TPS KIAMBERE AGROFORESTRY PILOT

Progress, Impact & Scalable Landscape Model (20-Year Framework)

1. Executive Summary

The Kiambere Agroforestry Pilot is a 50-hectare, 20-year agroforestry initiative implemented with 63 smallholder farmers in Kenya's semi-arid lands (ASAL). The pilot was designed to test a structured, farmer-integrated model combining timber trees, gum Arabic, fruit production, and continuous food cropping within a single land-use system.

The pilot demonstrates that diversified agroforestry can simultaneously improve household livelihoods, build long-term timber assets, and deliver measurable climate co-benefits under challenging ASAL conditions. By layering short-term cropping income with medium-term gum and fruit production and long-term timber value, the model addresses income volatility while creating durable natural assets.

Operationally, the pilot has proven institutional viability. Farmers have been successfully mobilised and retained, land has been demarcated and allocated, nurseries established, and planting and maintenance systems tested under below-average rainfall conditions. Early climatic and operational constraints have functioned as a stress test, generating practical lessons that strengthen the model's robustness ahead of any potential scaling.

Under conservative assumptions, the pilot is projected to generate approximately KES 77.7 million in additional household income over the 20-year period (approximately EUR 0.5 million), while establishing long-term timber assets and climate co-benefits.

This pilot is a proof of concept and reference model. It does not imply commitments regarding expansion, commercial participation, carbon crediting, or asset ownership. Any future scale-up remains subject to appropriate structuring, risk allocation, and separate contractual agreements among the relevant parties.

2. Overview

The Kiambere Agroforestry Pilot aims to test a structured 20-year agroforestry model integrating timber production, gum Arabic, fruit trees, and continuous food cropping across 50 hectares in partnership with 63 smallholder farmers. The objective was not simply tree establishment, but the creation of a layered income system capable of increasing household cash flows while building long-term timber assets and measurable climate impact.

The model is grounded in the economic reality of the Kiambere ASAL context, where the average household cash income is approximately KES 60,000 per year and is typically single income. The pilot introduces structured diversification: annual crop income, mid-term fruit and gum income, and long-term timber value.

Under conservative modelling assumptions, participation increases average household income from KES 60,000 to approximately KES 121,688 per year over the 20 years, a 103% increase. Over the full rotation, each household is projected to generate approximately KES 1.23 million in additional income. Across 63 households, this represents an estimated KES 77.7 million livelihood injection.

Beyond livelihoods, the 50-hectare pilot is projected to remove approximately 6,500 tCO_2e over 20 years (base case). The model has further expansion potential across 4,000 hectares of land identified for possible

leasing around Lake Kiambere, where impact could scale to approximately 5,000 households, generate KES 6.17 billion in livelihood income over 20 years, and remove approximately 506,632 tCO_2e.

The pilot, therefore, demonstrates a replicable agroforestry framework with integrated economic and environmental performance.

3. Context: Economic and Climatic Realities in Kiambere

Kiambere lies within Kenya's semi-arid lands (ASAL), characterized by erratic rainfall, high evapotranspiration rates, and recurrent drought cycles. Household livelihoods are predominantly rain-fed, with limited irrigation infrastructure and low diversification. In practice, most households rely on a single income earner and experience unstable annual cash flows.

The baseline economic estimate of KES 60,000 per household per year reflects this reality. In drought years, incomes fall below this level. The structural vulnerability of the area makes purely seasonal cropping insufficient as a long-term strategy.

This pilot was designed in response to this vulnerability to the community and as a potential blended pathway that creates impact under controlled circumstances for both the community and TPS. By integrating timber trees within farming systems on land leased from TARDA and managed by BGF, this model spreads risk across multiple time horizons and value streams. It aims to stabilize income, improve soil conditions, and build durable assets for all the stakeholders.

4. Project Design and Institutional Framework

The project eventually targets 10,000 trees across 50 hectares allocated to 63 registered farmers, each managing approximately 0.8 hectares (2 acres). The design incorporates Melia volkensii as the timber species, Acacia senegal for gum production, and mango trees for fruit income, intercropped with staple and market crops for continuous annual revenue.

The 7m × 7m spacing allows sustained cropping between trees throughout the rotation period. This is a deliberate design to maintain annual income streams. Institutionally, the programme required:

- *Community sensitization meetings*,
- f*armer registration, and land allocation*,
- g*roup leadership elections*,
- f*ormalized agreements clarifying rights and responsibilities,*
- and c*lear delineation of tree ownership and maintenance duties*

This institutional architecture has been established and is functioning.

- *Institutional Roles & Responsibilities*

The pilot is implemented by Better Globe Forestry (BGF), which is responsible for community engagement, nursery development, land demarcation, farmer coordination, field supervision, and long-term maintenance systems.

TPS participates as a strategic partner and potential off-taker / scale partner, while TARDA provides land access under agreed terms. Each party's role, risk exposure, and economic participation are subject to separate contractual arrangements and are not implied by the pilot results alone.

5. Nursery Development and Plant Production

Seedling production formed the operational backbone of the pilot. Activities included seed sourcing, germination management, pricking and potting, and distribution planning. Early production cycles revealed important lessons:

Seed quality, particularly for Acacia, directly influenced germination performance. Storage conditions required tighter control. Synchronization between nursery readiness and rainfall windows proved critical.

These lessons have provided an operational foundation for scale as we plan to finalise the initial establishment this year. The nursery system is structured, repeatable, and scalable.

Nursery Establishment & Seedling Production




6. Community Engagement

The first phase of the programme focused on structured community engagement. Initial meetings were conducted to explain:

- *The 20-year agroforestry concept*
- *Species selection and economic logic*
- *Land requirements*
- *Roles and responsibilities*
- *Maintenance expectations*

- *Anticipated benefit timelines*

The community response was measured and pragmatic. Farmers showed interest but were cautious, particularly regarding long-term commitments and rainfall uncertainty. Discussions focused heavily on: Security of tree ownership, continued cropping rights, risk in drought years, and benefit distribution clarity

Through multiple meetings and open dialogue, confidence grew.

Registration followed sensitisation. Approximately 60–63 households participated during registration and early implementation, with final enrolment stabilising at 60 farmers.

Community Engagement and Training

7. Land Identification, Demarcation and Allocation (50 Hectares)

The next stage involved identifying and preparing approximately 50 hectares for implementation. This process included:

- *Physical identification of suitable land blocks within a highly degraded landscape.*
- *Boundary verification using GPS and coordinates.*
- *Plot subdivision and clear demarcation using pegs and field markings*
- *Allocation of approximately 0.8 hectares per farmer*

Demarcation ensured clarity on individual responsibility, tree distribution mapping, maintenance accountability, and long-term asset positioning as stipulated in the agreement.

The allocation process reduced potential future disputes and created clear spatial planning for the 10,000-tree layout.

Land Demarcation Activity and Plot Maps

8. Distribution and Establishment

The programme faced significant rainfall constraints during the intended planting window. With only one rainfall in October and sporadic showers in November. In spite of lower than average rainfalls experienced last year, to date, 3,420 Melia trees have been planted. The target is to finalise the establishment activities within one year.

Additional challenges included seed quality variability, limited irrigation infrastructure, and grazing-related security risks due to the drought experienced last year. Rather than halting progress, these constraints functioned as a stress test of the system. They highlighted the necessity of water support systems, improved seed storage protocols, and strengthened field supervision.

Maintenance practices such as mulching, soil and water conservation measures, and plot monitoring have been implemented for the seedlings planted. These early constraints have provided valuable operational data that strengthens the model before scale expansion.

Distribution and Establishment




9. Livelihood Impact: 20-Year Projection

The economic modelling integrates continuous cropping for 20 years, mango income from year 4 onwards, and gum income from year 4 onwards.

Over the 20-year rotation:

- *Cropping generates approximately KES 1,000,000 per household.*
- *Mango production contributes approximately KES 127,500.*
- *Gum production contributes approximately KES 106,250.*

Total projected incremental income per household: **KES 1,233,750.**

When averaged across the 20 years, this is approximately KES 61,688 additional income per year per household. Combined with the baseline income of KES 60,000, the model more than doubles average household cash earnings.

Across the 63 projected participating households, total additional income is projected at approximately **KES 77.7 million** over 20 years.

This modelling remains conservative and does not include potential price increases, productivity improvements, or value-chain upgrades.

10. Climate and Environmental Performance

Consistent with dryland agroforestry systems, the 50-hectare pilot is projected to remove approximately **6,500 tCO_2e of CO_2 over 20 years.**

If expanded to 4,000 hectares, the same rate would yield approximately **506,632 tCO_2e of CO_2 removed over 20 years**, with higher removal potential under improved management and rainfall conditions.

These estimates are indicative and based on conservative assumptions; formal crediting would require separate methodology selection, validation, and registration.

This provides measurable climate co-benefits alongside livelihood and timber outcomes.

11. Timber Asset Development and Long-Term Value

At scale, the agroforestry model supports the establishment of approximately 450,000 Melia trees across 4,000 hectares. Using conservative volume assumptions of 0.35 m^3 per tree and a standing log value of KES 68,000 per m^3, gross timber value could reach approximately **KES 2.84 billion** at rotation.

Actual timber value realization will depend on harvesting strategy, market conditions, processing pathways, and contractual arrangements governing timber rights.

Agroforestry conditions, including improved soil fertility from cropping and reduced competition compared to dense plantations, are expected to support stable timber growth while maintaining annual farm productivity. The timber component transforms the programme from a short-term development initiative into a structured long-term asset-building framework.

While the model demonstrates strong resilience, long-term performance remains subject to climatic variability, farmer retention, and market conditions. These risks are mitigated through diversification, institutional structuring, and phased scaling rather than single-season roll-outs.

12. Expansion Potential: 4,000 Hectare Scenario

The identified 4,000 hectares of land available from TARDA represent a structured opportunity to replicate the Kiambere model at the landscape scale.

Under identical assumptions:

- *Approximately 5,000 households could participate.*
- *Roughly 25,000 individuals would be directly impacted.*
- *Total additional household income over 20 years would approximate **KES 6.17 billion** (approximately EUR 40 million)*
- *CO_2 removal would reach approximately* **506,632 tCO_2e** *(base case).*

The pilot has established the institutional and technical foundation necessary for this level of expansion.

13. Forward Pathway

The next phase focuses on consolidating the pilot, finalising establishment within this year, and preparing for structured scale-up. Priorities include completing the 10,000-tree establishment target, strengthening seed systems, continuing training of farmers, installing water infrastructure, and refining maintenance and supervision protocols.

The Kiambere pilot has moved beyond conceptual design. It has mobilized farmers, tested operational systems under climatic stress, quantified economic impact, and demonstrated a scalable agroforestry blueprint.

It stands as a practical model integrating livelihoods, climate resilience, and long-term timber asset development within a unified 20-year framework.

The pilot has also generated detailed internal cost data relating to nursery operations, field supervision, farmer coordination, and maintenance, which will inform future economic structuring and partnership discussions.

14. Conclusion

The Kiambere Agroforestry Pilot demonstrates that a structured dryland agroforestry system can deliver livelihood resilience, climate co-benefits, and long-term timber asset creation under real ASAL conditions.

Beyond tree establishment, the pilot has validated farmer engagement, institutional coordination, and operational performance under climatic stress. It provides a robust technical and organisational foundation for further discussion on potential scaling pathways, subject to appropriate structuring, risk allocation, and partnership agreements.

The pilot therefore serves as a practical reference model rather than a predefined expansion commitment.

..... END .....

Report By: Samuel Nakhone.

02/03/2026