Farmer-Managed Natural Regeneration as a restoration strategy in Migori and Homa Bay, Kenya

Workshop summary report: Kenya, November 2022

Acknowledgements

We are much indebted to all the participants for their active engagement in the workshops and for sharing their knowledge. Specifically, we are grateful for the support and advice given by John Awero, Charles Omondi, Irene Kibon, Brian Wambua, Milton Oboke, Ongalo Jared, Edwin Ochola and Mieke Bourne.

This project was funded by the Wageningen University & Research investment theme Biodiversity Positive Food Systems. Scientific and logistical support was received from World Vision and World Agroforestry (ICRAF).

Lay-out and editing was carried out by Gina Maffey (www.ginamaffey.com)

To cite this report: Madelon Lohbeck, Lieven Claessens, Luuk Fleskens, Laura Mukhwana, Amir Soliman, Bas Verschuuren, 2023. Farmer-Managed Natural Regeneration as a restoration strategy in Migori and Homa Bay, Kenya. Workshop summary report. Wageningen University.

Contents

Acknowledgements 1

Contents 2

Background and introduction 3

1. What is Farmer-Managed Natural Regeneration? 5

2. What species regenerate naturally? 6

3. What conditions influence natural regeneration? 8

4. Is species' regeneration success influenced by different conditions? 9

5. What benefits and disadvantages are associated with FMNR? 12

6. How do benefits and disadvantages differ depending on the species? 14

Conclusions and Recommendations 19

Background and introduction

This report presents a summary of the outcomes of two workshops held as part of the project called 'Restoring and diversifying food systems with natural regeneration'.

The project aims to understand the potential of natural regeneration for restoring and diversifying farming systems.

Summary of outcomes

Farmer-Managed Natural regeneration (FMNR) is a land restoration practice that is being promoted across Kenya, as well as in other countries in Africa. During this workshop we aimed to unravel farmers knowledge on FMNR and find out the extent to which natural regeneration meets farmers' expectations. We found out that workshop participants generally conceived it as a traditional practice, which is now being revived. It is likely that successful adoption of FMNR can be partly attributed to the fact that it builds on traditional practice and knowledge.

To practice FMNR a farmer depends on what regenerates naturally on a farm. During the workshops it became clear that farmers have substantial local knowledge on the variety of species that regenerate and that a large variety of species have the potential to do so. FMNR thus has a large potential for increasing biodiversity in agricultural landscapes.

"farmers have substantial local knowledge on the variety of species that regenerate"

The species that regenerate, as well as their abundance, are affected by biophysical conditions (e.g., climate, soil type), by management activities (e.g., grazing, tree management) and by social factors (e.g. poverty, knowledge). Consequently, depending on the context of each farm, a different set of species is available to select and manage under FMNR. Different species also provide different perceived benefits. This raises the question; does natural regeneration meet the needs and expectations of the farmer, or will additional tree planting be needed to attain this? Follow-up research aims to dive into this query more deeply.

While FMNR generates many different benefits, some disadvantages were also reported. The disadvantages point to potential barriers to FMNR adoption, particularly since they directly relate to a feeling of safety (attracting wild animals, intruders, poachers). These should be explored further as they are likely to form realistic barriers hampering current efforts to scale out the practice.

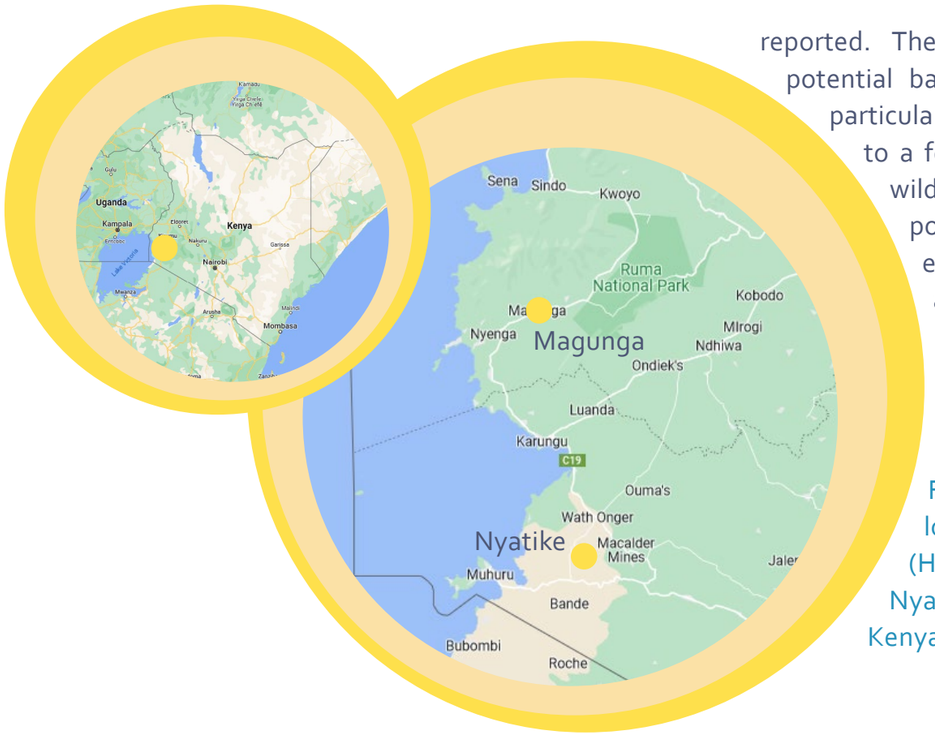


Fig 1. The workshop locations in Magunga (Homa Bay county) and Nyatike (Migori county), Kenya.

Workshop design

Two one-day workshops were organized; in Nyatike, Migori county (8th November 2022) and in Magunga, Homa Bay County (10th of November 2022). The workshops aimed to:

- Understand how farmers define and practice farmer-managed natural regeneration in the study region.
- Determine what the potential benefits and disadvantages of FMNR are.
- Recognize which tree species are thought to regenerate naturally, and what benefits the species bring to farmers.
- Learn what conditions are perceived to affect species performance and the implementation of FMNR practices in the study region.

Workshop participants

Workshop participants were farmers, invited by World Vision Kenya from the collective of farmers that they collaborate with. FMNR lead farmers have received extensive training by World Vision to train, guide and mentor other farmers into practicing FMNR.

- At the Homa Bay workshop there were 28 participants (14 male and 14 female); 27 of the participants were lead farmers.
- At the Migori workshop there were 35 participants (20 male and 15 female); 19 of the participants were lead farmers.

1. What is Farmer-Managed Natural Regeneration?

The workshops began by discussing participants' understanding of FMNR and sharing experiences with the practice. Differences were explored further to find a consensus.

Main findings

- FMNR is the management and promotion of 'natural trees' on the farm. Natural trees are those trees that have grown from tree stumps or from seed. It explicitly excludes trees that were planted. It involves taking care of natural trees, which is characterized by a variety of practices including pruning, weeding, thinning, fencing tying branches together to ensure that they grow straight, nurturing stumps until they grow tall enough to not need active management anymore.

- Through FMNR, land is restored to 'how it was created', as defined by the participants. Both indigenous and exotic species are taken care of under FMNR, although the majority are indigenous species.

- FMNR can be combined with crops such as sweet potatoes, or with grazing. Fallow land (land that is no longer used for agricultural activities) can also be classified as FMNR if the practices outlined above are applied to promote the growth of beneficial trees.

- FMNR is considered a traditional practice, because previous generations also took care of trees. However, the practice was lost due to population increase and the introduction of exotic species in the 1940s (notably Eucalypt). It is now becoming more widespread as farmers receive training on FMNR by World Vision lead farmers and through the Regreening Africa programme.

"land is restored to 'how it was created'"

2. What species regenerate naturally?

We asked all participants to take 10 minutes on their own, to write down as many species that they could think of which regenerate naturally on their farms. Figure 2 (page 7) presents the species that were mentioned, by workshop location, with the size of the bar representing the number of times a species was mentioned by all workshop participants.

"this large number of species highlights the potentiol of FMNR for increasing biodiversity in agricultural landscapes"

Main findings

- A large number of species were mentioned in both workshops. Since natural regeneration is a requirement for practicing FMNR, this large number of species highlights the potential of FMNR for increasing biodiversity in agricultural landscapes. It also shows that farmers have substantial knowledge on natural regeneration which increases the possibilities for farmers to promote a wide variety of species under FMNR, which further increases the possibilities of raising on-farm biodiversity.

- The number of species listed was lower in the Homa Bay workshop. A possible explanation for this, is that trainings delivered by World Vision had only started seven months before the workshop took place. However, in Migori, trainings have taken place since 2018; and additional projects (e.g. Regreening Africa) have actively built capacity. Consequently, farmers in Homa Bay have had less time to build up experiential knowledge with FMNR.

- The most commonly identified species overlap between the regions. Differences between listed species at each region may be caused by local differences in species pools, or by variation in regional species names. Not all species that regenerate naturally are indigenous species. Some exotic species also regenerate naturally across the farms in the study regions, for example: Mapera (*Psidium guayava*) and Chamama (*Thevetia peruviana*), both of which are native to the Neotropics.

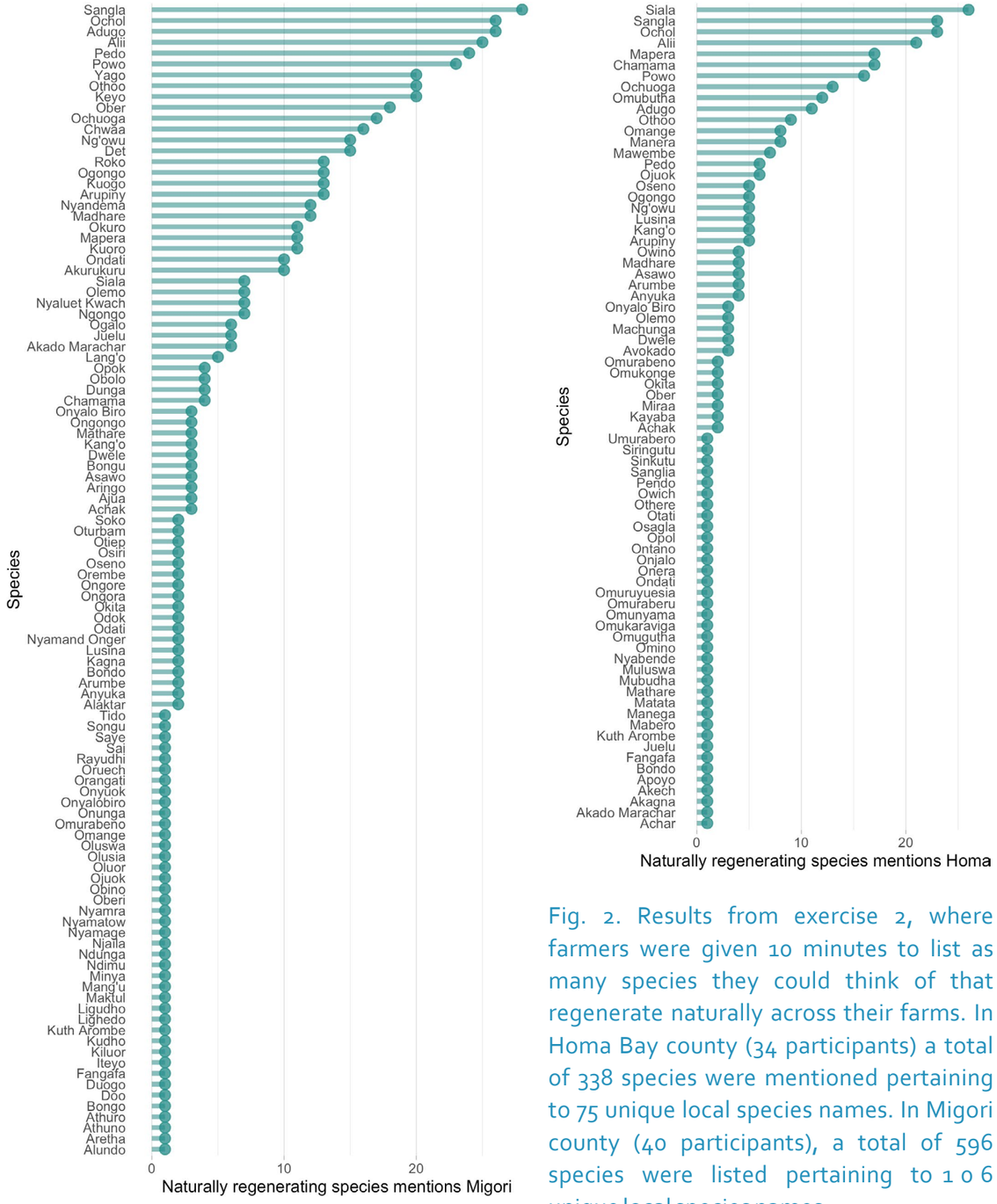


Fig. 2. Results from exercise 2, where farmers were given 10 minutes to list as many species they could think of that regenerate naturally across their farms. In Homa Bay county (34 participants) a total of 338 species were mentioned pertaining to 75 unique local species names. In Migori county (40 participants), a total of 596 species were listed pertaining to 1 0 6 unique local species names.

3. What conditions influence natural regeneration?

In this exercise, participants were split into groups and asked to identify conditions that influence regeneration. They were also requested to determine whether that influence was positive or negative. Finally, participants gave reasons as to why this condition influenced regeneration. In each workshop participants were divided into five groups; two composed of women, two composed of men, and one composed of both men and women.

Table 1. The main conditions that influence natural regeneration, their effects (positive or negative) and underlying mechanisms. Conditions are categorized into climatic, soil, landscape, management and social by workshop organizers.

	CONDITION	+/-	UNDERLYING MECHANISM
CLIMATIC	Drought (and climate change)	-	Trees dry up, growth is hampered, and germination of tree seedlings is hindered. In addition, grass becomes scarce and livestock depend more on trees and shrubs for fodder, causing further damage to trees and slowing regeneration.
	Flooding	-	Trees can die, and seeds washed away. Soil nutrients may be leached, worsening conditions for trees to regenerate.
SOIL	Soil fertility	+	Promotes tree growth and regeneration.
	Type of soil	+ -	Effects can be positive or negative depending on soil characteristics. It is also dependent on tree species, for example, some species cannot survive in shallow soils.
	Soil erosion	-	Eroded soils are less favorable for regeneration.
	Soil conservation measures (e.g. terraces)	+	Enhances soil properties for regeneration.
LAND-SCAPE	Presence of seed dispersal agents (e.g. birds)	+	Enhances tree species regeneration.
	Invasive species (e.g. Olembe japielo)	-	Hampers regeneration.
MANAGEMENT	Human activities (e.g. mining, construction, agriculture)	-	To make place for such activities, trees are cut and tree stumps are destroyed.
	Extractive practices such as tree cutting and charcoal burning	-	Trees are cut and tree stumps are destroyed which hampers regeneration.
	Livestock grazing	-	Livestock such as goats and cows eat the leaves and thereby damage trees and regeneration.
	Fire	-	Fire kills trees and regeneration
	Reforestation	+	Trees are planted, regeneration is promoted.
SOCIAL	Poverty	-	Poverty leads to increased tree cutting for income.
	Presence of criminals	-	People clear bushes and cut down trees to remove potential hideouts for criminals.
	Farmer knowledge, better farming practices and environmental conservation	+	Knowledge helps farmers to make the right decisions regarding management and the promotion of regeneration on their farms.

4. Is species' regeneration success influenced by different conditions?

The participants were asked to match the conditions identified in exercise three to the species that regenerate on their farms. This aimed to identify and understand variation in species regeneration.

This assignment was carried out in the previously assigned groups in exercise three. The assignment was executed in a slightly different way in the two workshops, and as a consequence the results cannot be directly compared. In Migori, workshop participants used beans to indicate the extent to which a species was affected by a certain condition (an effect that could be positive when the species regenerates more under that condition, or negative when the species is hampered in their regeneration under that condition), see table 2. In Homa Bay we adjusted the assignment and asked participants to estimate the abundance of a species that would regenerate under the selected conditions, see table 3. Each group could make their own selection of species and conditions to include in the assignment.

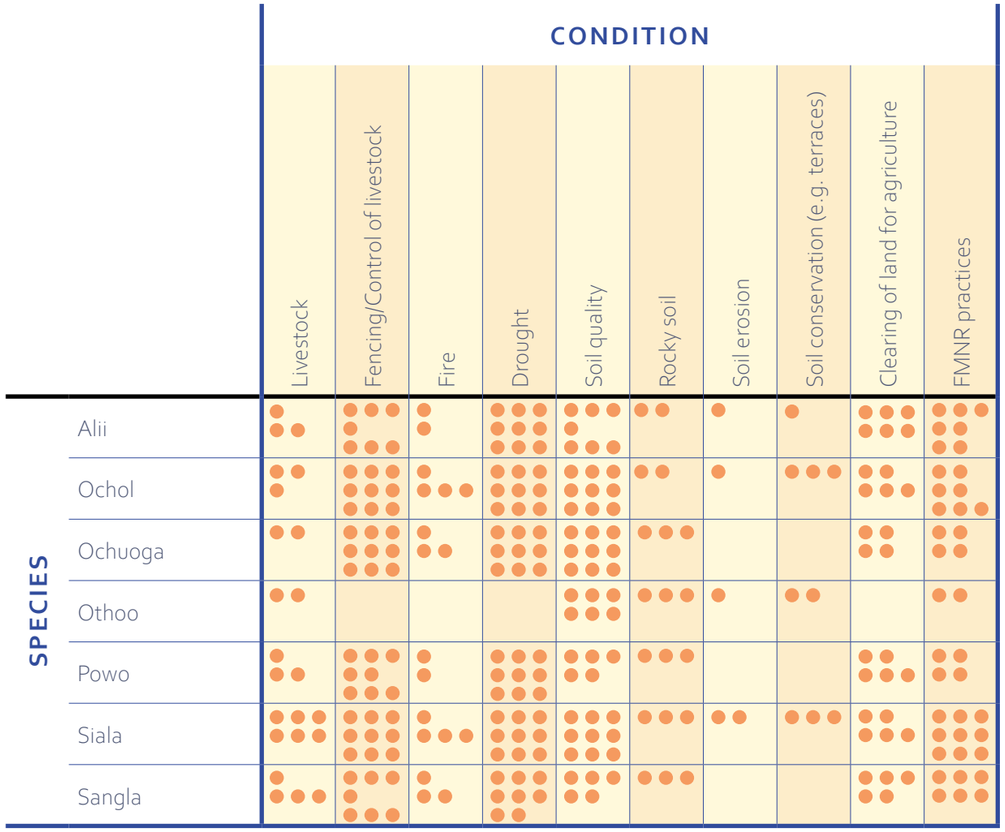
Main findings

- At both workshops there was much variation in the results between the groups, which was not explained by whether the groups consisted of male, female, or mixed groups.
- Both table 2 and 3 highlight potential differences between species, in how their perceived regeneration is affected by biophysical conditions and human activities.
- Results from Homa Bay substantiate that fire, livestock and soil erosion have strong negative effects on regeneration, though some species are better adjusted to these conditions (e.g. Ochol to fire, Siala to livestock grazing). At the same time drought is not perceived to reduce regeneration very much, despite the extremely dry years experienced in the study regions over the past few years. Interestingly, clearing land for agriculture is not thought to have a negative impact on regeneration, however this can be explained by the fact that all participants are FMNR farmers who promote regeneration as part of their agricultural practices.
- A similar interpretation from the Migori workshop is not possible because the scoring masks whether effects on species are positive or negative.
- Based on these findings it can be concluded that the main conditions stimulating regeneration are controlling grazing livestock, preventing erosion and avoiding the use of fire. Enhancing capacity and knowledge of regeneration may further have a positive impact on the abundance of regeneration across the regions.

Table 2. Results from 'species by conditions' exercise in Migori County. The number of dots indicate the sensitivity of a species to the factor relative to other species; 1 dot: species is less likely to change in abundance as a response to changes in the condition compared to other species, 2 dots: species responsiveness to changes in the condition is average, 3 dots: species is highly sensitive to changes in the condition compare to other species. For each species, the dots for each participant group are arranged horizontally in the cell. Please note it is not possible to identify the same group across species or across conditions, neither is a direct comparison with table 3 from Homa Bay county possible.

SPECIES	CONDITION: Drought	Soil type	Flooding	Settlement/ Construction	Fire	Seed dispersal	Economic activities	Invasive species
Achak	●	●			●	●	●	
Adugo	●	●			●	●	●	
Alii	● ● ●	● ● ● ● ● ●	● ●	● ● ●	● ● ● ● ●	● ● ●	●	
Aporo	●	●		●	●		●	
Asso	● ● ●					●		
Chwaa	● ● ● ●	● ● ● ●		● ● ●	● ● ●	● ● ●	● ●	●
Det	●	●	●	●	●			
Duele	●	●	●	●	●			
Keyo	● ● ●	● ● ●	●	● ● ●	● ● ●	●	● ● ●	
Kuogo	● ● ●	● ●	● ●	● ● ●	● ●			
Mapera	●	●			● ● ●	● ●		
Ng'owu/Ng'ou	● ● ●	● ●		●	● ● ●	● ● ●		
Ober	●	●	● ● ●	● ● ●	●			
Ochol	● ● ●	● ●		● ● ●	●	● ●	● ● ●	
Ogongo	● ● ●	● ● ●	●	● ●	● ● ●	● ●	● ●	●
Ondati	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ●	●	●
Othoo	● ●	● ●			● ●	● ●		
Pedo	● ● ●	● ● ●		●	● ● ●	● ●	● ● ●	
Powo	● ●	● ● ●		● ● ●	● ● ●		●	
Roko	●	●		●	● ● ●		●	
Sangla	● ● ●	● ● ●	● ●	●	● ● ●	● ● ●	● ● ●	● ● ●
Yago	● ● ● ●	● ● ● ● ●	● ● ●	● ● ●	● ● ● ●	● ●	● ●	

Table 3. Results from 'species by conditions' assignment in Homa Bay County. The number of dots in a row is proportional to the abundance of regeneration of that species under those conditions. 1 dot: species regenerates less abundantly as a response to the condition compared to other species, 2 dots: species regenerates with average abundance as a response to the condition, 3 dots: species regenerates more abundantly under condition. For each species, the rows of dots are separated for each participant group. Please note it is not possible to identify the same group across species or across conditions, neither is a direct comparison with table 2 from Migori county possible.



5. What benefits and disadvantages are associated with FMNR?

Participants were asked to list the benefits provided by FMNR, as well as the disadvantages that may arise from practicing FMNR. This exercise was done in the previously assigned groups.

Main findings

- Consistently, the lists of benefits were longer than the lists of disadvantages (Fig. 3). FMNR is perceived to generate many benefits by our participants, who all practice FMNR. While disadvantages are also identified, they have not been enough to discourage participants from practicing FMNR. It would be worth following up with non-practicing farmers, and with farmers that potentially stopped practicing, on how they perceive the benefits and disadvantages of FMNR.

- The disadvantages point to potential barriers to initial FMNR adoption, particularly since they directly relate to a feeling of safety (attracting wild animals, intruders, poachers).

- The results show that perceived benefits from FMNR practices, include: provision of household energy through wood fuel and charcoal, increased crop yield that contributes to food security, increases in household income/source of income, soil erosion control/ prevention, increased soil fertility, attracts rainfall and provides herbs and fruits.

"FMNR is perceived to generate many benefits by our participants"

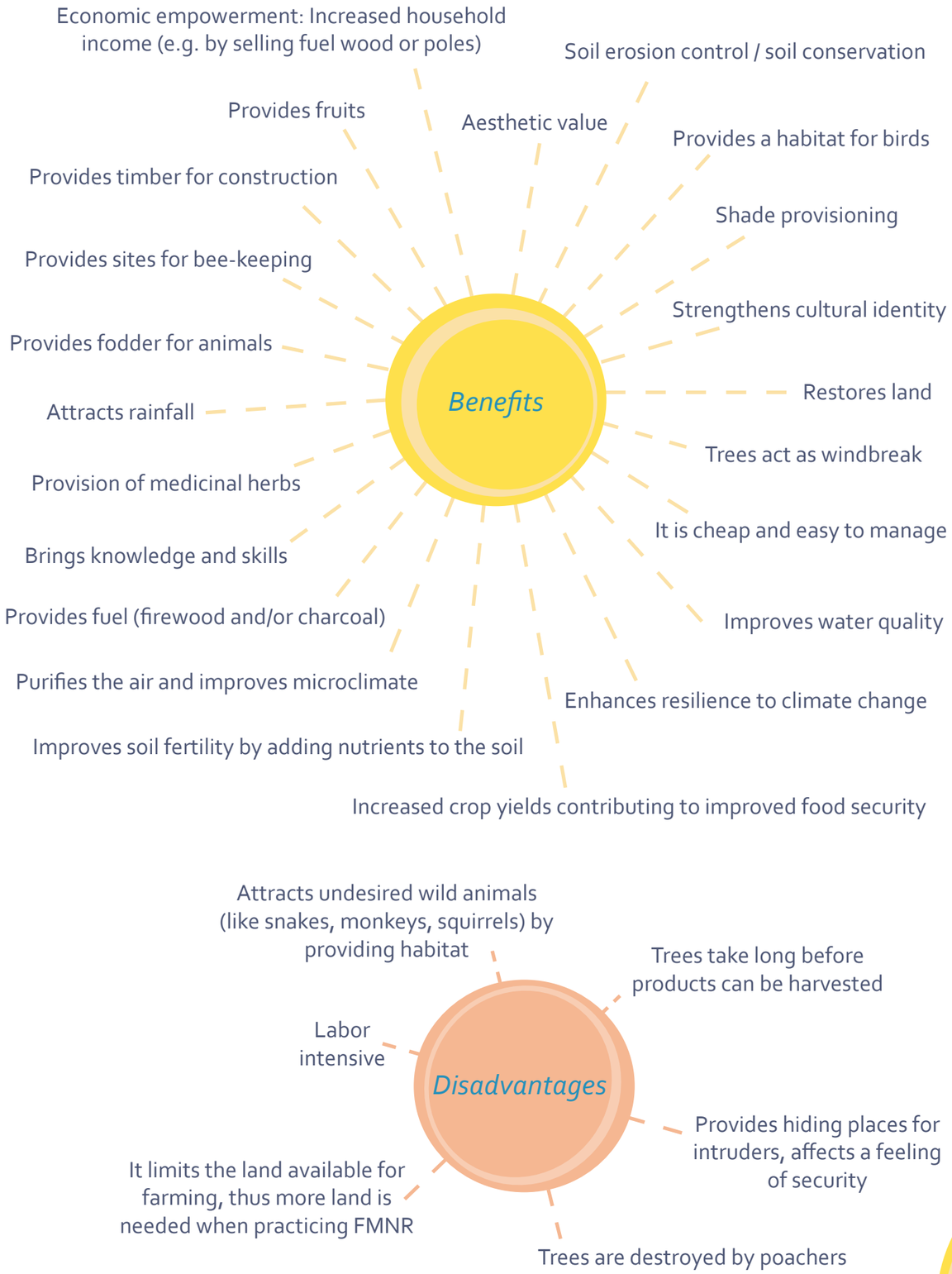


Fig. 3. Summary of the benefits and disadvantages related to FMNR, the results of all groups and the two workshops are combined.

6. How do benefits and disadvantages differ depending on the species?

Building on the assignment on benefits and disadvantages, the groups were asked to select some key benefits and disadvantages and some common species and score how each species contributed to the selected benefits / disadvantages. Results are presented by gender to explore potential differences between males and females. This is relevant as FMNR has been proposed to empower women, as demonstrated in other parts of Kenya[1].

Main findings

- Species differ in the extent to which they can deliver certain benefits (Table 4 and Table 5).
- For disadvantages the link with specific species was less clear. Rather, disadvantages were more often linked to the increased amount of vegetation (attracting wild animals, providing hiding places for intruders) rather than the presence of a specific species. For this reason, in Homa Bay the species were only matched with benefits and not with disadvantages.
- There was much variation between the groups, but unlike what was expected we saw no relation with the gender of the group.

1. Ojuok, I., and T. Ndayizigiye. 2020. Women Participation in Farmer Managed Natural Regeneration for Climate Resilience: Laisamis, Marsabit County, Kenya. African Handbook of Climate Change Adaptation.

"Species differ in the extent to which they can deliver certain benefits"

Table 4. Perceived benefits (ticks) and disadvantages (crosses) related to the practice of FMNR for selected species in Migori county. Circle size indicates how much that species contributed to the given quality. Small: species contributes a limited extent, medium: species' contribution to quality is average, large: species contributes more than other species to the quality. Blue circles indicate results from the male groups, red circles from the female groups and green represents the mixed group.

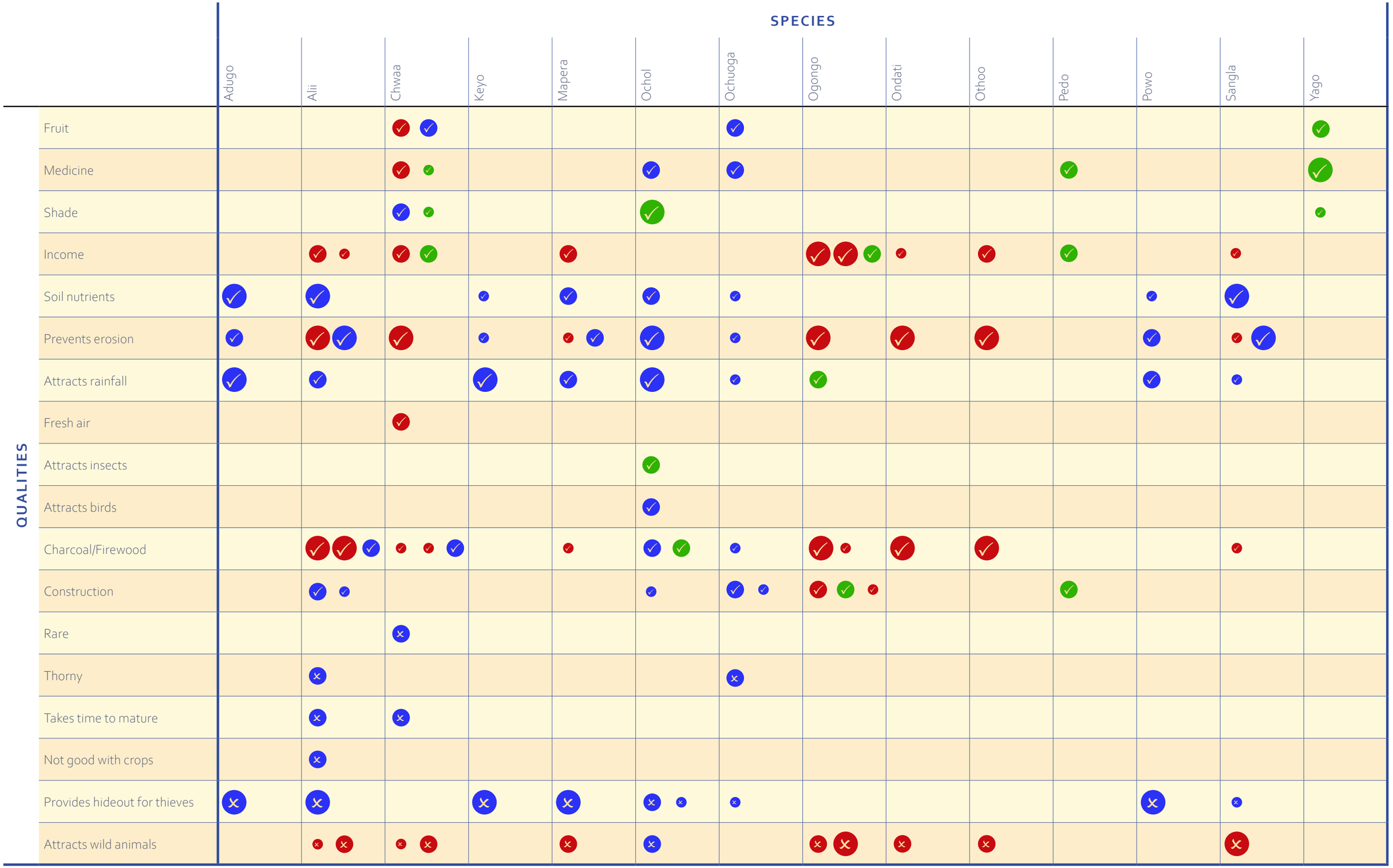


Table 5. Benefits related to the practice of FMNR for selected species in Homa Bay county. Circle size indicates how much that species contributed to the given benefit. Small: species contributes a limited extent, medium: species' contribution to benefit is average, large: species contributes more than other species to the benefit. Blue circles indicate results from the male groups, red circles from the female groups and green represents the mixed group.

BENEFITS	Adugo	Alii	Apoyo	Asawo	Chamama	Leucaena	Manera	Mapera	Mawemba	Ochol	Ochuoga	Omange	Pedo	Powo	Sangla	Siala
	SPECIES															
Fodder						✓					✓		✓	✓		
Herbs		✓						✓		✓	✓	✓				
Fruits		✓						✓		✓	✓	✓				
Poles/Timber	✓	✓					✓							✓	✓	✓
Fuel wood	✓	✓ ✓ ✓		✓	✓	✓	✓	✓ ✓		✓	✓	✓		✓	✓ ✓	✓ ✓
Reduces soil erosion						✓					✓		✓	✓		
Increases crop yield						✓					✓		✓	✓		
Land restoration		✓		✓	✓	✓		✓							✓	✓
Food security		✓	✓	✓	✓	✓		✓	✓						✓	✓ ✓
Income	✓	✓	✓				✓		✓					✓	✓	✓ ✓
Beauty of environment			✓						✓							✓

Conclusions and Recommendations

The two workshops held in Migori county (8th November) and in Homa Bay county (10th November) respectively, revealed that FMNR is understood as a traditional practice. As such, participants acknowledge that similar practices have been conducted for many generations, though often forgotten. Current efforts by NGO's (e.g., World Vision) are effectively bringing these practices back through FMNR. It is likely that the successful adoption of FMNR can be attributed in part to the fact that it builds on traditional practice and knowledge.

The restoration outcomes of FMNR depend on what can regenerate on farms as well as on what farmers do with this. During the workshops we realized that the potential of FMNR to increase on-farm biodiversity is high because of the large variety of species that regenerates across farmland, and because farmers expressed substantial knowledge on biodiversity (Fig 2).

Regeneration is affected by biophysical conditions (e.g., climate, soil type), by management activities (e.g., grazing, tree management) and social factors (e.g. poverty, knowledge). Depending on the context and management of a field, the composition of species that regenerates will differ. Due to the consistently negatively reported effects of livestock grazing and fire, it is recommended to protect and fence FMNR fields to protect regeneration. Enhancing capacity and knowledge of FMNR may further have a positive impact on the abundance and diversity of regeneration across the regions. One way to do this is by supporting learning communities of farmers where they are encouraged to share their knowledge and experiences with each other.

FMNR generates many different benefits, and farmers were very positive about how the practice has contributed to their household. However, it should be noted that the participants were not representative of the wider farming community; all farmers were FMNR practitioners, and a large proportion, 'FMNR lead farmers'.

Some disadvantages were also reported. The disadvantages point to potential barriers to FMNR adoption, particularly since they directly relate to a feeling of safety (attracting wild animals, intruders, poachers). The risk of people stealing trees may be mitigated by stronger enforcement of land and tree ownership by the area chiefs. Further research into these social barriers, and how they can be overcome, is important given the current efforts to scale up FMNR as a restoration practice.

The species that regenerate on each farm is strongly dependent on the local context, which includes climatic, soil, management and social conditions. Different species also provide different perceived benefits. This raises the question; does natural regeneration meet the needs and expectations of the farmer, or will additional tree planting be needed to attain this?

"farmers have substantial local knowledge on the variety of species that regenerate"

Next phase of the research

Following the workshops, we began the field research in Nyatike, one of the two research locations. We established 25 by 25 meter plots on selected FMNR (maize-)fields, as well as on unmanaged fallow fields. In the plots we measured and identified all trees and regeneration and we plan to repeat these measurements annually for several years in a row. The comparison of these two types of fields gives us an idea of what species regenerate under managed conditions and unmanaged conditions, and a further indication of how natural regeneration benefits farmers. When new results are available, they will be reported back to the farmers in the study regions of Magunga and Nyatike.

If you would like to know more about this study, please contact Madelon Lohbeck: madelon.lohbeck@wur.nl