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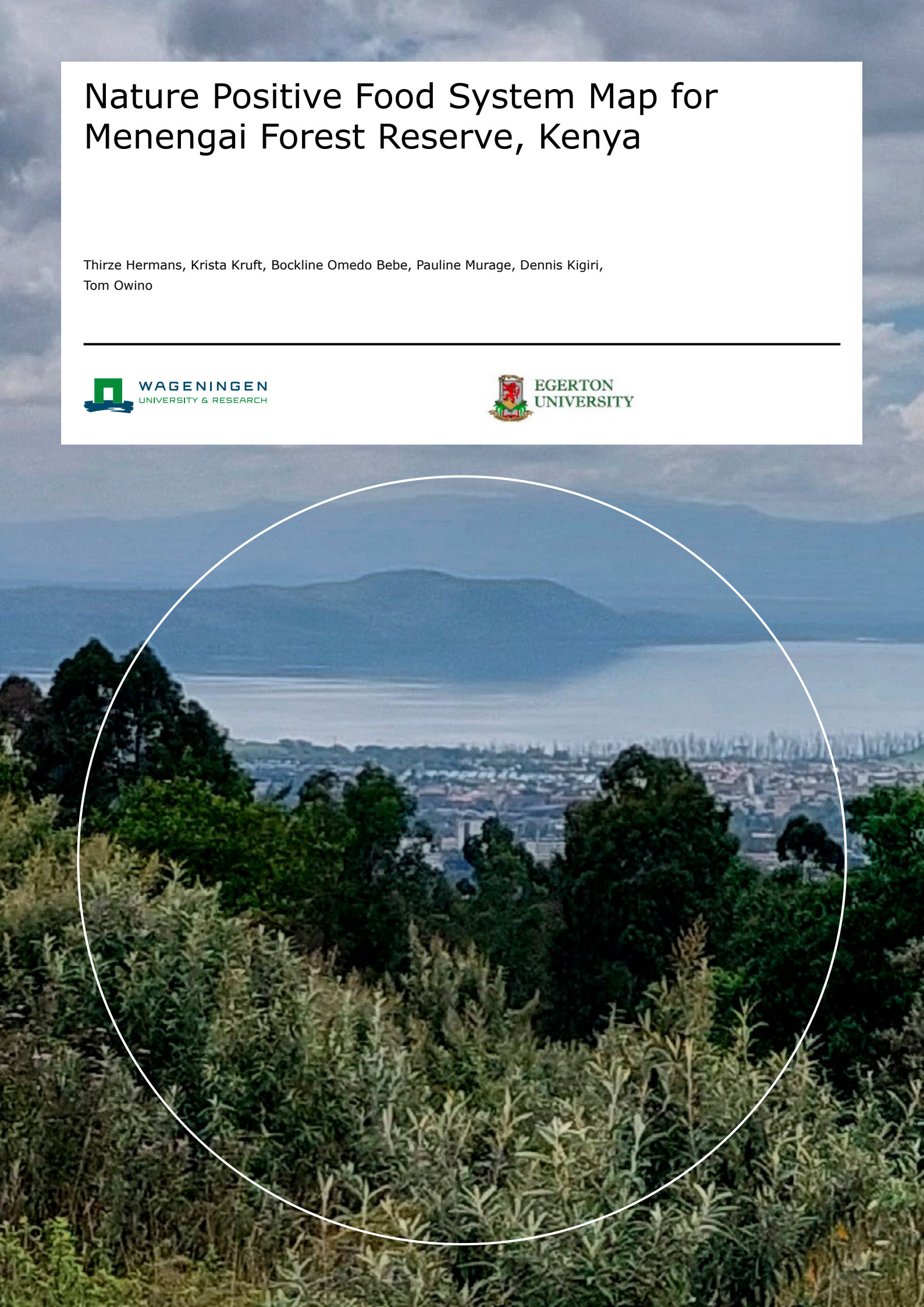

Nature Positive Food System Map for Menengai Forest Reserve, Kenya

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Disclaimer
This report captures the views and perspectives of various stakeholders on nature-positive food systems. The aim has been to represent local understanding as accurately as possible. However, there may be gaps or limitations due to the authors' positionality of not living within the case study community. The opinions expressed are those of the participants and do not necessarily reflect the official positions or policies of the affiliated organizations, or the sponsoring institutions. While efforts have been made to ensure accuracy, the report is intended for informational purposes and should not be taken as a definitive statement on the subject. Readers are encouraged to consider these perspectives as part of a broader dialogue on nature positive food systems.

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Photo cover: View of Lake Nakuru from Menegai Forest Reserve. Credit: Krista Kruft

Contents

List of abbreviations and acronyms

FGD	Focus Group Discussion
GMO	genetically modified organism
KFS	Kenya Forest Service
NLL	Nakuru Living Lab
NGO	non-governmental organizations
NPFS	Nature Positive Food System
MCFA	Menengai Community Forest Association
RIFS	regenerative and inclusive food systems
PELIS	Plantation Establishment and Livelihood Improvement System
PFMP	Participatory Forest Management Plan
WCDI	Wageningen Centre for Development Innovation, Wageningen University & Research
WUR	Wageningen University & Research

1 Introduction

Transformation towards a nature-positive food system (NPFS) requires integrated and concerted actions from all actors involved to develop new solutions. Arriving at integrated and concerted action requires not only a shared recognition of the urgency of NPFS, but also agreement on pathways towards such a NPFS and the tools and solutions needed. This implies a broader paradigm shift from 'do-less-harm-to-nature' to 'regenerating-nature'. Defining what it means to 'do-good-for-nature' will depend on the spatial context in which actors operate, and above all, a broad agreement on the type of actions to be taken. As part of understanding what a NPFS is, and how to support NPFS transitions in different spatial, environmental, social, cultural, and economic contexts, two case studies were selected: The Menengai Forest Reserve in Nakuru, Kenya and a case study on small-holder dairy farming in Gujarat, India. **The objective of the case studies is (a) to outline the interpretation of NPFS based on the local stakeholders' reality and perceptions; (b) to identify the barriers/enablers to transition to a NPFS; (c) the roles of various stakeholders in this transition; (d) the potential synergies/trade-offs and instruments for a NPFS; and (e) the indicators relevant to measure and track progress.** As a methodology, an **NPFS canvas** was created to understand what NPFS means in the context of Menengai reserve, what is needed, who is needed, how a transition to a NPFS can be supported and what success looks like. This Menengai NPFS map is part (deliverable 2.2) of the NPFS project under the KB35 programme Food and Water security at Wageningen University & Research funded by the Ministry of Agriculture, Nature and Food Quality.

1.1 Case study description

The Menengai Caldera is located within the Rift valley, Kenya, providing a large, protected forest area. Currently, Menengai is characterized as an urban forest, situated next to the city of Nakuru. It is surrounded by residential areas and agricultural lands. The Kenya Forest Service (KFS) is the custodian of the area which covers around 6,018.9ha within the Menengai Forest Conservation Area. Companies are active in the area for broadcasting mobile phone networks and extracting geo-thermal energy (making use of the volcanic activity in the area). Menengai forest has resources that provide diverse benefits to the local communities in the form of bee keeping, grazing, construction materials, fuel, wood and traditional medicine.

Figure 1 *Forested crater part of the Menengai reserve.*

Figure 2 *Location of Menengai Community next to Nakuru town.*

It is also nationally important due to its contribution to green energy production in the form of geothermal energy. However, over the years, the forest and ecosystems have faced adverse effects due to unsustainable use as a result of poverty, increasing population, unemployment, poor natural resource management skills and structures. As the resources on private and community lands become scarcer, people turn to the adjacent protected areas to extract resources. The unsustainable extraction led to systematic exploitation, accelerating the adverse effects.

The KFS plays an integral role in the health of the forest (e.g., prevention of deforestation) and in the livelihoods of those living around and dependent on the forest. Currently there are efforts to change the predominantly top-down approach to forest management and planning, with the adoption of community forest associations (CFAs). Mechanisms are set up in which the members (the communities living in and around the forest) can be included in some forest management decisions using a Participatory Forest Management Plan (PFMP) process. To help connect the community to KFS and the PFMP, the Menengai Community Forest Association has been set up (MCFA) as an umbrella body representing the interests of affiliated community user groups for sustainable management of the Menengai forest, while carrying out various economic activities. The area covered by the MCFA is identified as the forest area between – Nakuru North, Nakuru West, Nakuru East and Rongai Sub Counties surrounding Menengai Caldera as well as the adjacent farmland covering up to a distance of 5 Km from the forest boundary. Its vision is that the forest can be conserved while utilizing non-timber forest resources for economic purposes. Non-timber activities are for instance seed bank, seedlings, honey, medicinal herbs and pasture. MCFA's collaboration with KFS and other stakeholders in and around Menengai forest is guided by the Participatory Forest Management Plan. This plan has increased the awareness about the potential of the forest and has fostered community ownership to manage the forest sustainably. The MCFA is one of ten Innovation Cases identified by the Nakuru Living Lab (NLL), hosted by Egerton University, to accelerate the transformation towards regenerative and inclusive food systems (RIFS). MCFA has nine user groups which form the basis of community interactions with the forest which are beekeepers, Plantation Establishment and Livelihood Improvement System (PELIS), Eco tourism, Elders (Kiama Kia Maa), fuel wood collectors, Tree Nursery holders/workers, Ndeffo Community water project, Curio shops and Grazers. These user groups also provided an entry point for the organization of our focus discussion groups. In addition to the listed participants in the MCFA users' group, the Menengai Participatory Forest Management Plan identified additional stakeholders and their roles, such as Kenya Forest Service, Government County office for Agriculture, Government Environment County office, Egerton University, Equity bank, and the Geothermal Development Company[1].

[1] Further details on the menengai forest plan can be found in this 'story of place': https://www.wur.nl/en/show/story-of-place.-accompanying-document-to-collaborate-to-regenerate-facilitators-guide.htm.

2 Methodology

The case study methodology was guided by a NPFS canvas, based on landscape canvas design (Appendix 1). The canvas functioned as a framework for collecting the data on NFPS in each case study. In this case Menengai forest in Nakuru Kenya was visited between November 20th to December 10th, 2023, with the actual research being implemented between December 3rd to 10th, 2023. The aim of the case study methodology was to fill in the different elements of the canvas. The NPFS canvas can be used in various settings, from workshops to one-on-one interviews. In this case study, we chose to divide up the elements of the canvas between focus group discussions with the user groups, semi structured, one on one interviews with organizations and government offices, and a workshop event. This workshop, which hosted the representatives of all stakeholder groups interviewed for the case study, was organized at the end of the week with the purpose to validate the data collected so far and to cover the last element of the canvas ('What is success?'). The FGDs and interviews conducted on days 1 through 4 covered the canvas elements of NATURE POSITIVE FOOD SYSTEMS (definition), WHY? (motivation), WHAT? (conditions, barriers, enablers), WHO IS NEEDED? (stakeholder roles), HOW? (instruments, trade-offs, synergies). The end of the week workshop focused on the WHAT IS SUCCESS? Element, covering indicators for NPFS.

The canvas methodology was collaboratively implemented with Egerton University, a strategic research partner of the WUR. Egerton enabled the application of the methodology in the local context and sensitised the concept of NPFS with the stakeholders in Menengai before the field work started. Egerton played a key role in engaging stakeholders in the discussions by translating the terms and concepts, not just into local languages, but into the local socio-economic, cultural and political realities of the stakeholders concerned.

During the research implementation, the user groups (beekeepers, grazers, ecotourism, water, tree nursery, firewood collectors, PELIS, elders) organized under the MCFA in and around Menengai Forest reserve were divided across three user group FGDs. During these FGDs, different tools were used to facilitate the discussions. For both the first FGD including three user groups) and the second FGD including two user groups, we used a ranking exercise to understand the ongoing activities and how nature positive or negative these activities were considered. Following this we used a NPFS tree exercise,[2] to understand the root causes of current degradation, potential solutions, NPFS activities, their barriers and enablers, possible actions (including synergies), and who is needed for the identified actions. The activities in the trunk were chosen by the group as most important for a NPFS, such as fertilizer and pesticide use.

[2] A tree exercise is the use of a tree picture as a simple and accessible metaphor to discuss different aspects of a problem: the roots are causes, the trunk the activities, with enablers and barriers around them, and the branches solutions or actions, with leafs of who could do these actions.

Figure 3 *The third user group activity focusing on the power exercise.*

With the third user group (including the water, tree nurseries and eco-tourism user groups), we conducted a spatial power exercise to get a better sense of the WHO? element and the influence of power in the WHAT? element in the canvas. This exercise involved giving participants a card with the stakeholder they represent and asking them to organize themselves in terms of decision-making power regarding a topic. Stakeholders with high power were asked to stand close to the centre (symbolised by a decision-making table) and those with less power to stand further away. The topics covered discussed NPFS activities such as agricultural practices on the farm, tree planting, introduction of alternative stove, location of water access points.

The interviews were conducted with NGO, private sector and government representatives (Appendix 2). The interview elements were adapted to the expertise of the interviewee, but covered of NATURE POSITIVE FOOD SYSTEMS (definition), WHY? (motivation), WHAT? (conditions, barriers, enablers), WHO IS NEEDED? (stakeholder roles), HOW? (instruments, trade-offs, synergies). For the WHAT? section of the canvas, the interviews used the questions formulated in the 'Enablers and barriers Framework' (Synthesis Report Nature Positive Food Systems, Forthcoming), which was developed as one of the tools for this research.

The end-of the week workshop covered the indicators associated with NPFS, which was the last box of the canvas that still needed to be discussed. The participants were presented with a table of indicators based on literature research. This table was divided into socio-economic, environmental and food system indicators. The participants were divided into 4 groups; one covering environmental indicators, one concerning social indicators, one covering economic indicators, one covering food production indicators. Participants were allocated according to their expertise and to have a diversity in people from user groups, NGOs, government, academia and private sector. All groups were asked to refine the proposed indicators based on the Menengai context, rank the refined indicators, and add any missing indicators in the ranking.

All discussions were recorded through notetaking and where needed translated to English. The English notes were coded based on the NPFS canvas framing (Appendix 1). Within each canvas box topic, coding was done based on grounded theory[3] to identify major topics. Ethical approval was granted by Wageningen University & Research (approval number 2023-079). Consent was obtained from all participants before interviews or FGDs. It was clarified that the interview had no influence on participation in any programme and that no real names are used.

[3] Charmaz and Thornberg (2020) The pursuit of quality in grounded theory (tandfonline.com).

3 Results

3.1 Nature positive food systems – definition, motivation and practice-based interpretations

Starting with 'nature', participants approached nature as their environmental surroundings. When speaking about nature it was often interpreted as 'inside' or 'outside' the farm, where outside the farm 'nature' was often referred to as the forest (Menengai reserve), also framed as Mother Menengai (i.e. the nature reserve), or the air (i.e. in reference to emissions and climate change). Inside the farm, nature was frequently framed as soil health, animals (e.g., return of animals such as frogs, birds or earthworms) or other associated ideas of nature: crop diversification, or one crop helping other crops.

In the context of Menengai forest reserve, there has been an ongoing project on regenerative inclusive food systems. This project also involved the user groups, which is why nature positive food systems was often used interchangeably with regenerative food systems. Regeneration was helpful because it did highlight that it is a step further from doing no harm, which was often the first objective of interviewees in order to balance it with livelihood security. Another way of framing 'nature positive' was to give and take to/from nature. Such framing was especially convenient when nature was framed as Mother Menengai (e.g., living presence). In terms of giving and taking, examples were mentioned: taking firewood, giving through tree planting and reducing fire; giving is CO2 and taking fresh air; taking medicinal plants and giving is pruning trees so more comes back; giving is fertilizer through animals, taking forest is its function as a windbreaker. Interviewees recognized that currently the taking of mother Menengai is more than the giving back and as such the relation to nature is based on utility.

Within the MCFA, which is spearheaded by a religious leader, being nature positive was also framed through a religious lens. Humans affect the environment, to which the environment responds. It is the responsibility of humans to take care of nature, as this is what God's words says. The interviewee highlighted that God says that humans are the cause of the degradation, and we need to think about how to go back to the original place where we take care of nature. Even without human input, the forest will thrive, but humans need to use it, so humans need to take care of nature. In practice, this means that people need to figure out a way that people can benefit, for example, from collecting firewood, but that they also take care of nature.

This delicate balance was also a key reoccurring element in 'nature positive food system', namely, to balance regeneration and livelihoods. This means thinking, for example, about livelihood diversification and the focus on quality for nutrition. One interviewee phrased this balance as nature positive being a situation where the community is not denied what they need, but they cannot take without being held **accountable**. This means that nature positive activities need to be owned by the communities and places them at the centre of any regenerative efforts. Positive is then the activities that are not detrimental to the environment. This may require alternative livelihoods and incomes for communities, such as quick maturing trees or crops, and focusing on making people self-sufficient to decrease natural resource dependency. According to the environment county officer, communities have already changed the way they look at forests; they agree that there needs to be **no harm** when farming and that people need to take responsibility.

3.1.1 Practices as part of NPFS

Discussing nature positive food systems frequently led to a discussion on specific practices, which could be categorized under the umbrella term 'nature positive food systems'. Firstly, nature positive was often closely associated with organic farming. Organic farming was often framed as having various health benefits and long-term benefits for income and environment. However, a challenge that remains with organic farming is that the benefits are only in the long term. For example, the use of bio fertilizers may only be visible after 2-3 seasons, which is needed for soil regeneration. A group of organic farmers also mentioned that they

learnt from NGO training that organic farming is about regenerating the environment and supplying safe food. However, they did feel this needed to go together with information on food security, which is a major driver for pesticide use. The use of pesticides or synthetic fertilizers was also a common topic when discussing nature positive food systems. In this regard, the agricultural county officer mentioned that the government does not say 'do not use pesticides' but wants to promote more sustainable use of pesticides. Other agricultural topics covered conservation agriculture and permaculture.

Another frequently discussed practice within the domain of nature positive food systems was forest protection or tree planting. For example, tree planting on farms is promoted, and tree planting events are frequently organised. For the forest, there are objectives to increase the coverage and to plant more indigenous species to promote biodiversity. The goal is to reduce invasive species (e.g., eucalyptus) and reintroduce more indigenous species. Currently, most of the trees in the forest are eucalyptus for timber. Some of the invasive species are prone to forest fires, or sprout quickly after forest fires, which makes tree type selection challenging (given frequent forest fires). For the practice of forest protection, the fencing of the forest was also a widely considered a nature positive action (for some even 'the most nature positive').

Lastly, both water access and alternative cooking stoves were discussion topics within nature positive activities. Currently, there are water points where people have access to water, but there are no rivers or natural water bodies in this area. Therefore, water is a limiting factor for agricultural practices (e.g, no irrigation) and also for forest growth/fire extinguishing. In regard to alternative cooking stoves, biogas or solar energy was often mentioned. Currently, cooking is done with firewood, which is what results in the pressure on the forest through firewood collection.

The following sections are written taking this NPFS framing in mind, which means some points refer to the specific practices that participants used to talk about NPFS (e.g., organic farming, pesticide use, tree planting, forest protection, alternative cooking styles).

3.1.2 Motivation

When discussing NPFS, the motivation for the practices that fall within the NPFS framing were often not nature focussed. Health was often a primary motivation, especially when discussing nature positive farming practices. The environmental county officer mentioned this motivation is good, as health is strongly connected to the environment ('health is our internal environment'). The group of organic farmers mentioned various cases of people trying organic farming and recovering from health challenges (e.g., heartburn, blood pressure, fertility issues). For them, the health benefits were the main evidence base that they also used when marketing their organic produce. The health benefits are both for the farmer who avoids using chemicals, and the consumer who eats the products, and for the government who is promoting greening practices and landscape restoration.

Another major motivation for NPFS is livelihood security and income. One interviewee mentioned that the benefit of nature positive activities is that there will be more production from the forest. Extracting less from the forest would mean that the forest remains intact and can support more production of crops, honey and vegetables. If there are enough fruits in the forest, the monkeys will eat in the forest and not eat from the agricultural fields. Equally, another interviewee mentioned that if the farm runs well, there is no need to be in the forest.

A third motivation for NPFS related to climate change. Many interviewees, both government and user groups, connected the degeneration of Menengai forest to climate change in the area. The forest was also seen as a windbreaker and a barrier to floods which could protect the agricultural produce and the livelihoods of communities. This motivation was more indirect compared to health and livelihood security motivations. It can also be seen as a condition for the motivation of securing sustainable livelihoods.

3.2 What is needed – Conditions, Barriers, Enablers

The results of this section follow the flow of questions in the Enablers and Barriers framework (Synthesis Report Nature Positive Food Systems, Forthcoming) which is divided into 3 headings:

1. Food system activities, including enabling environment and business services, food supply system, markets, consumer characteristics.
2. Socio-economic drivers including policies, individual factors, social organisations, science and technology.
3. Environmental drivers including land/soils, climate, water, biodiversity, fossil fuels/minerals.

3.2.1 Food system activities: Enabling environment, business service, food supply, markets, consumer characteristics

In the case of Menengai forest reserve and its surrounding communities, there is a perceived barrier to access finance for developing nature positive businesses or to change practices such as the firewood-based cooking styles. The barrier is perceived as Equity Bank, a key stakeholder of the Nakuru Living Lab, offers small loans to groups wanting to start a business. Financial literacy training was already provided to the MCFA user groups and Equity expressed a willingness to work with the groups in financing their business. The activities are related to farming and the perceived low access to finance means there is little investment space for certified seeds (more resistant to pests and diseases and thus requiring less pesticide), biogas stoves (alternative cooking replacing firewood from the forest), tools or machinery to create added value products (which can diversify income and make it less forest dependent). An enabler would, therefore, be the organisational strengthening of the groups, linking them to other organisations that support their business process (e.g. One Acre Fund) and build the confidence and trust amongst the groups and their members to pursue a common goal, namely the diversification of livelihoods and a business that contributes to a NPFS. Another enabler would be to support an increased volume of agricultural produce, especially organic, for sale. Reaching a certain quantity, quality and stability of supply enables the sale of produce, and thereby enables re-investment in the business.

The demand from farmers for bio fertilizers or bio pest management is rising. Equally, the demand for organic produce is also increasing (survey by ministry of agriculture), though mostly in the urban areas (e.g., Nakuru, Nairobi). This means an improved connection to the market is needed. Organic farmers felt disadvantaged on the mixed produce markets since their products do not look as nice, which makes them harder to sell. In addition, to manage the organic production (e.g., the slow growth and transition which takes two seasons to get a return on investment) and make farmers invest, a premium price is needed, especially in urban markets, to make the business profitable. At the same time, a premium price will also make it harder to sell, especially in rural markets, since people who are interested in organic products cannot always afford it. There have been a few cases where they have been able to sell at a premium price at special organic markets; however, non-organic farmers also sold their products under the same organic banner. This decreased the trust of consumers of what is or is not organic. It also put the real organic products at a disadvantage as the non-organic products looked better and appealed more to customers. To advocate for organic products, stories about health improvement and safety are most effective. Currently, the organic farming group sends one person of the group to the market to sell the surplus after household consumption. They also use social media to connect to potential markets or directly sell products. NGOs such as Slowfoods help to advocate for organic stalls on the county markets. Supermarkets may also be a potential market, but they often require contracts for selling a consistent number of products (guaranteed supply), which is a challenge because the group is too small to ensure this. In some cases, these supermarket contracts require farmers to take produce back when it is not sold.

Some organic farmers make their own fertilizers and insect repellents. Such products are sold to neighbours but not on markets because that is not allowed due to a lack of certification. On the organic markets, certification may help to avoid selling non-organic products as organic at a premium price. However, the threshold for certification should not be too high. Due to the lack of connection to markets organic production often remains mostly a 'kitchen garden'.

To change farmers' behaviours, the aggressive marketing of agro-dealers (i.e. companies supplying farmers with seeds, fertilizers, and so on) also needs a shift. Most farmers rely on agro-dealers for their inputs, while agro-dealers have a vested interest in selling their products (chemicals/synthetic). Food security often gets the priority over food quality, leading to using chemical and synthetic fertilizers or pesticides instead of also thinking about the safety issues. Organic fertiliser is tested and promoted by the county government. For example, in one project, the use of organic fertilizer has extended the root mass that enabled the crop to withstand drought conditions and increased the yield of maize and potato. However, government projects are mainly focused on large farms and do not reach the farmers in Menengai. With the shortage of available organic fertilizers in Menengai, and the fast acting and easy access to synthetic fertilizers, shifting behaviours is challenging.

3.2.2 Socio-economic drivers: Policies, individual, social organisation, science & technology

Several policy frameworks support Menengai to become nature positive. The environmental government department works according to the Climate Change Act 2021, which guides locally led climate change action. This is a legal framework that empowers local community to take climate change action. Through locally led adaptation they aim for community championing on climate change, providing guidance on local risk and vulnerability assessment, and action plans. For 2023-2027 there is also a national climate change policy, which includes the promotion of Climate Smart practices, soil conservation, organic fertilizer and clean energy (replace fuelwood with alternatives). The government also promotes a natural regeneration programme (to leave land for recovery from grazing) and a programme to plant 15 billion trees by 2030 to promote biodiversity. However, the agricultural Nakuru county department mentioned that government funding for nature positive activities such as conservation agriculture, or bio inputs has decreased due to other priorities and Flagship Programmes such as dairy, avocado and pyrethrum. There is still a need to lobby and sensitise policy makers to the importance of nature regeneration and climate action. Another major policy influence is the Kenya Forest Act Kenya 2016[4], which identifies user rights for the collection of medicine, honey, timber, grasses, grazing, forest produce (PELIS) and eco-tourism for community purposes. It mentions that the user rights need to be balanced with regenerative plans. This policy is what guides MCFA and KFS to balance the need for livelihood/food security and forest protection in the Menengai forest reserve.

Figure 4 *Using the tree as a discussion tool to discussion the nature positive vision for Mother Menengai and what the enablers and barriers are.*

In the case of Menengai forest reserve, a Participatory Forest Management Plan (PFMP) guides the engagement of various stakeholders in managing the forest and its resources and is considered an enabler for a NPFS. The plan was developed by KFS and MCFA, in consultation with the community and other stakeholders. Initially the awareness around the PFMP was low, but by closely working together as a team,

[4] Kenya Forest Act 2016: No._34_of_2016.pdf (kenyalaw.org).

this increased. The plan sets out activities and facility development (e.g., shops, tourism locations) around the forest, and where these can take place. Therefore, it provides a form of landscape planning. The MCFA, representing community user groups that are part of the association, has signed an agreement with KFS on what user groups can do, providing some standards and how to apply for permission for forest activities at KFS. This has enabled more ownership at the community level for forest preservation. This also highlights that the organisational structure of MCFA and the user groups enable agreement and clear contact points. However, this organisational structure has also created a barrier, namely a power dynamic between user groups, as not all user groups in the forest were a member of the MCFA and are thus represented. Some of the user groups were described by aspiring members as 'closed' and not willing to accept new members. As a result, new user groups were formed by those not able to join existing ones, creating competition in accessing forest resources, in status (those who are part of the MCFA and those who are not) and this ultimately weakened the communities' position to safeguard their common interests. KFS's role as monitoring and regulating service also enables clarity on accountability for forest activities. For example, permission is needed to enter the forest, but no payment is required (yet). KFS is, however, challenged in how to implement this role. If the restrictions are too strict or they actually involve the police, the user group may burn the forest as revenge.

Another enabler for farmers to improve food security but also invest in nature positive activities is livelihood security and especially diversification. Currently nature negative activities such as firewood collection are not only for consumption but also for sale (charcoal). The firewood collectors, mostly women, also practice agriculture and have small cattle. Developing capacity and infrastructure (e.g., machines) for creating added value products (e.g., yoghurt from cow milk) can decrease the need to firewood collection for charcoal burning. Equally the introduction of beehives and beekeeping or crop diversification has provided alternative income sources, which are not harming the forest but even support it. Another example could be the introduction of fruit trees or indigenous trees in the forest, replacing the dominant eucalyptus. Certain jobs for the youth, such as collection of wooden poles for construction from the forest, could be replaced with other activities, such as ecotourism. A lack of employment often means going into the forest for resources. A major need to enable this livelihood development and diversification is capacity strengthening on added value activities and business development, including financial management. In addition, for existing products that have the potential to diversify livelihoods, such as pots of local honey or alternative cooking stoves (biogas cooking stoves, not dependent on wood) there is a need to lower the threshold to access the required finance, such as micro-credit, and to increase marketing skills.

A barrier to the development of small businesses for livelihood diversification is gender inequity. In general, women have less access to resources (such as knowledge or finance) and less opportunities to take value added products to markets. Part of this is related to the responsibilities assigned to women which focus on taking care of the homestead with less time in the public domain. Another part is related to women's lack of safety and the violence they experience both in the private and public sphere. Cases of Gender Based Violence in Menengai were shared by interviewees in informal conversations outside of FGD. Given the isolated nature of Menengai forest, its history of brutal clan fighting and the resulting myths (it is commonly referred to as 'place of death' or 'place of devils'), Menegai is a place where femicide has taken place. This environment does not give women the confidence needed to take financial risks, develop new businesses and go out to markets. Therefore, there may also be additional enablers and barriers for different groups.

Capacity strengthening and knowledge sharing are the main enablers. This currently happens in multiple ways: through the organisation of groups (e.g., user groups), through Nakuru Living Lab, or through agricultural extension for technical support (mostly by NGOs or KFS). The training from NGOs was found to be a major enabler (e.g., added value technologies, practices, seed banking), especially since the lack of extension services from government forms a barrier. Community members have also formed groups, for example the user groups. However, there is still a challenge with a lack of a common vision in the groups, and finding a way to unify different interests and perspectives, which includes the group chairs to listen to and provide space for members to add to the agenda. Interviewees suggested there is a need for capacity building on group dynamics and unification and how to build social capital for stronger connections. There were also requests for specific topics; such as how to use chemical fertilizer, soil testing, creating added value products (e.g., yoghurt, tomato sauce), how to access finance and markets, or how to use alternatives cooking styles based on solar energy or biogas (green energy for Menengai). One of the groups mentioned

they aim to train women on solar energy, britches (cow dung), or little fuel for cooking. Some of the elderly women still know how to do this, but they need to be enabled (get a platform) to share. One interviewee mentioned that changing the cooking style would have a more positive impact on the forest compared to building a fence around the forest. Another example of social capital as an enabler is the group seedbank created by Kahua-ini (organic farming group), where members can get 1kg of seeds and need to give back 3 kg of seeds the next season.

A barrier to group formation, building social capital and learning together is the dilemma between looking for work elsewhere (money) or staying with the group (teaching, learning). Time to learn or teach also takes time away to earn an income. Women especially face this dilemma as they are expected to take care of household duties and are therefore less flexible.

As a form of capacity strengthening among farmers, living labs (such as Nakuru Living Lab), demonstration plots, lead farmers and farmer field schools have been mentioned as important enablers. For example, the Nakuru Living Lab could facilitate a connection between Kahua-Ini organic farming group and the user groups to learn about organic farming and production. As (contextual) research develops, extension workers and farmers need to learn together via trials. Farmers can become part of the research to explore new practices and options and also become part of the extension network. Working with early adopters can be a strategic focus group for development and outreach.

3.2.3 Environmental drivers – land, soils, climate, water, biodiversity, fossil fuels/minerals

Climate change is currently a barrier as it makes pests and diseases worse, and therefore farms lean towards fast working pesticides. There is also an increase in droughts resulting in a lack of water for agricultural production. This is taking place in an area where there are no natural water bodies (rivers, lakes) and water can only be accessed through water points to which water is pumped. There are no irrigation systems that can increase climate change resilience. In some areas there is also temperature warming which means some crops do not grow well anymore. The awareness around climate change is a motivation for NPFS, since participants mentioned the forest provide protection from wind, high temperatures, soil erosion (due to rainfall) and alternative resources (e.g., food, grazing).

Originally there was no water access around Menengai reserve, but now there is a borehole created in the downhill area. This water is now pumped up to a big supply tank and connected to 22 water points. On average people need to walk 1.5km to get water and it is very expensive to pump and maintain the system. There is some rainwater harvesting but this is not sufficient, most of the water still flows downhill. The situation of the reserve on a hill also means there is high soil erosion through wind and water flow.

Most people living in the communities around Menengai forest reserve own their land, which means there is motivation to invest in the agricultural land. While this is an enabler to invest in for example soil health, many people lease out the land, or work on other fields, in which cases the motivation to invest in regeneration is low. The PELIS user group are allocated land within the forest to farm and in return take care of the newly planted trees. Once the trees have matured (over a period of 3-4 years), they have to vacate the plot to make space for the trees. While this looks like a win-win arrangement between people and nature (providing people in Menengai opportunities to increase their food and nutrition security while regenerating the forest), it did not incentivise PELIS farmers to invest in nature positive practices as they knew it was a temporary arrangement. There was a reoccurring request for soil testing on farmlands, since farmers were not sure about the soil status and what type of management would be most suitable. Soil erosion is, however, visible and managed by planting vegetation or building small walls. Soil testing services were available through KALRO (Kenya Agricultural and Livestock Research Organisation), although against a cost. A barrier to NPFS is therefore the lack of a long-term connection to the land, disincentivising investment, and the lack of information on, and funds for the soil testing service. The forest currently has a majority of eucalyptus trees, which are good for timber, but the aim is to diversify the trees with indigenous species and/or fruit trees. This also supports income diversification. Currently, *'People see money when thinking of eucalyptus'*, but indigenous trees are better for attracting animals (biodiversity) and beekeeping. Forest fires are a major challenge and often lead to the dominance of certain tree species, namely the ones that sprout

and grow quickly, thereby diminishing the tree planting efforts. On the farms, farmers are active in growing fruit trees and creating hedgerows.

The boxes provide a more in-depth description of the barriers and enablers for specific practices that are part of NPFS.

Nature positive practice: Organic fertilizer/less synthetic

There is currently a lack of organic fertilizers, whereas synthetic fertilizers are fast acting, subsidised and easy to access on the markets. Using organic fertilizers has a high risk at this point: if there is a shortage of rainfall, using organic fertilizer leads to low germination. Farmers are used to synthetic fertilizers, which creates an extra barrier for switching. Organic fertilizers require energy and labour to make. Even if market prices of organic and synthetic fertilizers are the same, a farmers will need only 50kg inorganic and 500kg organic. It would help to know how to make organic fertilizers of which less needs to be applied (high quality). In the tree exercise the following causes for the use of synthetic versus organic fertilizer were identified: lack of awareness, availability and effectiveness, costs, increase in weeds and diseases. Some enablers are: training on organic fertilizers, lobbying for premium market for products, mechanizing production process, integrated pest management, Farmer field schools, demo plots, training on biopesticides, mechanisation of organic fertilizer process, government stop subsidizing synthetics and making of foliar.

Nature positive practice: Forest area protection

The protection of the forest has been a major discussion in terms of what is enabling and what forms barriers. KFS is stewarding the forest, therefore giving structure through landscape planning and permissions for the use of the forest. MCFA enables this by connecting to the user communities. KFS has now a system where you need to register if you access the forest, and they also provide the PELIS program, where farmers can cultivate for 3-4 years on plots in the forest if they also plant and grow trees. After the 3-4 years, the areas are given back to the forest. Therefore, the monitoring role of KFS and MCFA, landscape planning, social organisation and connection to the communities through MCFA, and the PELIS program form enablers for the forest protection. Despite this work, there is still a major challenge with overusing of the forest (firewood, grazing etc.). This has fuelled the discussion and implementation plan to place a fence around the forest, to create a secure area with only a few gates through which access can be controlled. For example, goats can then be strictly kept out of the forests (they eat everything incl. seedlings). The gates will then be managed by members of the user groups via MCFA, who can earn additional income. For some, such as KFS and MCFA, this fence is a major enabler ('the most nature positive') but for others this is not a good solution as it creates new power dynamics and does not address the real challenges (demand for forest resources). In favour of fencing, is that finding good accountability mechanisms is a major barrier (big forest, insufficient scouts).

3.2.4 Who is needed – stakeholders and their role

Both KFS and MCFA form the bridge between different stakeholders, such as government, user groups, and the community. KFS as part of the government has two areas of focus, namely extension services (e.g., farm trees, agroforestry) and the forest station. KFS aims to implement the participatory forest management plan, for which it facilitated a participatory process with the communities. KFS plays a major role in providing permission, landscape planning and resources, since it is the steward of the forest reserve. KFS plans and manages the PELIS program, gives permission for tourism shops and provided beehives. In addition, it has a major role in mobilizing the community through MCFA support, for example, for tree planting activities, education (e.g., fuelwood collection), monitoring activities and fire extinguishing. It bridges between community, chiefs, county government and even police when there is overexploitation. It facilitates a registration system for forest entry and is therefore also major lobbyist of the forest fence.

To support the work of KFS within the community, MCFA is the umbrella organisation for the registered community user groups (beekeepers, grazers, ecotourism, water, tree nursery, firewood collectors, PELIS, elders). MCFA plays a capacity building and community engagement role, for example through creating community ownership and accountability tools (e.g., community scouts for monitoring resource use). It also provides a clear voice to represent the rights of the registered user groups.

The county government office is an important stakeholder through its legislative role and provision of resources (e.g., extension, service centers, subsidies). The agricultural department subsidizes synthetic fertilizers (NPK) and provides services around how to use synthetic fertilizers or pesticides responsibly. It connects farmers to NGOs who provide training on bio fertilizers or regenerative agriculture, since the government aims to promote conservation agriculture, organic fertilizers and composting for soil health. The county government of agriculture does not say 'do not use pesticides' but focuses on its responsible use while promoting the mixing of organic and inorganic fertilizer to slowly introduce biofertilizer with the support of NGOs like Biovision and SNV.

To this end, the county government works according to the national government guidelines (see socio-economic section on policies above) and aims to sensitise the national government on what they observe at county level. The county government department for agriculture implements extension services, which are currently lacking in the Menengai area and often only focus on government flagship programs (which are not nature positive). Besides providing resources and services, the government office develops policy, although this is mainly on a national level. An example of this is the Forest Act Kenya, outlining the user rights, and the new development of policy and strategy on agro-ecology. The county government department for Environment also places itself in an overview role in terms of climate change and natural resource management (e.g., locally led adaptation, clean energy, pollution). It provides a legal framework to empower local community, such as the Climate Change Act 2021, guiding locally led climate change actions and risk/vulnerability assessments. In addition, a climate change policy 2023-2027 is promoted and regulated, which includes climate smart agriculture, soil conservation and organic fertilizers. For such activities, county authorities in waste management, climate adaptation, natural resource management, lake and forests, the national environmental authority, and the national water authority work together and have a climate champion in each department. Intersectional collaboration mostly happens at the county level.

Figure 5 *Kahua Ini Farm.*

NGOs are major players for training and capacity building on specific nature positive practices. For example, Biovision disseminates information to farmers on organic farming and agro-ecology through magazines, radio, online platforms, extension services and face to face training. Seedsavers, another NGO, provides training on non-GMO seeds. Certain programmes such as organic farming are implemented in collaboration with Egerton University. The University has also been involved in providing trainings via the Nakuru Living Lab to user groups, organic farming groups or the wider community (e.g., on marketing organic products or improving biofertilizer). The NGO Slowfoods focuses on providing a better connection to organic markets in Nakuru and Nairobi, and works with the Kenya Organic Agriculture Network to offer participatory guarantee systems. It advocates for premium prices, lobbies with the government, and organizes events to showcase local foods. Another example is the support in lobbying with the government by HBS (Heinrich Boll Stiftung). It supported the set-up of an advocacy group to lobby for subsidies to organic farmers. The Nakuru Living Lab connects some of these NGOs and Egerton university to local communities for the provision of training on value addition (e.g., drying fruits and making soap).

Figure 6 *Organic farming was often mentioned as a nature positive practice. The Kahua-Ini organic farming group also makes their own organic insect repellent.*

The user groups and community members also see a role for themselves in terms of information and knowledge sharing. They already do this through group formations, which can provide a more unified voice when reaching out to stakeholders. Each of the group members can talk to other community members, elders can showcase good practices, or lead farmers can have demonstration plots. Groups are discussing setting up farmer field schools, which can support the knowledge sharing through learning together. However, the user group emphasized the need of externals for resources and expert input.

The private sector has been frequently mentioned as an important stakeholder. For example, to provide financial support for making organic fertilizers (e.g., Greencom) or to provide micro-finance to make investment for mechanisation or alternative cooking stoves (e.g., Equity bank). In the case of mechanisation, manufacturers are important to provide affordable technology or payment plans. The private sector organizes tree planting events (e.g., Safari.com, Banks) for communities to join. Lastly, in the Menengai forest reserve, the Geothermal Energy Company is active (located at the bottom of the Kaldera) and owns large parts of land used for the geothermal energy mining. They are innovative in showcasing a greenhouse running on left-over energy from their mining activities. While this innovation could support nature positive agricultural practices of communities around the forest, the infrastructure of the greenhouse cannot extend beyond the Kaldera, making it ineffective for the local farmers.

Figure 7 *Both the tree nursery (left) and the water tank (right) are management by a user group and contribute to enabling nature positive practices.*

The boxes provide a more in-depth description of the role of stakeholders in decision making on specific practices that are part of NPFS. These practices were selected by the user group in during a decision-power exercise. This provides some insight on who is taking decisions on different practices.

Tree planting: For the tree nurseries, KFS is the major buyer and also provides certified seeds. Sometimes companies buy trees, when they organize tree planting events. Fruit trees are also bought by farmers.
KFS decides on location and if it happens, they are mainly influenced by the government. Egerton University or MCFA are advisors. On the farm, the men decide if they integrate trees.

Agricultural practices on farm: most influential are MCFA and KFS as custodians of the area, and men and babu (grandfather) as farm land custodians. Religious leaders and chiefs whose advice is backed by the national government and Egerton University, play a role in terms of advising. The PELIS user group has a high stake, but they need to follow regulation from KFS. Women are often the ones working on the land but the men take the decisions. The county government is involved though policy making and public participation for policy process and engagement. MCFA provides a link between users (incl. youth) and the forest services/ government. Youth groups may have ideas but have no capacity or capital and production resources. Youth may execute decisions but are considered inexperienced and may not understand why or how to do it well. Female youth or women are often seen as inferior and have no influence on agricultural practices, although they work on the land. Gender inequity is therefore a key factor in nature positive food system practices.

Water points: Water committee (user group) organizes the waterpoints and payments. GDC (Geothermal company) suggested the hydro eco survey together with NAWASCO (Nakuru water and sanitation services). KFS is important for decision-making concerning water points in the forest. KFS decides for example where the water tank is placed since they own the area. For the water points in the community, the water committee decides. The water committee is the link between the community and the government and when the community is in conflict they need to be negotiators. The government decides on the water prices. In the context of decision-making about water, women are almost equal to men since water is 'women's work'. The youth is not directly involved in decision-making but they do have an interest for diversifying work or future income. Similar case for grazers, they have a high interest in water points and but are not part of the decision making. The local administration chief has authority to oversight and resolve any potential conflicts in the community.

Alternative cooking stove: County government together with the national government can foster enabling environment to popularise transition to green energy (solar power and/or biogas). They can also lobby with NGOs to promote alternative cooking stoves. The women, both young and old (Nyanya or grandmother) are the final users and therefore need to be involved. Nyanya has also knowledge on using different stoves and can teach or work together with institutes like Egerton University who have the technology and know-how. Chiefs and MCFA can be linking pins to connect government and university knowledge to the communities. Whereas women have a large role in providing experienced based advice, men and babu become more important when it is about investments in new technology. It was a wider debate in the group on how decisions are taken on financial investments, as it was also mentioned that families often sit together to make such decisions.

3.2.5 How - Synergies and trade-offs

The main challenge for both synergies and trade-offs addressed in discussions around NPFS was the balance between food/livelihood security and nature positive activities. Both trade-offs and synergies were identified in this balance, although in practice and in the short term, the trade-offs seemed dominant. Examples of perceived trade-offs in the short term are the need for grazing or firewood collection in the forest. Both activities are important for food security, although in some cases firewood is also collected for selling and thus income generation. Some of the activities, also promoted in the Participatory Forest Management Plan, aim to emphasize synergies, for example through the PELIS program and creation of beehives in the forest. The PELIS program allows farmers to farm crops (no maize) in the forest for 3-4 years if they also plant and grow trees. After 4 years this area is returned to the forest reserve, with grown trees and improved soil health through legume residues. The beehives provide synergy since the areas and the trees hosting the beehives are automatically protected from human intervention. Cows provide some synergies, since their grazing does not destroy the forest and their manure provides fertilizer to the forest. In addition, they provide multiple benefits including milk, meat, insurance and income and their manure can be transformed into biogas. These examples represent opportunities for livelihood diversification and alternative income. This balance is further emphasized through the Kenya Forest Act, establishing the user rights of communities but also the need for forest regeneration.

Taking care of the forest provides synergies, for example monkeys will feed in the forest which avoids them going to the farms, and the forest attracts tourism which provides jobs. Once the fence is set up and an entry fee is charged, this provides income for both people who work at the 39 gates, but also to MCFA as a group. A challenge remains that the income will be centred around MCFA and the registered user groups, although MCFA could reinvest this income in schools. Another challenge is that the fence, while perceived as an important NPFS intervention, also creates tension amongst the communities as there is a lack of clarity who can and cannot enter the forest. The fact that the MCFA was competing for the contract to construct the fence, did not help ease the tensions. Registered MCFA user groups, who would get paid for their labour in the construction of the fence, no longer accepted new members to secure the opportunity for existing members. The trade-off was therefore between safeguarding nature by fencing it and maintaining social cohesion and equity amongst communities and user group members.

The planting of trees was accredited with multiple benefits; providing protection from weeds, soil erosion, storms, and providing firewood, clean air and fruits without the need for fertilizer. A healthy forest provides food resilience during droughts. Such benefits were often mentioned since they lead to more employment and food security.

The social organisation in the Menengai forest reserve has facilitated some synergies. The establishment of the Nakuru Living Lab in the area linked different user groups with other stakeholders such as NGOs, Egerton University, Equity bank, Geothermal Energy Company and government and Food and Agriculture Organization (FAO). Sharing opportunities and knowledge has resulted in beneficial practices for the farmers and the forest. This led to user groups being more involved in decision-making on high-interest topics. However, there is still a gap between those who makes decisions on topics such as water and agricultural practices and those who have a high interest in those topics (e.g., youth, women, firewood collectors and grazers). At the county level, a participatory process is ongoing to develop a national level policy and strategy on 'agro-ecology for food systems'. This means different stakeholders and organized groups can provide feedback on this policy before its formalisation.

On the farm, there were also clear trade-offs between income/food security and nature or health positive activities, for example, the use of synthetic fertilizers and pesticides. To this end, choosing organic farming provides synergies between human and environmental health. Most farmers, however, go directly to agro-dealers to get quick solutions, which are often perceived to be cheaper (money and labour). There are efforts to look for suitable organic markets and partners to collect harvests. Here a group effort can provide an opportunity to take advantage of the economies of scale.

An agricultural practice that has become more popular as nature positive is zero-grazing. In this practice fodder is cut and dried, so it can be used as feed and cattle does not need to go to the forest anymore. The fodder needs to be cut to avoid soil degradation. It supports waste composting and does not impact the trees. The cattle manure can be used to fertilize the farm and even biogas production. However, this does require space for growing sufficient fodder.

New nature positive agricultural practices require time and space for information sharing and learning. Communities are facing a trade-off between securing food for the day and spending time learning or teaching about new practices, such as organic farming. The concrete dilemma is whether to go for the money by working on the farm or to go for the group and share knowledge and learning. Therefore, a long-term time investment is needed, which may not be affordable for everyone.

3.2.6 How - tools/ instruments

Subsidies
Subsidies play a role in the current continuation of farmers' use of fertilizers. Currently the government subsidises synthetic fertilizers, making their use cheaper compared to organic fertilizers, which is already a labour and knowledge intensive practice. Subsidies on nature positive products can therefore influence consumer behaviour.

Market demand and prices
For more farmers to go organic a premium price for organic products would help to cover the higher costs and the delay in benefits. Equally the lower prices for synthetic fertilizer compared to organic fertilizers influence farming practices. Without a strong market demand for organic products, supply and investments will stay behind.

Organic market
There have been issues with finding space to sell organic produce, mixed with other vendors selling non-organic produce as organic (at premium price). Therefore, investment in an organic market strategy by government and larger-scale food companies and the subsequent promotion of organic products at organic markets with certification would be helpful to shift towards more nature positive agricultural practices.

Micro-finance with Equity bank
Farmers frequently spoke about creating added value to their agricultural products to increase income, or to invest in alternative cooking styles (or technologies), to put less pressure on nature. For this micro finance is needed, as the investments are often too high for farmers. Although all user groups have been trained by Equity bank in financial literacy and small business development, farmers are still unsure how to reach out to the banks. Table banking as a user group or community may provide an opportunity to connect to the banks, although this requires a high level of trust. Building trust between farmers, e.g. using the social structure of the user groups, and better understanding what is holding back their confidence to engage with the available micro-finance opportunities, may be helpful to bridge the divide which is currently there.

PELIS program
The current PELIS program allows farmers to farm in the forest under strict conditions for 3-4 years. On this field, farmers are not allowed to grow maize, and they have to plant trees and ensure that these trees grow in 3-4 years. After this, the farmers need to leave, and the area becomes part of the forest again. If people do not stick to the agreements (e.g., only plant crops and not take care of the trees), KFS will shut down PELIS or ask people to leave the plot and limit the land availability to this program (accountability). This program provides farmers with a chance to cultivate additional crops, and also supports the regeneration of the forest.

Participatory Forest Management Plan/Landscape Planning
KFS and MCFA have developed a Participatory Forest Management Plan in consultation with the communities in Menengai. As part of this process, a team with representatives from communities and user groups took part. This plan has provided them with a space to discuss action and landscape development. The plan leaves space to practice user rights (taking from the forest) while also preserving the forest as per Forest Act Kenya (2016). This includes, for example, allocation of PELIS areas and protected forest area. KFS and the MCFA signed a document on what the community can do including setting standards and application processes. In the plan, other facilities are planned such as a zipline and rock climbing within specific locations, which can attract tourists and creates alternative income. With the plan, KFS and MCFA can reach out to investors.

Policy/Regulation
Governmental policy and law provide a framework to guide nature positive approaches. The Forest Act Kenya (2016) identifies user rights for the collection of medicine, honey, timber, grasses, grazing, forest produce (PELIS) and eco-tourism for community purposes. Every user right has or should have a regenerative element. This has guided the set-up of the user groups and the MCFA. There is a new national policy being created on 'agro-ecology for food system strategy' through a participatory process inviting different stakeholders to join the working group. In addition, the Climate Change Act mentions locally led climate change activities, such as risk and vulnerability assessments.

Menengai Community Forest Association (MCFA)
This organisation is the umbrella organisation for all the Menengai user groups, and therefore a representative organisation to work with KFS (government). It also functions as an organisation to create accountability among the forest users and for the community to call upon to represent their user rights. Accountability is crucial in MCFA work; therefore it has community scouts (community representatives) who monitor how people use and treat the forest before KFS checks. They initiate dialogues when people have chopped trees or have not taken care of the crops under the PELIS program. This form of community organisation enables discussion with representatives of different interests and provides input to the Participatory Forest Management Plan. However, this form of association creates its own power dynamics in terms of who is involved earning income and who is involved in forest protection activities (e.g., being a gatekeeper on the forest fence).

Group formation
In general, group formation was found to be a useful instrument to represent interest of users (e.g., user groups) and because nature protection needs to be supported by all users. Group members can reach out to others when in need of support. Groups provide a platform to learn and a point of contact for discussions with KFS (government) and other external stakeholders. However, some challenges were mentioned related to creating group unity and how to ensure members are listened to. Another challenge was the power dynamic between user groups as a result of their different status, i.e. those that were paid, registered members and represented by the MCFA and those that were more 'informal'. In the context of Menengai forest reserve there are already various user groups and one of the FGD suggested there is need to better connect across the user groups (e.g., through a meta group).

Fencing the forest
Accountability is a major challenge for KFS and MCFA to find the balance between user rights and forest protection/regeneration. MCFA mentioned that it is a big forest, and there are not enough rangers or scouts to monitor activities. Therefore MCFA is a strong advocate of fencing the forest. The forest fence is an envisioned partnership between KFS and MCFA, in which MCFA user groups qualify to apply for security jobs at the gates of the fence. Grazers (e.g., goats) are a major risk currently for the forest, and the fence can help with keeping grazers out. In addition, MCFA and KFS can monitor better how much products are collected from the forest, such as firewood. From their perspective "The most positive practice for nature positive is the fence". However, there are some associated risks, for example, if this creates a power conflict around the jobs for manning the gates, which lies with the user groups. (see also 'Synergies and Trade offs' section above)

Extension services for knowledge and capacity (government or NGOs)
There are currently little to no extension services present in Menengai. There are only a few extension officers that provide advice on the government's flagship programmes, such as synthetic fertilizers. NGOs thus far have provided most of the training, which has been appreciated and useful according to the user groups. There are plant clinics and farmer service centres provided by the government, who suggest 'less toxic' agricultural practices, such as Integrated Pest Management (on a pro-active basis – farmers have to go there). However, most farmers go to agro-dealers who have an interest in selling their products (chemicals/synthetic based). Therefore, providing extension on nature positive practices or being more deliberate in sharing knowledge on NP practice is important. For example, on how to use resources (e.g., the amount of firewood, alternative cooking styles).

Engagement of farmers in extension network
As part of building a better extension network, farmers can be a partner and help co-create such a network. For example, through lead farmers, farmer field schools, or demonstration plots. Extension services (by government or NGOs) can work with early adopters and focus on small groups that are willing to change. There are already examples, such as a program where Integrated pest management champions are selected to promote bio inputs and bio traps.

Living Labs
To create connections between wider stakeholder networks, the NLL has been important. This includes farmer groups (user groups), university, NGOs, equity bank, Geothermal Energy Company, and government. Other roles of the NLL, such as support for innovation cases and the innovation agenda for food security in an environmentally friendly and inclusive way, could also support the transition to a NPFS.

Advocacy, story sharing and awareness creation
The main question for farmers is: 'How do nature positive practices benefit the farmers (e.g., income, health etc) and how can farmers be enabled to implement NP practices?' Sharing success stories through radio programmes and magazines can motivate farmers and support behavioral change, for example, in consumption and input choices, and diversification of plants and crops. Such success stories can help in lobbying efforts with government (e.g., subsidies for organic fertilizers on the market). Some NGOs in the area are implementing these activities and benefit from public and private support to increase their scale and impact. Other examples of awareness raising are the large-scale tree planting program by the government (e.g, 15 billion trees by 2030 program to promote biodiversity). As farmers are aware of this program, it has created an awareness of the importance of trees. A similar approach could therefore work if the government would promote a nature positive food system programme.

3.3 What is success – indicators

The indicator workshop invited representatives of all the stakeholder groups that had participated in the interviews and FGD. The researchers presented the concept of nature positive food system as defined by the WUR project team and their preliminary findings for discussion and validation by the participants, using the canvas. Given the mixed group (firewood collectors sharing a table with a high-level county government official), the presentation was translated by Egerton University.

Figure 8 *Presenting the preliminary findings with Egerton University at the Indicator workshop.*

After a plenary discussion, the researchers presented indicators on the various elements of a nature positive food system, as developed by the WUR project team. The participants were divided into groups around the Food System, Environment, Livelihood/Economic and Social indicators. They were asked to rank the indicators according to importance, refine them to make them relevant for their context and add any indicators that are missing. The following tables are the end results of the group discussions. The indicators at the top of the table are most important.

3.3.1 Livelihood/Economic indicators

Figure 9 *Focus group discussion refining and ranking the economic indicators.*

The heading of this indicator was 'resilient and sustainable livelihoods for people in the food system' which was preliminarily defined as 'the capabilities, assets and activities required for a sustainable means of living'. This entails recovering from stress and shocks; maintaining assets and capabilities; and providing for the next generation. This can be measured as the % of members in a community or in a household that have access to resources to generate a resilient household. The group accepted the indicators but refined them by splitting them into various sub-indicators (see in bold in the indicator table below). The group members initially put financial resources as a high priority. In the discussion that followed it was questioned how useful financial resources are when people do not have access to natural resources or knowledge, for example. The user group members were especially focused on having access to finances and this was questioned by Equity Bank and GDC who were in the same discussion group. The table below shows the final prioritization by the group.

Livelihood/Economic – Resilient and sustainable livelihoods for people in the food system*			
People's access to resources and opportunities to deploy them	**People's access to rights** • **Ownership land** • **inheritance rights**	**People's access to safe productive employment & equal pay for equal value of work**	**People's access to services**
People's access to natural resources to generate resilient livelihoods – Water identified as key	Right to decide what to plant [Say over land use the 'what'] Duration of use Acre – size	Income risk when moving off the farm (alone)	People's access to water and sanitation
People have access to healthy human resources to generate resilient livelihoods	% women who own land (outside the forest)		People's access to health care
People have access to technical resources (no. of technical partners)			People's access to knowledge and information/training
People have access to financial resources to…	*People's access to safe productive employment + equal pay for equal value of work*		Government policies: taxation/subsidy program Government policy in organic market – premium price
People's access to social resources to generate resilient livelihoods	Income risk when moving off farm alone		Access to Tree planting programmes
People have access to physical resources to generate resilient livelihoods			NP education in primary, secondary and tertiary schools
Access to security			

*Italics refers to adapted or new indicators.

3.3.2 Social indicators

An indicator header called: 'Social equity, inclusion and gender equity' was presented with sub-headers ('descriptors') of 'gender equity' and 'social inclusion'. Using the table participants were asked to rank the indicators by perceived importance to measure the sub-header indicators. The researchers had prepared indicators per sub-heading as follows:

Gender Equity:
- Equal voice in decision making between men and women
- Men and women both have access to available resources
- Men and women are physically and emotionally safe in their households
- Men and women share duties equally

Social inclusion:
- All communities are treated equally and included in information sharing
- Equal voice in decision making for all group members
- Inclusion of all groups in the communities in decisions that affect them
- All community members benefit from available resources

Figure 10 *Focus group discussion refining and ranking the social indicators.*

During the table discussion, the participants used the descriptions of the indicators as input for an analysis of the current situation. When debriefing this discussion with the table facilitator (staff from Egerton University), it was mentioned that social and gender inequality was a topic which people did not easily discuss, and which perhaps needed more time to unpack. It was acknowledged there is a multi-dimensionality of inequalities and exclusions in and around Menengai forest area. In the plenary discussion, it was suggested that the poverty index was an important indicator in this discussion. The table from the social indicator group most likely reflects the current issues related to social exclusion and gender inequity. As the group did not fully follow the instructions of the exercise, the ranking may therefore not be fully representative. However, the topics and indicators are.

Social Equity, Inclusion and Gender Equity*			
	All communities are treated equally and included in information sharing	Equal Voice in decision-making between men and women	Equal voice in decision-making for all group members
		Men and women both have access to resources	Social inclusion
Poverty index - take poverty index into account as a driver of in/exclusion or gender inequality/inequity	Inclusion of all groups in the communities in decisions that affect them	Men and women are physically and emotionally safe in their household	
Youth Employment	All community members benefit from available resources	Equal sharing of economic activities – sharing duties equally	Equal ownership

*Italics refers to adapted or new indicators.

3.3.3 Environmental indicators

Figure 11 *Focus group discussion on refining and ranking the environmental indicators.*

The environmental group worked mostly with the provided indicators from the literature search. Only pesticide use was removed as they stated that this is part of the food system indicators. Soil associated indicators were found to be the most important as this forms the basis of the system, and other parts are dependent on soil. Soil organic matter protects from soil erosion and provides fire recovery. The species indicators were further refined (underlined indicators in table) since there are specific species for the Menengai reserve, such as insect eating Bat, eucalyptus, acacias, flaxines, sandlewood (protected plant). For the bat, the presence of insects can indicate that the bat is present (less insects mean less bats). Main animals present in this food system are: cats, dogs, monkey, snakes, cows, goats, chickens. Currently farmland is encroaching on the forest, so farmland in ha is an important indicator. On the other hand, hedgerows are already present everywhere, so this indicator was not found to be important. Hedgerows show that people appreciate nature. Equally pollinators (e.g., bees) were found to be less important because the group thought weeds and people can also take of the function of pollinating. Water is not highly ranked as indicator in the context of Menengai forest reserve, since there are no lakes or rivers or other natural waters, only rain. Therefore, water use and freshwater access are ranked in the Food Systems table.

Environment*				
		Soil Organic matter		
	Fault line forming (soil erosion)	Soil Biodiversity	Forest Thickness	
Abundance of ustaconathus compholutus (mueshwa)	Abundance of Sandle wood	Area covered by natural or diverse vegetation	Agricultural land cover	*Abundance of Fallock Eagle (endemic only in menengai)*
Animal diversity	Crop diversity	Species Abundance • animal • plants	Abundance of key species	Number of varieties/breeds
Varieties of fruit trees	Pollinator abundance & diversity			
		Percentage of hedgerows		

*Italics: adapted or new indicators.

3.3.4 Food System indicators

Figure 12 *Focus group discussion on food system indicators.*

Prices were highly ranked due to their barrier for going into organic farming. The barrier is that using pesticides is cheaper and/or that organic foods are currently difficult to sell for premium prices. Currently the government subsidizes NPK fertilizers and pesticides. In addition, current extension focuses on government flagship programs, meaning that even if there is extension this is not focused on being nature positive. Another refinement (underlined in the table) was that it is not only about access to extension, but extension with specific nature positive knowledge. Water use is important but not elaborated much on in terms of quality. There are no natural water bodies present in the area, and only recently water points are installed to which water is pumped. This means there is no water use for agriculture (only rain based), only for domestic use. The current water is groundwater and is sufficient for domestic use. The sourcing of water is therefore more important in this context. Being nature positive was often connected with organic farming and pesticide reduction, leading to various indicators referring to these topics. The interview below also reflects some of the other practices associated with nature positive in this context: alternative cooking stoves, forest reserve protection, and grazing.

Food systems*				
		Prices – both for inputs and outputs		
No. of farmers practicing NP practices	Nutrient input • Seed quality • Fertiliser • Type (bio/manure or synthetic	Land productivity	Access to agricultural *NP extension* • *Quality of agricultural extension- needs to be specific NP extension* • *Can be private or public*	*Advocacy groups* *Interest groups for NP farming*
	Reduction of external inputs • *It would be a positive development to be more self sufficient*	Freshwater resources • *Roof catchment* • *Borehole* • *Availability* • *Access to*	Diversification of farm enterprises • *Less dependency on one product* • *Income diversification*	
	No. Training of extension on organic farming	Water Quality		
	NP technology • *Availability* • *Access* • *Alternative cooking stoves*	Water Use • *Domestic* • *Farming – currently no irrigation present*		
		Animal Welfare		
		Greenhouse gas emissions		

*Italics: adapted or new indicators.

3.3.5 Additional interviews on indicators

From the interviews, a few new indicators emerged, which are not covered yet in the initial tables. These are especially related to community engagement, and the connection of people to nature. The Kenya Forest Service mentioned tree types, indigenous forest versus invasive, forest coverage, soil erosion, community engagement. The KFS officer mainly observes how bare areas are turned to grass and to trees, thereby also looking at soil erosion. KFS has a rain gauge, but no other measurements. Kahua-Ini (the organic farming group) mentioned the following indicators: presence of wild animals (e.g., insects, birds, earthworms, frogs), no flooding or clogging after rain, thriving weeds, diverse crops. The environment county government office suggested river flow, which can enable irrigation on farms. In addition, it is important to consider wider dynamics such as generating all food from farms and not in the forest and creating sufficient yield for surplus. Some behavioural indicators were mentioned, such as the community taking care of nature (attitude), for example moving from farming to beekeeping. Lastly, the way farmers look at the forest is good to consider; this would mean farmers aim to not harm when farming and taking responsibility. Other indicators were: presence of energy saving stoves, livelihood diversification, self-sufficiency of people. Biovision (NGO) mentioned looking at the behaviour of farmers, food production, diversification of plants, and attitude towards practices. They also emphasized the importance of success stories.

4 Reflection on methods and results

4.1 Methods

As mentioned, Egerton University played a key role in engaging stakeholders in the discussions by translating the terms and concepts, not just into local languages, but into the local socio-economic, cultural and political realities of the stakeholders concerned. Applying this methodology in local contexts requires a partner that can translate the conceptual into the practical realities of local food system actors. A major challenge with NPFS framing is that it was up to the participants to decide what practice they wanted to look at under the NPFS farming. In this case this meant often exploring the barriers and enablers, synergies or stakeholders in for example, organic farming, forest reserve protection, alternative cooking stoves, or water access. We cannot say if these are nature positive practices in the context of Menengai forest, only that these were important practices brought up by the participants.

In general, the methodology has the potential to facilitate an awareness raising process in individuals and groups as it guides stakeholders through the logic of WHY, WHAT, WHO, HOW? In our experience, it generated a momentum for action as the research stimulated discussion amongst the interviewees and, at the end, brought them together as key local food system actors to discuss 'what does success look like?'. After doing the tree exercise to explore enablers, barriers, conditions, interpretation of NPFS and tools, we received similar responses. Therefore, it has been helpful to diversify the discussion tools to dive into various aspects, for example use the power circles and the indicator workshop. In a sense every element of the landscape canvas could be unpacked with different tools.

The indicators workshop was valuable to talk about what people find important in NPFS, without having to discuss who has to do what. It gives a sense of what is a successful NPFS from the perspective of participants. For example, through the discussion on indicators the lack of extension in Menengai was brought up, which was helpful for the county government representative to know. The workshop provided space to highlight key barriers, such as the government's subsidy programme for synthetic fertilisers, in the presence of the relevant government offices. In this way, responsible government offices were held accountable for the low uptake of organic fertiliser. The indicator workshop also helped refining the indicators to the context, for example, specific species were named and other elements such as hedge rows were judged to be less important because many have them already. New indicators came up such as community engagement, social inclusion, gender equity and the relation between people and nature. The indicators discussion led to the wish to collect baseline data.

Unfortunately, this research did not include follow up interventions to carry the momentum forward by e.g. the local partner. This would be a recommendation for future applications of this methodology.

4.2 Unexpected findings

The NPFS practices and motivations were mostly based on participants' short term perspective with a tangible benefit within a relatively short period of time. With the exception of participants from government and NGOs, a longer-term perspective, such as NPFS practices for long-term return on investment in soil health, quality of produce and sustainability of livelihoods beyond this generation did not emerge in discussions. This is associated with framing nature mostly from a utilitarian perspective. Participants perceived little intrinsic value of nature, which means that aiming for nature positive requires thinking about utilitarianism. The role of nature in the domain of health and livelihood security may be a more effective narrative. This provides a different angle to look at NPFS, namely where people's needs (e.g., livelihood) are central. This requires further discussion. Equally, there is potential to dive more into people's relationship to land and nature valuation.

Regarding the level of nature positive practices, many user groups and interviewees focused on first doing no harm while implementing their livelihood activities, which is a step before regeneration. Although this is protecting the forest, there were a few examples of regenerating, such as tree planting and forest thickness/diversifying tree species. In the discussion about balancing livelihood/food security, questions that emerged were 'to what extent do we push for regeneration instead of no harm?' 'How many synergies can be found that both promote livelihood/food security and regeneration?' One key synergy that emerged was between forest regeneration and crop protection from monkey attacks on private farmland. Managing human-wildlife conflicts can promote biodiversity and ecotourism in the area. Therefore, it is important to find synergies between livelihood/food security and regeneration.

The choice for forest fencing was promoted by various stakeholders as the most nature positive solution, and as a synergy through which user groups could earn an income (by being employed to manage the access gates). There seems to be a sense of 'fortress conservation' [5] - Keeping people out as the best way of conservation. This is in contrast with the previous attempt with the participatory forest management plan, which focused on user rights of people and the management of using the forest. One interviewee explicitly mentioned the fence will not solve the drivers of forest use (e.g., wood for cooking or construction)[6]. In terms of conservation practices there are two pathways: sharing the spaces (participatory forest management plan) or sparing the space (fortress conservation).

There were multiple aspects or topics that should be further explored. For example, access to finance is perceived as a major barrier, while financial services are available. More work on how communities/user groups, especially female members, can access available financial services and what financial services are still missing would be of interest. In addition, accountability mechanisms are mentioned as a major challenge.

The current study included one exercise on power. We noticed that power, inclusion and gender are important factors in knowing what to work on with what group for NPFS. The power dynamics around gender inequity emerged as a major barrier to a NPFS, especially in relation to diversifying livelihoods (see also the section on socio-economic drivers). It was found that new social organization creates new power dynamics. For example, MCFA provides a form of community organisation to connect to the government and monitor the use of the forest by the communities. However, it has also created power dynamics in terms of who is invited to the user groups and therefore represented. Especially with the introduction of a forest fence and access gates that will be managed by the MCFA user groups, there is a level of power in who can earn from forest protection activities. On the topic of gender dynamics, verbal reports on frequent gender-based violence incidents taking place in Menengai tally with the national statistics. Gender Based Violence is a common occurrence in Kenya, data from the Kenya National Bureau of Statistics[7] reveals that 34% of women have endured physical violence since turning 15, and 13% have been subjected to sexual violence at least once in their lifetime. These are the official numbers. However, there are many unreported cases due to threat, stigma, isolation, social exclusion and economic dependence on the perpetrator. Moving towards a NPFS in Menengai therefore requires a move towards more gender equity, especially at community level. There is more to explore on this topic.

[5] Nature above People: Rolston and "Fortress" Conservation in the South on JSTOR.

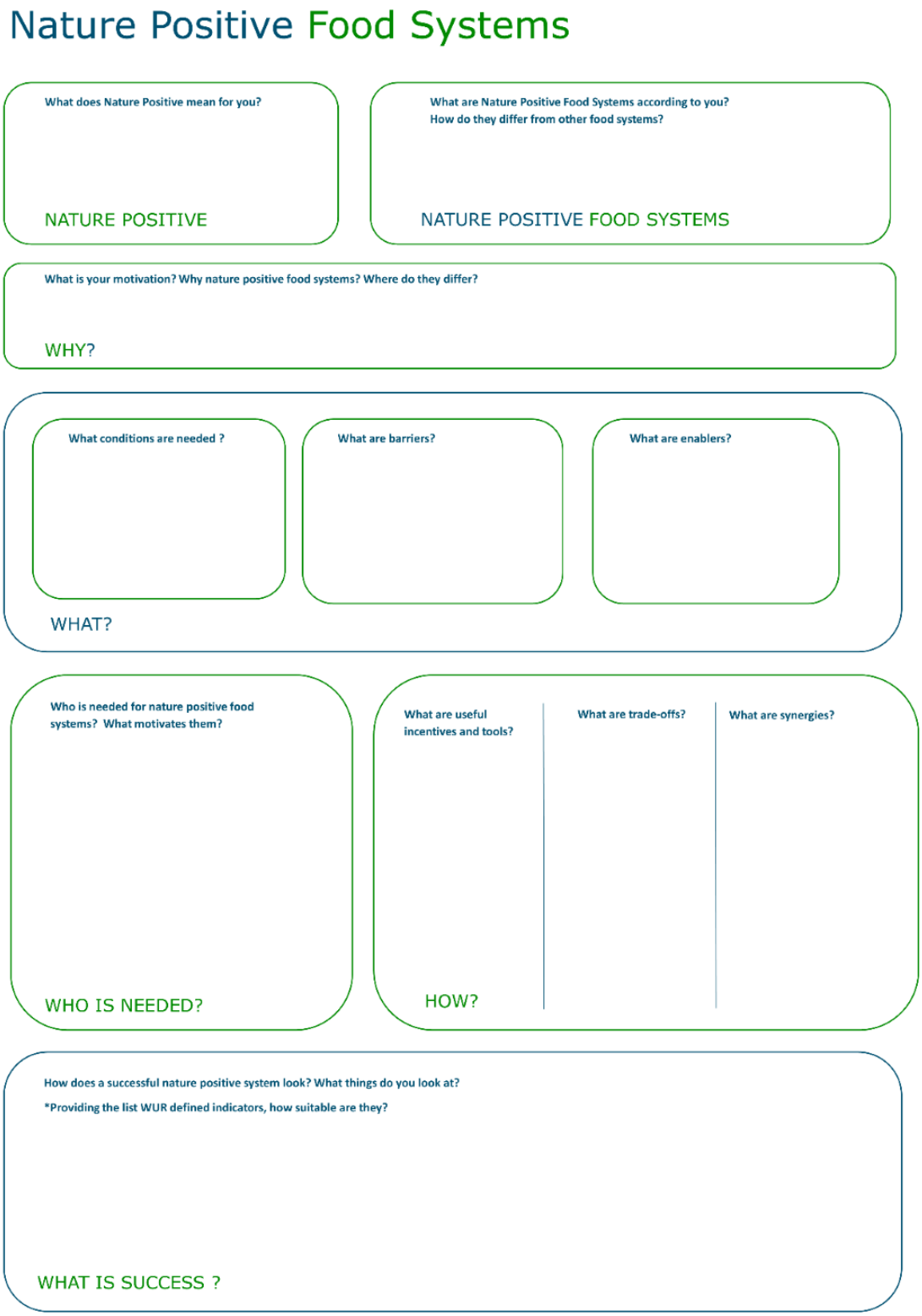
[6] Interviewee's visual description ('people will use their PE skills built in school, find a long stick and leap over the fence in a high jump') is worth an explicit mention.

[7] Kenya Demographic and Health Survey - 2022 - Kenya National Bureau of Statistics (knbs.or.ke).

4.3 Future perspectives

The different tools outlined in the tools section are helpful in moving towards a NPFS. For example, the role of the living labs has already resulted in increased capacity building around nature positive practices. Increasing the connection to government extension services, and extension support on nature positive practices is important. Other enablers are access to resources and finance, which means increasing the connection to markets and financial resources such as micro-credits. In regard to organic farming, premium prices, certification, and allocated organic markets, may help farmers overcome some of the initial high-cost barriers. The user group formation under the MCFA has provided a way of representation and a clear voice for the community members. Building on this, it is important to ensure there is a connection to the wider community and to reconsider how user group members are selected and included. Power and gender dynamics should be further explored to understand how this can support NPFS. This also includes an exploration of how to effectively improve the accountability mechanisms for natural resource use of the forest. Motivation for NPFS was tied into health and livelihood security. The role of nature in the domain of health and livelihood security may therefore be a more effective narrative when talking about promoting or transitioning to NPFS. A key aim should be to find practices and ways to ensure that community members can overcome short term needs that enable them to invest in nature positive practices – for example focusing on diversifying income or financial benefits from nature positive practices. This may involve making a farm, household or landscape level planning for socio-economic and environmental aspiration.

Appendix 1 Nature Positive Food Systems Canvas



Appendix 2 Interview guide – for user groups and one-on-one interviews

Interview

1. Explain the project and what is expected – share the information sheet
2. If ok, ask for consent according to consent form
   - *Explain what is meant by a 'food system': from soil and seeds, to planting, harvesting, processing, marketing, trading and the use of by-products or organic (food) waste as input for the food system (manure, biogas, etc) and diets of consumers. In short: it contains all the activities related to producing and consuming food and the impacts of these activities.**
   - *Explain what is meant by regeneration (nature positive) and degradation (nature negative)*
3. For **non-user group stakeholders**: Please tell us more about your work, how do you engage or are connected with the Menengai Forest?
   For **user groups**: when visiting the user groups at their location, questions to ask:
   - What is it that you do for your livelihood? (user group activity and others)
   - Where in the food system are your activities? Where would you position them? Are they NP or NN?
   - What are you using from the forest to do your livelihood activities? (probe beyond their user group activity, they may be a bee keeper, farmer, etc)
   - What are you giving back to the forest to ensure the forest is regenerated?

   For **elders**: how do you engage with the forest? What is your role?

Nature Positive

4a. What does it mean to be positive to nature in M? Can you name some examples of being positive to nature?

4b. How would you describe nature, and what is part of nature in Menengai Reserve/on your farm/Nakuru county? What have been the changes in the forest over the years, e.g. through changing weather patterns?

** After this point we can use the answer to question 4 as a reference for 'being positive towards nature', for example if they mention organic farming, soil conservation, forest fencing we focus on that**

Nature Positive Food Systems

5. How would you describe nature positive FS in Menengai? How would you describe nature negative FS in Menengai?
   Ask them to list their activities related to the food system on cards and to rank them on the NP-NN spectrum (DIAMOND TOOL)
6. For **user groups**: In the Menengai Forest Reserve, what would a nature positive food system look like? VISION DRAWING IN THE TRUNK OF THE CHALLENGE/ SOLUTION TREE
   Probe for debrief: Why is this important to you? How important is this for other stakeholders, including Menengai forest? (getting a sense of how they perceive other stakeholders' views and positions.) Ask follow up questions to get to the values underpinning their views.
   For **non-user group stakeholders**: Are your (organisation's) activities currently nature positive or nature negative (in Menengai Forest)? What are these activities?

What's needed?

7. For **user groups**: CHALLENGE/SOLUTIONS TREE: draw the roots: challenges; branches are opportunities/solutions and SH are the fruits. Debrief by examining the relationships/interactions between them.
   For **non-user group stakeholders:** What are enablers and barriers to becoming more nature positive? Using the 'barriers and Enablers framework' (Synthesis Report Nature Positive Food Systems, Forthcoming)
8. Debrief question: What is needed to become more 'positive towards nature'? What are the opportunities/solutions? What are the challenges and how could you overcome some of these?
   Prompts: these can be resources, social collaborations, infrastructure, policy and legislations?
9. Debrief question: Who do you need with you? How can you support each other?

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The mission of Wageningen University & Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 7,700 employees (7,000 fte), 2,500 PhD and EngD candidates, 13,100 students and over 150,000 participants to WUR's Life Long Learning, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.