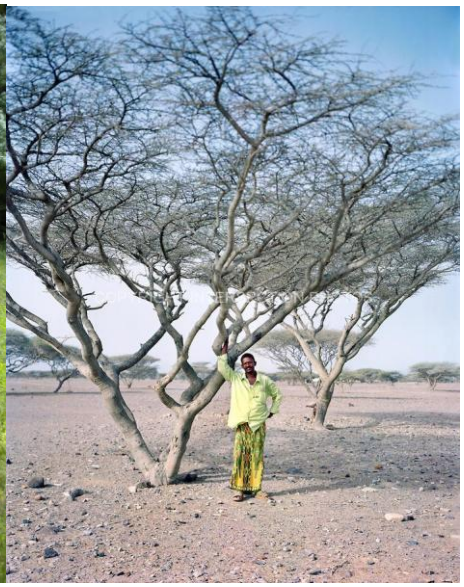
The goal of the first visit is to connect and meet with local landowners who have access to the study site, locate the 60 trees that are part of the study, mark them, and assess the approximate area of the study site.

PREPARE FOR THE FIELD

- Prepare team: who is going, who will do what
- Call local person at study site and set up visit; organize transport to the study site
- Prepare field materials: map of the area (if available), map coordinates of study area, printed Field Sheet, printed Field Guide, strips of old fabric (or rope), phone or camera and charger

IN THE FIELD

- Meet and spend time with local suppliers; get to know them, they are important partners in the project!
- Locate the area where the 60 frankincense trees are and take GPS coordinates.
- Determine whether the landowner has designated a general area for the study or has pre-selected individual trees for the study or both.
- Using strips of fabric or rope, mark out a few old, middle aged, and young trees, including baby frankincense trees. Loosely tie one strip (or piece of rope) to a low branch to mark tree. Take pictures of trees after you have marked them.Make sure to have a person or object next to it for reference as in these examples.

- Assess the approximate size of the study site in square meters and/or hectares
- How far do you have to walk from the car to reach the study site?

DATA ENTRY

Enter the data from the Field Sheet to the computer (or phone). Share data and pictures within 5 days after site visit via email with Anjanette and Marta.

Second Site Visit – Field Guide

GOALS OF SECOND VISIT TO STUDY SITE

- Understand the harvesting practices and the history of other uses
- Record general environmental conditions
- Record frankincense stand structure and measure diameter of each study tree and record their general health conditions

PREPARE FOR THE FIELD

- Research local songs, poems, and art about the Cal Madow and the *Boswellia* and *Commiphora* trees
- Obtain precipitation data for the study area (or whole of Sanaag) from global, regional or Somaliland governmental databases.
- Prepare team: who is going, who will do what
- Call local person at study site and set up visit; organize transport to the study site
- Prepare field materials (see Field Check List)

WITH THE LANDOWNER

- Ask When the 60 trees were last tapped
- Determine how ownership works (do landowners own the land and/or the trees?)
- Determine mindset around using and stewarding the trees versus the whole ecosystem
- Interview the landowner of the 60 trees and other landowners and harvesters who sell through the organic growers cooperative - use Questionnaires below
- Make sure to interview a few old harvesters whose knowledge of older practices would be very helpful

AT THE STUDY SITE

Establish the study plot, a square or round area that contains all 60 designated frankincense trees

- Mark with colored pins the four corners (or the center if round plot) as reference (you need to come back to this place and recognize the markers)
- Record coordinates of all four reference corners (or center) using GPS App on smartphone
- Measure size of study plot using GPS App on smartphone or tape measure
- Take several pictures of the study plot with the drone that we can use to create a digitized map

Record general environmental conditions within the study plot

- Record altitude with GPS App on smartphone
- Do a census of other shrub and tree species (How many different species are present? What species?)

- Describe soil and take pictures near the base of 5 or 6 study trees at different locations in the study plot

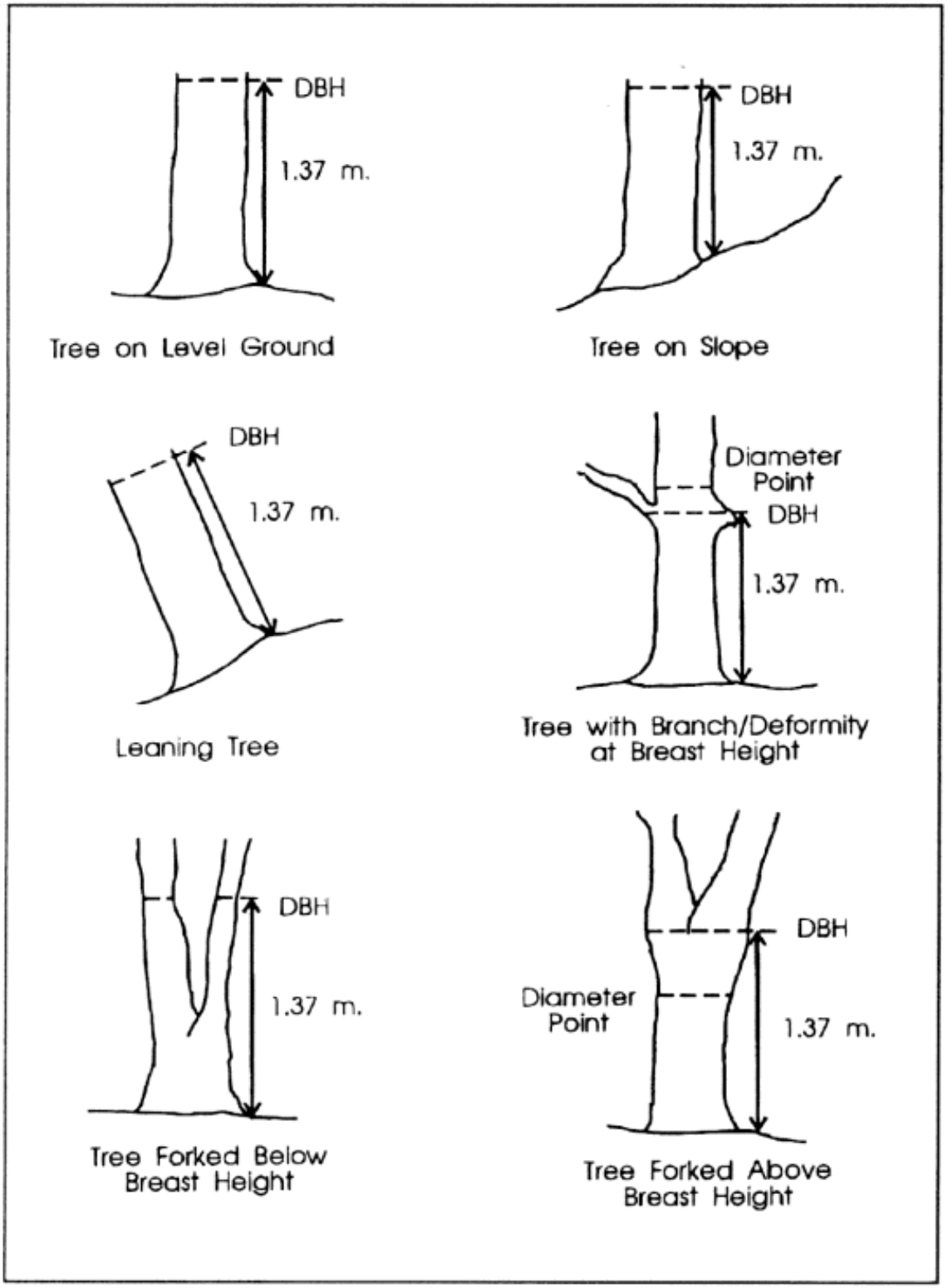
Record frankincense stand structure

- Label and number each of the 60 frankincense trees using labeling tape and/or tags on the ground and permanent markers
- Measure Diameter at Breast Height (1.37 m) of each of the 60 frankincense trees and all other frankincense trees in the study plot with diameter greater than 5 cm (see guide below)
- Estimate approximate crown diameter for adult trees.
- Count, record, and flag the number of baby frankincense trees (less than 1 cm) and juvenile trees (between 1 and 5 cm) in the study plot
- Record presence of frankincense leaves, flowers, seeds, and seedlings for each of the 60 frankincense trees
- Measure height of the few tallest frankincense trees
- Record general health conditions of each study tree: presence of disease, dead trees, sick leaves or limbs, number of incisions on the trunk. Also note the presence and condition of additional, non-study adult trees.

DATA ENTRY

Enter the data from the Field Sheet to the computer (or phone). Share data and pictures within two weeks of site visit via email with Anjanette and Marta.

Diameter of trees is measured at “breast height”, 1.37 m from the ground. In reality as long as you’re taking the measurement at your breast height, it is OK, no need to measure exactly at 1.37 m. See suggestions below for measuring in different cases.



Tree Health Project
Field Equipment Checklist

ORIENTATION

- Local contacts
- Printed Field Sheet (Stephen)
- Printed Study Plan (Stephen)
- Botanical handbook (if available, Stephen)*
- Topographic map, printed aerial photo or satellite image of the area (if available)(Somland)(Stephen)
- Map coordinates of study area
- Compass (Anjanette)
- GPS (or smartphone with the GPS app) + extra batteries (Anjanette)*
- First Aid kit [Stephen]
- Flashlight/headlight and batteries (Anjanette)
- Camping equipment and cooking utensils

MEASUREMENTS

- Rigid board to support data sheets (Somland)
- Waterproof Field journals (Anjanette)
- Tape measure (20 m) (Anjanette)
- Diameter tape (Anjanette)
- 1.3 m stick (to mark breast height for DBH) (Somland)
- Caliper, 50 cm (Anjanette)
- Tree Height measurement device (Moti App and/or Suunto clinometer) (Casey and Anjanette)
- 360 degrees Camera (Anjanette)*
- Phone for taking photos + extra SD cards + extra batteries (Anjanette)*
- Anker Solar chargers (21 Watt) for phones, cameras, and other equipment (Anjanette)*
- Storage Battery (Anjanette)*
- Battery charger (Anjanette)*
- Heavy Duty Scissors (Somland)
- Rubber mallet (Somland)
- Box cutter (Somland)
- Pocket knife (Somland)
- Equipment case (Anjanette)*
- Plastic bags to protect measurement instruments (Somland)
- Pencils (Stephen)*
- Pens (Stephen)*
- Permanent Markers (e.g. Sharpies) (Stephen)*

- Precision scale (Anjanette)
- Labels for trees (Anjanette)
- Colored flagging tape (Anjanette)
- Pins to mark corners of study plot (Somland)
- Download GPS App for area calculation (Anjanette)*
- Download GPS App for altitude and coordinates (Anjanette)*
- Instructions for collecting soil samples (Stephen)
- Containers and labels for soil samples (Anjanette)
- Spade (Somland)
- Coring sampling device (for soil) (Anjanette)
- Smart phones - Buy them smart phones – Casey: what capacity does it need to have? (Anjanette)*
- Drone, check in and check out, Casey will teach Mahdi and Anjanette, drone will stay with the president (Anjanette)*
- Marking trees, plastic bags are shredded and spooled, used. (Somland)
- spool of metal wire (Anjanette)

-* Anjanette to follow up on purchasing