Relating workshops with smallholder farmers to Reforest Africa's objectives

Agrisys Tanzania project

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Introduction

The following document has been prepared for Reforest Africa by Eleanor Moore (Agrisys PhD student) from her analysis of transcript data collected during Smallholder farmer workshops in the Northern Kilombero landscape (July-August 2021). These workshops were led by Dr. Susannah Sallu and Dr. Margherita Lala (University of Leeds) and Dr. Deo Shirima (Sokoine University) as part of the Agrisys Project. This analysis has been conducted for Reforest Africa as a means of contributing to their restoration planning activities in the landscape.

Agrisys Tanzania is a research project that applies an interdisciplinary systems approach to develop new scientific knowledge to support design integrated forest-agricultural landscapes to enhance multiple livelihood benefits to and from agriculture.

Permission must be sought from Agrisys Principal Investigators Dr. Pfeifer (Newcastle University), Dr. Shirima and Dr. Sallu before sharing this report or any of the research findings reported here. Any use of this information should include acknowledgement of the Agrisys project and associated partners. Use of this information should also be communicated with Pfeifer, Shirima and Sallu allowing impact to be monitored.

Workshop details

We conducted nine workshops across six villages with smallholder farmers in the Northern Kilombero Valley, see table 1 for workshop groupings. The villages included were Msalise, Mgudeni, Mangula'B, Kidatu, Sanje and Katurukila. Seven workshops were with adults and two with youth. Within each workshop, participants were further divided into male and female groups. There were 85 participants in total, 38 women, 47 men of which 20 were youth and 65 adults.

Participants were chosen based on where they live. However, farmers often do not live in the same village as their farm, therefore, we do have participants with farms in both Magombera and Kanyenga.

Table 1. Workshop groupings

Workshop number	Age	Wellbeing grouping	Villages
1	youth	Mixed	Msalise, Mgudeni, Mangula'B, Katurukila
2	youth	Mixed	Kidatu, Msalise
3	adult	High	Kidatu, Sanje
4	adult	Low	Kidatu, Sanje
5	adult	High	Msolwa station, Mangula'B
6	adult	Low	Msolwa station, Mangula'B
7	adult	High	Mgudeni, Msalise
8	adult	Low	Mgudeni, Msalise
9	adult	Mixed	Katurukila

The workshops lasted one day through which participants were guided through various activities. Firstly, they were asked to describe their current farm including the location, crops they grow, tree cover, tree species and tree uses. They were then prompted to discuss the features that surround their farm such as roads, rivers, or forest.

Participants then moved to the second activity where they were asked to describe their future desirable farm and surrounding area. A local artist was on hand to draw a visual interpretation of the farm for each individual. Participants were asked why or why not they included trees, the specific species desired and the reasons for their choices.

Lastly, they explored challenges and opportunities in achieving the desirable farm. This activity related less directly to trees than the previous ones.
After each activity there was a plenary discussion with the group to discuss and compare current farms, desirable farms, challenges, and opportunities.

At the end of the workshop, participants were presented with Agrisys research feedback leaflets, these focussed on multiple topics such as birds, influence of trees on microclimate, pest information and control.

General insights

Farmers often described trees as either 'natural' or 'planted' trees. Natural trees are trees that the farmer did not plant so were either left when land was cleared to farm, naturally regenerated, or planted by a previous occupier of the land. These tend to be native trees but not always, that do not necessarily have a marketable product but are used for multiple benefits like firewood and shade.

"*I wish to be surrounded by trees…If I will find natural trees on the farm, I will not cut them down, because they have benefits*" - Participant WS3 desirable farm description

Trees were usually desired for multiple benefits such as shade, timber, fruit, beekeeping, boundary marking, clean air, and firewood. Usually in the desirable farm, the primary focus was on food security and income, crops/trees that could provide both of those were often favoured such as rice and fruit trees. There was also a strong notion that timber trees could be used to raise income in the future.

Beekeeping was also very common in desired farms across the workshops and participants knew the benefits of beekeeping well in terms of pollination, income, and medicine. A few also mentioned using the beehive fencing to repel elephants.

There was a very strong narrative around tree shade reducing crop yields and there was interest being educated in keeping trees that would not affect yields. One farmer mentioned they kept tamarind and sausage trees because they do not affect their crops and there was also mention of desiring trees with a small canopy for this reason.

Relationships with other surrounding farmers are very important for both crop and tree growing. It was often considered in discussion about trees on the boundary, participants did not want conflict with neighbours if their trees shade others farms. Farmers desired to be surrounded by other farmers for cooperation and security. They also often desired surrounding farmers to also be growing similar crops as them for this reason. A few farmers mentioned wanting to plant something because their neighbour has such as a participant from workshop six:
"other people also plant the trees, why should I not plant them?"

Plantations/Woodlots

Very few participants already had woodlots or plantations, most participants had a few trees on the farm boundaries if at all. However, plantations were often mentioned in the desirable farm by both men and women, although more often by men. Participants from Msolwa station and Mangula'B (WS5 and 6) were particularly interested in having a mixed-species plantation in their desirable farms (Figure 1). The most common species specified were teak, *Khaya anthotheca,* and *Milicia excelsa,* although often farmers did not specify the species but instead focussed on the benefits the plantation would provide. These benefits were usually timber, firewood, beehives, and charcoal.

Only one participant across all workshops wanted to plant trees for conservation, particularly endangered species for medicinal uses. They mentioned Ficus, sausage tree, Msekese, Neem, Pine, Mkundekunde. This participant said that trees are disappearing and they wanted 2 acres of trees that could be used as a tourism centre for the future. This also highlights a theme across all workshops in the desirable farms that trees would also provide extra income, alongside other multiple benefits.

Figure 1: Desirable farms from two male participants from workshop 6 showing diversified farming that includes tree plantations.

Crops and agroforestry in the desirable farm

Crops in the desirable farm were watermelon (although mentioned desire for irrigation and inputs to do this), potatoes, sesame, pigeon peas, cassava, ground nuts, and drought resistant crops. When considering agroforestry in the desirable farm, maize was the most common crop mentioned with bananas and other trees, also being intercropped with legumes such as pigeon peas.

There was a strong theme about wild animals eating crops. Crops described as being eaten by wild animals include: maize, rice, cassava, cow peas, ground nuts, sweet potatoes. Farmers bordering Udzungwa NP described switching to growing chilli peppers because the elephants do not eat them. Other farmers described shifting to sugarcane because elephants do not eat the mature plant. Sesame was also mentioned as not being eaten by elephants.

There was some interest in growing cocoa trees because they have heard they achieve a good price but there is a lack of knowledge as to how. This linked to discussion that Agricultural Extension Officers (AEOs) do not give them sufficient farming advice. A participant described themselves as '*cultivating by guessing*' (WS3) due to a lack education and support from AEOs at the right time, and problems transporting crops to market.

Soil fertility, synthetic inputs, and trees

Soil fertility and use of synthetic agricultural inputs (lack of supply, not arriving on time, expensive) was often a challenge described by farmers across the workshops, but there was only one participant who made a link to the role of trees eg. biopesticides, N-fixing species to improve soil. This was also demonstrated in the reactions to the Agrisys leaflets that mainly focussed on Neem as a biopesticide because most participants did not know this. One noted they knew but did not know how to use it. There was also mention that it is difficult to get Neem seeds in Kilombero.

Challenges of trees

Wild animals

Wild animals were a primary challenge around farming and trees and this was described as an increasing problem with wild animal numbers increasing. Some participants linked this to the change in protection status from Selous Game Reserve to a National Park. Trees were described to decrease visibility to wild animals and attract them. Animals were said to destroy the trees and raid the crops, particularly elephants. Participants described these issues as preventing them from keeping/planting trees and a motivation for some to remove them.

"if it wasn't for elephants destroying trees at my home I wanted to be surrounded by trees" (WS9)

This narrative also linked to the ban on using protected areas. Some participants expressed being advised to plant trees by TANAPA because they could no longer use protected areas but then this has caused wild animals to enter their farm. This was also a contributor to farmers wanting to be surrounded by cropland rather than reserves or forest.

"There was time we were told to go to TANAPA to take tree seedlings to plant in our farms for firewood, now the trees are big and elephants are staying under the trees up to 2 pm, so we are afraid of planting more trees" (WS5).

The workshop with participants from Katurukila spoke a lot of the challenges of elephant crop raiding, particularly mentioning that they come from Magombera forest. The narrative of being told to plant trees because they cannot use the forest was also comparatively strong in this workshop

"I want to have 3 or 4 trees in the farm for firewood, in case they keep baring access of firewood from the forest." (WS9).

Participants also associated management of Magombera with TANAPA.

"*these elephants come from Magombera forest which is now under TANAPA."* (WS9)

Trees affecting crops

There was particularly strong narrative that having trees on the farm decreases surrounding crop yields, particularly around sugarcane and rice. This was one of the most common reasons of not keeping and removing trees. Difficulty in ploughing the field was also a reason for removing trees. Some participants expressed wanting trees that do not harm to crop yields, but they have a lack of knowledge on this.

Other common challenges of keeping trees

Farmers also mentioned a variety of other challenges in keeping trees in bullet points below.

- High financial costs of planting and keeping trees.
- Security issues of trees being stolen for firewood or charcoal, particularly if farms are far from the home.
- Planted trees not growing because of poor soils or seedlings eaten by animals.
- Issues of getting harvest permits.
- Care of trees on rented fields is with the owner of the farm.
- Sugarcane farms get burnt so a firebreak may be needed.
- Lack of knowledge on what trees are beneficial, particularly around ones that do not harm crop yields.

Tree species

A total of 41 species were mentioned across the current (33 species) and desirable (24 species) farms (excluding fruit trees). The most common trees in the current farm (mentioned in ≥ 3 workshops) were: fruit trees particularly mango, banana, *Kigelia africana*, *Ficus*, palm oil and teak. These were also the most desired species (mentioned in ≥ 3 workshops), alongside *Khaya anthotheca* and *Milicia excelsa*.

Table 2: Tree species mentioned by farmers as either being on their current farm or in their future desirable farm. To give an indication of commonality/popularity, the number of workshops this species was mentioned in is included. ≥ 1 workshop means it was mentioned by at least one participant in at least one workshop. Within a workshop, a species may have been mentioned by one or many farmers but this has not been recorded below.

No.	Species	Current farm	Desirable farm	Notes mentioned by farmers.
1	African plum	≥ 2 workshops	≥ 1 workshop	
2	African sausage tree (*Kigelia africana*) mwegeya mingungua mfungutua	Most workshops	≥ 3 workshop	Shade Boundary marker Medicinal Firewood
3	Bamboo	≥ 1 workshop	≥ 1 workshop	Reduces sugarcane yield below. One participant desired it to be planted surrounding a fish farm In the desirable because it conserves water, but was concerned it can easily spread.
4	Banana trees	Most workshops.	Most workshops.	Food security. Attract elephants. Large canopy shades crops
5	*Brachystegia spp*	≥ 1 workshop	≥ 2 workshops	Hang beehives Shade
6	Cocoa		≥ 2 workshops	Heard high price but lacking knowledge
7	Ficus	≥ 8 workshops	≥ 2 workshops	Firewood, source of rain and water conservation, leaves as mulch, medicinal, timber. Die when planted. Issues with big branches.
8	Fruit trees – Papaya, mango, orange, cashew, coconut, tangerine, lemon, avocado, jackfruit	All workshops	All workshops	Mango was the most common fruit tree spoken about. In the desirable farm it usually provided fruit and shade. However, also said to be home to bird pests. Coconut – mentioned as having a lesser canopy so better to grow with crops.

#	Name			
				Attracts wild animals, farmers near Udzungwa particularly mentioned Monkeys. Food and commercial purposes
9	*Grevillea spp*	≥ 1 workshop		Firewood
10	*Khaya anthotheca*	≥ 2 workshops	≥ 5 workshops	Planted for firewood Timber – furniture, roofs, windows. Often desired in plantations. Big branches that shades crops. Takes a lot of water.
11	Marula tree	≥ 1 workshop		Natural tree used as a windbreaker
12	Mbalikila	≥ 1 workshop	≥ 1 workshop	Firewood
13	Mchenjere	≥ 1 workshop		Birds love to eat the fruit.
14	Mfulu (*Vitex doniana*)	≥ 1 workshop.	≥ 1 workshop	Fruit for food, firewood, and charcoal. Mentioned as fast grower for firewood.
15	Mfumbi	≥ 1 workshop		Firewood
16	Mfungutawa/Mfungutuwa	≥ 1 workshop		
17	Mfuru	≥ 1 workshop		Want to hang beehives
18	Mhalaka	≥ 1 workshop		
19	Mikarati	≥ 1 workshop		
20	Ming'ongo	≥ 1 workshop		
21	Minukanuka (*Cedrela*)	≥ 2 workshops	≥ 1 workshop	Planted for wind break, firewood, and timber.
22	Misekese	≥ 1 workshop		
23	Miyae		≥ 1 workshop	Hang bee hives and borders.
24	Mkarati (*Burkea Africana*)	≥ 1 workshop	≥ 1 workshop	Shade
25	Mkundekunde	≥ 1 workshop		
26	Mninga (*Pterocarpus angolensis*)	≥ 1 workshop	≥ 1 workshop	Shade and timber
27	Mpingo – African blackwood	≥ 2 workshops	≥ 1 workshop	Plantation Shade, firewood, and medicinal uses.
28	Msolwa	≥ 1 workshop		
29	Msukuliko	≥ 1 workshop		
30	Mtogo	≥ 1 workshop		
31	Mvule (*Milicia excelsa*)	≥ 1 workshop	≥ 3 workshops	Plantations and boundary planting.

#	Name			
				Mention it does not affect crops by a couple of participants.
32	Mzanzibari	≥ 1 workshop	≥ 1 workshop	A participant in workshop 9 said they desired this as a boundary planter in their desirable farm because it does not attract elephants.
33	Neem	≥ 1 workshop	≥ 2 workshops	Timber. Only a couple of participants in one workshop spoke in-depth about the medicinal and pesticide properties.
34	Palm oil trees	≥ 3 workshops	≥ 4 workshops	Generally desired for boundary planting and oil for food and to sell. Mention of reducing harvest of crops (rice) below so wants to remove it. One farmer said his paddy keeps being destroyed because of floods so he is thinking of planting palm trees instead because he can get oil and animals don't like them. Thorns can damage the farmer when harvesting.
35	Pine trees	≥ 2 workshops	≥ 2 workshops	Planted for firewood because you can coppice. Desired in a plantation and along borders. Mention of a new pine tree variety that grows quickly? Participant said it was good for boundary marking, does not have big branches, good for moisture and a windbreaker.
36	Msolo (*Pseudolachnostylis maprouneifolia*)		≥ 1 workshop	Fruits eaten by birds
37	Sycamore tree	≥ 1 workshop		
38	Mkwaju (*Tamarindus indica*)	≥ 1 workshop		Shade. Mentioned to not decrease crop yields by a participant.
39	Teak	≥ 3 workshops	≥ 5 workshops	Concerned it absorbs a lot of water by a few participants across workshops.

				"I wish to plant other trees around my farm; the trees should be species which conserve water like pine trees, ficus trees and even palm trees, will be useful for oil. But Tectona trees absorb much water." - WS5 Preferred because they can be coppiced. Plantations with other timber trees for beehives, firewood, and timber. Intercropping with maize. "They are like cash crops, I will sell."- WS8
40	Wild papaya	≥ 1 workshop		
41	Msonobari (*Senna spp*)	≥ 1 workshop	≥ 1 workshop	Desired for construction and charcoal "*if you grow senna it doesn't affect crops.*" - WS9
42	White teak		≥ 1 workshop	Keeps land wet and attracts rain.