Water for Food Scoping

The Netherlands Food Partnership (NFP)

Case Documentation (Final report)

Integrated Water-Food Nexus Model Across Household, Community and Landscape Levels in the Mau Region of Kenya

Submitted by:

Josiah Ateka (JKUAT), Forah Obebo (KU) and Mercy Njeri (JKUAT)

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The case was prepared by Dr. Josiah Ateka (Jomo Kenyatta University of Agriculture and Technology—JKUAT), Dr. Forah Obebo (Kenyatta University—KU), and Mercyline Njeri (JKUAT). Further technical contributions were provided by Bente Meindertsma, Babette Bodlaender, and Hilke Jansen of the Netherlands Food Partnership (NFP).

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ACRONYMS

CFAs	Community Forest Association(s)
CSA	Climate Smart Agriculture
ISLA	Initiative for Sustainable Landscapes
KTDA	Kenya Tea Development Agency
KWS	Kenya Wildlife Service
MFC	Mau Forest Complex
NFP	Netherlands Food Partnership
PFM	Participatory Forest Management
PGS	Participatory Guarantee Systems
SACCO	Savings and Credit Cooperative Organizations
WASH	Water Sanitation and Hygiene
WRI	World Resources Institute
WRUA	Water Resource Users Association

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1.0 INTRODUCTION

1.1 Context

The strong interlinkages between water and food systems are increasingly shaping development outcomes, driven by climate variability, population growth, and rising resource demand. In Kenya, where food production is highly water-dependent, upstream–downstream dynamics strongly influence food security, livelihoods, and ecosystem health. Against this backdrop, the Netherlands Food Partnership (NFP) commissioned a study to better understand and address these challenges through integrated, cross-sectoral approaches to water and food systems. Using a Kenyan case study, this report provides insight into integrated landscape approaches, environmental restoration, water stewardship, food security, livelihoods, and governance arrangements, including how different partnerships work together in managing water–food systems. The findings identify practical entry points for improving coordination, strengthening resource management, and guiding investments toward more integrated water-food systems.

This case study is situated within the Mau Forest Complex (MFC), the largest closed-canopy montane forest ecosystem in Eastern Africa and Kenya's most important water tower. The area serves as the main catchment area for 12 rivers draining into Lake Baringo, Lake Nakuru, Lake Turkana, Lake Natron, and Lake Victoria (Figure 1). As such, the Mau underpins regional water security, food security, hydropower generation, and biodiversity conservation. The area is mainly inhabited by four ethnic groups, namely the Maasai, Ogiek, Kikuyu, and Kipsigis, with the Ogiek recognized as an indigenous community whose traditional knowledge and practices are critical for forest conservation

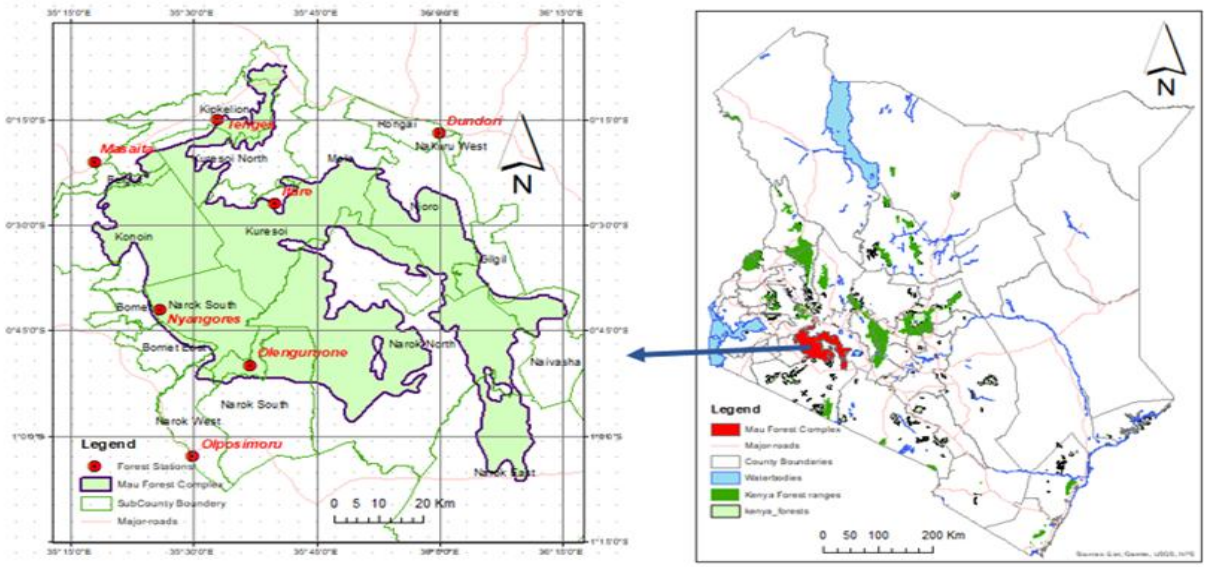

Figure 1: Mau Complex (Adapted from the KWS Report 2008 https://www.kws.go.ke/sites/default/files/2019-11/Mau%20Forest%20Complex%20-%20Values%20and%20Threats.pdf _

Over the past three decades, however, the Mau has undergone significant land-use change driven by population growth, settlement expansion, and unsustainable intensification of agricultural value chains, including in tea, maize, potato, wheat, dairy, and avocado. These pressures have caused deforestation, wetland destruction, and land fragmentation, leading to lower dry-season river flows, poorer water

quality, increased soil erosion, agricultural productivity and reduced ecosystem resilience (Auditor-General, 2023[1]; Anomat, 2024[2]).

The case focuses on three sub-counties of Nakuru County (Kuresoi South, Kuresoi North, and Njoro) in the Eastern and South West Mau landscapes of the Mau Forest Complex. These two landscapes illustrate upstream–downstream watershed dynamics, diverse livelihood systems, ethnic heterogeneity, varying levels of market integration, and vulnerability to climate risks, water stress, and food insecurity. The two landscapes are characterised by diverse production systems, encompassing small-, medium-, and relatively large-scale farms. These systems exhibit varying levels of livestock intensification and production orientations that range from subsistence to semi-commercial and fully commercial operations.

In the South West Mau, farming is dominated by smallholder production of potato, maize, beans, and french beans, alongside dairy and avocado, with tea playing a central role for both smallholders and large estates. The landscape is supported by a mix of actors, including international organizations such as IDH Kenya, SNV, the World Resources Institute (WRI), Agriterra, and the Syngenta Foundation, as well as national actors like the Seed Savers Network and Slow Food Kenya, alongside private sector players such as KTDA and Brown Plantations (formerly Finlays and Unilever). In contrast, the Eastern Mau, particularly Njoro Sub County, is characterized by smallholder mixed crop–livestock systems with crops such as maize, beans, wheat, and potato, complemented by dairy farming. Interventions here focus on land restoration, soil and water conservation, and strengthening local food systems, led by organizations including WRI, World Wide Fund for Nature (WWF), the Seed Savers Network, and Slow Food Kenya, working with community groups. The Eastern Mau also serves as a critical water source, supplying key rivers including the Rongai, Njoro, Molo, Naishi, and Makalia (Kunyiha, 2016)[3].

The case study applied a mixed qualitative approach grounded in a water–food systems analytical framework. The choice was informed by the integrated landscape approach, which considers interactions across agricultural production, natural resource management, and livelihoods at multiple scales. The case was identified through a review of published documents and interviews with organizations implementing interventions across the Mau Forest Complex. Primary data was collected through Focus Group Discussions (FGDs) with farmer groups, Key Informant Interviews (KIIs) with implementing partners, and field observations (see Annex 1), and analysed using content analysis. The analysis was guided by a predefined criteria covering context, problem setting, interventions, partnerships, synergies and trade-offs, impacts, and lessons. The case refinement also benefited from feedback from an April 2026 validation meeting involving the Dutch Embassy in Nairobi, NGOs, private sector actors, research institutions, and multi stakeholder platforms. By situating restoration interventions within this broader landscape context, the study captures how integrated approaches can enhance ecological integrity, strengthen livelihoods, and build resilience, while also highlighting trade-offs between conservation objectives and the expansion of high-value agricultural value chains that place pressure on forest and water resources.

1.2 The problem

The Mau Forest Complex is undergoing rapid degradation driven by deforestation, weak governance, and unsustainable land use. Forest cover declined from about 75% in 1986 to 60% by 1989, as

[1] Office of the Auditor-General. (2023). Auditor-General's performance audit report on conservation of water towers in Kenya by the Kenya Water Towers Agency. Government of Kenya. https://www.oagkenya.go.ke/wp-content/uploads/2023/10/KENYA-WATER-TOWERS-REPORT.pdf
[2] Anomat, J. (2024). The implications of restoration programmes on forest cover in Kenya's water towers (Discussion Paper No. 356). Kenya Institute for Public Policy Research and Analysis (KIPPRA). https://repository.kippra.or.ke/server/api/core/bitstreams/244bab12-dd35-4359-b763-5d0e2f5c2490/content
[3] Kunyiha, N. (2016). *Role and status of children in forest-related conflicts in the Mau Forest Complex*. University of Nairobi.

agriculture and settlements expanded. Since then, forest excisions, insecure land tenure, and weak enforcement have accelerated conversion, with up to 40% of forest lost in some areas between 1986 and 2020 (Lake Nakuru Org, 2024)[4]. Satellite data and studies by Kenya's Ministry of Environment indicate that more than 100,000 hectares of forest in the Mau have been degraded since the 1990s ((Lake Nakuru Org, 2024). This has disrupted hydrological functions, reduced water regulation, and increased erosion. Sedimentation has intensified, river flows have become more variable, and floods and dry-season water shortages have become more frequent, alongside declining water quality (Olang & Kundu, 2011[5]). Water quality challenges include high fluoride levels, pollution, and potential pesticide residues above safe limits. In addition, springs and wetlands have diminished, sedimentation has increased, and unregulated groundwater abstraction has risen, further undermining ecosystem and water system resilience.

The ecological changes are significantly undermining agricultural productivity and livelihoods across the landscape. Farmers are increasingly facing declining soil fertility and more frequent crop failures, associated with prolonged dry spells. In response, many are intensifying the use of agrochemicals, further degrading soil and water systems. At the same time, reduced dry-season river flows are limiting irrigation and intensifying competition among water users. Overall, the interaction between environmental degradation, climate variability, and socio-economic vulnerability is weakening ecosystem services, reducing agricultural productivity, and deepening food insecurity (Table 1).

Table 1: Contextual analysis of the problem (indirect threats, direct threats, and stresses)

Direct threats	Stresses	Indirect threats
Unsustainable land use practices (deforestation, riparian encroachment, overgrazing, unregulated farming in fragile ecosystems)	• Habitat degradation and biodiversity loss • Soil erosion and declining soil fertility • Reduced water quality and increased runoff • Drying of rivers, wetlands, and water springs	• Population pressure and land fragmentation • Poverty and reliance on natural resources for livelihoods • Weak land tenure systems and unclear resource rights • Poor governance and weak enforcement of environmental regulations
Unsustainable agricultural practices (poor soil management, overuse of agrochemicals, continuous cultivation)	• Soil degradation and reduced land productivity • Water contamination (agrochemical runoff, sedimentation) • Declining crop yields, incomes and increased food insecurity	• Limited knowledge of sustainable farming practices • Weak agricultural extension services • Poor market access and linkages • - Limited capacity of cooperatives to provide technical support
Climate variability and extreme weather events (droughts, erratic rainfall, floods)	• Increased frequency of drought and water stress • Crop failure and livestock losses • Water scarcity for domestic and agricultural use	• Climate change (global driver) • Limited adaptive capacity at community level • Lack of social safety nets and risk management systems • Inadequate climate information services

[4] Lake Nakuru Org. (2024). *46% loss of Mau Forest Complex threatens Lake Nakuru*. https://lakenakuru.org/46-loss-of-mau-forest-complex-threatens-lake-nakuru/

[5] Olang L.O., Kundu P. M, Bauer T. & Fürst, J. (2011). Analysis of spatio-temporal land cover change for hydrological impact analysis within the Nyando River basin of Kenya. Environmental Monitoring and Assessment (Springer), doi::10.1007/s10661-010-1743-6.

	• Increased vulnerability of communities and ecosystems	

Avocado tree seedlings are drying up due to water shortage

Water dams are drying up due to drought

2.0 KEY INTERVENTIONS

The interventions are presented through an integrated landscape approach, covering forest and environmental restoration, water stewardship, food security and livelihoods, and strengthened governance and financing, including partner collaboration. We report on two broad programmes. First, IDH Kenya, through the ISLA programme, brought together diverse partners across the landscape. Private tea sector actors (KTDA, Browns Plantations, Finlays, and Lipton) influenced production systems, land use, and sustainability standards, while public agencies—including Kenya Forest Service, Kenya Wildlife Service, county governments, and environmental authorities—provided regulatory oversight. Safaricom Foundation supported restoration and community investments, while NGOs and civil society groups such as SNV, Rhino Ark, the Sustainable Agriculture Foundation, CFAs, and WRUAs strengthened community mobilisation and local resource management. At the project's end, IDH Kenya launched the Stawisha Mau Charitable Trust to coordinate conservation and livelihood efforts, linking policy dialogue with on-the-ground action.

Second, organizations including WRI, WWF, Seed Savers Network, and Slow Food Kenya, working with community groups, support agroecology, forest restoration, biodiversity conservation, and sustainable intensification of value chains. Interventions span multiple scales: at the household level, promoting sustainable practices through demonstration farms and peer learning; at the community level, strengthening cooperatives, CFAs, and WRUAs alongside participatory forest and water management; and at the landscape level, convening multi-stakeholder collaboration to align investments and interventions. These detailed interventions are described below;

2.1 Forests and the environment

Restoration initiatives across the landscapes are part of a broader effort to restore Kenya's largest forest ecosystem by restoring degraded landscapes, supporting nature-positive enterprises, promoting circularity, and advancing environmental education. The specific interventions include establishing tree nurseries, planting indigenous and fruit trees (especially avocado), supported by the county government seedling distribution program at the household level (Table 2). Through agroforestry, farmers have planted trees along farm boundaries, on crop land, and in homesteads. The common trees included:

timber (*Grevillea robusta*), fruit (tree tomato, avocado, mango), fodder, ornamental, medicinal, and soil fertility improvement species. The choice of trees was based on the agroecological zone and the farmer's intended purpose. At the community level, community surveillance and forest monitoring were leveraged, along with the engagement of forest-adjacent households in tree-planting initiatives. At the landscape level, forest restoration was undertaken through tree planting, forest electric fencing to reduce encroachment, through collaboration between the KFS, Rhino Ark, and Community Forest Associations (CFAs).

Table 2: Interventions in forests and environmental protection and restoration

Forest Restoration and Regeneration	Indigenous tree species and nursery development	Water protection and hydrological management	Livelihoods and sustainable energy	Capacity building and governance
• Planting and regenerating degraded forest areas. • Installing fencing and cut lines to protect regenerating zones. • Managing grazing in forest areas to maintain vegetation cover and ecosystem services • Careful selection of indigenous plant species adapted to the local conditions	• Establishing community nurseries for indigenous tree seedlings • Selecting suitable species using indigenous knowledge. • Distributing seedlings for on-farm and landscape-level planting	• Protecting springs and riparian zones through fencing and vegetation restoration. • Enhancing water infiltration and recharge via restored vegetation cover. • Implementing community-managed water pans, shallow wells, and irrigation systems	• Integrating tree planting into farming systems for fodder, fuelwood, and fruit production. • Promoting reduced reliance on charcoal through alternative energy interventions. • Linking tree- and water-based interventions to productivity and food security	• Recruiting community scouts and establishing monitoring outposts. • Developing participatory forest and grazing management plans. • Conducting aerial and ground surveillance for forest and watershed monitoring

2.2 Water stewardship

Water interventions aimed to improve access, reduce conflicts, and enhance water quality and availability far beyond the Mau's borders. The case shows that at the household level, interventions focused on organic soil management to improve water retention, alongside agroforestry and tree planting to enhance microclimate regulation and reduce runoff. At the community level, county governments undertook spring protection, installation of water piping systems, and borehole construction. Collective management of shared water resources was promoted through community-based governance structures, including water resource user groups and local committees that oversee the operation and maintenance of water infrastructure, establish allocation rules, and coordinate maintenance. Water pans and small-scale irrigation systems were developed to support access and reduce competition among users.

Water, sanitation, and hygiene (WASH) interventions complement these efforts by improving water safety and usability through spring protection, water quality testing (including addressing fluoride contamination), and separation of water points for different uses. Off-grid solar pumping, piped systems, paid water kiosks, and direct household connections further helped to expand access and reduce labour burdens, particularly for women. Within the landscape access models such as free-stream access, paid water kiosks, and direct household connections via piping have improved availability and reduced collection burdens. Water pans and shallow wells have been distributed in the lower parts of the landscape, though many beneficiaries lack liners, leading to seepage losses, reduced water retention, and higher vulnerability to drying up during dry periods. Additional harvesting is also needed to meet demand especially during the dry spell.

At the landscape level, watershed restoration through forest regeneration, participatory water governance through Water Resource Users Associations (WRUAs), and the construction of dams by the national government to enhance water storage capacity were undertaken. At the upper part of the landscape, degraded springs were mapped, and some 10 springs (out of 61) were protected through fencing, planting of indigenous trees, and installation of reservoir tanks. Boreholes have been installed to provide reliable water sources, and water-intensive eucalyptus trees have been removed from riparian areas to improve ground water recharge. Improved vegetation cover, along with reduced livestock pressure, enhanced water infiltration and availability, and cultural attachment to water points helped ensure community stewardship. These measures have supported improved food production by securing water for irrigation, livestock, and kitchen gardens.

2.3 Food security and livelihoods

Interventions on food and livelihoods mainly focused on dairy intensification, commercialization of high-value crops such as Irish potato, agroecology (organic farming), collective marketing, and agroforestry (Table 3). At the household level, initiatives centred on improving soil health through organic biopesticides and fertilisers, enhancing market access, promoting avocado farming for income diversification, and supporting organic vegetable production and crop diversification. At the community level, agroecology is being promoted as a pathway to sustainable food systems through climate-resilient practices, water-efficient production systems (such as protected or greenhouse technologies), integrated pest and disease management, and improved market access through local certification schemes such as Participatory Guarantee Systems (PGS).

In Njoro Sub-County (one of the sub counties in the landscape), a multi-stakeholder partnership led by WRI and involving Seed Savers Network and Slow Food Kenya is supporting the agroecological transition, building on the recent launch of the agroecology policy in the county. WRI provides technical support for landscape restoration and monitoring frameworks (metrics and indicators), Seed Savers Network promotes agroecological practices, seed sovereignty, and farmer training, while Slow Food Kenya strengthens farmer organisations, local market development, and consumer awareness of sustainably produced food. At scale, partnerships involving local and Dutch actors such as Koppert, SNV, Holland Greentech and Acacia Water could support access to agroecological inputs and technologies and innovations.

Table 3: Livelihood related interventions in the model

	Household	Community	Landscape
Dairy	• Breed improvement (AI, Crossbreeding) • Livestock nutrition and health (e.g., silage making and fodder)	• Artificial insemination services • Collective milk marketing and value addition • Training and demonstration farms	• Managed livestock grazing in/near forested areas • Reduction of stocking rates
Potato	• Localised irrigated certified seed multiplication • Training on good agricultural practices that optimise water use	• Training and demonstration farms • Collective seed multiplication and distribution systems	• Promotion of soil conservation practices • Landscape-level planning to reduce degradation
Avocado	• Seedling provision to farmers • Adoption of improved varieties	• County-led seed multiplication • Training and demonstration farms	• Expansion of tree-based systems to enhance vegetation cover
Tea	• Transition from forest-dependent livelihood to the establishment of tea farms	• Organised marketing structures	• Establishment of processing facilities

Trees	• On-farm tree planting • Integration of fruit trees in land restoration activities	• Community nurseries for indigenous and fruit tree species	• Reforestation and regeneration corridors

At the landscape level, initiatives leveraged integrated crop–livestock–tree systems to stabilise production systems. Agriterra, in partnership with SNV and local cooperatives, is piloting irrigated potato seed multiplication models to ensure year-round availability of quality seed, reduce seasonal shortages, and strengthen climate resilience through cooperative-led production. Some cooperatives have expanded beyond potato production to include dairy aggregation and the provision of Climate-Smart Agriculture (CSA) loans through their SACCOs. This integrated approach improves resource sharing, enhances access to finance, and strengthens coordination across value chains. Through SACCOs, members access tailored financial services to support production, input acquisition, and investment in climate-resilient practices. Cooperatives also aggregate dairy and potato, undertake seed multiplication, and provide soil analysis services through a bundled service model. Farmers benefit from coordinated access to seeds, soil diagnostics, and technical advisory services, supporting better decisions on crop management, nutrient application, and water use. By consolidating services, the model reduces transaction costs, strengthens local seed systems, improves product quality, and enhances market access. Overall, this bundled approach supports farmer resilience, stabilises market linkages, and promotes sustainable intensification.

The approach offers opportunities for scaling through farmer networks, cooperatives, and landscape-level partnerships. Organisations such as Holland GreenTech are exploring replication in regions where smallholders face constraints in accessing quality seeds, soil diagnostics, and advisory services. In Kisima, Bura Ward (Samburu County) about 30 greenhouses have been established, alongside a demonstration farm training approximately 200 farmers on seed propagation and greenhouse-based production. Scaling could involve integrating the bundled model into agroecology programmes, cooperatives, and county extension systems, while leveraging private-sector partners such as Koppert, Cropnuts, and Agriterra. If replicated, the model could strengthen local seed systems, improve soil health management, and enhance water and input-use efficiency across landscapes.

2.4 Governance and financing

The presence of multiple stakeholders in the Mau landscape—including government agencies, private sector actors, and community institutions with diverse interests, functions, and mandates creates governance complexity, often resulting in fragmented coordination, siloed approaches to decision-making. Capacity constraints among local institutions, competing interests, and weak policy coherence have further limited the effectiveness and sustainability of restoration and livelihood interventions.

Against this backdrop, the case highlights the role of a strong multi-stakeholder partnership framework facilitated by the Stawisha Mau Trust, bringing together government agencies, county governments (providing oversight and legitimacy of efforts), and private sector actors such as Kenya Tea Development Agency, Unilever, and Finlays, which contribute financing, supply chain engagement, and sustainability commitments. The civil society and NGOs support community mobilisation, restoration, and capacity building. Local forest-adjacent communities are engaged in co-management, restoration work, and livelihood initiatives, strengthening ownership and ensuring interventions are grounded in community priorities. The other notable innovation was the strengthening of an agricultural cooperative to diversify its services beyond production, into potato seed multiplication, milk aggregation and the establishment of a SACCO to provide microloans to farmers. The blended financing approach enabled farmers to access inputs and adopt improved practices while linking livelihood improvements with landscape restoration goals. The SACCO with support from SNV and Agriterra leveraged external financing from

Rabobank, demonstrating how multi-stakeholder platforms can create sustainable financing mechanisms for integrated water–food–ecosystem interventions.

The critical success factors were the development of a shared understanding of the underlying landscape challenges, which helped align diverse stakeholder interests and priorities. The presence of IDH Kenya as a neutral convenor further strengthened trust by facilitating transparent communication, mediating competing interests, and creating safe spaces for negotiation among actors with historically conflicting mandates. In addition, buy-in and active participation from county governments and public institutions were fostered through early involvement in the design phase, alignment of project objectives with county development priorities, and integration of activities within existing policy and planning frameworks such as County Integrated Development Plans (CIDPs). This ensured institutional ownership, legitimacy, and continuity beyond project cycles. The idea of building early and continuous engagement with public institutions, embedding interventions within existing governance structures, and using neutral convenors to manage stakeholder dynamics can enhance coordination and trust. Additionally, adopting participatory planning approaches and clearly demonstrating co-benefits—such as improved livelihoods alongside ecosystem restoration—can incentivize private sector participation and sustain multi-stakeholder collaboration across diverse settings.

2.5 Partnerships: Who was involved and how they worked together

Strong participatory governance mechanisms formed the foundation of the sustainability of all interventions. At the livelihood level, partners leveraged the engagement of opinion leaders to influence practice adoption, as well as peer-to-peer learning through demonstration farms. At the community level, there was strengthening of organic farmer groups and cooperatives, promotion of the group certification models, and participatory decision-making on water and forest use. At the landscape level, partners focused on strengthening Community Forest Associations (CFAs), engaging Water Resource User Associations (WRUAs), and fostering multi-stakeholder collaboration among civil society, government, and the private sector. Across the levels, partnerships varied by initiative type, ranging from livelihood improvement and agroecology to restoration, value chain development, and water resource management (Table 4).

Table 4: Types of partnerships and initiatives being implemented

Type of partnership	Members	Initiative
Multi-stakeholder partnership	IDH, SNV, WRUAs, CFAs	Landscape-level engagement in forest restoration, water resource management, and community-based governance across the landscapes.
Development partners and Community	SNV, CFAs, Ogiek community	Dairy intensification through engagement of opinion leaders and community members in South-West Mau (5–10 km from forest edge)
National and local NGOs	WRI, Slow Food Kenya, Seed Savers Network, Biovision Foundation Trust	Tree planting for farmers, including 380 households, promoting indigenous and fruit trees (e.g., avocado, tree tomato, Calliandra) in the South West Mau.
County and farmers	County Government, Farmer Groups	Distribution of avocado seedlings to promote high-value crop production across the landscapes.
Civil society–farmer	Slow Food Kenya, Seed Savers Network, Biovision Foundation Trust	Promotion of organic farming, water harvesting, conservation practices, and indigenous seed saving and banking in the Eastern Mau.
	Slow Food Kenya and Organic Farmers	Support for organic certification of agricultural products
Private Sector	KTDA, Koppert, Browns Plantations	Linking production to markets, providing financing and agricultural inputs, and incentivizing the adoption of sustainable practices.

	Kenya, Cropnuts, Holland Greentech	Promotion of improved potato seed multiplication among farmers adjacent to forest areas

What are their interests and priorities?

The stakeholders have diverse but overlapping interests regarding sustainable water use and food security. These interests are shaped by their roles, mandates, and exposure to environmental and livelihood risks.

- Stakeholders in the Mau landscape hold diverse but overlapping interests regarding sustainable water use and food security, shaped by their roles, mandates, and exposure to environmental and livelihood risks. At the community level, including farmers, Water Resource Users Associations (WRUAs), Community Forest Associations (CFAs), and Indigenous communities such as the Ogiek, priorities centre on reliable and equitable access to water, improved agricultural productivity, and livelihood resilience. These groups emphasise interventions that combine restoration with tangible economic benefits, such as agroforestry, irrigation, dairy production, and high-value crops, while also highlighting the importance of secure land tenure and reduced pressure on forest resources.
- Civil society organisations, including Slow Food Kenya, Seed Savers Network, and Biovision Foundation, placed greater emphasis on sustainability approaches. Their priorities focus on promoting agroecological farming systems, enhancing soil and water conservation, strengthening indigenous seed systems, and reducing dependence on agrochemicals. This reflects a broader vision centred on ecosystem health, biodiversity conservation, and long-term resilience of food systems.
- Development partners such as SNV, WRI, and IDH adopt a more integrated approach that links environmental sustainability with economic development. Their priorities include scaling climate-smart agriculture, strengthening value chains such as dairy and tea, and aligning restoration efforts with market-based incentives. These actors often promote integrated landscape approaches that seek to balance productivity, restoration, and livelihood outcomes.
- Private sector actors, including the Syngenta Foundation and agribusiness firms, are primarily driven by commercial viability and scaling of production systems. Their focus is on improving access to quality inputs, strengthening seed systems, enhancing value chain performance, and expanding access to finance and technologies for farmers.

In contrast, government actors at both national and county levels prioritise food security, agricultural productivity, and infrastructure development, including irrigation systems, dams, and boreholes, while also maintaining responsibilities for policy implementation and catchment management. While these stakeholder groups share a common concern over declining water availability and agricultural productivity, their differing priorities reflect a balance between immediate livelihood needs, long-term environmental sustainability, and economic development objectives.

3.0 OUTPUTS AND IMPACTS

3.1 Forests and environment

The interventions have resulted in various impacts at different scales. At the individual level, each household is targeted to plant up to 100 trees, including indigenous and fruit tree species, especially those living adjacent to the forest. While the initiative helps to reduce the pressure on the forest, it has significantly increased on-farm tree cover and strengthened agroforestry systems. Increased tree cover

has contributed to microclimate regulation, reduced surface temperatures, and improved wind buffering effects at the farm level. The organic soil amendments are reported to improve soil health, reduce erosion, and enhance moisture retention. The encroachment of people into the forest has drastically decreased due to livelihood diversification options promoted by the WWF, SNV, and IDH in the focal landscape.

In addition, the Initiative for Sustainable Landscapes (ISLA) in the South West Mau is a landscape-level intervention designed to promote sustainable production while conserving critical forest ecosystems. The initiative focused on aligning agricultural production with environmental conservation through coordinated actions, including forest protection, restoration, and sustainable land management practices. Following the ISLA project, deforestation in the focal landscape decreased by 56% (from 577.50 ha/year to 253 ha/year). Increased tree planting has contributed to expanded forest cover across the landscape. Farmers reported a reduction in wildlife–human conflicts over forest and water resources, as ecosystem restoration improved natural resource availability and fencing ensured that wildlife remained confined within the forest perimeter. Reduced human-wildlife conflict – as one participant indicated, *"in the past, baboons would be all over here destroying our crops. Even elephants would come out here because they lacked food. Now you rarely see them because they have a lot of food in the forest"*.

The Landscape has experienced reduced grazing pressures over time, with a significant decline in the livestock population grazing under permitted conditions. Structured grazing management, including the *Ndoinet* grazing plan, has regulated livestock access and significantly reduced uncontrolled grazing within forest areas. These measures have contributed to reduced degradation pressures and improved forest recovery. Ecologically, dense and moderate forests in the focal landscape show signs of stability and recovery, with over 1,500 hectares of the Mau Forest restored through tree planting under the ISLA project by IDH, achieving a 90% survival rate. The programme also enhanced forest protection and monitoring through the establishment of 7 outposts, the recruitment of community scouts, and intensive enforcement and monitoring by government agencies, and the development of 6 participatory management plans, conducting quarterly aerial and ground surveillance, and participatory community engagement in restoration and protection.

A project led by the World Wildlife Fund (WWF) is supporting landscape restoration in the area by carefully selecting indigenous plant species adapted to local conditions. In forest restoration efforts, tree planting emphasises a diverse mix of native species, including Grevillea robusta (Grevillea) and Olea europaea subsp. Africana, locally known as Mutamaiyo, Bambusa vulgaris (Bamboo), Dombeya torrida (syn. Dombeya goetzenii), locally called Silibwet. This approach enhances biodiversity, improves ecosystem resilience, restores soil fertility, and supports sustainable livelihoods for local communities.

Active rehabilitation of degraded forest and grassland areas has not only accelerated natural regeneration but also increased species diversity. Greater biodiversity strengthens ecosystem resilience by improving ecological stability, adaptive capacity, and resistance to climate extremes. In addition to adaptation benefits, the interventions generated mitigation benefits through increased carbon sequestration in trees and soils and reduced greenhouse gas emissions associated with lower synthetic fertilizer use by 26.53%.

3.2 Water stewardship

Initiatives across the landscape have also resulted in improved water quantity and availability. Spring protection and catchment restoration have reduced conflicts between upstream and downstream water users. Increased and more reliable water flows have enhanced ecosystem stability and agricultural productivity, particularly in dairy farming systems that depend on a consistent water supply for livestock. Each restored water spring serves more than 500 households, who now have reliable access to water for both domestic and agricultural use. In terms of water-use efficiency, 5 farmer hubs were supported with irrigation kits to ensure year-round production. Women reported a substantial reduction in time spent

fetching water, from approximately 2 hours to less than 30 minutes. The availability of both protected springs and strategically located water kiosks near market centres has eased the domestic water burden, freeing time for productive and care activities.

Improved soil health through organic amendments has further strengthened hydrological resilience. Enhanced water infiltration, moisture retention, and nutrient cycling have contributed to more stable production systems. While local perceptions of rainfall changes may partly reflect microclimate improvements, increased tree cover and watershed restoration have demonstrably improved water regulation and soil moisture retention.

Spring restoration and protection

Spring water kiosk

3.3 Food Security and Livelihoods

Household livelihoods have improved significantly, with farmers reporting higher overall incomes primarily driven by livestock production, potato production, and avocado farming; over 6,000 seedlings were distributed to farmers; and the sale of organic produce at premium prices and organic fertilisers such as Bokashi. Farmers now keep fewer, higher-quality breeds, resulting in higher production. The integration of modern breeding techniques such as artificial insemination, improvements in feeding practices, organic fodder systems, and paddocking has contributed to enhanced milk production of up to 7 litres per cow per day, from an average of a litre. On the other hand, potato production increased to an average yield of 8,304 kg/acre, up from 3.22 tonnes, following training on seed multiplication under the ISLA project, which targeted over 1,100 farmers. The increase has translated into higher incomes from dairy commercialisation, leading to improved welfare, including a rise in the number of schoolchildren.

The transition to organic farming has the potential to reduce reliance on synthetic fertilisers, thereby improving soil fertility and saving farmers money that would otherwise be spent on synthetic fertilisers. Farmers received training on the Safe Pesticide Use training by the Pesticides Control Products Board. As a result, they reported improved soil structure, moisture retention, and sustained yields from the use of bio-inputs. The use of mulching and sunken beds was reported to contribute to more efficient irrigation, as farmers irrigate once a week rather than daily when no mulching is used. The emphasis on sustainable land-use practices is also reflected in increased land allocation for tree planting (both indigenous and fruit trees) and organic crops, including maize, vegetables, and beans, potentially diversifying income sources and enhancing resilience against economic shocks. Dietary diversity has improved through crop diversification and the establishment of fruit trees and organic vegetable gardens. These changes could contribute to healthier and more diverse household diets.

Mulching helps retain water around the crops

Fruit trees nursery preparation

Women reported a reduction in time spent fetching water due to spring protection and improved water access, which previously took them up to four (4) hours a day. This freed time for productive, collective action and caregiving activities. Improved access to alternative and organic medicine, which is sustained by the protection and restoration of indigenous trees, has contributed to better health outcomes within the community. The group's organic certification effort has enhanced market access, increased collective bargaining power, and improved income opportunities for smallholder farmers, as observed in Njoro, where organic farmers have been allocated stalls for their produce in the markets. Collective action around tree planting and natural resource management strengthens social cohesion, mutual understanding, and trust amongst the community members. Gender inclusion emerged as a significant achievement, with increased participation of women in decision-making across all stages of livestock production, marketing and forest management. This inclusivity not only empowers women economically but also diversifies their decision-making processes. Diversified income streams, including dairy commercialisation, crop diversification, organic produce markets, and agroforestry products, have reduced household vulnerability to climate shocks. By spreading risk across multiple enterprises, households are less exposed to climate risks.

3.4 Governance and financing

Communities living within approximately 5 km of the forest edge and near protected springs are organised into Community Forest Associations (CFAs) and Water Resource User Associations (WRUAs). Membership enables regulated access to forest and water resources, including permits for charcoal production, controlled grazing, and domestic water use. Participating farmers generally perceive community forest governance positively and expressed high satisfaction with their involvement in decision-making, collective choice arrangements, and forest operations. Farmers are more involved in conservation activities like tree planting, eco-tourism, and forest patrols. There is also a change in perception of forest values with more prominence placed on non-extractive use of the forest, such as for cultural, medicinal value, eco-tourism, recreation, and ceremonial use, than for extractive use values (firewood and charcoal production). This indicates a positive impact on more sustainable use practices and less dependence on public forests. Despite these improvements in local governance systems, several gaps continue to limit their collective impact (Box 1):

Box 1: Gaps in local governance in water-food systems
• Planning frameworks such as Participatory Forest Management Plans (PFMPs) and Sub Catchment Management Plans (SCMPs) are implemented independently, without a common evidence base to align forest, water, and agricultural outcomes • Disconnected data systems, with WRUAs tracking hydrology and CFAs monitoring forest conditions in isolation • Limited inclusion of farmer groups and unclear private sector roles in water food governance • Institutional constraints, including weak capacity, donor dependence, elite capture, and poor coordination mechanisms • Weak coordination despite mandate overlaps, resulting in duplication rather than synergy • Short term, project-based financing with limited support for sustained, integrated catchment management

At the community level, the formation of a SACCOS, building on the pre-existing cooperatives such as Starlight Cooperative in Molo, significantly improved access to finance for agricultural inputs and technologies. While the cooperatives previously focused on aggregation and marketing, the SACCO institutionalised a structured credit system that has enabled farmers to invest in productive assets such as solar irrigation pumps, improved dairy breeds, and certified seed systems. A growing number of farmers have accessed loans, and repayment rates have been reported as timely and consistent, indicating improved financial discipline and the viability of the supported enterprises. The integration of multiple value chains, particularly dairy and potato, within the SACCO has strengthened income diversification and reduced members' risk exposure.

At the landscape level, the model demonstrates that financing mechanisms aligned with profitable value chains can reduce pressure on forest ecosystems by enabling intensification on existing farmland rather than expansion into forest areas. A key milestone was the establishment of the Stawisha Mau Charitable Trust in 2018, which serves as a sustainable institutional vehicle for coordinating conservation efforts, mobilising partnerships, and anchoring long-term financing. Notably, the initiative has leveraged approximately 50% co-financing from public and private sector actors, demonstrating shared ownership and strengthening financial sustainability.

4.0 SYNERGIES AND TRADEOFFS

The case illustrates that landscape restoration and agricultural intensification generate both reinforcing synergies and structural tensions.

4.1 Synergies

The case presents a number of synergies that can be leveraged. First, MSPs provide a critical mechanism for strengthening advocacy, integrated interventions, and enhancing coordination across sectors. Second, the evolving policy environment increasingly supports food system thinking, agroecology, and transformation pathways, enabling integrated planning and implementation. Third, cooperative models deliver blended services, combining micro-loans, quality inputs, advisory support, and irrigation kits to improve productivity and reduce water stress. Fourth, private sector actors, including Dutch and local agribusinesses, input suppliers, and fintech companies, can enhance value-chain efficiency and expand access to inputs and financing. Fifth, linking universities and research institutions with field projects facilitates co-generation of context-specific climate-smart technologies, and soil–water diagnostics. Finally, Kenya's growing ICT sector enables digital and financial innovations, such as real-time weather forecasting, mobile financial solutions, remote soil monitoring, insurance products, and payments for ecosystem services.

4.2 Trade-offs

The case presents multiple trade-offs that must be carefully managed. Market-oriented value chains, such as dairy, Irish potatoes, or export crops like avocado, can improve incomes and productivity but are often water- and input-intensive, increasing pressure on scarce resources and potentially conflicting with ecosystem restoration. Gender and equity dynamics further complicate outcomes, as better-resourced households and men frequently capture the benefits of commercialization, limiting women's decision-making and access to inputs, which can undermine household food security. Financing water resource management is also challenging: perceptions of water as a public right, limited private-sector incentives, and competing stakeholder interests, including upstream–downstream water use conflicts, tensions between agricultural expansion and ecosystem conservation, disparities between commercial and smallholder priorities, and differing incentives between public and private actors constrain sustainable and coordinated investments. Additional pressures stem from the perception of water as a public right versus an economic resource, as well as gendered inequalities and trade-offs between short-term livelihood needs and long-term sustainability. Achieving systemic resilience, therefore, requires integrated planning, sustainable intensification, equitable financing mechanisms, and careful species and value-chain selection to balance livelihoods with ecosystem function and long-term water security.

Scaling of fruit trees in land restoration, such as avocado, has implications for the water footprint: The rapid expansion of high-value crops such as avocado is improving livelihoods by providing higher incomes for farmers. However, ecologists are raising concerns about the crop's high-water footprint, particularly when established in water-stressed basins. This creates potential tensions between income generation and sustainable water management. In addition, the distribution of avocado seedlings appears skewed in favour of wealthier farmers, raising equity concerns and potentially excluding smallholder or resource-poor households.

Institutional overlap and competition: The presence of multiple structures of collective action, including WRUAs, CFAs, cooperatives, and community groups, can create duplication of mandates, implementation gaps, competition for membership, and fragmented coordination if roles are not clearly defined. Currently, these institutions operate under different governance frameworks: WRUAs under the Water Resources Authority, focusing on water allocation and catchment management; CFAs under the Kenya Forest Service through Participatory Forest Management agreements; and cooperatives that support production and market access. Coordination is increasingly facilitated through multi-stakeholder platforms and landscape partnerships. However, alongside overlaps, important gaps remain, particularly in linking watershed management with agricultural planning and strengthening coordination between community institutions and county-level governance.

Specialisation vs. blended cooperative models: While diversified cooperatives can enhance resilience by offering multiple services (e.g., production, finance, and input supply), they may dilute managerial focus and stretch institutional capacity. In contrast, specialised cooperatives often achieve greater efficiency and technical depth within a single value chain but may miss opportunities for integration and resource sharing across services.

Tree species for livelihood vs. ecological restoration: Tensions emerge between promoting fast-growing commercial species such as blue gum (Eucalyptus) and planting ecologically suitable indigenous trees. Blue gum has a high calorific value and is energy-dense, matures quickly, and offers strong commercial returns, making it valuable for fuelwood, timber, and reducing reliance on natural forests. However, it is a water-intensive species, which can stress local water resources, potentially impacting both agricultural production and the hydrological benefits provided by native trees. In

contrast, indigenous species support biodiversity, water regulation, soil health, and long-term ecosystem stability, but they generally have slower growth rates and lower immediate commercial value.

Scaling dairy Intensification has implications for staple food availability: While dairy intensification, particularly through the use of silage, can improve milk yields and increase farm incomes, it often requires allocating land and biomass that could otherwise be used for staple food production. This creates a trade-off between livestock productivity and household food availability. Consequently, although dairy systems may enhance income and nutrition through increased milk consumption, they can also reduce the production of staple crops, potentially affecting overall household food security.

5.0 LESSONS AND IMPLICATIONS FOR PROGRAMMING

The Mau Complex case shows how linking forest restoration, water management, soil health, and livelihoods can deliver ecological and socio-economic benefits. Initiatives such as ISLA, led by IDH with partners including KTDA, SNV, and KFS, alongside other interventions by WRI, Slow Food Kenya, and the Seed Savers Network, demonstrate tangible progress in reducing forest pressure and strengthening local food systems. These experiences highlight the importance of multi-stakeholder coordination, aligning conservation with livelihood incentives, and embedding interventions within local governance systems for scalable and sustained impact. Overall, the following lessons highlight successes and strategies for scaling and sustaining impact.

1. Scale integrated landscape models, not isolated projects

The Mau experience shows that integrated interventions linking livelihoods, watershed restoration, and forest regeneration delivered the strongest impact. Organic soil amendments improved moisture retention and cut fertiliser costs, spring protection enhanced water access, and higher dairy incomes reduced pressure on forests. Scaling should package livelihood intensification, agroforestry, water restoration, and governance into a single integrated programme within development and watershed frameworks.

2. Anchor restoration in profitable and viable value chains

The case shows that restoration is most sustainable when linked to organised, profitable value chains. Value chains should be carefully selected for both local relevance and their potential to encourage behavioural change. Patience is essential, as communities often take time to adopt new practices within the same value chains. Embedding restoration within these viable systems, with clear sustainability standards, aggregation, and predictable market access, can reinforce adoption and long-term impact.

3. The value of convening, neutral facilitation, and shared problems

Building effective multi-stakeholder partnerships takes time. Convening diverse actors—particularly cooperatives, financial institutions, and private sector players—requires sustained engagement and trust-building. Securing private-sector participation is especially challenging, as businesses require a clear, evidence-based business case before committing resources. In many cases, such data is initially unavailable, making pilot projects essential to generate proof of concept and demonstrate viability. The experience also highlights the critical role of a neutral convener, such as IDH, in facilitating dialogue and alignment among stakeholders with differing interests. An independent intermediary helps manage power dynamics, build trust, and ensure that commercial, social, and environmental objectives can be negotiated within a shared framework.

4. Strengthen cooperatives and collective action

The case demonstrates that cooperatives and other collective action mechanisms are critical for scaling services and improving market access. By pooling resources and knowledge, farmers accessed inputs, training, and credit more efficiently, while aggregating produce strengthened bargaining power and opened new markets. Financial services such as SACCOs and microfinance enabled farmers to invest in

improved dairy breeds, irrigation, and certified seeds, while dual value chains (e.g., potato and dairy) diversified incomes and created economic incentives for conservation. Integrating these structures within programmes supports both livelihood improvement and long-term sustainability. An integrated cooperative model that combines aggregation, financial services through SACCO structures, seed system development, and soil health support is more effective in strengthening farmer livelihoods than single-value-chain interventions. By bundling services, cooperatives reduce transaction costs, improve access to finance, stabilise markets, and enhance climate resilience—demonstrating that diversified, member-centred service delivery is key to sustainable intensification

5. Strengthen and institutionalize integrated participatory governance

CFAs, WRUAs, cooperatives, and SACCOs are central to the water food nexus, helping reduce conflicts, improve accountability, and strengthen farmer participation in water and forest management. However, weak coordination and fragmented systems limit their full impact. Strengthening local governance requires better coordination between CFAs and WRUAs, integration of local water-food plans through a shared evidence base, and development of common data systems linking forests, water, and land use. It also requires stronger inclusion of farmer groups, clearer private sector roles, and alignment of overlapping mandates to reduce duplication. These institutions should be formally embedded and resourced within county and national systems to sustain participation and improve long term resilience.

6. Use peer learning and local champions to accelerate adoption

Adoption of agroecological practices and organic farming increased significantly where demonstration farms were led by respected opinion leaders and farmers. Social legitimacy and farmer-to-farmer learning proved more effective than isolated training approaches. Expansion strategies should prioritize structured farmer learning networks, increase champion-led demonstration hubs, and continuous peer engagement mechanisms.

7. Nature-based solutions generate multiple co-benefits

Agroforestry, indigenous tree planting, organic soil amendments, and spring protection improved agricultural productivity while strengthening biodiversity, water regulation, climate resilience, and nutrition outcomes. These interventions illustrate how ecological restoration can simultaneously support livelihoods and ecosystem recovery.

8. Integrate gender, equity, and youth engagement

Evidence from the Mau case demonstrates that reducing water collection time (from several hours to under 30 minutes) freed women for productive and caregiving activities, while greater participation in marketing and governance improved household welfare and decision-making equity. Gender-responsive programming should ensure equitable access to land, finance, markets, and leadership roles, especially as commercialization expands. There is a need to engage youth who often have greater skills and interests in innovation, logistics, input distribution, processing, marketing, and agribusiness solutions to ensure inclusivity in supply chains.

9. Manage trade-offs and ecological limits proactively

Landscape restoration and agricultural intensification offer multiple benefits when well designed. Integrating fruit trees and indigenous species supports ecosystem recovery, diversifies incomes, and improves household nutrition. However, dairy intensification and high-value crops like avocado can increase pressure on land and water if ecological thresholds are not monitored. Open forests and degraded grasslands need active rehabilitation, as passive recovery alone is insufficient. Commercialization can also marginalize women where access to land, credit, and markets is unequal. Scaling restoration should combine water-use monitoring, land-use planning, and restoration financing to maximize benefits while preventing environmental harm.

10. Scale restoration through institutional and policy support

Restoration and livelihood interventions cannot scale effectively without policy and institutional support. Entrenching agroecology, watershed restoration, and landscape governance into county development plans and national climate strategies ensures alignment with broader systems. Long-term behavioural transformation and ecological recovery require sustained engagement, so programmes should secure blended financing and collaborate with government structures to maintain continuity beyond project cycles.

6.0 ANNEX

Annex 1: List of interviewed stakeholders

No	Stakeholder category	Stakeholder name
1	National Government	• Ministry of Agriculture and Livestock Development • Ministry of Water, Sanitation and Irrigation (MWSI) • Water Resources Authority • Kenya Forest Services (KFS)
2	County Governments	• County Executive Committee (CEC), Agriculture, Nakuru • Land and Environment Office, Nakuru County • Water Service Providers
3	Research and academia	• Jomo Kenyatta University of Agriculture and Technology (JKUAT • University of Nairobi (UoN) • Kenyatta University (KU)
4	International Organizations	• World Resources Institute • Kenya Water Partnership – KWP
5	Embassy	• Embassy of the Kingdom of the Netherlands, Nairobi
6	Dutch Organizations and Businesses	• SNV • Agriterra • IDH Kenya • Solidaridad
7	Local implementing partners and groups	• Slow Food Kenya • Seed Savers Network • Stawisha Charitable Trust Fund
8	WRUAs	• Ogiek Community Group
9	Farmer groups	• Organic farmers group, Njoro
10	Cooperative	• Starlight Farmer's Cooperative Society Limited, Molo