KINALE SITE

Introduction

Kinale forest block is part of the famous Kijabe Forest which was connected to Kikuyu Escarpment Forest, an extension of Aberdare Ranges Forest Reserve. However, due to anthropogenic activities; illegal logging, community encroachment, charcoal burning, other resource pressures, Kijabe Forest strip of about 28.36 Km has become geographically isolated. The Forest falls under the management of the Kenya Forest Service, but due to geographic and financial constraints, over exploitation and mismanagement of the forest have continued for decades.

Kinale Forest site is dry upland forest and is home to diverse flora and fauna and a key transition zone between the mesic upland forests and the drier savannah ecosystems of Eastern Africa. This narrow forest strip straddles the Eastern wall of the Great Rift Valley with an altitudinal variance of roughly 1,000 meters which enables a mosaic of floral communities along its elevation gradient. Key plant species for conservation include East African sandalwood, African olive, and African pencil cedar among other species. A wide variety of mammals, reptiles and birds have been recorded, including leopards, spotted hyaenas, Maasai bushbuck, Suni, Eland, Honey badger, Aardvark, and black and white Colobus monkeys. The forest also provides significant ecosystem services to surrounding communities including hydrological services to an estimated 200,000 people in the catchment area, as well as carbon cycling, soil stabilization, and forest products such as fuelwood, seeds, and honey.

In the face of increasing threats, EarthLungs Reforestation Foundation (ELRF) is working in collaboration with the Kenya Forest Service (KFS) and Community Forest Association (CFA) to secure a more sustainable future for the Kinale forest block. One in which the indigenous forests are restored by the local communities while generating incomes, and wildlife have a place to thrive. Ultimately, a future in which the Kijabe ecosystem can help Kenya adapt to climate change.

Objective

The overall objective is to reforest and restore the Kinale forests with the help of its local communities through the *Decent Wages for Decent Living for Decent Forests* model by ELRF with collaboration from KFS and CFA.

Specific objectives

- Employ and train deserving forest adjacent community members to grow indigenous tree species
- Establish indigenous tree nursery of 1 million seedlings capacity
- Establish Agroforestry program to plant more trees on-farm to increase landscape connectivity, food security and long-term sustainability of our work
- Establish and promote collaboration and partnership

Planting methods

ELRF endeavors to establish reforestation projects that extend for more than five years. As it is known that effective restoration is a gradual process that entails multi-years commitment for ecological and human welfare benefits to be realized. In restoration of Kinale Forest, ELRF will employ forest adjacent communities for a period of not less than five years to undertake nursery and planting activities. Various planting methods including seedlings, wildings, cuttings, direct seeding and assisted natural regeneration shall be adopted. Plantation of seedlings, wildings and cuttings will be done during the rainy season mainly March to May "long rains" and September to November "short rains", while direct seeding will be planted before the onset of the rains mainly February and September mostly in areas not suitable for planting seedlings with rocky and steep areas and presence of shrubs (shade). The selection of tree species was done during site profiling where mother trees growing in Kinale site were identified in addition to indigenous knowledge on historical trees species that were common but have now been wiped out by over exploitation. Tree species will be planted in specific ecological zones that are deemed favorable to ensure that the seedlings are protected from potentially harmful conditions and to improve the survivability to maturity. A mixture of pioneer, infill, understory, and canopy tree species will be planted while observing the right spacing to enhance seedlings' survivability and healthy forest restoration using the various planting methods.

The ELRF planting strategy to ensure quality control in planting includes;

- Pitting and planting are done at random and not in straight lines.
- Over 20 tree species planted to boost diversity of the degraded forest.
- Planting is undertaken at the right season with sufficient soil moisture content and the right planting method.
- Species site matching is observed for every planting site and application of the right restoration technique.

1. **Seedlings –** This the most common planting method of ELRF. Seedlings are nurtured from viable seeds that are mostly collected by the nursery team from mature mother trees in an ecologically area similar to the planting areas. The collected seeds will then be propagated in the nursery to about 30 cm height. The seedlings will be hardened before they are dispatched to the planting site.

2. **Cuttings -** The cuttings of particular tree species are placed in an environment that encourages them to produce new roots and/or stems, thus forming a new, independent tree. The nursery team ensures that only species that strike roots easily can be propagated by cuttings or species that are difficult to grow from seeds.

3. **Wildlings -** This method has been widely used traditionally to produce planting material for indigenous species. Wildlings are seedlings that have germinated naturally, under or near mother trees which are uprooted and grown in nurseries and/or planted directly to the site when the soil moisture is high such as early in the wet season. ELRF nursery team will ensure sustainable collection of wildlings, by uprooting about half of the germinates/shoots (40%) of the shoots within a forest area to maximize the species regeneration. Collected wildings shall have at least 2-4 fully formed leaves and are collected only during the rainy season when the soil moisture is high. The bare-rooted wildings of about 2-3 inches are uprooted by loosening the soil around the roots with a pointed stick. The plants are pulled up carefully and the soil is shaken off the roots and potted in the nursery for further growth before transplanting to the planting site. Wildings of about 5-6 inches will be uprooted with the soil and transplanted to degraded areas within the forest.

Monitoring

Photo monitoring - Before and after photo monitoring will be undertaken in Kinale site. This will involve taking photos before any activity takes place on the site. Photos of the planted area will also be taken in a sequence of three months interval to monitor the demographics of the planted tree species and ultimately the success of reforestation program.

Drone monitoring and Mapping – Drones will be deployed by ELRF pilots to provide an accurate overview of Kinale site with clear images of the area being restored. Drones provide an aerial view which is crucial in mapping and exploring changes in the forest.

Community socio-economic monitoring - Impact surveys will be undertaken to gather information from the community employed by ELRF programs to measure the impact on poverty alleviation. The surveys will be important in implementation of the necessary management practices. Impact surveys will also be carried out amongst ELRF staff.

Hotsprings Block

Planting Plan Size = 139 ha Total trees to be grown = 347,500 Agroforestry trees (10%) = 34,750 Terrestrial trees (90%) = 300,000	Seedlings = 173,750 Direct seeding = 69,500 Wildings/Bareroots/Cuttings = 34,750 Assisted natural regeneration = 69,500

Tree Species	Seedlings	Wildings
Albizia gummifera		√
Vachellia xanthophloea	√	√
Allophylus abyssinicus	√	√
Apodytes dimidiata	√	
Bersama abyssinica	√	
Casearia battiscombe		√
Cassipourea malosana		√
Celtis africana	√	√
Cordia africana	√	√
Croton macrostachyus	√	√
Croton megalocarpus	√	√
Cussonia holstii/spicata		√
Dombeya torrida	√	√
Dovyalis abyssinica	√	√
Dracaena steudneri	√	√
Ehretia cymosa		√
Ekebergia capensis	√	√
Elaeodendron buchananii		
Euclea divinorum		√
Faurea saligna		
Ficus thonningii		√
Flacourtia indica	√	
Hagenia abyssinica		√
Juniperus procera	√	
Maesa lanceolata	√	
Myrsine africana		√
Macaranga kilimandscharica		√

Tree Species	Seedlings	Wildings
Neoboutonia macrocalyx	√	√
Nuxia congesta		
Olea africana	√	√
Olea capensis	√	
Olea welwitschii	√	√
Oncoba spinosa	√	√
Pistacia aethiopica		
Pittosporum viridiflorum	√	√
Afrocarpus falcatus	√	√
Podocarpus latifolius	√	
Polyscias fulva	√	√
Polyscias kikuyuensis	√	√
Prunus africana	√	√
Pterolobium stellatum		√
Rauvolfia caffra		√
Rapanea melanophloeos		√
Rhus natalensis	√	
Spathodea campanulata	√	
Schefflera volkensii		√
Sclerocarya birrea	√	√
Syzygium guineense	√	√
Trichocladus ellipticus	√	√
Vangueria madagascariensis	√	√
Vepris nobilis	√	√
Xymalos monospora	√	√
Tabernaemontana holstii	√	√
Vitex keniensis	√	

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Assisted Natural Regeneration	
Species	**Planting method**
Acacia nilotica	Singling
Acacia seyal	Singling
Acacia tortilis	Singling
Acacia xanthophloea	Singling
Ehretia cymosa	Singling
Euclea divinorum	Singling
Flacourtia indica	Singling
Grewia similis	Singling
Olea africana	Singling
Oncoba sinosa	Singling
Psydrax schimperiana	Singling
Rhus natalensis	Singling
Schrebera alata	Singling
Scutia myritina	Singling
Tarchonanthus camphoratus	Singling
Trimeria grandiflora	Singling
Vepris simplicifolia	Singling
Warburgia ugandensis	Singling
Psidium guajava	Singling
Acokanthera oppositifolia	cuttings
Calodendrum capense	cuttings
Commiphora eminii	cuttings
Cordia monoica	cuttings
Cussonia spicata	cuttings
Dombeya torrida	cuttings
Ficus sycomorus	cuttings
Rubus volkensii	cuttings
Solanecio mannii	cuttings
Vangueria madagascariensis	cuttings
Warburgia ugandensis	cuttings

Agroforestry	
Species	**Planting method**
Calliandra callothyrsus	Direct seeding
Croton megalocarpus	Direct seeding
Polyscias fulva	Direct seeding
Sesbania sesban	Direct seeding
Acacia melanoxylon	Direct seeding
Acacia seyal	Direct seeding
Cordia africana	Direct seeding
Croton megalocarpus	Direct seeding
Polyscias fulva	Direct seeding
Zanthoxylum usambarense	Direct seeding
Dendrocalamus asper	Seedlings
Bambusa longinternode	Seedlings
Dendrocalamus grandis	Seedlings
Acacia melanoxylon	Seedlings
Calistemon Salignus	Seedlings
Calliandra callothyrsus	Seedlings
Camellia sinensis	Seedlings
Casuarina equisitifolia	Seedlings
Croton megalocarpus	Seedlings
Cupressus lusitanica	Seedlings
Grevillea robusta	Seedlings
Markharmia lutea	Seedlings
Passiflora edulis	Seedlings
Pisum sativum	Seedlings
Persea americana	Seedlings
Prunus africana	Seedlings
Prunus domestica	Seedlings
Pyrus communis	Seedlings
Sesbania sesban	Seedlings
Syzygium guineense	Seedlings
Zanthoxylum usambarense	Seedlings

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Kinale, Hot-Springs Planting Plan

Month/ Year	Planting Goal (Put Deadlines for Reevaluation and Things to Follow Up On)	Nursery Activity	Anticipated Seed Collection Activity	Monitoring/ Evaluation Activity	Agroforestry Activity	Hiring And Training Activities	Procurement Activity
December 2023	- Establish a 500,000 capacity nursery	- Potting tubes filling. - Watering and weeding. - Pricking of germinates & wildings and seeds in potting tubes.	Collect 20,000 seeds of different species			Hiring of Site Forester and M & E officers. Hiring and training of 10 nursery team.	Potting tubes. Fencing materials. Tools and equipment for nursery.
January 2024	- Singling 5,000 trees of recommended species - Nurture 20,000 of seedlings in the nursery of diverse species - Plant 5,000 wildings of diverse species if available.	- Watering and weeding. - Wildings pricking & direct sowing of seeds in potting tubes. - Germinating collected seeds in beds. - Potting tubes filling.	Collect 20,000 seeds of different species				Construction of toilets and nursery team shade.
February 2024	- Singling 5,000 trees of recommended species - Direct seeding of 5,000 seeds. - Nurture 20,000 of seedlings in the nursery of diverse species.	- Watering and weeding. - Pricking of seeds & wildings & germinates in potting tubes. - Germinate collected seeds in beds. - Potting tubes filling.	Collect 20,000 seeds of different species	Monitoring of singled stems and planted wildings.			
March 2024	- Plant 10,000 seedlings from the nursery if long rains are received. - Singling 5,000 trees of recommended species - Nurture 20,000 of seedlings in the nursery of diverse species.	- Watering and weeding. - Pricking of seeds & wildings & germinates in potting tubes. - Germinate collected seeds in beds. - Potting tubes filling.	Collect 20,000 seeds of different species		Distribution of fruit tree seeds to community		

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April 2024	- Plant 10,000 seedlings from the nursery – Nurture 20,000 of seedlings in the nursery of diverse species.	– Watering and weeding. – Pricking of germinates in potting tubes. – Germinate collected seeds in beds. – Potting tubes filling	Collect 20,000 seeds of different species		Distribution of fruit tree seeds to community		
May 2024	- Plant 10,000 seedlings from the nursery – Nurture 20,000 of seedlings in the nursery of diverse species.	– Watering and weeding. – Pricking of germinates in potting tubes. – Germinate collected seeds in beds. Potting tubes filling	Collect 20,000 seeds of different species	Monitoring of singled stems, planted seedlings.	Distribution of fruit tree seeds to community		
June 2024	– Nurture 20,000 of seedlings in the nursery of diverse species. – Plant 10,000 seedlings from the nursery – Singling 5,000 trees of recommended species	– Watering and weeding. – Pricking of germinates in potting tubes. – Germinate collected seeds in beds. – Potting tubes filling	Collect 20,000 seeds of different species				
July 2024	– Singling 5,000 trees of recommended species – Nurture 20,000 of seedlings in the nursery of diverse species.	– Watering and weeding. – Pricking of germinates in potting tubes. – Germinate collected seeds in beds. – Potting tubes filling	Collect 20,000 seeds of different species				
August 2024	– Singling 5,000 trees of recommended species – Nurture 20,000 of seedlings in the nursery of diverse species.	– Watering and weeding. – Pricking of germinates in potting tubes. – Germinate collected seeds in beds. – Potting tubes filling	Collect 20,000 seeds of different species	Monitoring of singled stems, planted seedlings.			
September 2024	– Singling 5,000 trees of recommended species – Nurture 20,000 of seedlings in the	– Watering and weeding. – Pricking of germinates in potting tubes.	Collect 20,000 seeds of different species		Distribution of agroforestry seedlings to		

	nursery of diverse species.	– Germinate collected seeds in beds. Potting tubes filling			community		
October 2024	- Plant 10,000 seedlings from the nursery. - Nurture 20,000 of seedlings in the nursery of diverse species.	– Watering and weeding. – Pricking of germinates in potting tubes. – Germinate collected seeds in beds. Potting tubes filling	Collect 20,000 seeds of different species		Distribution of agroforestry seedlings to community		
November 2024	- Plant 10,000 seedlings from the nursery. - Nurture 20,000 of seedlings in the nursery of diverse species.	– Watering and weeding. – Pricking of germinates in potting tubes. – Germinate collected seeds in beds. Potting tubes filling	Collect 20,000 seeds of different species	Monitoring of singled stems, planted seedlings.	Distribution of agroforestry seedlings to community		