The Upper Tana – Nairobi Water Fund Trust

KENYA

Plan Vivo Project Design Document
Version 1.1, 13 Apr 2023

4 counties in Kenya
3300 km^2 focus area
10,000 km^2 gross area
2017 year of Trust incorporation
165,000 local farmers targeted by scheme

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Contents

Acronyms 4
Executive Summary 5
Part A: Aims and objectives 6
Part B: Site Information 7
B1 Project location and boundaries 7
B2 Description of the project area 9
B3 Recent changes in land use and environment conditions 10
B4 Drivers of degradation 10
Part C: Community and Livelihoods Information 11
C1 Participating communities/groups 11
C2 Socio-economic context 13
C3 Land tenure & ownership of carbon rights 14
Part D: Project Interventions & Activities 15
D1 Project interventions 15
D2 Summary of project activities 15
D3 Effects of activities on biodiversity and the environment 17
Part E: Community Participation 18
E1 Participatory project design 18
E2 Community-led implementation 19
E3 Community-level project governance 20
Part F: Ecosystem Services & Other Project Benefits 21
F1 Carbon benefits 21
F2 Livelihoods benefits 24
F3 Ecosystem & biodiversity benefits 26
Part G: Technical Specifications 28
G1 Project intervention and activities 28
G2 Additionality and environmental integrity 28
G3 Project period 33
G4 Baseline scenario 34
G5 Ecosystem service benefits 34
G6 Leakage and uncertainty 34
Part H: Risk Management 35
H1 Identification of risk areas 35
H2 Risk buffer 40
Part I: Project Coordination & Management 40
I1 Project organisational structure 40
I2 Relationships to national organisations 48
I3 Legal compliance 49

I4 Project management....50
I5 Project financial management....52
I6 Marketing....52
I7 Technical support....53
Part J: Benefit Sharing....53
J1 Plan Vivo Agreements....53
J2 Benefit sharing....56
Part K: Monitoring....58
K1 Ecosystem services benefits....58
K2 Socio-economic impacts....61
K3 Environmental and biodiversity impacts....61
K4 Other monitoring....62
Annexes....63
Annex 1. Example Farm Specific Action Plan....63
Annex 2. Project Database....63
Annex 3. Technical Specifications....63
Annex 4. Permits and Legal Documentation....63
Annex 5. List of Key People....63
Annex 6. Equal Opportunity and Employment Policies....63
Annex 7. Financial Plan....63
Annex 8. Information About Funding Sources....63
Annex 9. Plan Vivo Agreement Template....63
Annex 10. Evidence of Community Participation....63
Annex 11. Socioeconomic Baseline Survey....63
Annex 12. Social and Environmental Monitoring Plan....63

Acronyms

BOM	Board Of Management
BOT	Board Of Trustees
CAC	Counties Advisory Committee
CARITAS	Catholic Diocese of Murang'a
CFA	Community Forest Association
FAT	Focal Area Team
FSAP	Farm Specific Action Plan
INRM	Integrated Natural Resource Management
MOU	Memorandum Of Understanding
NCWSC	Nairobi City Water and Sewerage Company
NGO	Non-Governmental Organisation
PMU	Project Management Unit
SACDEP	Sustainable Agriculture Community Development Program
SLM	Sustainable Land Management
WRA	Water Resources Authority
WRUA	Water Resource User Association

Executive Summary

The project is located in the Upper Tana watershed covering an area of 10,000 km^2 in four Kenyan counties; Murang'a, Nyeri, Nyandarua and Laikipia. Within this landscape, a pilot area of 3,300km^2 has been prioritized based on potential for conservation and increasing carbon storage in trees.

The aim of the Upper Tana-Nairobi Water Fund Trust (hereinafter the 'Water Fund') is to achieve a well conserved Upper Tana River watershed with improved water quality and quantity for downstream water users, maintain biodiversity and enhance ecosystem services – contributing to food security, climate change mitigation and livelihood improvement for local communities. This will be achieved by the landowners through sustainable land management activities that include agroforestry, terracing of steep farmlands, riverbank restoration, establishment of permanent grass strips, reforestation, rainwater harvesting and improved agricultural practices. The Plan Vivo project (hereinafter the 'project') aims to generate carbon credits from agroforestry activities to help finance Water Fund activities in the Upper Tana.

The project aims to work with at least 165,000 smallholder farmers whose income ranges from USD 8-26 per month. Apart from the Water Fund, the implementation will be supported technically by contracted Non-Governmental Organizations - Sustainable Agriculture Community Development Program (SACDEP), and Catholic Diocese of Murang'a (CARITAS) - and the relevant County Governments.

The start date for the Plan Vivo project corresponds to the date when the first agroforestry plots were planted by Water Fund participants in 2017. The additional carbon sequestered in the agroforestry plots of current and future participants will be quantified over a 20-year period, and monitored for at least 10-years.

Long-term partnership between the farmers and the Water Fund will be recognized in farm specific management plans drawn and agreed upon by the two parties as well as electronically managed contracts indicating the conditions, terms and benefits for the farmers. The Water Fund is a charitable trust created to undertake this work.

The finance generated through the sale of Plan Vivo Certificates will be managed via a long-term endowment fund to generate annual interest for investment in supporting conservation work and other direct benefits to participating farmers under the leadership of the Water Fund.

Part A: Aims and objectives

The Upper Tana watershed has two water towers - the eastern Aberdare Mountains and southern Mount Kenya which are recognized as unique biodiversity areas. Parts of the forests and wetlands in this landscape, that play an important role in maintaining water quality and quantity, have been converted to agricultural lands which now make up around 60% of the overall land use[1]. For the close to 300,000 smallholder farmers in the Water Fund area, soil erosion due to the prevailing high-intensity storms contributes to loss of soil nutrient and declining crop yields[2] Increased sediments in streams and rivers are becoming a serious challenge, reducing the capacity of reservoirs and increasing the cost of raw water treatment for Nairobi City Water and Sewerage Company (NCWSC)[3] . Presently, approximately 60% of Nairobi's residents experience some form of water supply interruption[2]. Masinga hydropower reservoir, for instance, has lost an estimated 158 million m^3 of the storage volume due to sedimentation, and declining water flow during the dry season has negatively affected hydropower generation leading to a drop in electricity output[3]. These challenges are likely to increase as climate change brings increasingly unpredictable rainfall in the region.

The planting of trees within the degraded areas of the forest, riparian buffer areas and farmlands will restore the capacity of the watershed to maintain its ecosystem functions that include provision of clean water throughout the year, soil nutrient retention on farmlands and provision of firewood.

The Water Fund brings together public and private sector players in the Upper Tana watershed as well as downstream beneficiaries with a common goal to improve land management in the watershed. The objectives of the Water Fund are to:

a) Achieve a well-conserved Upper Tana River watershed with improved water quantity and quality for downstream users;
b) Maintain regular flows of water in rivers and streams throughout the year;
c) Enhance biodiversity and ecosystem services including food security, climate change mitigation, and supply of freshwater; and
d) Improve human well-being and quality of life for upstream local communities.

To achieve these objectives, the project has three interlinked components, namely:

i. Institutionalizing the Water Fund's management platform – the Water Fund has been established as a charitable trust registered under Kenyan law and governed by a board of trustees. This component will achieve a multi-stakeholder and multi-scale platform that supports policy development, institutional reforms, and upscaling of Integrated Natural Resource Management (INRM) - mainly agroforestry; and develops policies and incentives that support Sustainable Land

[1]Makau, J., Leisher, C. and Kihara, F. (2017) *Establishment of the Upper Tana-Nairobi Water Fund*. A baseline survey report.
[2] TNC, 2015. Upper Tana-Nairobi Water Fund Business Case. Version 2. The Nature Conservancy: Nairobi, Kenya.
[3] WRMA 2011. Physiographic baseline survey of the upper Tana catchment area

Management (SLM) through climate-smart smallholder agriculture and development of financially viable and sustainable food value.

ii. Improved Upper Tana watershed ecosystems that support livelihoods, food security, and economic development – this aims to foster adaptation and increase the resilience of the local population through increased food production, food security, household incomes, and diversified development options and livelihoods for at least 165,000 households. The outcome is to have an increased area under INRM and SLM.

iii. Robust knowledge management and learning systems implemented to direct the management of the project and share lessons both regionally and internationally. This will entail capturing lessons, examples and scientific findings generated during project implementation in the form of lessons learnt and good practices; and ensuring that this knowledge is documented and shared with farmers and stakeholders through appropriate communication channels to strengthen their capacities and improve performance.

Part B: Site Information

B1 Project location and boundaries

The project landscape covers the 10,000 km^2 upper Tana River watershed as shown in Figure 1. The initial focal area for the project is three priority sub-watersheds covering 3,300 km^2 which comprises of the highly degraded areas within the watershed and those that require urgent intervention measures. These comprise steep sloping lands being cultivated for food, riparian areas currently under crops and bucket irrigation, degraded pasturelands, and forests that need improved management or rehabilitation amongst others.

The three priority sub-watershed areas shown in Figure 1 comprise:

- Gura-Sagana subwatershed drained by the Gura and Sagana rivers as well as their tributaries. Gura river originates from Aberdare forest while Sagana river drains the South Western part of Mt Kenya forest and National Park;
- The Maragua river subwatershed stretching 126km from the Aberdare forest to Masinga dam; and
- Thika- Chania rivers sub watershed to the south which also includes the Sasumua dam drainage area.

This area stands between Nyeri, Murang'a and Nyandarua counties with small portions of Laikipia, Kirinyaga and Kiambu included.

The priority watersheds comprise areas of global significance and high priority areas for the conservation of nature as well as global heritage. Relevant designations include:

- National Park status for both Mt Kenya and Aberdare forests
- UNESCO World Heritage Site Status for Mt Kenya Forest and National Park
- Man and Biosphere Reserve for Mt Kenya, Aberdare national parks and community

lands adjacent to the two forests

- Important Bird Area for Mt Kenya forest.

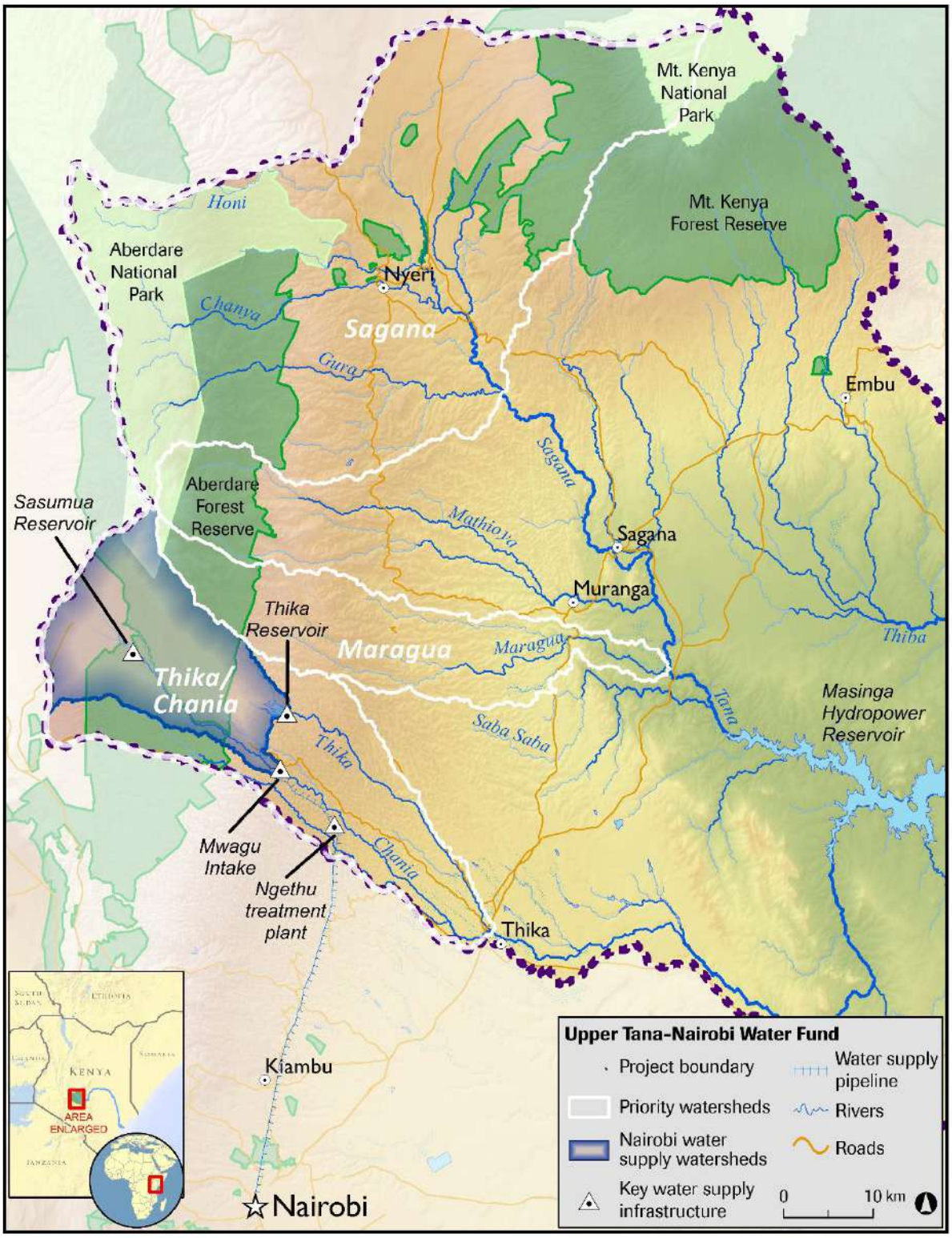


Figure 1 The upper Tana watershed and the project priority watersheds in white boundary.

B2 Description of the project area

The initial project areas are within three priority sub-watersheds namely; Thika-Chania, Sagana-Gura, and Maragua sub-watersheds as shown in Figure 1.. These areas comprise one of the most important agricultural and economic areas in Kenya providing livelihoods to a good portion of the 5 million people who live in the Upper Tana watershed, about 65% of the country's hydropower and 95% of the water consumed in Nairobi and adjacent areas.[2].

The rainfall pattern is bimodal and annual average rainfall varies from 2300 mm in high altitude areas to 400 mm in low lying regions. The average annual evapotranspiration rate is approximately 1000 mm.[4]

The higher slopes of Mt. Kenya and the Aberdares are dominated by volcanic ash soils (Andosols) while the middle foot slopes have mainly well-structured nutrient-rich clay soils (Nitisols) and the lower foot slopes are dominated by deep strongly leached clay soils (Ferralsols and Acrisols).[4]

The Upper Tana watershed is home to a wide range of biodiversity including some the world's most iconic wildlife like African elephants, Cape buffaloes, Leopards, Colobus monkeys and the endangered Mountain bongo antelopes, now recording stable or even growing and healthy populations[4]. Biodiversity assessment in the project landscape indicates several plants and animal species that are either endemic or endangered[5]. Some plant species that are endemic to Mt Kenya include *Vitex keniensis* and *Prunus Africana*. *Prunus Africana* has been listed as an endangered species due to the conversion of pristine areas to agriculture.

The rich and unique plant and animal diversity in the Mt. Kenya and the Aberdares ecosystems make these hotspots for conservation. Species present include 25 large mammals, 479 plant genera, including 81 regionally endemic and 11 nationally endemic species, 53 out of Kenya's 67 African highlands biome bird species, various reptiles, and amphibians and a total of 4282 currently documented invertebrates[6].

The presence of species such as the herbaceous flowering plant *Bidens Pilosa* is a good indicator of ecosystem disturbances and land degradation. Increasing rainfall intensity in the region results in landslides that affect the livelihoods of communities in the project area as well as the disruption of water treatment and supply systems to the urban centers.

[4] The Nature Conservancy (2012) The Upper Tana Nairobi Water Fund. Technical Report of the Upper Tana Watershed; Sombroek, W.G., Pauw, B.J.A. van der. (1980). Exploratory Soil Map of Kenya. Republic of Kenya. Ministry of Agriculture. Kenya Soil Survey, Nairobi

[5] Ndiritu et.al, (2021) Using the Biological Condition Gradient Model as a Bioassessment Framework to Support Rehabilitation and Restoration of the Upper Tana River Watershed in Kenya. doi:10.3389/fenvs.2021.671051

[6] NMK (2014), Assessment of Status of Ecosystems along Tana River Basin, Nairobi, Kenya

The project area comprises a well-linked trafficable road network with the main access road recently tarmacked while 90% of the local feeder roads are lined with gravel or murram[7]. It is possible to access all areas of the watershed with a 4x4 vehicle even during the wet season with the exception of a few tracks in the forest. The main roads connect Counties and Sub Counties while the feeder roads connect from local centers to main roads. However, a lot of road upgrading to all weather roads is proposed or ongoing. Most of the local centers and public facilities are connected with 240 W electricity power and the households within a 600 meter radius from these public facilities are progressively being connected[7].

B3 Recent changes in land use and environment conditions

The main land use within the Upper Tana watershed can be classified into three classes: (i) natural vegetation (forest, grasslands, and wetlands), (ii) rainfed and smallholder irrigated agriculture (tea, coffee, maize, and horticultural crops), and (iii) rangeland[4] The majority of the farmers are smallholders and depend on rainfall to grow their crops[8]. There has been continuous clearing of natural vegetation in farmlands to open more land for crop farming including in riparian areas[8]. These riparian areas are targeted for rehabilitation by the Water Fund.

There has also been some conversion of tea and coffee farms to annual crops like pineapples and vegetables[4] The switch to annual crops increases erosion and there is therefore a need for conservation measures that provide erosion control. The weather pattern in the watershed has become increasingly unpredictable with the interchange of low and high rainfall events that affect crop production and productivity[4] As rainfall intensifies, and coupled with poor farming practices, more soils and nutrients are washed from the lands to the water bodies leading to clogging of water intakes and systems shutdown for drinking water treatment[8]. As the soils become more nutrient poor and farmlands are subdivided into small portions, more areas that were previously uncultivated are being opened for agriculture[8]. The dry seasons are becoming more pronounced, and farmers are reverting to growing their crops along the riparian areas which further exacerbate the sedimentation of rivers and reservoirs[4].

Due to the growing population in the country, there has been an increased pressure on forests resulting from increased need for construction materials especially timber and land for cultivation[8]. The cultivation of indigenous forest is prohibited by law and plantation areas are managed by Kenya Forest Service in collaboration with Community Forest Associations; so indigenous forest and plantations are not included in the project.

B4 Drivers of degradation

[7] GoK (2018) Nyeri County Integrated Development Plan 2018- 2022
[8] Vogl et.al (2017) Valuing investments in sustainable land management in the Upper Tana River basin, Kenya. Journal of Environmental Management.. http://dx.doi.org/10.1016/j.jenvman.2016.10.013

The main drivers of land and ecosystem degradation in the project landscape are population growth, unsustainable land management by farmers using traditional farming methods which do not employ soil and water conservation measures, the topography of the area, and climate change/variability[4]. In addition, social drivers of land and ecosystem degradation include poverty, inadequate extension services and poor law enforcement.[4].

Lands in the catchment area are increasingly being subdivided among the family members as the population grows and as agricultural practices intensify while more timber is required for construction. This has resulted in the cultivation of very steep areas that are more vulnerable to severe water-induced soil erosion, and conversion of forest to agricultural lands leading to more soil erosion[4 8].

Wetlands and riparian areas have also been opened to cultivate water-dependent crops such as cocoyam (*Xanthosoma* spp.). These crops are grown through the dry seasons when rainfall is either erratic or inadequate to sustain crop growth in the upslopes. Farming in these areas has altered the natural functioning of these ecosystems to regulate sediments and flow in the rivers. In the last 4 years, for example, sediment yield from a designated monitored micro-watershed has increased by more than 200%.[4]

High-intensity rainfall has resulted in the occurrence of landslides in the steep areas of the watershed leading to loss of lives, property, and livelihoods[2]. Some of the land in the project landscape is currently under tea and coffee which are greatly affected by international trade dynamics. Price variation in recent years has affected farmer income from both crops leading to some of the farmers becoming demoralized and lowering their investment and care for the crops[9]. Neglecting some of these fields is leading to increased erosion, a challenge the Water Fund is trying to address by keeping the landowners motived to care for the steep crop lands and riparian areas.

Part C: Community and Livelihoods Information

C1 Participating communities/groups

The Upper Tana watershed includes four counties namely Laikipia, Nyeri, Murang'a, and Nyandarua. The project aims to enable at least 165,000 smallholder farmers within this landscape to implement agroforestry practices on their land. Each farmer has an average land holding of 0.64 ha.[7,10] To date, the Water Fund has enrolled a total of 153,078 ha of smallholder farms and 164,368 farmers into their activities (see Figure 2). The project landscape indirectly serves approximately 9 million people being local residents and also including 4 million people downstream in the capital city, Nairobi.

[9] The Nature Conservancy (2013) Maragua and Thika/Chania Baseline Survey for the Upper Tana-Nairobi Water Fund.
[10] GoK (2018) CIDP Murang'a County

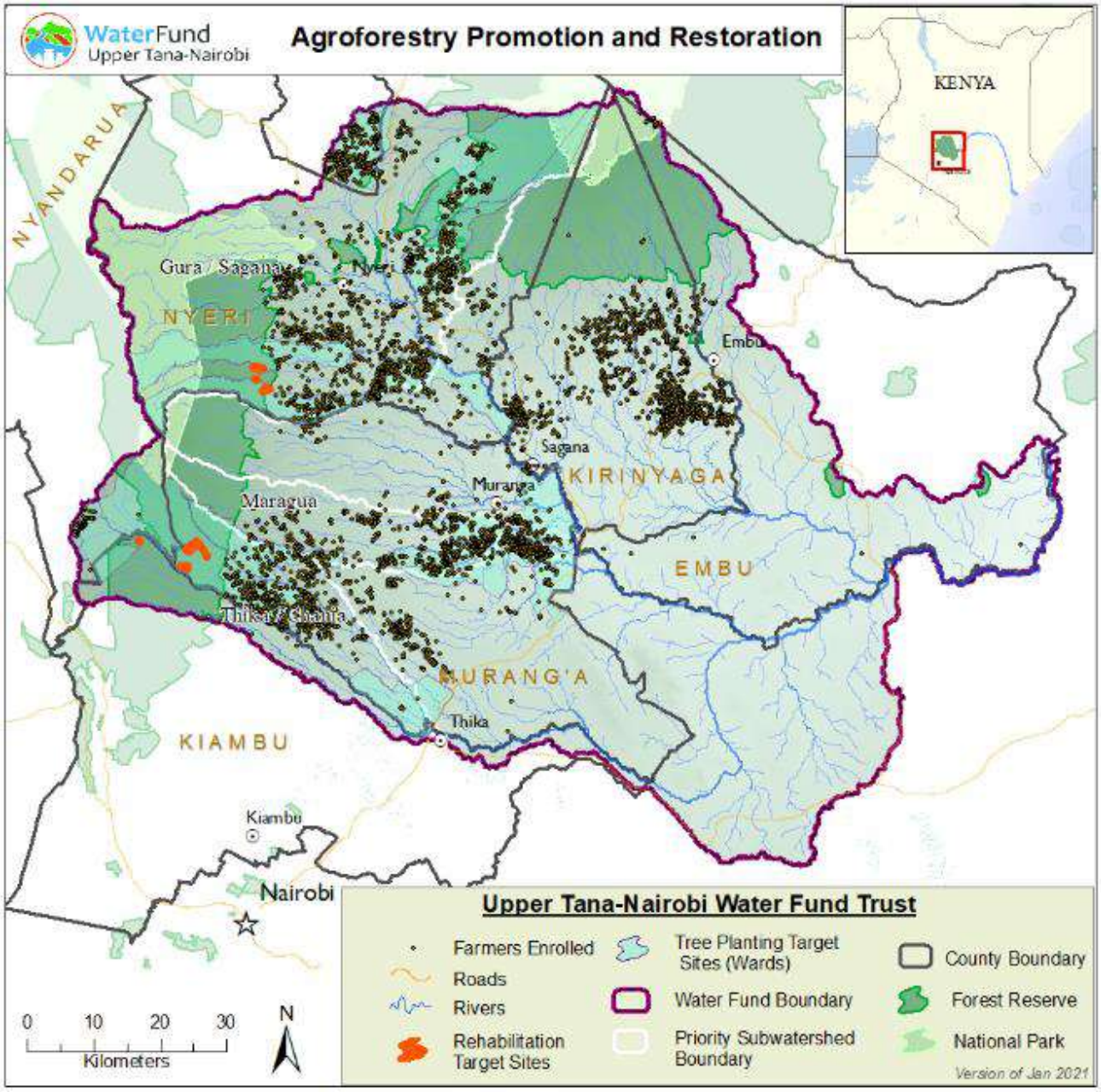


Figure 2 Project region and initial project participants

The dominant group in the project landscape is the Kikuyu community who believe in a God (Ngai) who lives on Mount Kenya and to whom they traditionally offer animal sacrifices at designated places e.g. under fig trees[11]. The conservation and protection of such sites are therefore critical to the beliefs of the communities as well as the preservation of these and other cultural sites. Some members of the community are organized in specific groups that are either religious or geared towards improving socio-economic status. For instance, women's groups that have regular contributory social support activities (buying household items for others) as well as table banking where they make regular cash contribution which

[11] Jomo Kenyatta (1965) Facing Mt. Kenya. The Tribal Life of Gikuyu

gets pooled to offer loan money among themselves at a low interest (also referred to as chamas).

The society in the project landscape is majorly patriarchal with 24% of households led by women[1,9]. The initial project participants comprise 39% female- and 61% male-led households. This has been achieved with a deliberate effort to encourage and involve women in decision making and sustainable land management.

The project works with young men and women within the project areas to further promote the interventions to reverse and prevent land degradation and provide extension services to the farmers. About 20% of the project beneficiaries are youth which is notable given that most youths migrate to urban cities in search of formal employment. It is anticipated that this number will grow as some of the project targeted activities like fruit tree growing will create additional opportunities for youth of both genders in tree management, fruit harvesting, grading, packaging, aggregating, transportation and marketing.

The governance system in the region is a devolved system with the project landscape covering 4 counties namely Nyandarua, Murang'a, Nyeri and Laikipia. The main devolved functions that impact on the project are agriculture, health, environmental management, domestic water supply services and county planning and development. The Water Fund has formed a Counties Advisory Committee that enables local leaders and line agencies' representatives to give advice to the Water Fund. Two local youths elected from within the communities represent youth interests in the Water Fund's governance.

C2 Socio-economic context

The main economic activity in the project landscape is agriculture. According to a baseline survey conducted in Upper Tana[9], 76% of the households are headed by males while 24% are headed by females. The main economic activity for 53% of the respondents (n=1,002) was farming, 7% were formally employed, 7% were in informal employment, 6% participated in family businesses, 8% provided day labor to other people's farms and 19% were students as shown in Figure 3; 95% of households use wood as the main source of fuel for cooking, 3% use gas, and coal or charcoal is used by 2% of the residents. Only 22% and 36% of households are connected with electricity in Thika Chania and Sagana Gura respectively. A majority of the population within the project landscape access untreated water for drinking from the rivers through localized domestic water abstraction schemes.

An analysis of water treatment[9] showed that 40% of residents often or always treat water before drinking, 36% never treat the water, 11% do not find it necessary, 3% rarely treat drinking water, and 10% sometimes treat water before drinking. The survey results further show that burning of household waste is the main method of waste management in the project landscape as it is practiced by 88% of the community members, 3% compost their waste into manure, 3% discard the waste within 25 meters, and 2% have their waste regularly collected within 75 meters of their households.

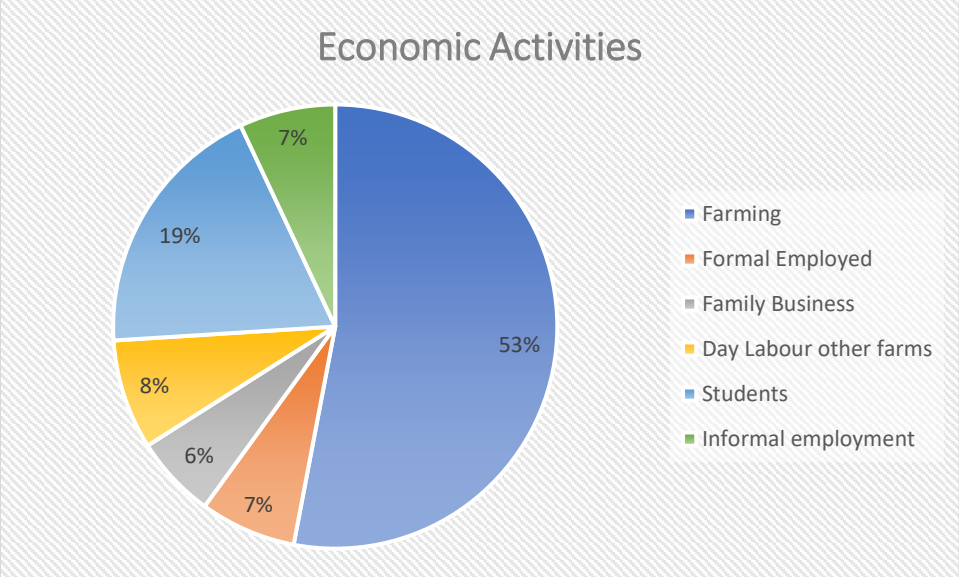


Figure 3: Economic activities in the upper Tana catchment area. Source: TNC, 2013 Maragua and Thika/Chania Baseline Survey for the Upper Tana-Nairobi Water Fund.

The main crops grown include maize, beans, horticultural crops, and cash crops like tea and coffee[9]. Rapidly expanding urban centers in the highlands cause agricultural land sizes to decline and expansion of agricultural land is highly limited; and high population density, rapid growth, and intensive farming practices all contribute to the environmental challenges facing the region, including deforestation, erosion, and diminishing water resources[9]. Paradoxically, these high potential areas also host many poor people, with poverty prevalence estimated at 35.4%[12] falling below international poverty line for the people earning less than 1.9 USD per day.

The average income across the project landscape has been estimated to range from USD 8-26 per month[13]. Climate variability has significant economic costs mainly because it manifests itself in the extreme weather conditions of floods and droughts which cause major macroeconomic costs and reductions in economic growth[13].

C3 Land tenure & ownership of carbon rights

The land tenure system of smallholder farmers that the Water Fund works with is mainly private landholding with appropriately adjudicated registered freehold title deeds. Farmers have full perpetual mandate on their land by law[7,10]. The average landholding in the project area is 0.64 hectares[7,10]. Baseline survey reports indicate that approximately 82% of residents owned less than one acre of land, 12.9% had between 1 and 2 acres, 5% owned between 2 and 10 acres and only 0.1% owned more than 10 acres [14]. The average landholding, however, varies among regions and sub-watersheds. The project areas targeted for agroforestry interventions have been adjudicated and are therefore individually owned under a freehold system for the farmers or public institutions with no

[12] Government of Kenya (2012) Agricultural Growth and Poverty Reduction in Kenya.
[13] MEWNR, *Upper Tana Natural Resouces Management Project (UTaNRMP)*, 2014.
[14]Makau, J., Leisher, C. and Kihara, F. (2017) Establishment of the Upper Tana-Nairobi Water Fund. A baseline survey report.

land being held by large corporations. The government has granted full rights to individuals or corporate entities that own land with unlimited rights of use and disposition[7,10], and carbon rights are vested on the titled landowner. This is subject to the general regulatory powers of the State.

Part D: Project Interventions & Activities

D1 Project interventions

The Plan Vivo project interventions are ecosystem restoration and rehabilitation, and improved agricultural land management through agroforestry. The initial agroforestry systems that will be implemented are listed below (see Table D2 and Annex 3 for further details):

- Fruit Orchards
- Alley Cropping
- Enrichment Fallows
- Dispersed Interplanting
- Boundary Planting

As the project expands, additional agroforestry systems, and forest restoration interventions may be added (see Table D2 for further details).

In addition to the agroforestry interventions, for which Plan Vivo Certificates will be claimed, the Water Fund will support the following activities within the project landscape.

- Terracing (and stabilization with vegetative materials) of steep and very steep farmland i.e. >12% slope.
- Reforestation of degraded lands on forest edges
- Riparian lands management e.g. vegetation buffer zones along riverbanks
- Grass strips in farmlands
- Road erosion mitigation – includes stabilization of rural road shoulders using Congo grass (*Brachiaria ruziziensis*)
- Provision of renewable energy through Biogas systems installation.

D2 Summary of project activities

A summary of the project activities for each intervention is provided in Table D2. Further details of the agroforestry interventions are provided in Annex 3.

Table D2 – Description of activities

Intervention type	Project Activity	Description	Target group	Eligible for PV accreditation
Agroforestry	Fruit Orchards	Mixture of Mango, Avocado, Orange and Macadamia planted at approximately	Smallholder farmers	Yes

		9m x 9m spacing		
Agroforestry	Alley Cropping	Rows of trees (*Grevillia robusta*); shrubs (*Leucaena trichandra* and *Calliandra calothyrus*); and bamboo (*Dendrocalamus asper*), with crops planted between rows.	Smallholder farmers	Yes
Agroforestry	Enrichment Fallows	Rows of trees (*Markhamia lutea* and *Casuarina equisetifolia*) and shrubs (*Leucaena trichandra*, *Calliandra calothyrus* and *Sesbania sesban*) with crops planted between rows.	Smallholder farmers	Yes
Agroforestry	Dispersed Interplanting	Mixture of tree species (e.g. *Prunus africana, Olea europaea cuspidate, Warburgia ugandensis, Juniperus procera, Hagenia abyssinica, Dombeya rotundifolia, Vitex keniensis, Fraxinus pennsylvanica, Acacia xanothoplea*) planted with >10 m between trees.	Smallholder farmers	Yes
Agroforestry	Boundary Planting	Trees (*Grevillea robusta* and *Croton megalocarpus*) planted at approximately 3m intervals along field boundaries.	Smallholder farmers	Yes
Improved land management	Construction and stabilization of terraces	Steep slopes >12% are terraced. Terraces are stabilized with grass, shrubs, and trees	Smallholder farmers on steep areas	No
Improved land management	Grass strips	Grass strips are planted in slopes less than 12% to conserve soil and water	Smallholder farmers with lands whose slopes are <12%	No
Ecosystem restoration	Riparian and wetlands conservation	Establish vegetation buffer zones using indigenous trees, bamboo, and Napier grass	Community group (WRUAs*), smallholder farmers	No
Ecosystem restoration	Reforestation of degraded lands	Enrichment planting and protection of natural regeneration of native species	Community groups (CFAs*), smallholder farmers	No
Improved land	Road erosion	Stabilization of rural road	Smallholder	No

management	mitigation	shoulders using Congo grass (*Brachiaria ruziziensis*).	farmers and community groups working with Public roads agency	
Ecosystem rehabilitation	Landslides and quarries rehabilitation	Includes planting of trees in areas where landslides have occurred and rehabilitation on quarry sites	Community groups (quarry owners) and smallholder farmers	No
Improved land management	Rainwater harvesting	Harvesting rainwater in excavated ponds that are lined with UVI treated liners for dry season farming	Smallholder farmers	No
Improved land management	Efficient water use and crop diversification	Installing small holder low-head drip irrigation technology for efficient water application and cultivation of high-value crops	Smallholder farmers	No
Prevention of ecosystem conversion/degradation	Construction of efficient cooking methods e.g. Biogas	Biogas avoid the cutting down of trees for fuel and also use of GHG that would otherwise be emitted into the atmosphere	Smallholder farmers and learning institutions	No

* WRUA = Water Resource User Association; CFA = Community Forest Association

D3 Effects of activities on biodiversity and the environment

A study conducted in the project landscape shows that for every dollar invested to improve land and watershed management there is a two dollar return in benefits to the stakeholders[2]. Key potential benefits for smallholder farmers adopting agroforestry practices in the Upper Tana catchment are increasing food security and climate adaptation potential and resilience at the household level, stabilizing and restoring ecosystem services in the targeted area, and improving water quality and quantity for both upstream and downstream water users. Through close involvement of national (Water Resources Authority, Ministry of Environment and Forestry) and county level agencies (Kenya Forest Service, Agriculture department) and local NGOs (CARITAS, SACDEP) and community-based organisations (CFAs and WRUAs), rural communities will also be better able to plan, target, implement, and monitor development activities.

Agroforestry activities will generate long term benefits from improvement of soil fertility, texture and structure by increasing organic matter, nutrient retention and nitrogen fixation in soils, benefiting biodiversity and ecosystem services including food production. Increasing vegetation buffers will also create new habitat for pollinators and seed dispersal agents. It is estimated that pollinators in Kenya contribute about US$200 million worth of

ecosystem services each year[15]. These services will be positively impacted by the Water Fund in an estimated 150,000 hectares. Other benefits include an increase in the type and abundance of species that are beneficial to the health of the ecosystems and the communities. The activities will also have a positive impact on soil fertility, texture and structure though nutrient retention and nitrogen fixation. None of the species planted are expected to become invasive or have a detrimental effect on the water table (see Annex 3).

According to the Upper Tana Nairobi Water Fund Business Case, and results from the Soil Water Assessment Tool model applied[4] show the planned interventions will lead to a more than 50% reduction in sediment concentration in rivers and an 18% decrease in annual sedimentation in the Masinga reservoir. Due to the rainwater harvesting and other water conservation measures, the annual water yields across the project targeted watersheds will increase by 15% compared to the baseline average. Agricultural production and yield benefits by the smallholder farmers are estimated to be USD 3 million per year largely from in-situ moisture retention in the protected farmlands and additional tree crops. There will also be improved water quality with a potential decrease in waterborne pathogens for both upstream and downstream water users. Approximately USD 250,000 in cost-saving will be realized per year by water service providers from avoided filtration, reduced sludge disposal costs, and fewer shutdown days.

Part E: Community Participation

E1 Participatory project design

As of November 2022, the project includes 164,368 smallholder farmers implementing agroforestry interventions. The implementation of project activities uses a landscape approach to optimize project benefits of ecosystem restoration and rehabilitation. A participatory planning process has been developed where individual landowners (farmers) and the project's extension staff discuss a wide range of activities that are suitable for every farm to generate a Farm Specific Action Plan (FSAP).

The design of project activities therefore takes place at the farm-level. The agroforestry interventions were developed around broad categories of agroforestry practices that have the potential to contribute to the aims of the project and increase the productivity and resilience of smallholder farmers. The interventions and the species included in each intervention were determined with input from the farmers that took part in the pilot phase of the project to ensure that they meet the requirements of the project participants.

Community groups like women and youth groups, WRUA and Community Forest Associations (CFA) are governed by elected officials who are also members of the group and the community. CFA are groups formed by the local communities under the Societies Act to participate in some aspects of the management and conservation of forest resources adjacent to them.

[15] Muo, K (2015) Bringing ecosystem services close to the farmers: A case of Pollination. http://www.kenyaforestservice.org/documents/TotalKenyaTreeConference2015-PresentationbyKALRO.pdf

The project has put additional measures to promote soil and water conservation and to enhance women's participation in decision making. The project encourages a third of the group members to be women and it has done gender mainstreaming training for the groups to encourage women to be part of the leadership positions. Women-led households as well as those led by elderly people above 60 years receive extra supports in terms of additional subsidies to costs incurred in implementing project activities like the cost of drip kits, biogas, and UVI liners for water harvesting. The project has further deliberate measures to involve women as demonstration farmers and in the extension services (offering training and technical support) as well as farmer field schools. While there are no socially excluded communities in the project area we ensure that the resource poor in the community get full engaged. The interventions are implemented at a landscape level in farmlands to promote inclusion and optimize community and ecosystem benefits. The communities who do not participate in the project from the start will have an opportunity to participate at a later stage as we upscale the project. However, they will continue benefiting from ecosystem services (clean and more water) as a result to a well conserved ecosystem.

E2 Community-led implementation

Agroforestry and other project activities are designed at the farm-level through the generation of Farm Specific Action Plans (FSAPs). Prior to generating a FSAP, inception meetings on the project are held with potential project participants and technical staff to explain the project and the design process. Farmers that indicate their interest to enroll are then visited at their farms, and are supported by technical staff to prepare and register their FSAPs. The procedures for preparation, registration, recording and storage of FSAPs are described below.

Preparation and registration of Farm Specific Action Plans

The farmer and the technical staff discuss the various options for project interventions and farmers decide on which they would like to adopt for specific areas in their farm. Care is taken to avoid any activities that could undermine the farmer’s food security or livelihood needs. In the case of agroforestry interventions farmers are guided by technical staff on species and planting densities that will complement their existing land use activities and improve agricultural production.

Details of the interventions the farmer plans to adopt are recorded in a simple FSAP that includes a sketch map showing the locations where different interventions will be implemented (see Annex 1). GPS coordinates for each farm are taken and details from the FSAP are entered into the project database (see Annex 2).

Assessment of Farm Specific Action Plans

Farmers who wish to participate in the project activities are required to show proof of land ownership that is consistent with the national legislation of the Government of Kenya. Proof of land ownership can be in the form of land title, purchase agreement, proof of

inheritance, customary ownership or any form of acceptable evidence of land ownership from the local leadership, all in line with national legislation.

Each Farm Specific Action Plan is assessed to ensure that the land where interventions will be carried out meet the eligibility criteria in the relevant Technical Specification(s), and will not undermine food security or livelihood needs, or cause negative environmental impacts.

Mapping, recording and storage of Farm Specific Action Plans

Digital copies of all FSAP digitized maps are stored on hard drives of project computers in the Water Fund offices, and are backed up using a secure cloud-based server. Paper copies are also held in the Water Fund office or the offices of NGOs with delegated mandate from the trust.

E3 Community-level project governance

Through the Water Fund activities, participating farmers establish community-based organizations with elected officials such as WRUAs and CFAs. Representatives of these groups participate in a monthly project review by the Focal Area Team (FAT; see Annex 10). Farmers' grievances and opinions are aired in these forums that are also attended by the agricultural extensionists and the project implementing partners. The minutes of these meetings and their proceedings are filed at the project management unit. The minutes are made available to the participants through their leaders who are represented in the FAT. Representatives of project participants are also elected as members of the Counties Advisory Committee (CAC) that includes representatives from the County agriculture devolved system and Water Resources Authority.

The project has established a dialogue and grievance mechanism in each of the counites where farmers are participating. Complaints are submitted to community representatives, agricultural extension officers and Implementing partners who form a Focal Area Team (FAT) committee which includes the CFAs, WRUAs, County extension officers, and implementing NGOs within a particular sub watershed. The complaints are documented and addressed by the FAT or the Project Management Unit (PMU) (if they are of management in nature). Complaints are also submitted to the County agriculture devolved system, Water Resources Authority and Kenya Forest Service which are represented in the project Counties Advisory Committee (CAC) where the same will be documented and addressed.

Complaints that are linked to the project, and are presented in writing or verbally by a member of the community are addressed within no more than 30 working days and the proposed resolution is relayed back to the complainant. A Follow-up at the local level is done through the representative of the project, which in the first place are the Technical Extension Officers, and at the second level, the Water Fund officer, who at the same time will inform the Water Fund project Coordinator.

During quarterly technical meetings, those complaints pending resolution will be addressed and possible solutions will be discussed, describing any related issue in the act of the meeting. Where possible, complaints will be resolved by the technical coordination of the project. If this is not possible, the complaint may be escalated to the UTNWF Board of Management or Board of Trustees for policy direction. If necessary, an extraordinary meeting will be held with all the sub watersheds technical officers, to generate a resolution.

- If the issue relates to water or the riparian buffer area, the Water Resource Users Association under umbrella of the Water Resource Authority and the County Government will be responsible for resolving the issue.
- If the issue relates to agriculture and livestock issues, the County Government will be responsible for resolving the issue
- If the issue relates to forestry the Kenya Forest Service (KFS) will be responsible for resolving the issue.
- If the issue does not relate to the water or riparian buffers, agriculture, livestock or forestry and cannot be resolved to the satisfaction of the complainant by the Project Coordinator, the Chief Officer of the line department within the County Government shall be responsible for resolving the issue. If the issue cannot be resolved by the County Government, it shall be referred to competent courts based on the laws of Kenya.

For complaints that are escalated, the proposed resolution must be presented within 60 business days, and provided in writing to the complainant. A record of all complaints and resolutions is maintained by the project coordinator, and a summary will be provided to Plan Vivo in each Annual Report.

Part F: Ecosystem Services & Other Project Benefits

F1 Carbon benefits

Tables F1a to F1d summarise the estimated carbon benefits per ha (or per 100 m of Boundary Planting) for each agroforestry intervention over a 20-year quantification period. For all interventions species mixtures and planting densities will be adapted to the conditions in each project area. Annex 3 includes details of the calculations and a spreadsheet for calculating carbon benefit for each project area. Increases in soil organic carbon are only included if project areas are larger than 0.1 ha and planted tree density is 100 trees per hectare or more, because estimates are based on a methodology for Afforestation and Reforestation.

Fruit Orchards

The carbon benefits per hectare of pure stands of each species included in this intervention planted on long-term cultivated cropland at 9m by 9m spacing are provided in F1a.

Table F1a – Fruit Orchard Carbon Benefits								
		1	2		3	4	5	2-(1+3+4+5)
Soil type	Species	Baseline carbon uptake (t CO_2e/ha)	Carbon uptake with project (t CO_2e/ha)		Expected leakage emissions (t CO_2e/ha)	Uncertainty discount (t CO_2e/ha)	Risk buffer (t CO_2e /ha)	Net carbon benefit (t CO_2e/ha)
			Biomass	Soil				
LAC	Mango	0	79	51	0	7	24.6	98.4
	Avocado	0	119	51	0	9	32.2	128.8
	Orange	0	28	51	0	4	15	60
	Macadamia	0	64	51	0	6	21.8	87.2
Volcanic	Mango	0	79	59	0	7	26.2	104.8
	Avocado	0	119	59	0	9	33.8	135.2
	Orange	0	28	59	0	4	16.6	66.4
	Macadamia	0	64	59	0	6	23.4	93.6

Alley Cropping and Enrichment Fallows

The carbon benefits per hectare for rows of each alley cropped and enrichment planting species included in this intervention planted in long-term cultivated cropland are provided in Table F1b, assuming rows at 25 m spacing, trees planted every 3 m along rows, shrubs planted in two parallel sub-rows with plants and sub-rows 50 cm apart, and bamboo planted every 7 m along rows.

Under these interventions trees can be harvested after 7-years so project removals represent the average carbon stock over a 7-year harvest cycle, shrubs are pruned to 1 m height so the equation of volume of a 1 m cylinder is used to estimate biomass, and individual bamboo culms can be sustainably harvested after 5-years, so the estimated biomass increase from bamboo does not increase after year 5.

Table F1b – Alley Cropping and Enrichment Fallows Carbon Benefits								
		1	2		3	4	5	2-(1+3+4+5)
Soil type	Species	Baseline carbon uptake (t CO_2e/ha)	Carbon uptake with project (t CO_2e/ha)		Expected leakage emissions (t CO_2e/ha)	Uncertainty discount (t CO_2e/ha)	Risk buffer (t CO_2e/ha)	Net carbon benefit (t CO_2e/ha)
			Biomass	Soil				
Alley Cropping								
LAC	*G. robusta*	0	30	51	0	4	15.4	61.6
	Shrubs	0	15	0	0	1	2.8	11.2
	Bamboo	0	11	0	0	1	2.0	8.0
Volcanic	*G. robusta*	0	30	59	0	4	17.0	68.0
	Shrubs	0	15	0	0	1	2.8	11.2
	Bamboo	0	11	0	0	1	2.0	8.0
Enrichment Fallows								
LAC	*M. lutea*	0	4	51	0	3	10.4	41.6
	C. equisetifolia	0	6	51	0	3	10.8	43.2
	Shrubs	0	14	0	0	1	2.6	10.4
Volcanic	*M. lutea*	0	4	59	0	3	12.0	48.0
	C. equisetifolia	0	6	59	0	3	12.4	49.6
	Shrubs	0	14	0	0	1	2.6	10.4

Dispersed Interplanting

The carbon benefits per hectare of dispersed interplanting in long-term cultivated cropland at a planting density of 100 trees per hectare are summarized in in Table F1c. Because of a lack of species specific growth data for the species planted under this intervention, species are classified as either fast growing or slow growing, and a conservative growth model is applied for each. This intervention does not include any harvesting of trees so carbon benefits are based on the total increase in woody biomass during the quantification period.

Table F1c – Dispersed Interplanting Carbon Benefits							
		1	2	3	4	5	2-(1+3+4+5)
Soil type	Species	Baseline carbon uptake (t CO_2e/ha)	Carbon uptake with project (t CO_2e/ha)	Expected leakage emissions (t CO_2e/ ha)	Uncertainty discount (t CO_2e/ha)	Risk buffer (t CO_2e/ha)	Net carbon benefit (t CO_2e/ha)

			Biomass	Soil				
LAC	Fast growing	0	108	51	0	8	30.2	120.8
	Slow growing	0	13	51	0	3	12.2	48.8
Volcanic	Fast growing	0	108	59	0	8	31.8	127.2
	Slow growing	0	13	59	0	4	13.6	54.4

Boundary Planting

The carbon benefits per 100 m of boundary planting with the species included in this intervention are provided in Table F1d, assuming that 33 trees are planted per 100 m of boundary, and planted trees are not harvested. The carbon benefits from soils are not included in this intervention as it does not qualify as afforestation or reforestation.

Table F1d – Boundary Planting Carbon Benefits

	1	2		3	4	5	2-(1+3+4+5)
Species	Baseline carbon uptake (t CO_2e/100m)	Carbon uptake with project (t CO_2e/100m)		Expected leakage emissions (t CO_2e/100m)	Uncertainty discount (t CO_2e/100m)	Risk buffer (t CO_2e/ha)	Net carbon benefit (t CO_2e/100m)
		Biomass	Soil				
G. robusta	0	25	0	0	1	4.8	19.2
C. megalocarpus	0	106	0	0	5	20.2	80.5
C. equisetifolia	0	9	0	0	1	1.6	6.4
M. lutea	0	13	0	0	1	2.4	9.6

F2 Livelihoods benefits

Table F2.1 describes how the project will affect different livelihoods aspects of the participating farmers. Table F2.2 describes potential negative impacts on participating farmers and the broader community in the project landscape, and measures that will be employed to mitigate the risk of negative impacts.

Table F2.1 – Livelihoods benefits – Small holder farmers							
Food and agricultural production	**Financial assets and incomes**	**Environ-mental services (water, soil, etc.)**	**Energy**	**Timber & non-timber forest products (incl. forest food)**	**Land & tenure security**	**Use-rights to natural resources**	**Social and cultural assets**
Increase the food production for 165,000 Households by 30%[16] though soil improvements, water harvesting, agricultural inputs and irrigation. Increase in fruits production through avocado and mangoes, More milk due to increased high quality fodder, more income through crop diversification. Enhanced Climate change resilience.	Improve 3 value chains for avocadoes, dairy, coffee to raise Income by at least 30% as of 2017 baseline.	Dry seasonal flows in 5 major rivers increase 10% for domestic use. Irrigation water to be availed in water pans, and increased soil productivity through nutrients recycling in 165,000 farms	Clean energy availed through Biogas technology, access of firewood through agroforestry tree pruning's	Avocado fruits will be a major income earner and employment to the youths. Estimate over 5000 youth will get seasonal jobs. Access of herbal medicines improved, honey, More income Timber after thinning in the forests and farms.	All the lands in the project area are under free hold titles	The farmers who are members of Community Forest Association have rights to access natural resources through participatory management agreements with Kenya Forest Service.	Program is bringing farmers together through Field Farmers School groups that will be a basis for any intervention and assistance to the members. Continuous training by extension staff, round table banking, group access to credit facilities.

[16] Farmers currently grow crops in two seasons each year. Once they harvest water using the water pans and terraces, they will be able to grow crops during the dry season and therefore adding another harvest to total 3 annually resulting 50% increase. Due to the unpredictable weather conditions this percentage has been reduced to a conservative figure of at least 30% .

Table F2.2 – Potential Negative Impacts – and mitigation measures					
Factor	**Food security**	**Environ-mental services (water, soil, etc.)**	**Wood based enterprises growing wood demand (Charcoal, firewood)**	**Riparian buffer area management and use**	**Social and cultural biases**
Potential negative impacts	1. Farmers may abandon indigenous food species 2. Farmers may start growing highly perishable crops 3. Increasing shade cover by trees may reduce the yield of some crops	1. Farmers may abandon indigenous shrubs in favour of larger biomass tree species 2. Farmers may excavate water pans in on shallow water tables thus reducing the spring flows to downstream users.	1.Abundance of trees may promote potentially damaging wood-based enterprise like Charcoal and firewood.	1. Farmers will forfeit farming along river buffers. This may cause shortage of some foods	1. May cause envy from those not enrolled in scheme
Mitigation Measures	1. Project will offer extension staff support from a prolonged period to help recover 2. Project will train farmers on diversification with stable food crops 3. Farmers will be trained on the agroforestry design to maximise light penetration	1.Project will help farmers develop Farm specific action plans encompassing all species 2. A trained extension staff will be used to locate and lay the water pans	1. Education of community on alternative sources of energy e.g., Biogas, energy saving stoves.	1. Upland coco yam plots being promoted. Other crops will be factored too	1. Project will continue recruiting any willing members under the trust and offer them opportunities

F3 Ecosystem & biodiversity benefits

Table F3 summarises the expected ecosystem and biodiversity benefits of each project intervention.

Table F3 – Ecosystem impacts				
Project activity	**Biodiversity impacts**	**Water/watershed impacts**	**Soil productivity/conservation impacts**	**Other impacts**
Agroforestry	Increased tree biodiversity, improves habitat quality. Increased terrestrial biodiversity e.g. Birds and pollinators.	Reduced probability of flooding in the wet season and increased water retention in the dry season. Increased stream flows during the dry seasons. Reduced evaporation thus retaining soil moisture during dry seasons	Recycling of nutrients through foliage, nitrogen fixing species and reduction of soil erosion. Prevent wind erosion. Sequester carbon.	Retain humidity and reduce particulate matter in the air, particularly in the dry season. Reduce soil moisture evaporation. Increased food security through fruit production, increased medicinal access., protecting crops from wind damage. Improved air quality,
Construction and stabilization of terraces	Maintained habitats for soil invertebrates/microbes though reduced erosion	Increase streams dry seasonal flows through increased water percolation and retention.	Reduce soil erosion through reduced water velocity and increasing the soil moisture	Maintaining the soil carbon sequestrated
Grass strips; and Road erosion mitigation	Increased ground cover/ habitat for invertebrates	Trap sediments from getting into water bodies and increasing percolation	Reduce soil erosion by trapping sediments	Increased improved fodder for livestock
Riparian and wetlands conservation	Maintains the riparian flora and fauna species	Reduces the sediments into rivers through filtering	Reduce the riverbank erosion	Reduces water evaporation form rivers
Reforestation of degraded lands; and Landslides and quarries rehabilitation	Increase forest cover and thus, wildlife habitat through the use of rare native tree species.	Prioritizing critical watersheds reducing the probability of flooding in the wet season and increasing water retention in the dry season.	Forest cycle and use of nitrogen fixing trees nourishes the soil while increasing forest cover reduces erosion.	Retain humidity and reduce particulate matter in the air, particularly in the dry season; Sequester CO_2
Rainwater harvesting	Protect aquatic invertebrates through maintaining the stream volumes through avoided abstraction	Reduce water abstraction form streams	Reduced soil erosion	Increased vegetation cover through irrigation
Efficient water use and crop diversification	Maintaining soil microorganism through controlled water irrigated	Reduced water abstraction	Reduced soil degradation through reduced tillage	Maintain the soil nutrients through reduce leaching.
Construction of efficient cooking methods e.g. Biogas	Reduced deforestation thus maintaining the habit for Arboreal animals and maintaining the native species.	Maintaining of the forest cover through reduced cutting trees for firewood	Recycling of nutrients through the use of bio slurry.	Reduced smoke related diseases

Part G: Technical Specifications

G1 Project intervention and activities

For a description of the activities required to implement the agroforestry interventions, and associated applicability conditions see the Technical Specifications in Annex 3.

Prior to enrolling in the project, all project areas will be screened against the project area applicability conditions, to demonstrate that:

- The project participant can demonstrate land ownership for the entire area;
- They are not wetlands;
- They are located within the Upper Tana Watershed;
- Land use in the baseline scenario is rainfed or manually irrigated cropland;
- The project area has not been converted from a natural ecosystem within 5-years of the start initiation of the project intervention;
- The project intervention will not cause displacement of agricultural activities from within project areas to areas of land outside the project boundary.

Soil type and level of inputs will also be assessed to determine whether the applicability conditions of the CDM tool used to estimate changes in soil organic carbon have been met (see Annex 3 for further details).

G2 Additionality and environmental integrity

The Plan Vivo Approved Approach for Additionality[17] was applied to demonstrate that the project interventions would not be carried out in the absence of the project on the basis of regulatory surplus and barrier analysis.

Regulatory surplus

The relevant laws and regulations that cover land management in the project landscape, and their relationship to the project interventions are summarized in Table G2.1.

[17] https://www.planvivo.org/Handlers/Download.ashx?IDMF=dcb2398d-9cd6-4d48-ad00-43180f251b08

Table G2.1 Regulatory surplus		
Law/Regulation	**Relevant elements**	**Regulatory surplus assessment**
Forest Conservation and Management Act 2016 [18]	Part five emphasizes participation through Community Forest Associations (CFA). The CFA are then responsible for reforestation of degraded lands at forest edges as part of the participatory forest management	Agroforestry activities are not carried out in areas managed by CFAs.
Agriculture Act, CAP 318, revised 2012 [19]	Part IV – 'The preservation of the soil and its fertility' stipulates how the agricultural farms should be sustainably managed by farmers through the support of the agriculture extension services.	This should be done voluntarily by farmers as there is no enforcement agency mandated to Sustainable Land Management. The Local government lacks resources for facilitating the extension officers to support farmers and therefore degradation continues to happen. The project will facilitate the agricultural extension officers from the County governments and implementing partners (NGOs) to support farmers with farm planning, laying of terraces, laying of grass strips and provision of relevant materials.
Agriculture (Farm Forestry) Rules, 2009 [20]	Part1 stipulates that every person who owns or occupies agricultural land shall establish and maintain a minimum of 10 per cent of the land under farm forestry which may include trees on soil conservation structures or rangeland and cropland in any suitable configurations. Provided that the species of trees or varieties planted shall not have adverse effects on water sources, crops, livestock, soil fertility and the neighbourhood and should not be of invasive nature.	There is no enforcement or support for the agroforestry materials to achieve this requirement. The project will provide agroforestry materials and extension services to support to farmers achieve the 10% tree cover required.

[18] http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/ForestConservationandManagementActNo34of2016.pdf
[19] http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/AgricultureActCap318.pdf
[20] http://extwprlegs1.fao.org/docs/pdf/ken101360.pdf

Barrier analysis

The barriers that prevent smallholder farmers in the project landscape from implementing agroforestry interventions, and the support that will be provided by the project to overcome these barriers, are summarized in Table G2.2.

Table G2.2 Barrier analysis		
Type of barrier	**Description of Specific Barriers**	**How barriers will be overcome by project activities**
Financial/economic barriers	Insufficient financial resources to procure seedlings, planting, maintenance, monitoring and training of staff and community[21]. Many farmers in the project region have identified lack of financial resources as a barrier to adoption of agroforestry practices. Agroforestry interventions were established at initial project sites with funding from the Water Fund endowment fund. This amount will be paid back from the sale of Plan Vivo Certificates to support the broader suite of activities that benefit participating farmers that are an essential component of the project logic and without which, farmers would not have joined the programme. Further expansion of project activities is also reliant on income from the sale of Plan Vivo Certificates.	Funding from the sale of Plan Vivo Certificates will be secured to pay-back the investment in initial project sites, and expand the adoption of agroforestry interventions as well as providing the finance to maintain and monitor existing project areas. A support system is being developed by the trust including an endowment account for sustaining revolving fund for conservation activities
Technical barriers	Communities without organisational capacity, technical skills on species selection, carbon stock computation, as well as awareness and appropriate skills to initiate agroforestry interventions and conservation activities. Inadequate knowledge on the impact of climate change on food systems and ecosystem services[9].	Participatory tree species selection is made with the landowners once they have fully understood the suitability of each to their ago-ecological zone, what levels of carbon stocks each species is able to store given the specific projected growth regime and document to be part of the cumulative stock for the project. Training will be undertaken with the project coordinator staff, site coordinators and community field workers include mapping; biomass inventories; participatory threat assessment and; carbon quantification

[21] Adrian Vogl and Stacie Wolny (2015) Developing cost effective investment portfolio for the Upper Tana Nairobi Water fund Kenya

Institutional/political barriers	Since the collapse of the national agricultural extension service, the farmers have not had much support to design agroforestry systems. UTNWF Business Case (2015) recommended investment of USD 10million over 10 years across the target 165,000 farmers to train them on Sustainable Land Management and Agroforestry. This would enable farmers take part in land improvement and carbon sequestration, Inadequate incentives regarding Sustainable land management as well as incentives for adopting agroforestry and riparian management has been a major hinderance to investment. Lack of enforcement on minimum tree cover by government agencies failed with the collapse of the extension service	Support the stakeholders to develop the policies to, facilitate the agriculture extension officer to support farmers on SLM, provision of materials for agroforestry and conservation of riparian lands. Liaise and lobby the local leaders to campaign on tree planting and participating in tree planting events. The carbon project will ensure propagation and planting of suiting species that are good for the environment and sequestration of carbon. The project will develop and maintain a dedicated database for the carbon that is transparent and accessible to farmers and validators when needed.
Ecological barriers	Widespread soil degradation[22], recent natural events such as landslides, road network expansion in hilly areas, climatic variability, land pressures due to population growth resulting in increased house construction.	Support development of farm plans, implementation of SLM, rehabilitation of landslides, create an early-warning system on rainfall, train the farmers on land intensification, promotion of climate smart agriculture. The project will also promote composting and farm-yard manure as nutrient resources for nutrients needed by the trees. The project will integrate in situ and ex situ rainwater harvesting that will provide water for tree growth
Social barriers	Low participation by women and youth due to lands ownership[23], the poor due to lack of finances, and elderly due to lack of labour.	The UTNWF Trust will expand capacity for raising planting material that we envisage will be continuously demanded by the farmers and public lands. These will be supported by the carbon sales which will also meet the costs of coordination and monitoring. The project will also ensure additional nutrients from compost and farm-yard manure are promoted. Project will provide all the tree seedlings required which will include high value trees and provide incentives for participants through extending. While some pilot effort has been made as part of proof of concept, the carbon project proceeds will help drive these to scale as

[22] Vågen et.al (2018) Upper Tana-Nairobi Water Fund Land Health Baseline Report
[23] Anthony Njurai (2015 An Assessment of Involvement and Participation of Women and Youth in the LASCOR and BCFC Projects Areas in Gatanga Sub County of Murang'a County

		well as sustain supply throughout the life of this project. UTNWF Business case (2015) requires that all the farms be reached as well as river riparian for main rivers and their tributaries. A lot of these areas area still outstanding and will need a lot of resources for materials, staff time and monitoring to be covered. Additional subsidies for other conservation materials like rainwater harvesting technology, drip irrigation and efficient energy use e.g. improved cook stoves and biogas.

Double counting

There are no other projects generating carbon certificates in the project landscape, so no potential for double claiming currently exists.

The Government of Kenya's Nationally Determined Contribution under the United Nations Framework Convention and Climate Change (UNFCCC) Paris Agreement includes the aim of a 30% reduction in greenhouse gas emissions by 2030, that is expected to cost USD 62 billion[24]. The NDC includes plans to mobilise 13% of this amount domestically, with the balance being raised through international support.

Climate change mitigation activities in Kenya's NDC include making progress towards achieving a tree cover of at least 10% of the land area of Kenya, in part by planting 350,000 agroforestry trees. Project activities, therefore provide the opportunity to contribute to this aim, and the project will be included in the national register for climate and carbon sequestration projects once established. The project is independent of any national government NDC activities, however.

There are currently no national or jurisdictional results-based finance mechanisms for carbon benefits from agroforestry activities in Kenya. Should such a mechanism be developed in the future, the project will comply with all government regulations to ensure that there is no double claiming of carbon benefits for which Plan Vivo certificates have been issued.

G3 Project period

The Water Fund has been developing and implementing agroforestry interventions with smallholder farmers in the Upper Tana Watershed since 2014 under a proof of concept scheme which ended in November 2016. This generated lessons that were used to develop the carbon project concept and engage partners to support the project.

The project start date is 1 January 2017, which corresponds to the date when the first agroforestry interventions linked to the proposed carbon project were established. Agreements with participating farmers cover a period of 10-years from the time of planting, which is expected to be sufficient for the agroforestry systems to become established, and for the benefits from access to tree products and improvements to soil conditions to be realised – helping to ensure the systems will be maintained by the participating farmers in the long term.

Ex-ante Plan Vivo Certificates will be claimed for the carbon benefits expected over a 20-year quantification period. New project areas will be added throughout the project, and project areas will be monitored for at least 10-years from the date of establishment of the

[24] Ministry of Environment and Forestry (2020) Kenya's Updated Nationally Determined Contribution (NDC). https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Kenya%20First/Kenya%27s%20First%20%20NDC%20(updated%20version).pdf

intervention. The project period will run from the start date, until all of the agreements with participating farmers have expired, and will be verified at least every 5-years.

G4 Baseline scenario

Agroforestry interventions will be implemented on smallholder farms that are used for rainfed agriculture. Cultivated crops include tea, coffee, maize and horticultural crops. The approach for defining the baseline scenario follows the CDM methodology for small scale afforestation and reforestation activities which allows for continuation of the pre-project land use to be considered the most likely baseline scenario (AR-AMS0007 Section 5.2)[25]. Barriers that prevent participating farmers from implementing agroforestry activities on their land are described in Section G2.

The carbon pools and emission sources accounted for, the changes in carbon stocks expected under the baseline conditions, and details of the data sources and methodologies used are provided for each intervention in Annex 3.

G5 Ecosystem service benefits

The expected climate benefits from each agroforestry intervention are summarized in the Table F1. Full details of data sources and methodologies used are provided in Annex 3.

G6 Leakage and uncertainty

The agroforestry interventions include trees that will provide an additional crop and/or improve fertility and provide soil protection, and the interventions are expected to increase productivity over the long-term. They are, therefore, not expected to lead to displacement of agricultural activity. Checks to ensure that relevant applicability conditions are met are required (see Section G1), and for project areas that meet these conditions leakage is assumed to be zero.

As described in Annex 3, the main sources of uncertainty in estimates of expected carbon benefits, and measures in place to minimise uncertainty are:

- Baseline and leakage assumptions– minimised through the applicability conditions, that all project areas must conform to;
- Parameter values applied for estimating project removals from woody biomass and for estimating project removals from soil organic carbon – minimised by selecting appropriate default factors and periodic review and updating; and
- Tree growth and biomass allometric models – minimized by selecting the most appropriate models available and periodic review and updating.

It is not possible to eliminate all sources of uncertainty, or to quantify the uncertainty of expected carbon benefits. To reduce the likelihood that carbon benefits are overestimated, an uncertainty adjustment factor of 95% is applied in the calculation of carbon benefits

[25] https://cdm.unfccc.int/methodologies/DB/J6ZHLX1C3AEMSZ52PWIII6D2AOJZUB

(see Tables F1a to F1d) to reduce carbon benefits for which ex-ante certificates are claimed by 5%.

Part H: Risk Management

H1 Identification of risk areas

The Plan Vivo Approved Approach for Assessing risk and quantifying non-permanence buffer allocation[26] was used to describe risk factors and mitigation actions and assess the severity and likelihood of risks to non-permanence (see Table H1). The risks and mitigation actions, listed in Table H1, were identified by stakeholders during consultation meetings[27]. To deal with present and emerging risks, the project maintains a risk register, to create a single place where risks can be documented, tracked and prioritised for mitigation.

[26] https://www.planvivo.org/Handlers/Download.ashx?IDMF=e4ce17d4-4283-4409-b8e4-7a1d4b101271
[27] UTNWF (2019) Environment and social risk mitigation

Table H1. Risk Summary				
Category	**Risk Factor/Level**	**Likely impact (H/M/L)**	**Likelihood (H/M/L)**	**Mitigating action**
Social	Low Land tenure and/or rights to climate benefits are disputed	Low Project activities taking place on small private landholdings (0.64 ha).	Low The traditional ways of verifying ownership (purchase agreements, title deeds), which involves the endorsement of the local administration, is an effective way of verifying ownership.	The contract refers to the land where participating farmers are resident and have recognized land tenure rights in accordance with the Land Act. Farmers are allowed to transfer land (either through sale or leasing) and the new owner takes on the carbon rights and responsibilities.
	Low Political or social instability	Low Project activities may widen the gap between the 'have' and 'have not' causing friction among community members. In addition, neighbours may have boundary conflicts. This may lead to malicious acts, which may result into reversals being very localised.	Low Due to benefits the project brings to the participating and non-participating communities, incidences of malicious damage are minimal. Disputes are usually between not more than two people and can be resolved before it escalates into more serious acts e.g. arson.	Technical specifications have been designed to benefit the entire community e.g. by accommodating even those with the smallest of land (boundary planting). Participating farmers are advised not to plant their trees too close to their neighbours' land. The local authorities, responsible for handling (land) disputes are part of the farmer recruitment / land ownership verification process
	Very low Corruption	Very low: In the event of corruption the impact should be minimal as it would be detected promptly.	Very low: Corruption has not been identified by the project or evidenced since the project started in 2017. The history of the project coupled with a solid project governance makes the likelihood of corruption even less likely	Monitoring of activities and finances and accountability to the project governance parties. Strict norms for the trust requiring immediate action for perpetrators if this occurred at any stage of the project or trust's life
Economic	Low Insufficient finance secured to reward farmers.	Low The farmers' commitment to implement activities is based on an understanding that they will receive benefits from their activities in the long run, through the Water Fund activities, but that there may be some delays until the finance is securred from PVC sales.. This is reflected in the Plan Vivo Agreements. Farmers' goodwill towards the project is in part a result of tangible benefits they have received by the project including	Low By managing the expansion of project areas in line with available finance, and using the endowment Fund as a hedge for any unsold carbon ensures that there is sufficient funds to reward all participating farmers.	Farmers have agreed that if there is a period of no payment; they are committed to continuing with the project and permanency of activities. This is a component of the Plan Vivo Agreement.

		planting materials, training, subsidies, and indirect financial benefits. Although the ex-ante sale of certificates guarantees that there are sufficient funds to reward farmers, sometimes the project may not be able to match supply with demand. Without sufficient finance from the sale of Plan Vivo Certificates, it will not be possible to execute performance-based payments and upscaling.		
	Low Alternative land uses become more attractive to the local community	Low Income from another land use commodity may become more attractive than farming and tree planting and some farmers drop out from the project, but this is not expected to affect a large proportion of participating farmers.	Low Project activities are designed to add value reducing the likelihood that other land use options will be more attractive.	The project seeks to integrate tree planting as a livelihood strategy complimentary to other land use options. The carbon payments together with the multiple short, medium and long-term environmental benefits enable agroforestry to compete favourably because farmers have very few reliable sources of income. It is mainly the income from the sale of Plan Vivo Certificates that allows them to engage in other revenue-generating activities.
Environmental	Low Pest and disease attacks	Low In the 7 years of the Water Fund's existence, this threat has been very localised (about 1 of the 100 or so farms monitored in a year) and mainly involving termites and viral infections. Well-managed farms usually easily recover from these attacks.	Low The risk of pests and diseases is ever present, but with good agriculture and silvicultural practices, these can be well confined.	Farmers are assisted in the assessment and selection of the quality of seed and seedlings that can resist insect as well as pest attacks. The planting of indigenous trees that are well adapted to local conditions coupled with the application of proper silvi-cultural practices in pruning, the applications of local organic manure, and the planting of mixed native species have all assisted in containment of this threat.
	Low Extreme weather or geological events	Low The project landscape experiences moderate drought but, with changing weather patterns, the threat of drought is becoming more likely especially in the long-term. In fact, the planting of trees on farms is partly a strategy to make these farms more resilient to more extreme weather conditions (such as drought) by improving the soil water retention. There is also threat of floods and mudslides at a very localised scale, particularly in the	Low The likelihood of occurrence of landslides still exists and its impact will undoubtedly be severe for those few affected farmers. Compared to the size of the project the area likely to be affected is very minimal and any lost carbon will be replaced. This is thus, a low risk.	Farmers are required to plant at the beginning of the rainy season to maximise on the rains. The project ensures that all the training, recruitment, nursery and field preparations take place well before the start of the rainy season. In addition, the performance-based payments require farmers to replant all trees affected by drought. Farmers use Year 2 of their management plan as a gap-filling year and, if they do not achieve the 85% survival rate by the third year as indicated in the technical specifications, they are not rewarded. Where farmers are disproportionately affected by these extreme weather conditions such as drought, the endowment

		mountains. Landslides are now occurring more frequently than in the past (every 2 to 3 years but they have not yet affected the farmers involved in the project)		fund is used to support the replanting of the lost trees. In sloped sites where landslides are prone and trees are planted, a soil stabilisation management action is applied in order to make the communities less prone to the landslides. If the risk potential increases, these sites will be eliminated from the project, but general support for tree planting as adaptation strategies will continue through the endowment fund. Typically, the lost farms will be replaced with farms from less prone areas, thus replacing the lost carbon.
Technical	Low Project activities fail to deliver expected climate benefits	Low If modelling results are inaccurate, climate benefits may be overestimated even though significant bias is unlikely. The risk of bias is higher for project areas where local parameters are not used for modelling expected climate benefits.	Low The likelihood that estimated climate benefits are significantly overestimated is low because robust and conservative parameters were used for the project's carbon models.	The modelling approach used to estimate climate benefits includes adjustments to account for uncertainty.
	Low Project activities fail to deliver expected livelihood benefits	Low If project activities are not successfully implemented, the expected livelihood benefits may not be fully realised.	Low It is unlikely that the combination of direct rewards, non-cash benefits in the form of materials, capacity building, extension service provision, and market access will not result into the expected livelihood benefits.	Agroforestry interventions are designed as a livelihood strategy, where farmers are consulted and land use options are created to fit into the farmer's livelihood plans. In addition, each farmer is trained to develop a land use/business plan, with a specific management objective. The carbon income is delivered to the farmers in kind to facilitate the execution of the business plan. Farmers are mobilised into groups that support market access for their products (Fruits, Milk, vegetables etc.). The project also raises the visibility of participating farmers with other development partners to support the achievement of their management objectives.
	Low Technical capacity to implement project activities is not maintained	Moderate The project activities are not highly technical, can be done with household labour since they are very small scale but do require some training to support their implementation.	Low The continuous capacity building, step-wise approach and the performance-based reward system make this risk low.	The project holds community group meetings every month to train new and continuing farmers in SLM. In addition, the project offers extension services as part of the project monitoring activities. The performance payments will encourage the farmers to stick to the management guidelines.
Administrative	Low Capacity of the project coordinator to support the	Moderate Achieving climate benefits will require the ongoing support of the project coordinator. If this is not maintained throughout the project period, the ability of farmers to implement	Very low Given the proven track record of the project coordinator, the likelihood that its	The project coordinator is a well-established- local Environmental Trust expert with a specialization in conservation financing. The Trust has a 4 years history of effective project and programme management, with proven on the ground infrastructure to enable farmer

	project is not maintained	project activities could be undermined, especially if monitoring, capacity building activities are not sustained.	capacity to deliver the project will be compromised is very low.	recruitment, capacity building, monitoring and is capable of delivering payments. The corporate governance structures are well established with a highly technical secretariat supervised by a Board of Trustees selected from key stakeholders. The organization has established an Endowment Fund to support conservation activities in perpetuity and is able to hire and maintain a team of highly motivated staff with a diversity of technical expertise.
	Low Poor record keeping and lack of accountability	Low: Some delays on payments might occur if record keeping is not efficient.	Low: The project has a good track record on book-keeping.	Databases to track field activities (area size and tree planting) and storage of information relating carbon sales and payments are in place.

H2 Risk buffer

With the risk mitigation measures the project has in place, all of risk factors identified in Table H1 have a low or very low risk level. Overall, the project is therefore considered to have a low risk of non-permanence. The Plan Vivo Approved Approach for Assessing risk and quantifying non-permanence buffer allocation suggests that low risk projects receiving ex-ante certificates, should have a risk buffer between 10% and 20%. A 20% risk buffer is therefore adopted.

Part I: Project Coordination & Management

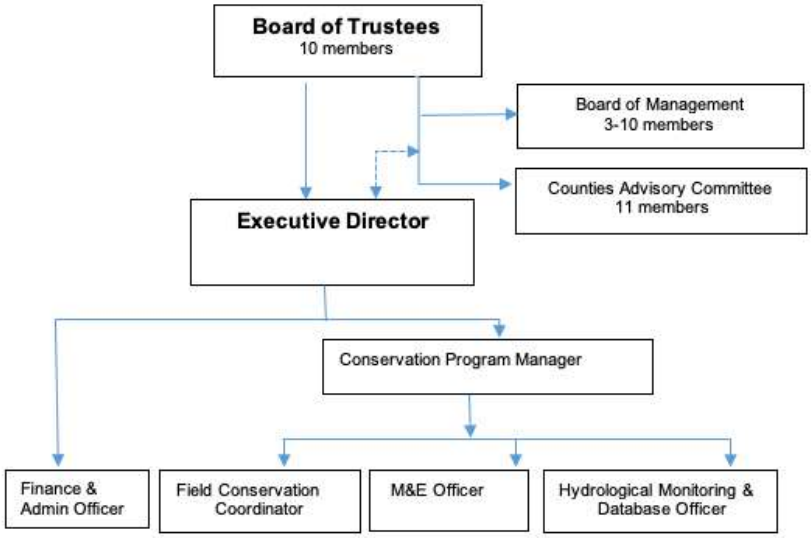
I1 Project organisational structure

The project coordinator is the Upper Tana- Nairobi Water Fund Trust (Water Fund). The trust was registered as a fully incorporated charitable trust in 2017 under the Kenya Lands Act (see Annex 4) and its mandate is to conserve the Upper Tana Watershed in perpetuity. It has 10 full time staff comprising of 5 employees for the trust and 5 seconded staff from the public sector (see Annex 5). The carbon project will be managed by the trust. Prior to full establishment it was executed by The Nature Conservancy (TNC), together with several implementation partners, including the Ministry of Environment and Forestry, National Museums of Kenya, Water Resources Authority and Kenya Forest Service amongst others.

The Water Trust is managed by a board of trustees (BOT). Currently this has ten members (five from the public sector and five from the private sector), The BOT has two committees:

i. Counties Advisory Committee (CAC) - provides a link between the project and devolved leadership, public agencies active in the watershed and local communities. Currently it has 13 volunteer members including community and youth representatives
ii. Board Of Management (BOM) - comprising ten professionals drawn from a wide spectrum of skillsets needed to support the implementation of its mandate. The BOM has created 3 committees for Finance and Investments; Resource Mobilization and Monitoring & Evaluation. The committees meet quarterly.

The executive is headed by a general manager in charge of conservation and in future will have an Executive Director appointed. The four line-managers coordinate work on the ground to ensure workplans are implemented effectively and within time. An overview of the Water Fund's governance structure is provided in Figure 4.



THE CHARITABLE TRUST

3 Founder trustees,
Up to 7 invited trustees

BOM- 3 founder directors,
7 invited directors

County advisory Committee comprising county and in- region state agencies heads

BOT & Transition committee to determine mode of advertising for staff positions

Executive Director nominates officer in-charge of Sagana field

Figure 4: Overview of Water Fund's governance structure

The organisational structure of the project is summarised in Figure 5. The participating farmers are clustered within their respective sub watersheds and their representatives will be engaged in monitoring on activities on behalf of the project. A focal area team (FAT) established for each sub-watershed meets quarterly to review progress and project support needs for future activities. The clusters have elected two representatives to the Counties Advisory Committee.

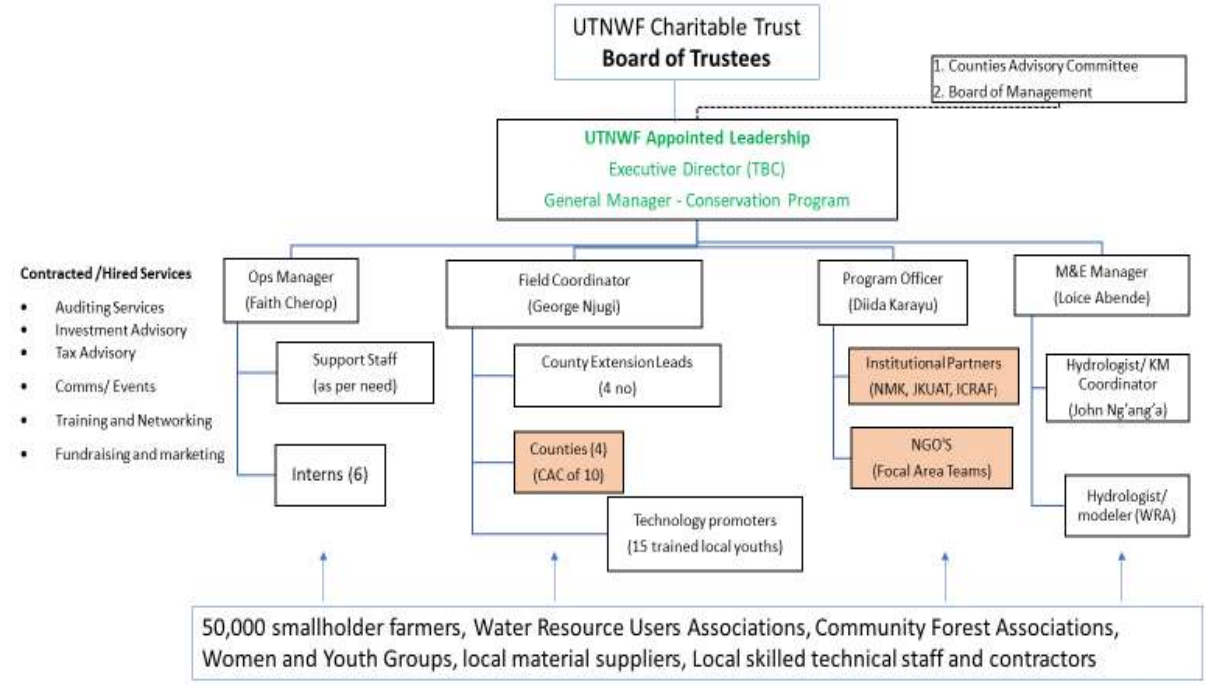


Figure 5: Diagram showing project organizational structure

Capacity and experience

As the first water fund in Africa, the Water Fund has integrated an elaborate monitoring and evaluation framework to pick the lessons and experiences on governance, public – private partnership, endowments capitalization and investments, incentives for land stewards to participate and maintain SLM investments, return on investments for private funds etc. and promote learning at national and regional levels. Through its network of public agencies, NGOs and community based organisations (CBOs), the Project supports at least 23,218 smallholder households in the Upper Tana watershed to adopt climate-smart sustainable land management practices, with the aim to increase food security and climate adaptation potential at household level, to stabilize and restore ecosystem services of the targeted area and to improve water quality and quantity for both upstream and downstream water users.

The following is some of the measurable progress of the Upper Tana Nairobi Water Fund as it has generated a vast array of benefits for people who depend on the watershed.

- More than 23,000 farmers engage to implement soil conservation and water-saving methods on their farmlands
- An endowment fund account set up with USD 2million seed capital secured 11
- More than 7,150 farmers, 8 coffee wet mills and 1 community owned miller have received Rainforest Alliance certification
- More than 3,691,964 trees are planted in four year with 78% survival rate achieved
- 590 ha of riparian land conserved and 20.5 km of rural road put under rainwater harvesting
- Over 5760 ha of terraces and grass strips completed and stabilized with Napier grass
- 8,297 water pans completed and that will increase rainwater harvested for productive use by farmers to increase their income generated from farming
- A mobile phone platform for conservation messaging established with 26,000 farmers on the platform
- Partnerships for project implementation established with MENR, 3 specialist institutions (ICRAF, NMK and JKUAT) and 2 local NGOs (SACDEP and Caritas – Murang'a Catholic Diocese) and 4 county government supporting the extension component.
- 40 small holder drip irrigation kits installed.

The Water Fund has identified key partners to support the implementation phase of the project. In addition, local NGOs were also contracted as implementing partners. Partners that have been consulted in the development of the project include:

- ✓ The Nature Conservancy – A global not for profit organisation that works in more than 70 countries including 8 countries in Africa. The Africa Business unit has more 92 staff. As a trustee the organization provides technical support on per need basis. It's envisaged that the organization will help the trust in reach out to off-shore carbon markets

- ✓ Private sector companies and Utilities – comprising corporates with interest in the water sector like the (i) Nairobi City Water & Sewerage Company (ii) Frigoken Ltd- a leading horticultural growing and processing company (iii) Pentair Limited – a

leading water technology company (iv) East Africa Breweries Limited- a leading beverage making company based in Nairobi etc. These corporates provide technical expertise and financial support to ensure the success of the trust. No *quid pro quo* arrangements are offered in return to their support as this should be part of their sustainability impacts and mission.

- ✓ Ministry of Environment and Forestry – is the authority for all environmental matters in the country and will help in policy mainstreaming for the smooth implementation of activities. It has been elected as a trustee.

- ✓ World Agroforestry Centre (ICRAF) - is an international centre of science and development excellence that harnesses the benefits of trees for people and the environment. It leverages the world's largest repository of agroforestry science and information, and develops knowledge practices, from farmers' fields to the global sphere, to ensure food security and environmental sustainability. It will assist in developing a Land Degradation Surveillance Network for the project target areas.

- ✓ Jomo Kenyatta University of Agriculture and Technology (JKUAT – WARREC Institute) - is an institute of Jomo Kenyatta University with the core mandate of encouraging the use of science, technology and innovation to back up development and investments for the water sector. It was Launched on 14th December 2011 by the Minister of Water and Irrigation. It will help in biophysical monitoring and research as well as providing scholarly research support in region.

- ✓ National Museums of Kenya (NMK) – is a state corporation established by an Act of Parliament, the Museums and Heritage Act 2006. It manages museums, sites and monuments in Kenya. It carries out heritage research, and has expertise in subjects ranging from palaeontology, ethnography and biodiversity research and conservation. It will help to develop a wetland biodiversity atlas, undertake a Biological Resources Assessment for food and feed, and help in knowledge management.

Two local NGOs identified during the prove of concept phase in each of the priority sub watersheds have retained field-based partnerships with the water fund to implement sustainable land management and integrated natural resources management in the watershed through contract:

- ✓ SACDEP- Sustainable Agriculture and Community Development Programme covering Sasumua sub watershed in Nyandarua County and Thika-Chania sub watershed in Murang'a County.

- ✓ CARITAS- under the Catholic Diocese of Murang'a, covering Maragua sub watershed in Murang'a County.

Stakeholder analysis

Project stakeholders can be considered in three levels (see Figure 6):

Core Level: Those who strongly influence and/or are influenced by the project. They have a long-term presence in the project and / or are investing in the project.

- **Carbon buyers**: These are market players wishing to off-set their emissions. They will work with the trust to ensure records are maintained well and verifications done periodically
- **Donors:** These will complement in terms of resources need to cover as many landowners as possible in a short time as possible as well as undertake operation and maintenance. Their contribution will also help offsetting some of the operation overheads of the trust
- **UTNWF Trustees:** These are volunteer leaders who have offered their time, capacity and leadership to guide the trust and ensure its managed to the best possible way. These are senior leaders at a national level drawn from government and business in the continent.
- **Farmers groups:** these are aggregation of landowners practicing farming in the Upper Tana watershed. They will be targeted for training, community mobilization and sharing of local indigenous knowledge with the project.
- **Individual Farmers:** These form the lowest unit and refer to the individual landowners. These are targeted to undertake conservation measures on their farms and plant conservation materials that generate carbon credits once established. They are being supported to develop and implement Farm specific Improvement Plans.

Primary Level: Provide partnership, technical and to certain extent financial and governance support to the project as it may be needed. These are core to the success of the Water Fund trust. They nominate representatives to the governance organs of the trust, provide professional expertise that guides the Water Fund. They also raise supplemental funding to cover gaps for the operations of the water fund.
The local NGOs and government departments are engaged to provide farmer support education and support to ensure conservation work is implemented on time.

Secondary Level: Those who the project consult with from time to time and of strategic and macro policy importance to the project. Generally, members in this category have interest that span beyond just the Upper Tana Watershed. They are collaborators in the Tana and offer expertise and national level networks as needed. They also share lessons with other geographies where they have interest in. They also nominate voluntary representatives to the governance body where their expertise is needed

The details of stakeholders in the project are included in Table I1.

Figure 6: Stakeholder Monitoring and Evaluation Roles

Table I1. Stakeholder Analysis			
Stakeholder Layers	**Roles and Responsibilities**	**Influence to the Project (1= very weak, 5= very strong)**	**Influence by the Project (1=very weak, 5=very strong)**
Core Stakeholders			
UTNWF Trust	Provide administrative and organizational support and financial incentives to farmers in the absence of carbon buyers. Provide financial support to organizational development of the project Provide advice and overall guidance to the project implementation and PV farmer groups; Discuss suggestions and feedback from communities, provide endorsements and recommendations for project implementation and opportunities for project improvement	5	5
Carbon credit buyers	Enter into an agreement with project coordinator in this case UTNWF to purchase the credits from farmers.	5	5
Donors (tree planting expansion)	To provide voluntary funding for the expansion of tree planting in identified sites by the communities based on the project plan	5	4
Farmers Groups	Oversee the benefit-sharing mechanism, with the support of the project coordinator; Prepare for the conferment of in-kind support and agreements, with the support of the project coordinator; Promote socio-economic prosperity to each member Facilitate consensus among farmers on project directions and implementation of recommendations made by the PSC, if deemed necessary; and Facilitate communication with the Project Coordinator (i.e. grievances or complaints).	4	4
Farmers	Comply with the Plan Vivo Agreement Carry out responsibilities based on Plan Vivo Agreement Participate in Farmers Groups as members Attend regular meetings when meeting is held	5	4

Primary Stakeholders			
SACDEP	Provide technical support needed on Sustainable Land Management and other sustainable practice of agriculture and land conservation	4	5
CARITAS	Provide technical support needed on Sustainable Land Management and other sustainable practice of agriculture and land conservation	4	5
Water Resources Authority	Provide technical support in monitoring of water resources	4	3
The Nature Conservancy	Provide technical support when required and resource mobilisation support	5	4
Frigoken Ltd	Provide market for the farm produce	2	5
CFAs	Provide forum for farmers grievances	4	3
WRUAs	Provide forum for farmers grievances	4	3
Rain Forest Alliance	Provide funding for parallel livelihood activities	5	3
NCWSC	Provide technical support in monitoring of water quality and quantity	3	5
Secondary Stakeholders			
Water Fund Trustees	Provide Leadership for the project	4	2
Water Fund Trust Investment Managers	Provide financial management for the endowment fund	3	2
Kenya Electricity Generating Company	Provide funding for SLM expansion programs	3	2
Nairobi Water & Sewerage Company	Provide funding for endowment	3	2
National Museums of Kenya	To provide studies that will form a basis of biodiversity monitoring	3	2
International Fund For Agriculture	Provide funding for SLM expansion programs	3	2
County Governments	Provide leadership of the project ownership Mainstream polices for for enabling implementation	4	3
The Coca Cola Foundation	Provide funding for SLM expansion programs	3	2
East Africa Breweries Ltd	Provide funding for SLM expansion programs	3	2
Ministry of Environment and Forestry	To provide sound policies that will promote community based small holders carbon offsetting initiatives To provide support to the project by promoting the project to the donors	4	2
Jomo Kenyatta University of Agriculture and Technology	To provide studies and encouraging the use of science, technology and innovation to back up development and investments for the water sector	4	3
Ministry of Water and Sanitation	To provide policies that will provide funding mechanism from water users	3	3

The relationship of the following Core stakeholders is illustrated in Figure 7:

- **Carbon buyers**: These are market players wishing to off-set their emissions. They will work with the trust to ensure records are maintained well and verifications done periodically
- **Donors:** These will complement in terms of resources need to cover as many landowners as possible in a short time as possible as well as undertake operation and maintenance. Their contribution will also help offsetting some of the operation overheads of the trust
- **UTNWF Trustees:** These are volunteer leaders who have offered their time, capacity and leadership to guide the trust and ensure its managed to the best possible way. These are senior leaders at a national level drawn from government and business in the continent.
- **Farmers groups:** these are aggregation of landowners practicing farming in the Upper Tana watershed. They will be targeted for training, community mobilization and sharing of local indigenous knowledge with the project.
- **Individual Farmers:** These form the lowest unit and refer to the individual landowners. These are targeted to undertake conservation measures on their farms and plant conservation materials that generate carbon credits once established. They are being supported to develop and implement Farm specific Improvement Plans.

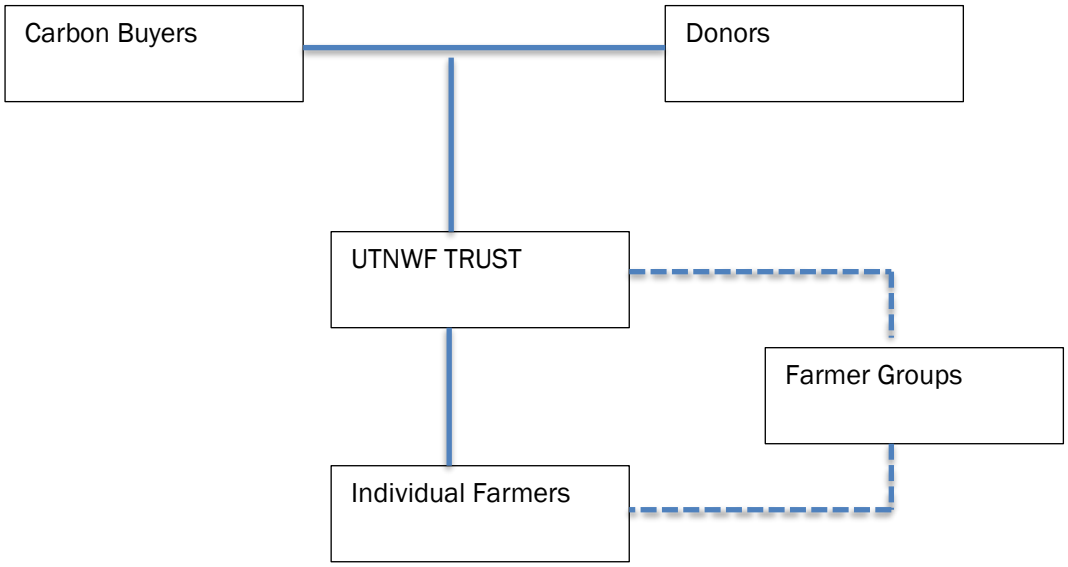


Figure 7: Relationship of Core stakeholders. The straight lines indicate the contractual binding relationship based on contractual obligations while the dotted lines represent the line of coordination, support and collaboration.

I2 Relationships to national organisations

The project has Memoranda of Understanding with the following national organizations. Their involvement in the project is summarized in Section I1.

- ✓ Ministry of Environment and Forestry
- ✓ Jomo Kenyatta University of Agriculture and Technology (JKUAT – WARREC Institute)
- ✓ National Museums of Kenya (NMK)

- ✓ Ministry of Water

Despite these close relationships, there are no linkages between the project and other government schemes or projects

I3 Legal compliance

The Water Fund has been duly registered under the Ministry of Lands and is obligated to carry out any charitable conservation activities within the Upper Tana Watershed, in line with Kenyan Law. The Trust complies with all requirements for annual return filing as well as tax returns filings as required by law.

Key legislation that the project will operate in compliance with and contribute to includes:

- The Constitution of Kenya (2010)[28], that has a target of national forest cover expansion to 10%.
- Forest Act (2005)[29] on the promotion of private investment and the recognition of important roles of forest in livelihoods and sustainable development.
- Climate Change Act (2016)[30] that provides a framework for promoting climate resilient low carbon economic development
- Water Act (2016)[31] Chapter 29 on Establishment and functions of water resource users associations and WRA 2007 Regulations Seventh Schedule. The main function for the Water resource users association is the cooperative management of water resources which includes establishment of vegetation buffer zones along river-banks which the project is addressing as a key conservation activity that maintains the carbon in the vegetative materials and in the soil.
- Forest Conservation and Management Act (2016)[32] that establishes the Community Forest Associations for cooperative management of forest that entails the reforestation of degraded lands at forest edges as part of the participatory forest management. The project will provide all the required materials to rehabilitate the degraded lands.
- Agriculture CAP 318 (revised 2012)[33] and Constitution of Kenya (2010) stipulates how the agricultural farms should be sustainably managed by farmers through the support of the devolved agriculture extension services. The project will facilitate the agricultural extension officers from the County governments and implementing partners (NGOs) to support farmers with farm planning, laying of terraces, laying of

[28] GoK (2010) The Constitution of Kenya.
http://www.kenyalaw.org:8181/exist/kenyalex/actview.xql?actid=Const2010
[29] GoK (2005) The Forests Act
http://www.kenyaforestservice.org/images/MMMB/forests%20act%20no.7%20of%202005.pdf
[30] GoK (2016) The Kenya Climate Change Act
http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/ClimateChangeActNo11of2016.pdf
[31] GoK (2016) Water Act https://wasreb.go.ke/downloads/Water%20Act%202016.pdf
[32] GoK (2016) Forest Conservation and Management Act
http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/ForestConservationandManagementActNo34of2016.pdf
[33] GoK (2012) Agriculture Act Cap 318
http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/AgricultureActCap318.pdf

grass strips and provision of relevant materials.

- Agriculture (Farm Forestry) Rules (2009)[34] stipulates well that everyone should ensure 10% tree cover in the farms, Project will provide agroforestry materials and extension support to farmers.
- Kenya National Biodiversity Strategy and Action Plan (2000)[35], objectives 1, 3, 6 and 10, calling for capacity building, conservation, sustainable use of biodiversity and implementation
- National Climate Change Response Strategy (2010)[36] calling for low-carbon pathways in the national development and National Climate Change Action plan (NCCAP)
- Environmental Management and Coordination Act (2015)[37], providing for EIAs and SEAs to be applied for all developments

Equal opportunity and employment policies

The project coordinator will adhere to the principles of fairness and equality in employment as stipulated in the Constitution of Kenya (2010). Standard Operating Procedures to guide staff on day to day operations, have been developed with support from legal department of The Nature Conservancy and approved by the Water Fund governance board for adoption in the project[38] (see Annex 6).

These policies stipulate that the Water Trust "will not condone or permit discrimination, including actions that create a hostile work environment, against any employee or applicant for employment based on race, color, religion, sex, national origin, age, disability, sexual orientation, gender identity, military or veteran status, or other status protected by law in all locations where it works". The policies encourage and support work environments that respect differences and provide all employees with dignity, fairness, and opportunities for professional development in all locations. The Water Fund will actively promote diversity in its workforce in all of the places where it works by utilizing fair recruitment processes and seeking broad applicant pools.

It is part of the Standard Operating Procedure to provide employee benefits as part of total compensation. The trust provides the benefits prescribed by law where it employs staff. In addition, the Water Fund may provide other benefits, such as health and life insurance and savings and retirement plans.

I4 Project management

[34] GoK (2009) Agriculture (Farm Forestry) Rules https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2017/12/Farm-Forestry-RulesKenya.pdf
[35] GoK(2000) Kenya National Biodiversity Strategy and Action Plan http://extwprlegs1.fao.org/docs/pdf/ken163085.pdf
[36] GoK (2010) National Climate Change Response Strategy https://cdkn.org/wp-content/uploads/2012/04/National-Climate-Change-Response-Strategy_April-2010.pdf
[37] GoK (2015) Environmental Management and Coordination Act https://isa.org.jm/files/files/documents/EMCA_Act_2015.pdf
[38] The Nature Conservancy (2020) Introduction To The Policies And Procedures Manual

Approximate timeline

Scoping for the Plan Vivo project took place from 2012 to 2014. Agroforestry interventions and other project activities were designed and tested between from 2014 to 2016, and agroforestry interventions were established in the initial project areas between 2017 and to 2020. The Plan Vivo Project Idea Note was drafted and submitted in 2020, and validation is planned for December 2021. The first annual report for the project, covering the period from 1 January 2017 to 24 Nov 2022 will be submitted in early 2023, and ex-ante certificates for the project areas established during the initial monitoring period will be claimed on acceptance of the monitoring report by Plan Vivo. Thereafter annual reports will be submitted for each calendar year.

An initial verification will be carried out in 2027 to verify the projects achievements in the period from 1 January 2017 to 31 Dec 2026. Additional project areas will be added to the project, based on availability of finance and the project period will be expanded to ensure that all project areas are monitored for a period of at least 10-years from the date the agroforestry interventions are established. Verifications will take place at five-year intervals throughout the project period.

Record keeping

Records related to project participants are stored in the official database for the project - District Health Information System v 2 (DHIS2; Annex 2). Digital copies of all FSAPs and maps are stored on hard drives of project computers in the Water Fund offices, and are backed up using a secure cloud-based server. Paper copies of management plans are also held in the Water Fund office or the offices of NGOs with delegated mandate from the trust. Financial records are maintained in QuickBooks® accounting software.

Roles and responsibilities

The Water Fund Executive Director takes the overall responsibility of business development. This includes the development and continued improvement of the incentive mechanism, engaging the market as well as managing transactions on the IHS Markit Environmental Registry. Business development is guided by a business plan based on a triple bottom line (social, environmental and financial).

Currently the communications role is being handled by the General Manager. The project uses a combination of tools: electronic, print media and national/international events:

- **Print media** - the project will produce articles to be published in different scientific and popular publications as well as promotional brochures.
- **Electronic media** - the project operates a website with a project map, videos, images and news about this and other project activities.

Furthermore, the project holds regular meetings with project stakeholders in the form of workshops, conferences and exhibitions at local, national and international fora where information about the project is regularly disseminated. Educational farmer messages are shared via mobile phone platform.

I5 Project financial management

Disbursement of PES Funds

The Water Fund will be responsible for receiving funds from the sale of Plan Vivo Certificates, and making payments for project activities. Funds will be received into and disbursed from a dedicated project bank account in Kenya, in the name of the Upper Tana Nairobi Water Fund. Records of all expenditure will be kept in QuickBooks® accounting software.

The Water Fund will keep all invoices and cash flow registers up to date. The detailed balance sheet of these funds will be audited annually and approved by the Water Fund Board of Trustees and Board of Management who will provide oversight on prudent financial management and monitoring. A summary of financial transactions will be included in Annual Reports to Plan Vivo.

Disbursements to participating farmers will managed through the provision of materials and services by the Water Fund (see Part J), and no cash payments will be made.

Project budget and financial plan

The estimated annual operational cost of implementing the project, based on the 2020/21 annual work plan is around USD 400,000. The project therefore aims to raise at least USD 10 million in Plan Vivo Certificate sales over a ten-year project period, so that at least 60% of this can be used for activities and investments that directly benefit the participating farmers and the broader community in the project landscape. To achieve this, the project will need to sell between 100,000 and 200,000 Plan Vivo Certificates per year (assuming a price per certificate between USD 5 and 10; see Annex 7).

The project interventions will be implemented over at least 150,000 ha with carbon benefits ranging from 11 to 169 tCO_2e/ha (see Section E1), so the project has potential to generate the number of certificates needed to fully fund the project. Any shortfall in certificates generated or sold will be covered from co-financing; and any additional finance raised above that needed to cover operational costs and agreed contributions to participating farmers, will be used to scale up the project or invested in an endowment fund to be used to support long-term management activities in the project landscape.

Co-financing

The project has been successful in raising establishment funds and mobilizing in-kind contribution from volunteer leaders in the country (see Annex 8). It will continuously mobilise resources from internal and external partners and organisations in order to upscale the project and build the endowment fund for the sustainability of the project even beyond the carbon project. The Water Fund is a registered charity to work and conserve the Upper Tana Watershed over a period of at least 80-years.

I6 Marketing

The Plan Vivo Certificates will be registered on the IHS Markit Environmental Registry, and the Water Fund will be responsible for sales and marketing. A full marketing plan will be developed with input from The Nature Conservancy who have a proven track record in securing high volumes of carbon certificate sales.

Approaches will include direct promotion of the project via the project coordinator and the project partner's websites and social media, as well as developing direct relationships with carbon certificate buyers – building on the networks and relationships of the Board of Trustees and partner organisations and exploring partnerships with established carbon certificate resellers.

Certificate sales will be sought from three main sources:

- Buyers whose primary motivation is to offset their greenhouse gas emissions;
- Funders whose primary motivation is to conserve biodiversity by supporting activities that contribute to the maintenance of habitat quantity and quality for threatened and endangered species; and
- Finance from companies whose activities have incurred a degradation or conservation liability and that wish to support a project that will contribute to conservation of a particular area, to remove this liability.

I7 Technical support

Capacity building and knowledge enhancement provide the foundations for the effectiveness and long-term success of the project. Participating farmers will receive initial training and periodic support from extension agents employed by the project. Training will include full details of the practices needed to effectively implement project interventions and troubleshoot problems that arise. Regular contact with project participants will be maintained throughout the project period to discuss challenges encountered and develop solutions.

Training provided to extension agents will include details of the project interventions and activities, risk avoidance and awareness, and environmental issues. Training is an ongoing process that will be managed by the Water Fund.

The project will use both farm-to-farm approaches and Farmers Field Schools (a group-based learning approach) to train farmers on agroforestry, climate change, resilience adaptation, water harvesting and management good agricultural practices and crop husbandly, who will then be trainers of the other farmers within the landscape. Farmer groups interested in having or already having nurseries will be trained in nursery management for growth to sustain the designed project agroforestry demand.

Part J: Benefit Sharing

J1 Plan Vivo Agreements

Farmers will join the project by developing a Farm Specific Action Plan (FSAP), that includes

one or more of the agroforestry interventions described in Part G and entering into a Plan Vivo Agreement with the Water Fund. The Plan Vivo Agreement grants the rights to the Water Fund to sell Plan Vivo Certificates generated from Project activities on behalf of the project participants.

Individual participants must agree to and sign their FSAP. Plan Vivo Agreements are then signed on behalf of the Participants by a Farmer Representative that has been freely chosen by the participants as their representative and granted the authority to enter into this agreement on their behalf (see Box 1).

Box 1: Farmer Representatives

To enable recruitment of farmers in a given geographic location, and administer training on conservation, agroforestry and climate change mitigation, the trust sets up meetings and announces to the community details for the training sessions through public channels like chief's public meetings (barazas), church and mosque announcements etc. Where there is good coverage of farmers in the Trust's mobile phone SMS communication channels, such messages are passed through the SMS platform.

On the day of the meeting farmers are voluntarily invited to the training, adoption of agroforestry systems in their farms, enrollment to received Trust's support in form of trees to be planted in their respective farms and to count into the collective climate impacts mitigation project. This process leads to formally enrolled farmers, and these farmers are scheduled for on-farm training and drawing of farm specific action plans. The farmers, upon enrolling identify a Farmer Representative to act as group leader through consensus or open-air elections (raising hands in support) in case more than one person volunteers to lead. The leader thus elected takes responsibility for coordination of group interest activities including:

1. Cumulating the tree seedlings needs for the participating farmers in the form of seedling species and quantities
2. Coordinating with the Trust to plan seasonal planting, delivery of seedlings, inspection of materials quality and distribution documentation.
3. Signing any delivery records on behalf of the group members
4. Coordinating with technical extension staff to ensure that all farmers needing technical support are supported
5. Signing on behalf of the group the carbon project contract and verifying the details for accuracy. They take further responsibility to update their group members on progress of the project and other activities offered by the trust.
6. The elected representatives remain the point persons for the trust. They will remain the focal persons during verification or validation exercises and organize their group members for any engagements during the processes. They liaise with the trust when information shared through mobile phone SMS needs to be publicized within their localities.
7. Farmers in the group come together if they need to change the leadership mandate to another person in case of unavailability of the elected representative – in the unlikely occurrence of a death, relocation, incapacitation or resignation.

Through the Plan Vivo Agreement project participants agree to follow their FSAP to enable the project to generate Plan Vivo Certificates. A template Plan Vivo Agreement that was developed with input from project participant representatives is provided in Annex 9. This includes monitoring targets, and details of land tenure. Execution of the Plan Vivo Agreement is contingent on receiving funds from the sale of Plan Vivo Certificates and describes the materials and extension service support that the participant will receive from the Water Fund, and details of the amount that will be used for project coordination and management costs. Periodic monitoring, throughout the project period – that will be validated by extension agents that visit the farms, will be used to ensure that project participants are implementing the project interventions as planned, that any monitoring commitments are fulfilled, and that problems that arise are addressed in a timely manner (see Section K1).

Any farmer within the project landscape that has land that meets the applicability for one or more of the project interventions described in Part G and who is willing to undertake conservation work that leads to carbon sequestration will be eligible to be party of the Water Fund support and can apply to join the project. Most of the farmers are enrolled through a mobile phone platform, and can request a detailed explained in their preferred language (e.g. Swahili or Kikuyu). They also have the opportunity to opt out if they so desire.

Potential risks associated with the Plan Vivo Agreements are:

- The project falling short of budgets due to low sales from the PVCs.
- Possibility of missing farmers details due to either sale of land parcel or demise.
- Some farmers may take time or not fully understand the Plan Vivo Agreement because this is a new concept to them
- Farmers may lose interest in the project if the benefits are too low to be meaningful to them.
- Trees may be harvested prematurely as the farmers see greater economic value in selling tree products than the project benefit, they stand to get from the project.

Measures in place to mitigate these risks are:

- The project will invest surplus funds from Plan Vivo Certificate sales and other sources into an endowment account that can be drawn on to sustain project activities in case of a shortfall in Plan Vivo Certificate sales.
- The project coordinator will continuously monitor the project activities and the respective land ownership, keep participant databases up to date, and implement corrective actions where necessary.
- Plan Vivo Agreements are fully explained to potential project participants prior to joining the project, Explanations are provided in the local dialect, using terms that could be easily understood. Regular meetings will be held to reinforce understanding and allow participants to voice their concerns or questions.
- Light thinning of planted trees is encouraged as part of farm management requirements and targets included in the Plan Vivo Agreement. The project

coordinator and the field team will monitor tree harvesting contravening the agreement and will issue corrective actions as per the contract which states that trees are not harvested for at least 30 years (excluding thinning prescribed) and that any trees harvested will need to be replanted.

- Any farmers that choose to leave the project before the end of the project period will be replaced by extending activities in existing FSAPs or recruiting additional participants, for which Plan Vivo Certificates will only be claimed for carbon benefits that exceed the volume of Plan Vivo Certificates issued for the departing farmer's activities.

J2 Benefit sharing

The Water Fund will enter into Plan Vivo Agreements with all participants in the project, detailing the agroforestry activities they will carry out and the in-kind support they will receive in return – including supply of materials described in Table J1 and extension services. These agreements will transfer the carbon rights from agroforestry activities to the Water Fund, which will market Plan Vivo Certificates collectively on behalf of participants and add additional resources if necessary to ensure that participants can implement all agroforestry activities as planned.

Table J1. In-kind support

Activity	Description	Inputs	Cost of Materials
Agroforestry	Planting of trees within and around agricultural areas, following specifications for species and spacing agreed with the Project technical officer.	Tree seedlings	c. $1 per seedling
Grass terraces	Stabilization of terraces with Congo grass	90 splits of High value variety of Congo grass (*Brachiaria* spp.) per 10m of terrace	c. $2.7 per 10m of terrace
	Stabilization of terraces with Napier grass	40 canes of high value Napier grass per 10m of terrace	c. $1.2 per 10m of terrace
Riparian buffers	Planting Napier grass to stabilize riverbanks	240 canes of high value Napier grass per 10m of riparian buffer	c. $7.2 per 10m of riparian buffer
	Planting trees to stabilize riverbanks	4 tree seedlings per 10m of riparian buffer	c. $4 per 10m of riparian buffer
Water pans	Excavation of water pan	UVI treated polythene liner of 250 micro thickness	c. $44 for a 24m^3 water pan; $73 for a 50m^3 water pan; and $100 for a 100m^3 water pan.

The in-kind support described in Table J1 will be provided to support all agroforestry activities at the time of Project initiation in the Project Area. Phased support for other activities will be contingent on achieving the monitoring targets, or implementing the corrective actions described for the Progress Indicators in Table K1a Support for non-

Agroforestry activities will be provided after monitoring in or around years 3, 6 and 9 after Project initiation with approximately 50% of the support provided after the 1st monitoring event, 35% after the second monitoring event and the remaining 15% after the 3rd monitoring event. Each farmer is monitored (progress indicators) once in a 3 year period by an extension officer employed by the project. At this monitoring event, the extension officer provides the in-kind benefits if the farmer has met their monitoring target. The in-kind benefits are decided by the farmer based on the conservation works they specified they wanted to implement on their farm in their Farm Specific Action Plan.

At least 60% of the proceeds from the sale of Plan Vivo Certificates will directly benefit the project participants and the broader community, while not more than 40% will be used for project operations. The benefits to project participants and the broader community will be dispersed to the participants in the form of ongoing extension services and conservation materials at times of need. The value of materials going to farmers will be tracked to ensure at least 60% of that benefits have reached the participants. If material costs exceed the finance available, the Water Fund will draw on their endowment fund and/or attempt to access alternative sources of co-finance.

The project and the proceeds of Plan Vivo Certificate sales will be managed collectively to accommodate landowners that require proportionately more materials and investment to implement their Farm Specific Management Plans than would-be their proportion of carbon benefits accrued, following the Financial Management Procedures for the UTNWF Trust Carbon Project (see Annex 13).

The procedures for benefit sharing will be described in each of the Plan Vivo Agreements that the project coordinator will sign with project participant. No cash payments will be made to participating farmers, and instead in-kind support will be distributed though subsidies on drip kits and water pan liners, provision of high value crops and seedlings, beehives, and free agricultural extension services as agreed with the participants. When the monitoring thresholds and/or targets are not reached, then the participant has an opportunity to remediate with a list of agreed corrective actions. Measurements agreed by the project coordinator. If the corrective measurements are implemented within an agreed time, the participants can remain in the scheme and can received operation and maintenance support. Additionally, in-kind support may be withheld for farmers whose land ownership may come into dispute or are engaging in activities that contribute to land degradation on their lands.

When there are not enough buyers to fund the in-kind support to all participants, theinkind support will be divided equitably to all participants, depending on their performance as described in the monitoring plan in the Plan Vivo Agreement. Or the project may top up with other resources from the endowment fund to meet the basic demands from the participants. In case any participant feels that he/she has been unfairly rewarded, they can use the grievance mechanism to put forward his/her complaint. The retention of a

maximum of 40% from net payment for project coordination cost may vary depending on whether project coordinator is able to mobilize additional funding to cover the coordination cost. If there are sufficient resources to cover the coordination cost, then the coordination percentage (40%) will be used to upscale activities, by boosting the endowment fund.

Part K: Monitoring

K1 Ecosystem services benefits

The project will use a three-stage monitoring process for assessing the carbon benefits achieved: i) assessment of new project areas; ii) annual monitoring, and iii) verification. For further details see Annex 3.

New project areas

When new project areas are added to the project, the following information will be recorded by the project extension agent:

- Extent of planting area (in hectares)
- Pre-project land use
- Soil type
- Number of trees of each species planted
- Basal area of pre-project trees
- Average crop yield

Progress monitoring

The Progress indicators in Table K1a must be collected at least every 3-years from each project area during the 10-year agreement period. Project areas that fail to reach the target values must implement corrective actions to receive further in-kind support, as described in Section J2.

Table K1a. Monitoring Indicators			
Indicator	**Details**	**Target**	**Corrective Action**
Progress Indicators			
% survival of each species of planted trees/shrub/bamboo	Calculated from a complete census of planted trees/shrubs/bamboo by project participant	95%	Inquiry into tree loss to identify causes of loss, and supportive action with farmers to address these.
% of dead trees/shrubs/bamboo of each species that have been replanted	Reported by project participant	90%	Provision of support to assist with replanting.
Performance Indicators			
Average DBH of planted trees/shrubs/bamboo of each species	Estimated by project participant from a random sample of at least 10 trees/shrubs/bamboo per species	80% of value expected from growth models (see Table K1b).	Evaluation of growth challenges for trees, and actions such as increased mulching, watering, removing of grazers or other actions to be developed and implemented with farmers.
Basal area of pre-project trees	Calculated from measurement of all pre-project trees in the project area	80% of pre-project value.	Investigate causes of reduction, and if losses are related to the project intervention a conservative deduction for loss of pre-project tree biomass must be applied.
Crop yield from project areas	Reported by project participant	75% of pre-project crop yields	Evaluation of growth challenges for crops, and actions such as increased mulching, watering, and any need for better management of orchard trees. If not remedied within 3-years a conservative deduction for potential leakage must be applied.
Fruit yield from project area*	Reported by project participant	75% of expected fruit yields	Assessment of tree maintenance with farmers, including evaluation of pruning, watering and mulching regime.

*Only applicable to Fruit Orchard intervention

Table K1b. Average Diameter										
Species	**Age (years)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Alley Cropping										
G. robusta	4	8	11	14	17	19	20	22	23	24
Bamboo	1	4	7	8	9	10	11	12	13	13
Shrubs	4	6	6	7	7	8	8	8	9	9

Boundary Planting										
G. robusta	4	8	11	14	17	19	20	22	23	24
C. megalocarpus	4	8	12	16	19	22	25	28	31	33
C. equisetifolia	0	4	6	8	9	10	11	12	13	13
M. lutea	4	6	7	8	10	11	12	13	15	16
G. robusta	4	8	11	14	17	19	20	22	23	24
Dispersed Interplanting										
Fast growing	2	3	5	7	8	10	12	13	15	17
Slow growing	1	1	2	3	4	4	5	6	6	7
Enrichment Fallows										
Markhamia	4	6	7	8	10	11	12	13	15	16
Casuarina	0	4	6	8	9	10	11	12	13	13
Shrubs	4	6	6	7	7	8	8	8	9	9
Fruit Orchard										
Mango	4	5	7	8	9	10	12	13	14	15
Avocado	3	5	8	10	12	13	15	17	19	20
Citrus	0	4	7	8	10	11	12	12	13	14
Macadamia	2	4	6	7	9	11	12	14	15	17

Verification

The Performance Indicators in Table K1a will be measured in a random stratified sample of project areas, with each site being visited at least once every 5-years throughout the project period. Project areas will be stratified on the basis of year of planting, pre-project land use, soil type, species mixture planted, and basal area of pre-project trees, and at least 50 project areas from each stratum will be sampled.

If a Performance Indicator target is not met for any project area, the corrective action in Table K1a must be implemented in that project area. If more than 10% of the sampled project areas in any stratum fail to meet the target for any indicator the sample size within that stratum must be increased until either: i) all indicator targets are met in more than 90% of the sampled project areas; or ii) all project areas in the stratum have been sampled.

Data is collected by the project participants, a random sample of at least 10% of records from each stratum will be checked by project staff. If errors exceed 10% of the estimated value all project areas in the affected stratum will be re-assessed by project staff who will provide additional training to the project participants.

The total carbon benefits achieved in each verification period will be calculated using monitoring results for the Progress Indicators listed in Table K1a. The results will be compared to the carbon benefits expected in that period. If the difference between the expected carbon benefits and those calculated using monitoring data exceeds 10% of estimated value for the monitored project areas, the following parameters must be reviewed and updated if monitoring results differ substantially from the values used for estimation:

- Tree growth models
- Mortality rates

At the end of each verification period, the following parameters must be reviewed and replaced with updated or more appropriate values if these are available:

- Parameter values for estimating removals from woody biomass and for estimating project removals from soil organic carbon (see Annex 3)
- Allometric models for estimating tree biomass (see Annex 3)

K2 Socio-economic impacts

Socio-economic baseline data was collected at the start of the project in 2017 using a Multi-dimensional Poverty Assessment Tool[1] to establish the status of different dimensions of poverty critical to livelihoods and highlight where the project should focus its conservation interventions. The survey includes details of food and nutrition security; sanitation and hygiene; housing, clothing, and energy; education; farm and non-farm assets; exposure and resilience to shocks; gender and social equality (see Annex 11). The survey will be repeated at five-year intervals throughout the project period to assess:

- Percentage of households with improved Multidimensional Poverty Assessment Tool score
- Number of household members supported in coping with the effects of climate change
- Number of people adopting technologies that reduce or sequester greenhouse gas emissions
- Crop production and productivity in the project area.
- Increased ability of people to manage environmental and climate-related risks.

The project aims to achieve the following:

- 70% of participating farmers report increased productivity by at least 30%, compared to the baseline by 2025.
- 70% of participating farmers report increased incomes by 30%, compared to baseline by 2025.

Failure to meet these targets will trigger a re-assessment of the project interventions to determine actions that can be taken to improve their positive impacts on productivity and income, while acknowledging that some factors that influence these indicators may be beyond the control of the project. The socio-economic monitoring plan and definition of indicators is provided in Annex 12

K3 Environmental and biodiversity impacts

A baseline survey on the environmental and biodiversity condition in the project landscape was conducted in 2019 including details of the types and abundance of plants and animal species in the project landscape[4]. The environmental and biodiversity indicators for the project, their frequency of assessment is summarised in Annex 12.

The project also monitors sediments and turbidity in watercourses during the high and low rainfall seasons and collects data on water yield using automated water gauging equipment that measures water level on 30 minutes interval. A member of the community groups is appointed as a gauge reader to manually record water levels and water sampling during the rainy season for analysis of water quality in the laboratory. These results are then analysed every six months and compared to the baseline data.

By 2030, the project aims to:

- increase the abundance and composition of macroinvertebrates by 10% compared to the baseline
- Improve water quality in the watershed by 10% for both the total suspended solids and the turbidity especially during the wet season; and
- Increase the dry season flow of the upper Tana rivers by 15%.

Monitoring will be led by the project management unit monitoring and evaluation officer and supported by the various state agencies like the Water Resources Authority and the National Museums of Kenya.

Failure to meet these targets will trigger a re-assessment of the project interventions to determine actions that can be taken to improve their positive impacts on biodiversity and the environment, while acknowledging that some factors that influence these indicators may be beyond the control of the project.

K4 Other monitoring

The FSAP are reviewed annually by UTNWF staff to ascertain that what the farmer agreed on is accomplished. This exercise involves physical visits to a representative sample of the fields/plots to establish whether the information stated in the FSAP is correct and being implemented. This may be done within one to three years depending on how frequent changes may be anticipated in an area but at least once to every farm for each five-year cycle. During the field visit, the land being impacted by SLM is measured using GPS devices and tape measures and the details of its location are registered in the DHIS2. Lighter data collection tasks or polling is done using a mobile phone platform managed between the trust and Safaricom Limited (a communication service provider). This includes information like what extension support is needed by the farmers, material desired for the planting season and any significant changes in land use that may have occurred

The project maintains a database for participating farmers and landowners in the entire region (see Annex 2). This database has verifiable details of what each of them is implementing including scale and timelines. The project has obtained user and access rights to the information provided by the landowners and also that recorded in the farm improvement plans.

Annexes

The following Annexes are available to the Plan Vivo Foundation and the Validator:

Annex 1. Example Farm Specific Action Plan
Annex 2. Project Database
Annex 3. Technical Specifications
Annex 4. Permits and Legal Documentation
Annex 5. List of Key People
Annex 6. Equal Opportunity and Employment Policies
Annex 7. Financial Plan
Annex 8. Information About Funding Sources
Annex 9. Plan Vivo Agreement Template
Annex 10. Evidence of Community Participation
Annex 11. Socioeconomic Baseline Survey
Annex 12. Social and Environmental Monitoring Plan
Annex 13. Financial Management Procedures