THE KASIGAU CORRIDOR REDD+ PROJECT PHASE I – RUKINGA SANCTUARY

5TH MONITORING REPORT (M_5)



Document Prepared by Wildlife Works Carbon

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GHG Accounting/Crediting Period	01 January 2005 – 31 December 2034; 30-year total period
Monitoring Period of this Report	01 January 2015 – 31 December 2017
History of CCB Status	CCB Validation: 22 December 2009 CCB Verification M1: 3 February 2011 CCB Verification M2: 29 November 2012 CCB Verification M3: 23 May 2013 CCB Verification M4: 01 November 2016
Gold Level Criteria	The Kasigau Corridor REDD+ Project Phase I - Rukinga Sanctuary has achieved Gold Level for both its provision of Climate Change Adaptation Benefits and its Exceptional Biodiversity Benefits. **Climate Change Adaptation Benefits** There is overwhelming evidence in the literature that there will be significant negative effects from climate change and increased climate variability on the communities in the Project Zone. Traditionally, these communities have depended heavily on subsistence agriculture in an area that is one of the least fertile areas for agriculture in Kenya. In addition, the rains have failed far more frequently in recent years, and even when they have come, have been unpredictable. This has led to

missed opportunities for sowing seeds at the appropriate time within the growing season, which would have ensured a harvest even in seasons with low rainfall. These issues are expected to increase given the likelihood of more severe climate change impacts in the future. The resulting food insecurity causes farmers to continue shifting, clearing more land in the hope they will find a better plot on which the variable and highly localized rains will fall. In the baseline scenario, we therefore anticipate even higher deforestation rates in the future. Another detrimental impact of failed crops is the triggering of increases in poaching for bushmeat. The native wildlife populations are drought specialists. However, they do experience higher stress levels in years with lower rainfall and higher median temperatures. This in turn leads to wildlife populations with less resiliency to increased stress from poaching.

As of this Monitoring Period the Project has implemented the following activities:

- Reduce community dependence on livestock and land through alternative IGAs, promote cultivation of drought resistant crops, improve storage facilities and management of crops, water harvesting and water storage, raise awareness of danger of fires.
- Increase support of local institutional structures including the norms and rules of governance to help develop adaptive strategies, increase literacy levels, diversification of livelihood activities and income generation projects, involve women to a greater degree in decision making processes, increase general participation in decision making at the local level.
- Help to maintain intact and interconnected ecosystems through protection of ecosystems, ensure landscape connectivity to allow migration, regeneration activities using indigenous, drought-resistant trees.

Exceptional Biodiversity Benefits

- KCRPI has a resident population of Grevy's zebra (*Equus grevyi*) which is an IUCN Red List – Endangered. In fact, the 35-60 individuals in Rukinga based on 2015 estimates may constitute up to 2-3% of the global population.
- KCRPI is part of the home range of at least two packs of African Wild Dogs (*Lycaon pictus*) (Endangered) with active breeding dens recorded on the sanctuary.
- KCRPI also supports several vulture species including White-backed vulture *Gyps africanus* (Critically Endangered) and Lappet-faced vulture *Torgos tracheliotos* (Endangered).
- KCRPI has stable resident populations of several other High Conservation Value (HCV) species classified as Vulnerable

	including cheetah (*Acinonyx jubatus*), lion (*Panthera leo*), African elephant *Loxodonta africana*, Secretarybird *Sagittarius serpentarius* and Martial eagle *Polemaetus bellicosus.* • The larger Project Zone contains the Taita Hills which are part of the Eastern Arc Mountain Global Hotspot as defined by Conservation International, and harbour two Critically Endangered bird species: Taita Apalis (*Apalis fuscigularis*) and Taita Thrush (*Turdus helleri*). • During this monitoring period the primary activity implemented providing exceptional biodiversity benefits is the protection of the Project Area from deforestation and degradation. This has preserved and enhanced the native habitat for the biodiversity present. This Project Area also provides key connectivity for biodiversity, linking important habitat regions, and providing a protected route that reduces conflict with area communityes. • Additional activities implemented include the provision of and maintenance of water holes, providing vital sources of water to the biodiversity of the Project Area in this drought stricken region.

Acknowledgements



These reports are dedicated to the memory of Rob Dodson, the longtime head of Wildlife Works African Operations. Rob died suddenly and tragically from natural causes in 2017.

Rob was the living embodiment of Wildlife Works' vision, a man who loved every living thing, a caring man with a big heart who understood the challenges the people of the Kasigau community face, and the importance that we do everything in our power to help that community to meet those challenges as we work together to protect the wildlife that is their natural heritage.

Rob was always there to listen to the community's needs, to give his support to their ideas, to roll up his sleeves and work hard alongside them to make their dreams come true, and to celebrate with them life's sweet victories.

Rob was also a fortunate man, who met Lore, the love of his life, while living in the bush with the elephants and buffalo. Rob cherished every moment he could spend with her and with their two beautiful children. His family shares his passion for his work, and we thank them for sharing Rob with us for all these years.

Perhaps one of Rob's most enduring legacies is the wonderful team of people he leaves behind to continue his life's work. Rob was a strong leader, and an incredible mentor for the Wildlife Works team in Kenya. These Kenyan men and women are infused with Rob's strength and spirit; they shared many challenges and many triumphs with Rob, and through it all he always saw the funny side of life.

-Mike Korchinsky

Acronyms

ACoGS	Avoided Conversion of Grasslands and Shrublands
AFOLU	Agriculture, Forestry and Other Land Use
APD	Avoided Planned Deforestation
APC	Avoided Planned Conversion
AUC	Avoided Unplanned Conversion
AUDD	Avoided Unplanned Deforestation and/or Degradation
CCB	Climate, Community and Biodiversity
CDM	Cumulative Deforestation Model
CEPF	Critical Ecosystem Protection Fund
DNA	Designated National Authority
ER	Emissions Reductions
FAO	Food and Agricultural Organization
FCPF	Forest Carbon Partnership Facility
FPIC	Free, Prior and Informed Consent
GHG	Greenhouse Gas
GIS	Geographic Information System
GOK	Government of Kenya
GR	Group Ranch
HCV	High Conservation Value
IBA	Important Bird Area
KCRPI	Kasigau Corridor REDD+ Project Phase I – Rukinga Sanctuary
KCRPII	Kasigau Corridor REDD+ Project Phase II – The Community Ranches
KBA	Key Biodiversity Area
KFS	Kenya Forest Service
KWS	Kenya Wildlife Service
KWTA	Kenya Water Tower Agency
MRR	Monitoring Report Requirements of the VM0009 VCS methodology
MRV	Measuring, Reporting and Verification
NGO	Non-Governmental Organization

NPA	Natural Protected Area
NTFP	Non-Timber Forest Products
PA	Project Area
PD	Verified Carbon Standard and Climate, Community and Biodiversity Project Description document
REDD	Reducing Emissions from Deforestation and forest Degradation
REDD+	Reducing Emissions from Deforestation and forest Degradation, plus Conservation, Sustainable management of forests, and enhancement of forest carbon stocks
R-PP	Readiness Preparation Proposal
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
WWC	Wildlife Works Carbon

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1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Outcome or Impact	Achievements during the Monitoring Period	Section Reference	Achievements during the Project Lifetime
1) GLOW (Girls Leading our World)	Held in school trainings on sexual health and sanitation: 15 school meetings held, each attended by 30-50 students	2.1.1	Held in school trainings on sexual health and sanitation: 15 school meetings held, each attended by 30-50 students
2) Hadithi	Provided marketing and sales support to 31 craft groups, comprising over 800 women. About USD100,000 paid to the groups from 2015-2017	2.1.1	Provided marketing and sales support to 31 craft groups, comprising over 800 women. About USD100,000 paid to the groups from 2015-2017
3) Eco-tourism	4-10 staff, almost 500 guests annually to Kivuli Camp, and a net profit of USD 3000 and 7000 in 2016 and 2017	2.1.1	4-10 staff, almost 500 guests annually to Kivuli Camp, and a net profit of USD 3000 and 7000 in 2016 and 2017
4) Eco-charcoal production	8 permanent staff, setting up a long-term monitoring system for a rotational harvest plan at new production site. Leveraging R&D funds towards scaling up	2.1.1	Pioneered and tested the sustainable charcoal production using finger-sized twigs. Now on the verge of scaling up production to commercial level

1.2 Standardized Benefit Metrics

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
GHG emission reductions & removals	Net estimated emission removals in the project area, measured against the without-project scenario	0		0
	Net estimated emission reductions in the project area, measured against the without-project scenario	744,707 tCO_2e	3.2.4.5	2,751,773 tCO_2e
Forest[1] cover	For REDD[2] projects: Number of hectares of reduced forest loss in the project area measured against the without-project scenario	Data Not Available – Project baseline model does not calculate hectares		Not Applicable – Project baseline model does not calculate hectares
	For ARR[3] projects: Number of hectares of forest cover increased in the project area measured against the without-project scenario	Not Applicable		Not Applicable
Improved land management	Number of hectares of existing production forest land in which IFM[4] practices have occurred as a result of the project's activities, measured against the without-project scenario	Not Applicable		Not Applicable
	Number of hectares of non-forest land in which improved land management has occurred as a result of the	Not Applicable		Not Applicable

[1] Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (*VCS Program Definitions*)

[2] Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (*VCS Program Definitions*)

[3] Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (*VCS Program Definitions*)

[4] Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood (*VCS Program Definitions*)

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	project's activities, measured against the without-project scenario			
Training	Total number of community members who have improved skills and/or knowledge resulting from training provided as part of project activities	426 (includes school groups) visiting Greenhouse	2.1.1	>1,0000
	Number of female community members who have improved skills and/or knowledge resulting from training provided as part of project activities of project activities	About 200 (including two Women's Groups that have established community greenhouses)	2.1.1	>500
Employment	Total number of people employed in of project activities,[5] expressed as number of full time employees[6]	326 (of which close to 90% are from the Project Zone and Taita Taveta County)	2.1.1, 4.3	Long-term average of about 305 employees at the KCRPI with close to 90% always local
	Number of women employed in project activities, expressed as number of full time employees	87 (about 27%)	2.1.1	Long-term average between 20 and 30% of workforce
Livelihoods	Total number of people with improved livelihoods[7] or income generated as a result of project activities	Approximately 33% of households indicate they have received some	2.1.1	Approximately 33% of households indicate they have received some benefit from the

[5] Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.

[6] Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])

[7] Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. *The Sustainable Livelihood Approach to Poverty Reduction*. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
		benefit from the KCRPI including Bursary, Employment and Water		KCRPI including Bursary, Employment and Water
	Number of women with improved livelihoods or income generated as a result of project activities	Two Women groups with greenhouses for agri-business	2.1.1	Two Women groups with greenhouses for agri-business
Health	Total number of people for whom health services were improved as a result of project activities, measured against the without-project scenario	Voi Diagnostic Lab: ≈36,000 patients from 2015-2017	2.1.1	Voi Diagnostic Lab: ≈46,000 – at least 1000 patients per month since start in March 2014
	Number of women for whom health services were improved as a result of project activities, measured against the without-project scenario	Based on County statistics, about 50% of those seeking services at the Lab would be women, and all the GLOW participants	2.1.1	Based on County statistics, about 50% of those seeking services at the Lab would be women, and all the GLOW participants
Education	Total number of people for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario	• Bursary recipients: 2,899 • Classroom: 1 with 40 students • Furniture: in 1 school, ≈40 students	2.1.1	• Bursary recipients: 5,432 • Classrooms: 7 each with 40 students • Furniture: in 11 schools, each ≈40 students
	Number of women and girls for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario	For bursaries, almost half of the recipients were girls	2.1.1	For bursaries, about 47% of the recipients have been girls
Water	Total number of people who experienced increased water quality	Almost 3% of households	2.1.1	Almost 3% of households surveyed

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	surveyed indicated they received some water-related benefit from KCRP like Dams and Rock Catchments; 2 community water projects: ≈2000 people each 2 schools with improved water: ≈350 students each		indicated they received some water-related benefit from KCRP like Dams and Rock Catchments; 13 community water projects with more than 10,000 people 5 schools with improved water: ≈300-350 students each
	Number of women who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	Based on County statistics, about 50% of the water users in the community and schools would be women and girls	2.1.1	Based on County statistics, about 50% of the water users in the community and schools would be women and girls
Well-being	Total number of community members whose well-being[8] was improved as a result of project activities	In addition to the livelihoods, health, education and water-related improved wellbeing above, there are also three community organs (LCC, Bursary Committees and Community-based Organizations) that have either been	2.1.1, 4.1.2	In addition to the livelihoods, health, education and water-related improved wellbeing above, there are also three community organs (LCC, Bursary Committees and Community-based Organizations) that have either been created or

[8] Well-being is people's experience of the quality of their lives. Well-being benefits may include benefits reported in other metrics of this table (e.g. Training, Employment, Health, Education, Water, etc.), but could also include other benefits such as empowerment of community groups, strengthened legal rights to resources, conservation of access to areas of cultural significance, etc.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
		created or strengthened through the KCRP. Through these committees, the communities have a stronger sense of self-determination		strengthened through the KCRP. Through these committees, the communities have a stronger sense of self-determination
	Number of women whose well-being was improved as a result of project activities	At least 33% of the committee members are women	2.1.1	At least 33% of the committee members are women
Biodiversity conservation	Change in the number of hectares significantly better managed by the project for biodiversity conservation,[9] measured against the without-project scenario	30,168.66	5	30,168.66
	Number of globally Critically Endangered or Endangered species[10] benefiting from reduced threats as a result of project activities,[11] measured against the without-project scenario	4 – Grevy's zebra (breeding), African wild dog (breeding), White-backed and Lappet-faced vultures)	5.1.2	4– Grevy's zebra (breeding), African wild dog (breeding), White-backed and Lappet-faced vultures)

[9] Biodiversity conservation in this context means areas where specific management measures are being implemented as a part of project activities with an objective of enhancing biodiversity conservation.

[10] Per IUCN's Red List of Threatened Species

[11] In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit

2 GENERAL

2.1 Project Description

2.1.1 Implementation Description

As this is the 5th monitoring period for the KCRPI, and the Project has now been in operation for over 12 years, the Project Activity is fully implemented. The primary Project Activity is the conservation of the forest in the Project Area. This activity is fully implemented and operated successfully throughout this monitoring period. This Project Activity directly resulted in the reduction of CO_2e emissions being reported in this monitoring report.

All Project Activities that were proposed in the PD have been fully implemented except for a few that were found to be not feasible. The current description of the implementation status is provided below in Section 4.3.2. All Project Activities are described in full detail in the PD, section 6.1 Baseline Scenario. These Project Activities were designed to mitigate deforestation and human-wildlife conflict, and therefore by default serve to mitigate leakage and uphold project permanence.

A primary focus of the Project Activities is to provide employment and increased income either through direct employment with the Project or through introduction of new or improved income generating activities. Wildlife Works retains a workforce of between 300-320 at the KCRPI most of the time. At the end of the reporting period, there were 312 employees in total, 14 in senior management positions. Of the 312, almost 30% (87) are female and more than 90% (286) were from the local area (i.e., from one of the Project Zone or larger Taita Taveta County). In addition to the Project Activities implemented by the Project, revenue from carbon credit sales are also provided to the Wildlife Works Carbon Trust (WWCT) and is used to fund community projects. The major activities selected by the Locational Carbon Committees (LCCs) during the reporting period (2015-2017) included school construction or renovation projects, bursary schemes, agri-business and water projects. School projects have predominantly involved construction and repair of classrooms as well as furniture provision, whereas water projects entail improvements to collection and harvesting, including pipeline construction. Overall, total amount spent during this monitoring period on community projects was KES 14,634,360 (≈USD 145,000). This includes the bursary schemes, which totaled KES 5,393,601 (≈USD 54,000), for a total amount of KES 12,002,197 (≈USD 120,000) since implementation. Please see section 4.3.2 of this MR for more details on the WWCT funded projects.

Any potential leakage resulting from the Project Activity is measured through direct measurement in the Project's leakage area. The Project did not cause any leakage during this monitoring period. Please refer to sections 10.2 and 10.3 of the PD for descriptions of the delineation of the leakage area and the leakage measurement procedure. Section 3.2.3.2 of this monitoring report provides the results of the leakage area measurement for this (M_5) monitoring period. Non-permanence risk factors are assessed at each verification event in accordance with VCS requirements and reported in the non-permanence risk tool.

The total GHG emission reductions for this (M_5) monitoring period are 744,707 t CO_2e. There were no changes made to the Project since the last verification.

2.1.2 Project Category and Activity Type

The Kasigau Corridor REDD+ Project Phase I falls under the VCS sectoral scope 14: – Agriculture. Forestry, and Other Land Uses (AFOLU), under the categories Reduced Emissions from Deforestation and Degradation (REDD). Specifically, the project falls under the REDD+ category Avoided Unplanned Deforestation (AUD). The project is eligible under these categories by the definitions provided in the VCS AFOLU Requirements version 3.4 published 8 October 2013 by virtue of the fact that it prevents emissions that would have otherwise taken place through unplanned deforestation and native grassland conversion.

The Kasigau Corridor REDD+ Project Phase I is not a Grouped Project type under the VCS standard and the CCB Programmatic approach.

2.1.3 Project Proponent(s)

Organization name	Wildlife Works Carbon
Contact person	Mike Korchinsky
Title	Founder and CEO
Address	242 Redwood Highway, Mill Valley CA 94941 USA
Telephone	+1-415-332-8081
Email	mike@wildlifeworks.com

2.1.4 Other Entities Involved in the Project

No other entities are involved in the KCRPI.

2.1.5 Project Start Date (G3.4)

The Project Start Date is January 1st, 2005. This monitoring period (m_5) is the fifth monitoring period and started on January 1st, 2015 and ended on December 31st, 2017.

2.1.6 Project Crediting Period (G3.4)

The project crediting period started on January 1st, 2005 and will end on December 31st, 2034 (30 years).

The project length for The Kasigau Corridor REDD+ Phase I - Rukinga Sanctuary is 30 years and will end on December 31, 2034.

Wildlife Works will monitor and plans to verify the Project every year, producing accurate and credible documentation for all VCS required project accounting. Per VCS minimum requirements, a baseline revision will be performed once every 10 years (see section 2.2.4 for a deviation from the schedule listed in the VCS PD). If the VCS standard regarding baseline revision periodicity changes in the future, Wildlife Works will commit to performing baseline revisions whenever specified by the VCSA.

2.1.7 Project Location (G3.3)

The Kasigau Corridor REDD+ Project Phase I – Rukinga Sanctuary is located in Southeastern Kenya, in Taita Taveta County, Coast Province. It is approximately 150 km northwest of the city of Mombasa. As part of the 2010 ratification of the Kenyan Constitution, counties were introduced as new geographical administrative units. These counties number the same as the old districts (47), but there are significant governance changes planned after the elections of 2013, including devolution to a new two-level governance system, which sees only national and county governments.

The Project Area covers all the land known as Rukinga Sanctuary, with a total of 30,168.66 ha (74,516 acres). The land was originally known as LR 12263, which had historically been reduced by subdivisions 12263/1 and 12263/2 at dates prior to the start date of this project.

Rukinga is part of that land that forms a corridor (the Kasigau Wildlife Corridor) between the Tsavo East National Park and the Tsavo West National Parks to the East of the Marungu range. The Project Area and Reference Area are clearly delineated in Figure 1 in the PD in section 5.1, and the shape files representing the boundaries have been made available to the project validator. The land within the project boundary has been tropical dryland forest[12] for at least 20 years and has been a primary forest throughout recorded history[13].

The Project is located in Southeastern Kenya; in the Coast Province about 2 hours' drive from the port town of Mombasa along the Nairobi-Mombasa highway. The Project's Eco-Region is typified by a dryland forest ecosystem, dominated by acacia and commiphora drought-resistant species. The majority of people in the area descend from the Taita tribe, with significant populations of Duruma, Kamba and other less-prevalent tribes. More detailed information concerning the social, economic and geographic attributes of the Project Area can be found in the Project's CCB PDD.

There have been no changes to the Project Area, the project location or the maps since the publication of the VCS and CCB project documents.

[12] UN IPCC, Good Practice Guidance for LULUCF, Table 3A.1.8;

[13] Earliest record that has been located is dated 1895 which identifies the area as forested [Hobley 1895, Upon a Visit to Tsavo and the Taita Highlands, The Geographical Journal 1895 Vol 5 No 6 pp 545-561]

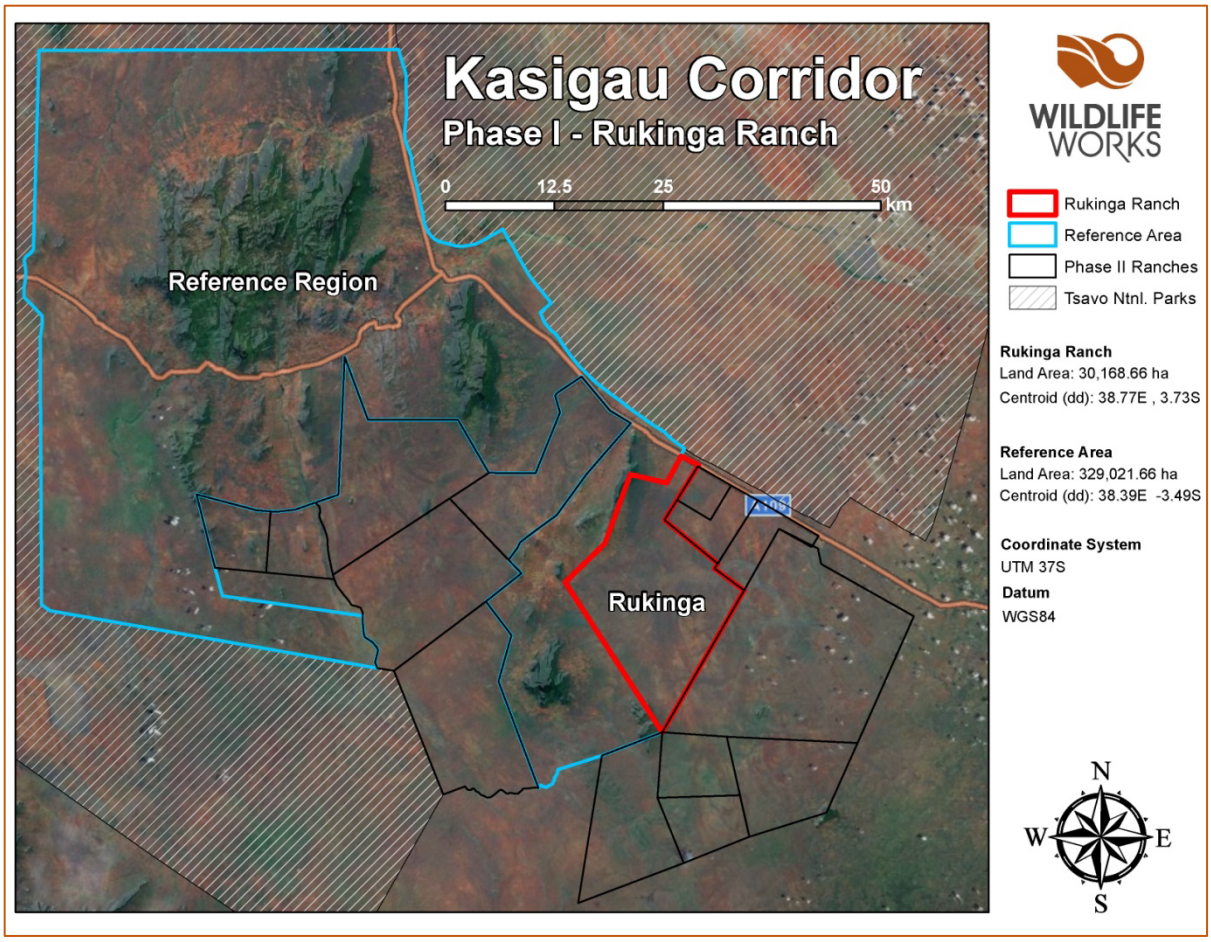


Figure 1: The Kasigau Corridor REDD Project Phase I - Rukinga Sancturay Project Area and Reference Region Spatial Boundaries

The communities impacted by this Phase I Project will be those villages from Maungu south along the Kasigau up to the Northern population of Mt Kasigau.

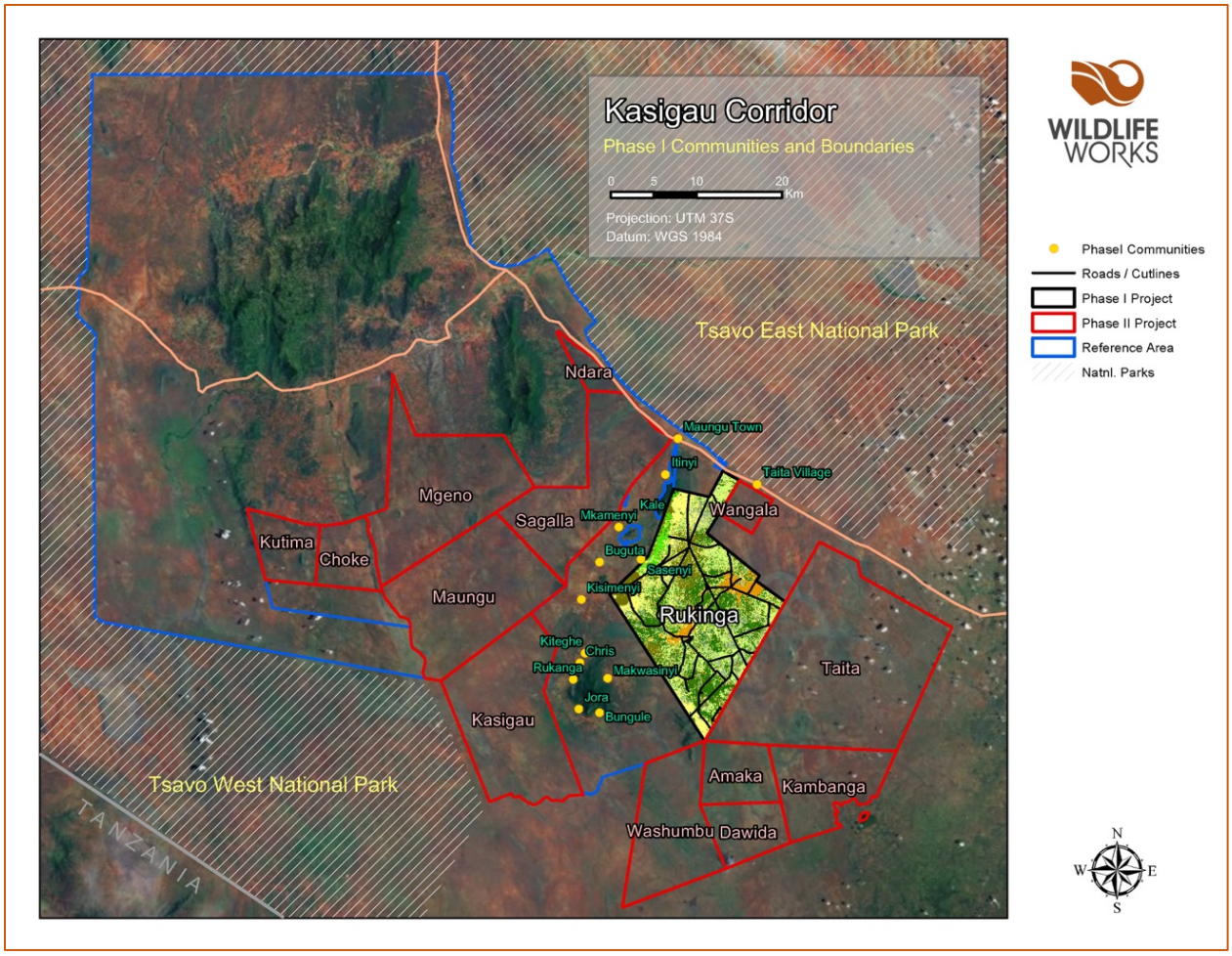


Figure 2: Communities within the scope of influence of the Phase I Project.

Climate

The climate in this region of Kenya is semi-arid, with average annual rainfall in the 300–450 mm range. There are no permanent water sources on the Project Area. Historically the rains occurred seasonally twice a year, in December and April. These are known as the grass rains and the long rains, respectively. However, over the past ten years the local climatic conditions have appeared to become more irregular, and there have been two periods of extended drought.

The Project is located at 3° South, and receives strong sunshine most days of the year. The coolest month is August, the hottest February.

Soils

The dominant soil type within the Project Area, and a common soil for this area of Kenya, is red laterite. This soil type characteristically contains high amounts of iron and aluminum. There are also small bands of black cotton soil occurring randomly within the Project Area, that account for a small amount of area, and is an insignificant contributor to the Project's soil carbon pool. There are areas within the project boundary where gneiss islands, rocky outcrops, penetrate the soil to form small rocky hills. These

outcrops represent a small portion of the Project Area and were excised from the Project's soil carbon pool.

Geology

The Project Area is geologically dominated by the remnants of the Eastern Arc Mountains, which include the Taita Hills, Mt. Kasigau at the Centre of the Project Area, and lesser hills such as Sagalla, and the Marungu Range that runs North-South along the Western boundary of the Rukinga Sanctuary. These hills all fall within the KCRPI Project Area, and are home to remnant patches of montane cloud forest, and to several endemic bird and flora species.

2.1.8 Title and Reference of Methodology

The Project utilizes VM0009 Methodology for Avoided Mosaic Deforestation of Tropical Forests v1.1, approved by the VCS for Sectoral scope 14 on November 10th, 2011.

2.1.9 Other Programs (CL1.5)

The KCRPI is not registered with any other GHG program, nor is it seeking registration with any. This is with the sole exception of the possible inclusion of the Project into a Kenya wide jurisdictional / nested REDD+ initiative (JNRI) approach. As Wildlife Works will be instrumental in the development Kenya's JNRI Program, the Kasigau Corridor Projects will be one of the first projects to participate in the jurisdictional program, and it will therefore be ensured that there are no conflicts with any existing or other GHG programs. In fact, Wildlife Works is in wide support of the VCS JNR program, and wishes to assist in its implementation. Any existing VCS project is guaranteed not to conflict with their own JNRI system.

2.1.10 Sustainable Development

The KCRPI provides many benefits that will help achieve Kenya's stated sustainable development goals. In 2015 Kenya joined the global community in adopting the Sustainable Development Goals (SDGs), a set of 17 universal goals covering the thematic areas of environmental, economic and social development. These 17 goals are structured to help drive the countries funding and policy decisions. Additionally, in 2016 Kenya implemented the Vision 2030 plan, a long-term development plan with the goal of transforming Kenya into a newly industrializing, middle-income country that provides a high quality of life to all its citizens by 2030 in a clean and secure environment. These two sustainable development plans are coordinated in their goals and thematic areas. The climate, community and biodiversity benefits provided by the KCRPI, and detailed in sections 3, 4 and 5, all contribute to achieving the global and national sustainable development goals detailed in these two plans. These contributing benefits are monitored through the KCRPI's climate, community and biodiversity monitoring plans. Some of Kenya's sustainable development goals that the KCRPI will contribute to include: ending poverty, providing education to all, sustainable water management, action to combat climate change and its impacts, and to sustainably manage forests, and reverse land degradation and halt biodiversity loss.

2.2 Project Implementation Status

2.2.1 Implementation Schedule (G3.4)

Date	Milestone(s) in the project's development and implementation
01 January 2005	Project Start Date
01 January	Start of project activity, protection of forest from deforestation and degradation.
22 December 2009	CCB Validation
04 February 2011	VCS Validation
07 February 2011	VCS Verification M_1
5 December 2012	CCB Verification M_1
11 December 2012	VCS Verification M_2
23 May 2013	CCB Verification M_2
22 May 2013	VCS Verification M_3
15 September 2015	CCB Verification M_3
31 August 2015	VCS Verification M_4

2.2.2 Methodology Deviations

The KCRPI does not have any deviations from the methodology.

2.2.3 Minor Changes to Project Description (*Rules* 3.5.6)

The KCRPI does not have any minor changes to the Project Description during this monitoring period.

The following minor changes from the PD during previous monitoring periods were listed in the appropriate VCS monitoring reports, and will be listed here to carry forward every deviation made from the PD or monitoring plan for the lifetime of the Project. The deviations listed below were accepted during each of the relevant verifications:

M_1 Deviations

There were no deviations in the first monitoring period

M_2 Deviations

There is one change from the parameters described in the Project Description. The parameter $\delta_{LE}, \hat{\delta}_{LE}$ was listed in the PD with a value of 0.4498, it was subsequently discovered that the equation was incorrect and with the corrected equation the parameter was recalculated at -0.564. There have been no other major deviations from the monitoring plan described in the PD, section 13 Monitoring, or in the monitoring standard operating procedure documents: 'Standard Operating Procedure - Biomass' and 'Standard Operating Procedure - Soils'.

The plot sampling team has been expanded to 13 members, and the biomass monitoring team is now fully implemented and operational, with a manager, Mwangi Githiru, a Biomass Monitoring center and 3 full-time members as well as seasonal interviewers.

M_3 Deviations

There is one change from the parameters described in the Project Description. In the first year of the Project 5 leakage plots were moved, however in this monitoring period it was discovered that due to an over-site the leakage model had not been updated to reflect the new plot values. With this update the parameter $\delta_{LE}, \hat{\delta}_{LE}$ has changed from -0.564 to - 0.762.

M_4 Deviations

There were no deviations in this monitoring period.

M_5 Deviations

During this monitoring period some Project procedures have been revised, including the disturbance monitoring plan and soil sampling and bulk density sampling standard operating procedures. Through the Project's adaptive management practices we are always looking for ways to improve the Project's procedures and protocols to incorporate new techniques and methods that will improve the quality of the data, reduce the potential for error and ensure repeatability. Both updated protocols have been provided to the auditor for review. The soil bulk density sampling procedures have been updated to include improved methods on the field measurement of bulk density through a pit method. The soil sampling procedure was revised to add better clarity and to integrate the bulk density sampling procedure. The disturbance monitoring procedure was revised to add a simplified method for quantifying the emission from a deforestation event. Whereas previously it was required that new sampling plots be added in the area of deforestation to determine the emission, in this revision the Project can now elect to delineate the area of disturbance and move it to a non-forest strata and assume that all biomass has been destroyed and emitted.

2.2.4 Project Description Deviations (*Rules* 3.5.7 – 3.5.10)

The KCRPI has one deviation from the Project's CCB Project Description. In the CCB PD it states that the Project Start Date is 01 January 2006, and that the Project Lifetime is 20 years. However, the Project's VCS PD and every Monitoring Report and Project Implementation Report has stated the Project Start Date to be 01 January 2005, and the Project Lifetime to be 30 years. The KCRPI Project Start date is 01 January 2005, and the Lifetime is 30 years.

The Project also has one deviation from the VCS Project Description. A Project schedule is listed in the PD in Section 5.2. After reading and attempting to interpret the AFOLU requirements, the assumption was made that baseline reassessment should be performed every 10 years following the date of project validation, not 10 years after the project crediting period start date as the schedule in the PD indicates. Specifically, as the m5 monitoring period ends on December 21, 2017 and a baseline reassessment has not yet been performed, there was a deviation from the schedule in the PD, which indicated that a baseline reassessment was required by January 1, 2016.

2.2.5 Risks to the Project (G3.5)

Major identified risks that could have impact on the Project are listed as follows:

- Change in legislation – government expropriating the land through compulsory purchase for development scheme. As the Government of Kenya is very supportive of our project, and has no recent history of expropriation of private conservation lands, this risk is however very low. We will continue to seek international press for our project, as keeping it in the spotlight promotes awareness, and reminds the Government of the value it is adding to the country of Kenya.
- Income – risk that revenues from the sale of carbon credits do not meet projected sale volumes or credit values to sustain the project financially. Financial sustainability was modeled at extremely conservative carbon offset credit sale values and volumes. This project is a very popular project with high potential value in the marketplace. The likelihood of financial insolvency is therefore deemed to be very low.
- Crop failure - substantial and repeated crop failure in surrounding communities could lead to increased poaching and use of the forests for financial benefit. The risk of the occurrence of this is deemed to be high. Virtually all of our alternative economic development efforts are aimed at mitigating this risk.
- Invasion of cattle grazers due to famine in adjacent communities, or lack of grazing elsewhere. Even though an influx of cattle would affect the quantity of grass in the Project Area, it would not lead to any significant change in carbon stock. There is a risk of this happening, especially as Somalis have used the land in this area to feed and water their cattle over the years, sometimes with permission from landowners and sometimes without. However, given the increasing aridity in the area, we believe Somali cattle herders will be forced to look elsewhere for rangelands. We will be using carbon funding to increase ranger patrolling to better protect the Project Area from illegal incursion.
- Drought – drought is an increasing reality in this area of Kenya. We anticipate that climate change will worsen this problem throughout the project-crediting period. Drought inherently introduces two additional risks:
  - Wildlife – drought places severe stress on wildlife in the Project Area. However, many of the species living in this ecosystem are extraordinarily drought-adapted, and have little problem surviving in extended periods without rain. For those that aren't, we plan to continue to provide emergency water sources at all the ranches in the Project Area. More detail on this issue is provided in the CCB PDD in Section GL1.2.
  - Cash crops – drought will render the survival of cash crops, such as jojoba and citrus trees more difficult. However, these high value cash crops will be planted sparingly so as to minimize water demand. Additionally, these crops require much less water than a comparable maize field, and are able to survive higher temperatures, provided they receive some water. Farmers will be in a position to provide this in order to preserve the financial value of the crop under project funding.
- Fire – grass fires are common in the region due to intense heat and dry conditions. Naturally occurring fires are extremely rare, with the majority caused by humans, either accidental or intentionally set. Our strategy is to continue educating the local population, especially the youth, about the dangers of burning fallows, which is often done to improve grazing for their animals.

Fires tend to burn the grasses and shrubs, but move very quickly, and typically don't kill trees, as the species present are generally grass-fire tolerant.

2.2.6 Enhancement of High Conservation Values (G3.6)

The KCRPI holds a dryland forest biome that doubles up as an important migratory corridor and range extension area, especially for elephants and other wide-ranging wildlife such as big cats from the protected parts of the Tsavo Conservation Area. It was recognized as one of the key Wildlife Migratory Corridors And Dispersal Areas by KWS in a recent analysis[14]. It contains several critically endangered wildlife including Grevy's Zebra and African Wild Dog, as well as others considered to be under threat globally (e.g., Lion, Cheetah, Elephant, several vultures, and the Secretary Bird). Mt. Kasigau, an important site holding a threatened cloud forest ecosystem that provides basic ecological services for wildlife in critical (dry) situations, lies within the KCRPI Project Zone. It also provides critical and fundamental livelihood and cultural resources for local communities.

Wildlife Works' entire KCRPI is set-up is designed to maintain these High Conservation Values (HCVs) within the Project Area and at Mt. Kasigau from four main fronts: security provision, habitat improvement, mainstreaming monitoring and supporting research and conservation in critical landscapes.

1. **Security provision and enhancement**: 2012-2014 saw a sharp increase in elephant poaching, both locally and globally, but has been declining from 2015-2017. Wildlife Works has instituted several permanent initiatives to deal with the poaching problem:
   - Increased ranger force: our ranger force has been increased to about 100 (with about 10% being women). In addition, we have maintained a large watchmen pool (currently 22) in order to free up rangers for wildlife security matters. These rangers maintain approximately 10 daily foot and car patrols from 8 outposts distributed across the entire Project Area. These patrols are coordinated by our Head of Security Eric Sagwe on each day focusing on particular areas of risk, such as entry points and high charcoal production areas.
   - Ranger Posts: All ranger posts are maintained to ensure they remain under good state of repair, especially in terms of reliable solar power supply to ensure phones and two-way radios are always charged, and other important amenities.
   - Kenya Wildlife Service (KWS) collaboration: Wildlife Works rangers remain an unarmed force. To help protect the rangers and coordinate larger actions the working relationship with the KWS Special Operations Teams initiated in 2012 has been maintained and mainstreamed. Indeed, KWS now has a permanent mobile team – Ranches Patrol Team – that is based on the ranches along the Kasigau Corridor (most of which are within the REDD+ Project) moving bases as need be, mainly dealing with commercial elephant poaching issues.
   - Collaboration with other organizations: Lastly, whenever appropriate, Wildlife Works continues to engage like-minded organizations or individuals in bolstering conservation and fighting the poaching menace, including use of tracker dogs and additional air patrols. To this end, Wildlife Works has obtained services of a second gyrocopter that seeks external support to fly over the project area on an almost daily basis collecting vital information for security and biodiversity

[14] Gordon O. Ojwang', Patrick W. Wargute, Mohammed Y. Said, Jeffrey S. Worden, Zeke Davidson, Philip Muruthi, Erustus Kanga, Festus Ihwagi and Benson Okita-Ouma (2017). Wildlife Migratory Corridors and Dispersal Areas: Kenya Rangelands and Coastal Terrestrial Ecosystems

monitoring purposes. Further, following the sad demise of our resident pilot (Rob Dodson) in 2017, Wildlife Works successfully supported the training of one of the local students (Dan Zuma) who came through our bursary system, to become an aeronautical technician (trained in Eldoret, Kenya) and qualified gyrocopter pilot (trained in the UK).

2. **Habitat enhancement in Project Area**: Water is still the critical limiting resource in this dryland ecosystem. Wildlife Works continues to improve water availability for wildlife in the Project Area by scooping (desilting) existing or old waterpans/waterholes to enhance water retention after the rains. Additionally, Wildlife Works has leveraged funding from an NGO (Elephant Conservation) to drill a borehole within the KCRPI specifically for wildlife, which partly also ameliorates human-elephant conflict as many conflicts occur when elephants are in search of water outside the ranches
   - Habitat enhancement around Mt Kasigau: a total of 1,548 seedlings have been planted around the mountain in neighboring schools and farms in an effort to reforest the landscape and reduce pressure on the trees on the mountain. Sites planted included: Bungule Primary and Polytechnic, Jora Primary, Rukanga Primary, Ngambenyi Primary, Moi High, Malewa Trust (private), Kiteghe Primary, Makwasinyi Primary and Kasigau Girls Secondary Schools. Survival is monitored annually by our Greenhouse Team (see report under Section 0).

3. **Mainstreaming monitoring**: the detailed biodiversity and social monitoring activities (outlined in Section 4 & 5) illustrate Wildlife Works' efforts to maintain high quality data collection to aid in evaluating project impacts and informing adaptive management. The Wildlife Works Research Camp has been maintained since 2012 and was expanded to in 2014-2016 to include a fully functional campsite with five safari tents available as extra accommodation for visiting researchers. To this end, Wildlife Works' Management maintains a long-term view of entrenching the monitoring and research components that will support implementation of the 30-year REDD+ program, as well as general long-term conservation and management of the expansive Tsavo Ecosystem. For instance, based on our knowledge and data, we were involved in the ESIA discussions around the railway development (and ongoing discussion on a planned Expressway) to try and ensure known wildlife corridors are avoided where possible or impacts mitigated for where development is unavoidable.

4. **Supporting conservation in critical landscapes**: Within the Reference Area of the KCRPI lie the Taita Hills, whose indigenous forests hold globally important biodiversity and are part of the Eastern Arc Mountains Hotspot. They are recognised as an Important Bird Area in Kenya, due to the presence of the two Critically Endangered bird species: the Taita Thrush and Taita Apalis. Dr. Mwangi Githiru, Wildlife Works' Director for Biodiversity and Social Monitoring is the 'Species Guardian' for both species (http://www.birdlife.org/extinction/pdfs/Taita_spp_Guardian_Action_Update.pdf) and continues to be involved in their research, monitoring and conservation.

2.2.7 Benefit Permanence (G3.7)

The KCRPI is a component of a comprehensive conservation project being executed by Wildlife Works since 1998. It is our intention to utilize carbon funding provided by the REDD project to make necessary investments in job creation and income generation activities in order to sustain financial stability into the foreseeable future. We have demonstrated the effective management of carbon proceeds throughout the first and second verification periods, achieving consecutive successful verifications, making it the most

advanced REDD+ project validated under VCS and CCB. The Project has executed carbon right agreements in the Project Area and received carbon proceeds through the sale of credits in the voluntary market as an operational REDD+ project. As a result, landowners now realize the value of their carbon. It is our intention to get these CRAs registered as full easements against the title deed of the land, although there is no perfected mechanism under Kenyan law as of yet. Our approach to transfer knowledge and our assistance in creating conservation institutions within the community speak to the efforts to ensure the CCB benefits extend indefinitely into the future.

It is Wildlife Works' intention to create a lasting culture of employment and financial health in the Project's sphere of influence. To that end, every job created thus far, and every job slated for creation in the future upon receipt of carbon funding, is designed to last not only throughout the project crediting period, but well beyond. Through job training, such as in our EcoFactory, members of the surrounding communities are building their capacity and gaining new skills, which will be lasting result of this project into the future. Carbon revenues have, and will continue to change the face of these communities, and Wildlife Works has effectively raised awareness about the link between forest / wildlife protection and the availability of sustainable employment. We have made detailed job creation information available to the public, and included many of the metrics in the various versions of this document. For virtually each and every Project Activity, as one of the measures of success, we will be tracking the number of jobs created as a direct result of that activity. Employment information will be reported in each PIR/Monitoring report throughout the lifetime of the Project. The types of job created by the KCRPI activities, whenever possible, are full-time, permanent positions, designed to last well beyond the crediting period.

2.3 Stakeholder Engagement

2.3.1 Community Consultation (G3.8)

Stakeholder Engagement

Please refer to sections G3.8-G3.10 in the CCB PDD for details of how stakeholders and communities were involved in project design and consulted during development. This section also describes Wildlife Work's commitment to on-going stakeholder engagement and consultation throughout the Project's lifetime.

The primary method of communication and consultation with project stakeholders and communities is through our community relations staff. They hold regular meetings with the communities and stakeholders to both disseminate project information, and to receive comments, suggestions and grievances. In addition, the Project Office is open during regular business hours and maintains an open-door policy for community members and stakeholders to come for project information or to make comments. The hours for the Carbon offices are 8:00 am to 5:00 pm Monday through Friday. This is the same plan as described in the CCB PDD, and has not been amended.

No significant project changes have resulted from these on-going consultations, but many small changes have occurred, mainly concerning the benefit sharing. Communities and stakeholders have provided a large amount of comments on how to ensure fairness and reduce corruption, or any possibility of the semblance of corruption, in the benefit sharing program. This has led to WWC providing great transparency to the communities on the names of students being provided with bursaries and the names of companies receiving contracts and the amounts of their contracts.

2.3.2 Public Comment Period Publicity (G3.9)

The Kasigau REDD+ Project Phase I – Rukinga Sanctuary Project Monitoring and Implementation Report (MR/PIR) has been posted for public comment on the CCBA website (http://www.climate-standards.org) and it was open to comments for 30 days, during the period May 15th to June 15th 2018. The document was also made available to the public in hard copy during the public comment period at our carbon offices in Rukinga, and at several other communities involved in Phase I. Affording local stakeholders an opportunity to review the documents and to raise any issues.

2.3.3 Distribution of Project Information (G3.9)

The following steps were taken to ensure all stakeholders have access to the project monitoring report document and are aware of and provided a means to comment on the document for the public comment period:

- An executive summary of the monitoring report was made available in English and Swahili at the Project office and distributed to the CBOs, LCCs and to project communities.
- WWC community relations staff actively communicated to community members the start of the Public Comment Period at all their community outreach meetings and encourage them to file any comments. Community relations officers will also make note of any verbal comment and ensure that these are registered.
- A computer was made available to any member of the public at the Project Office for making comments directly on the CCB website. All Public comments received in writing will be provided to the project verifier.

2.3.4 Conflicts and Grievances (G3.10)

In conjunction with key project stakeholders, Wildlife Works revised grievance mechanism during the reporting period to enable individuals, groups or communities across the KCRPI to contact us if they have an inquiry, a concern or a formal complaint regarding the environmental and social performance of the project. It is mainstreamed into our broader stakeholder engagement process (our *Stakeholder Engagement Policy and Procedures* document was also revised during this period). The Manager in-charge of Community Engagement and Outreach is responsible for receiving, registering and processing all grievances. We have established procedures to help us screen, investigate and determine resolution and redress options, plus systems to communicate decisions taken and progress on pending actions. This helps ensure the grievance mechanism remains accessible and trusted.

Stakeholders across the KCRPI have five ways of registering their complaints or concerns, which they do either orally or through writing:

i. Open-door company policy: Wildlife Works maintains an open-door policy for all community members whereby they are free, if they would wish to, to walk in and personally register a complaint with the appropriate member of staff, including senior management. Wildlife Works retains its main operating base within the project area to ensure accessibility of key members of staff and management to community members
ii. Through the Chief's Office: the REDD+ project area covers six administrative Locations each headed by a Chief. Wildlife Works strives to engage these key leaders in all our operations involving the communities e.g., to organise community meetings and during our SBIA workshops.

They are also key arbiters in cases where Wildlife Works are unable to resolve an issue with the complainant. Blank Grievance Forms are also deposited at Chief's Offices, and Wildlife Works gets in touch with the Chiefs periodically to collect any completed forms. When forms are dropped into REDD+ Project's suggestion boxes outside Chief's Offices, we follow the procedure for opening and responding below

iii. Suggestion boxes: Wildlife Works has put up suggestion boxes across the entire project area at Chief's Offices. Chief's Offices are established such that they are accessible to most members in a Location and therefore are an ideal place to set these boxes. They are opened once a month by a team comprising a community representative, a Chief or chief's representative, and a Wildlife Works staff member. All comments and complaints are registered, and the team agrees on how to respond to them depending on the issue and following the Procedures and Guidelines

iv. During community meetings: as mentioned above, the Chief is involved in setting up various community meetings (termed Barazas) and community members are free to air any complaints or feedback during these meetings. Wildlife Works maintains records and minutes to all these meetings and follows up with the individual complainants in case of specific grievances, or with the Chief's Office for general complaints

v. Online via the CCB/VCS websites: this is especially during the Public Comments Period when project audits – validation and/or verification – are conducted. Members of the community with access to the Internet can register any complaints/feedback directly to the CCB/VCS websites. Those without such access can use any of the procedures above to register complains or comments, especially through the CBO or Chief's Office using grievance forms.

A total 52 comments were received from the community between 2016 (27) and 2017 (25) (Figure 4). Most were seeking information or clarification about the REDD+ project (25); the rest were requests or opinions (17) and complaints (10). Most of the complaints were about distribution of the community profit-share from the carbon revenues including bursary schemes. Wildlife Works' Community Liaison Department spent time explaining again the structure of the WWCT and the negotiated distribution scheme during Chief's barazas. Where necessary, they issues raised were escalated to the relevant authorities, such as KWS (for human-wildlife conflict) and the LCC's bursary committee for bursary-related issues.

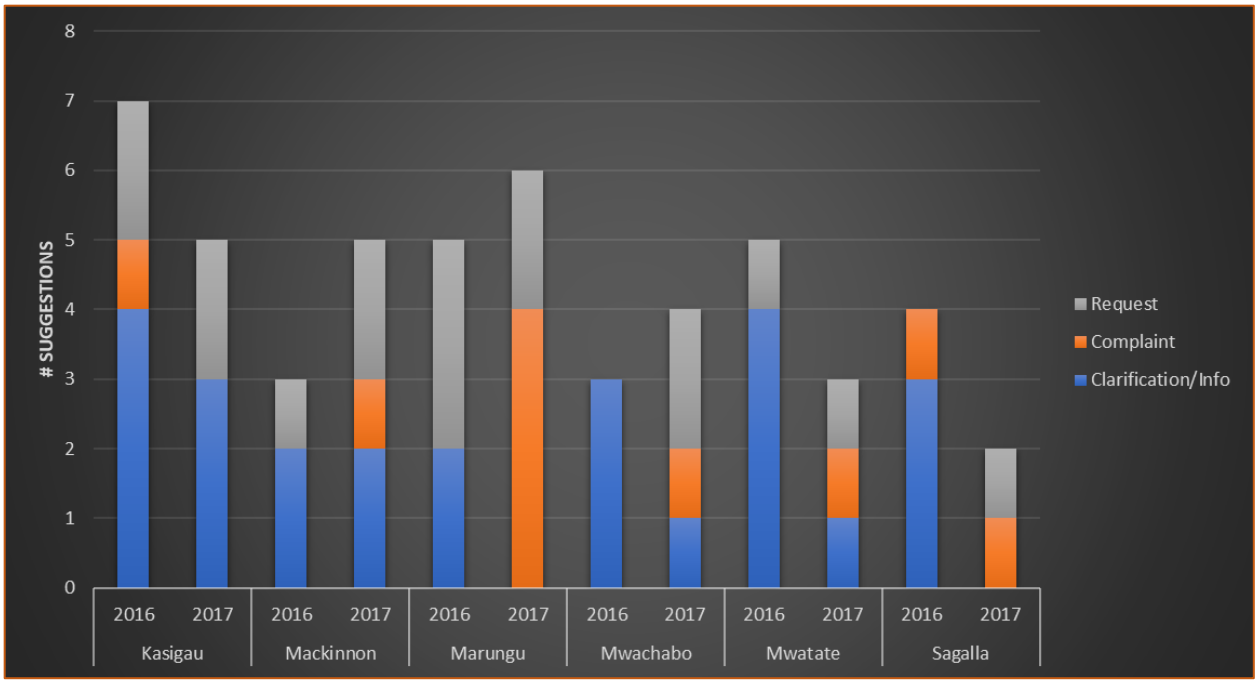


Figure 3: Categories of remarks collected through the different feedback avenues across the six locations within the REDD+ project zone from 2016-2017

2.4 Management Capacity and Best Practices

2.4.1 Required Technical Skills and Expertise (G4.2)

Wildlife Works is managed by Mike Korchinsky, a serial entrepreneur, with significant large company management expertise. Mike is supported by Colin Wiel who is a successful entrepreneur in his own right and the founder of the San Francisco chapter of the Keiretsu Forum, a world class angel investor forum.

Key personnel in this project include:



Wildlife Works' CEO and Founder - Mike Korchinsky, who has been a large-scale owner of conservation lands in Africa and Canada for almost 15 years. Previous to founding Wildlife Works, he followed a very successful business career. Through this he gained experience in managing multi-million dollar projects all over the world, some of which had as many as 5,000 team members, and in which he was he was responsible for all profit and loss accounts. In addition he also has experience in being a member of the executive team of a U.S. public company.

Mike founded Wildlife Works in 1997. Since then it has come to be respected by many leading conservation groups in the world as a model for community-based conservation. Mike and his team on the ground in Kenya have successfully steered Rukinga Ranch through many challenges over the years, and succeeded in creating the vibrant

biodiversity sanctuary that it is today. Mike has contributed extensively to the development of AFOLU carbon accounting methods and credit markets, and his achievements would run off of this page if listed in their entirety.

Director of Regional Operations – Jamie Hendriksen



Jamie is the head of all operations for the KCRPI and KCRPII projects, including the design, operations, budget, construction and management of the expansion plans to all the new ranches within the Project Area. Jamie is additionally responsible for all aspects of land management of the 30,168.66 ha Rukinga Ranch, plus additional lands of over 2,000 ha that Wildlife Works manages for conservation for the lands owners. Previously he was head of operations under the previous manager, Rob Dodson, and supported Rob in the daily management of the Project. He has extensive knowledge of local and regional biodiversity. Before Wildlife Works, Jamie had over 11 years experience in running high-end tourist lodges throughout Africa. He is skilled mechanically, trained in project management, and completes jobs quickly and professionally. He is fluent in Swahili and has had great experience operating in Wildlife Sanctuaries, often in high-conflict areas. He is a skilled communicator, negotiator and team player.

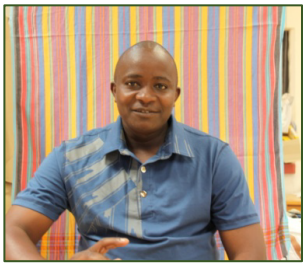
VP Carbon Development – Jeremy T. Freund



With over 20 years' experience in the fields of satellite remote sensing, GIS and applied geography, Jeremy brings broad technical and managerial skills to the Wildlife Works Carbon management team. Possessing a B.S. in Aerospace Engineering from the University of Colorado at Boulder, Jeremy specialized in satellite engineering and data analysis with several years' experience working for prime US government contractors. He went on to receive his Masters in geography from the University of California, Santa Barbara, where he developed a crop monitoring/ famine early warning system for Kenya. He has spent several years working in applied natural resource science with emphasis on GIS/remote sensing for ecosystem services monitoring and applied forestry / biometric applications. As the science and technology lead for WWC, Jeremy's primary responsibilities include carbon accounting and accreditation management for REDD+ projects and national REDD+ Programs. Jeremy also oversees WWC's policy and scientific consulting for national jurisdictional and nested REDD+ Programs. He manages technical documentation for Wildlife Works, including PDs, MRV documentation and methodologies.

Other key management roles to ensure successful continuation of all Project Activities include the following:

Sewing Factory Manager – Daniel Munyao



Daniel is a Kenyan citizen, also from the Kamba tribe. He is an experienced sewing factory supervisor, having held positions at several large factories in Nairobi and Mombasa prior to joining Wildlife Works in October 2002. He began his career in 1982 as a machinist and worked his way up through the management ranks. His wide experience of all aspects of apparel production, together with his personal attributes of being an excellent team player, a positive reinforcement style manager, and needing little or no supervision on a day to day basis. This makes him an invaluable resource for us in managing our sewing factory in the bush.

Community Relations and Human Resources Manager- Lenjo Laurian



Lenjo is of Taita origin from the immediate community and was one of our first employees. He was hired in January 2001 as a storekeeper and assistant to the previous site manager Alice Ndiga He was trained into the position he now holds. His skills include people management, cultural knowledge of local community norms, basic administration computer skills such as Word and Excel, excellent verbal and written communication skills with fluency in English, Swahili and Taita and excellent conflict resolution.

Director of Biodiversity and Social Monitoring – Dr. Mwangi Githiru

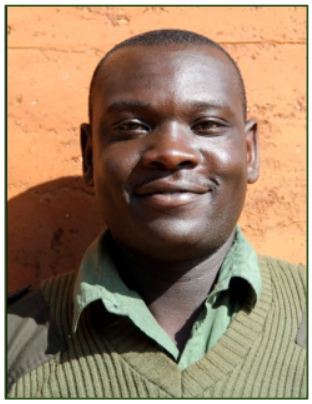
As Director of Biodiversity and Social Monitoring, Mwangi's main role is to formulate biodiversity and social monitoring plans, and lead research teams undertaking surveys and studies geared towards evaluating the impact of Wildlife Works' REDD+ programs in Africa. He has a Ph.D from the University of Oxford, England, and has held a Post-doctoral position at the University of Antwerp, Belgium and a fellowship at Brown University, USA. Previous to his employment at Wildlife Works, he worked on the governmental level as the Deputy Director of Research in the Ministry of Higher Education, Science and Technology.



Director of Forest Science - Simon Bird

Simon has been working in the forest ecology and environmental conservation industry for over 10 years. Simon has a B.S. in Environmental Science and a M.S. in Soil Science from the University of Vermont. Simon works in the Carbon Technical Development department at Wildlife Works Carbon's San Francisco California office. There he assists with the development of REDD projects, including the validation and verification process and the annual monitoring, reporting and verification for existing REDD projects. Simon's duties include overseeing biomass sampling methods and protocols, forest modeling, and technical writing and reporting to both the VCS and CCB standards. Simon has additionally participated in the revision process of VCS REDD methodology VM009.





Head Wildlife Ranger - Eric Sagwe

Eric grew up less than 1 mile from our project headquarters and was originally hired as a young man with no formal training to be a wildlife ranger in the sanctuary. At that time the Head Ranger was Ekiru Mirimuk from a different region of Kenya, who had been brought in at the start of our project because he had specific knowledge and experience with managing a ranger force in the Kenyan bush, to patrol and to perform anti-poaching and other activities. When Ekiru retired, Eric was promoted to Head Ranger. His skills include motivation and leadership by example, tracking, patrol design and supervision, wildlife recognition and bush awareness and conflict management.

Conservation Project Manager – Cara Braund



Cara has been with the Kasigau Corridor REDD+ Project since January 2012, and has been involved in various aspects of the project, including managing the office operations, communication with international and local stakeholders, supervising operations and ensuring departmental coordination. Based at the Kenyan Headquarters, one of her primary roles is communicating with the local landowners regarding the progress of the project, including giving them revenue updates. Cara also assists Jamie Hendriksen, Director of Regional Operations in various aspects of work, and serves as a primary or secondary point of contact for external stakeholders and project partners such as NGOs, private sector operators and government agencies. Cara also handles the logistics of national and international visitors to the project.

2.4.2 Worker Training (G4.3)

Wildlife Works has always provided training for its employees in Kenya, starting from the early days when we built a factory and taught local women how to sew from first principles. We have trained local wildlife rangers, factory workers and supervisors, organic greenhouse workers, personnel managers, and forest inventory specialists (plot sampling teams). We have provided the validator with training programs for Wildlife Works rangers, factory workers and greenhouse workers. The most recent specialized hires have been for the Biodiversity Monitoring Team, which involves geo-location of animal sightings, detailed inventory management and reporting and skilled field techniques. Each department works to cross-train employees, so that to the fullest extent feasible all members of a department are able to perform all tasks required by the department. Therefore, while there may be specialized tasks, tools used or processes utilized in a department, we desire for as many employees of that department be able to perform all tasks

required, and cover any position if needed in the event of an employee absence. Additionally, if an employee leaves their position for any reason, other employees can easily move up into that position.

2.4.3 Community Employment Opportunities (G4.4)

As mentioned above in section 2.1.1, Wildlife Works has supported the development of community-based organizations (CBO), whose aim it is to win and manage carbon-funded activities. The CBOs are trained in grant writing and management, project management, accounting and other key skills pertinent to developing the communities in the area. The goal is for these CBOs to eventually become 100% self-sustaining, but at their request they are currently under the tutelage and financial support of Wildlife Works. Without carbon funding, the CBOs would not have been implemented, and Wildlife Works is proud to be able to present the communities in the sphere of influence of the carbon project with the capacity to manage their funds accordingly.

To ensure that all hiring for positions in the Project are handled in a manner that provides equal opportunity to all members of the project communities the following process has been developed and is implemented by the Project Office.

Wildlife Works Jobs Advertisement

Once a vacancy arises, we advertise/announce so that it reaches all the locations within the project area through local administrators (Chiefs), CBOs and our community relations department.

Positions are advertised for a minimum of one month (30 days), after which suitable candidates from all locations are shortlisted according to the information listed on their application. As many suitable candidates as possible are invited for interviews. We conduct transparent interviews with the objective to fill the position with the best candidates, but priorities are given to women and disadvantaged groups to ensure they are well represented and given a fair chance as is described in our HR Policies.

We ensure that all locations of the project area are well represented to the extent of training those who lack the required skills.

Wildlife Works Relevant Recruitment and Selection Policies

Recruitment Policy & Procedure

Policy Statement

It's a policy of Wildlife Works to be an equal opportunity employer and Wildlife Works shall not in its recruitment discriminate based on gender, age, race and ethnicity or entertain any form of discrimination. The company shall ensure that all employee requisitions, interviewing, and hiring shall be performed in an effective manner and method with the objective to fill a position with the best available candidate.

Purpose

The purpose of this policy is to ensure that a transparent and unbiased recruitment and selection process is followed - one that results in the appointment of the best candidate, based solely on merit and best-fit with the organisational values, philosophy, and goals in mind.

Equity & Diversity Policy

Policy Statement

It is the policy of Wildlife Works to provide equal employment, educational and social opportunities for all employees, without regard to race, colour, religion, sex (including pregnancy), national origin, age, status, disability, political affiliation, sexual orientation, gender identity or genetic information at any given time. Wildlife Works is committed to the principle of excellence, with respect for all.

Equal Employment Opportunity & Affirmative Action

Wildlife Works prohibits discrimination and any form of harassment, provides equal employment opportunity without regard to race, HIV/AIDS status, pregnancy, mental status colour, religion, gender, trade affiliation, ethnicity or national origin, political or other opinion disability, sexual orientation or preferences of age.

The company is committed to recruiting, hiring, and promoting qualified minorities, such as women and individuals with disabilities within the surrounding community and within the workplace.

2.4.4 Relevant Laws and Regulations Related to Worker's Rights (G4.5)

Wildlife Works operates within all local and national employment laws and has been doing so for over 14 years in the country of Kenya. Like any business, Wildlife Works is subject to periodic audits by the Government Employment Officer. We have always passed all inspections, whether from local officials or International agencies such as Verite.

The laws that are relevant to this project are as follows:

EMPLOYMENT LAWS

Export Processing Zone's Act (Cap. 547)

As an Export Processing Zone (EPZ) company we are exempted from the standard Labor Laws of Kenya. Instead we must conform to those laws that that have been deemed applicable to General Provisions of the Employment Act (Cap 226-229) or amended for EPZs as covered by the Export Processing Zone's Act (Cap. 547).

National Health Insurance Fund

N.H.I.F was established on 12th July 1966 by an Act of Parliament (Cap 255) of the Laws of Kenya, and later became a state corporation on the 15th February 1999 through an Act of Parliament no.9 of 1998. The objective of its establishment is to enable majority of Kenyans to access healthcare services at supplemented costs. Contribution to the fund are compulsory for all persons whose income is Ksh.1000/= and above. To ensure our full compliance with this regulation a Wildlife Works representative visits the NHIF offices in Voi monthly. Our monthly payroll is submitted and the NHIF staff calculates our monthly contribution, which is then paid in full. Additionally, we are subject to random checks by the NHIF inspector, who makes unannounced visits to our facility to inspect our books. We have always been found to be in full compliance of this act.

The National Social Security Fund Act (Cap 258)

The National Social Security Fund Act of 1965 created this fund for the benefit of the members. It is a compulsory savings scheme into which the employer pays a statutory contribution for every employee who is a member. We physically go to the NSSF offices in Voi monthly to submit our monthly payroll on a NSSF form, and we pay the monthly dues. We are subject to strict audit checks by the NSSF inspector

who visits our facility every two months and on passing the audit provides us with an official letter indicating we are in compliance. We have always been found to be in full compliance of this act.

Pay As you Earn (P.A.Y.E)

Section 37 of the Income Tax Act.

The "Pay As You EARN" method of deducting income tax from salaries and wages applies to weekly wages, monthly salaries, annual salaries, bonuses, commissions and directors fees (whether the director is resident or non-resident). We are required to go to the Kenya Commercial Bank (KCB) on a monthly basis to pay the withheld tax from our employees' wages and salaries. The bank takes one folio from our KRA receipt book, and stamps the other two folios, one of which we then take to the KRA office in Voi and provide it to them.

The Factories and Other Places of Work Act (Cap 514)

The Factories Act deals with the health, safety and welfare of an employee who works in a factory or other place of work. This Government department has never audited our facilities, as it is very small and covers the entire country. However, we have good reason to believe we are in full compliance with this act as a result of a third-party audit of our factory and operations performed by the independent NGO Verite, from the USA.

FairTrade

As of 2012, the 3 Wildlife Works EcoFactories are now certified Fairtrade USA.

The Work Injury Benefits Act (Cap. 236)

This Act ensures that companies have systems in place so as to provide any employees who are injured on duty with adequate compensation from the employer. We are required to maintain private insurance to cover our responsibility under this act.

Regulation of Wages and Conditions of Employment Act (Cap. 229)

This act sets the conditions of work and the minimum wage guidelines. The EPZ Act supersedes this act with regard to minimum wage and in fact the EPZ minimum wage guidelines are slightly higher than the National Employment Act guidelines.

Labor Relations Act, 2007 (Acts No. 14)

This is the new version of the old Trade Unions Act and the Trade Disputes Act, revised to harmonize the old Trade Acts with Kenya's recent ratification of many of the elements of the ILO Freedom of Association and Protection of the Right to Organize Convention, 1948 (No. 87). We are required to provide our workers with the freedom of association. We are required to honor a dispute process as laid out in the act. We currently have no collective bargaining agreement in place nor are we required to do so. We have never had a dispute with any employee that resulted in any collective action, lock out etc. and we have no disputes at all at this time, and we believe that we are in full compliance with this Act. To ensure that employees are aware of their rights under the Act, the following language is included in all employment contracts issued by Wildlife Works in Kenya.

"Wildlife Works, EPZ Ltd. acknowledges the importance of the recently enacted Labor Relations Act 2007, and therefore we wish to inform you that you are entitled to Freedom of Association, and

specifically to join the Kenya Textile Workers Union (KTWU) should you so choose. Should you choose to join the KTWU, all membership dues and agency fees for the Union will be payable directly by you."

2.4.5 Occupational Safety Assessment (G4.6)

Wildlife Works is committed to worker safety and has a very strong track record thereof. In the field of wildlife management, it is impossible to remove all risks, as many of our staff spend every day in the bush that is now full of wild animals. Additionally, due to the illegal trade in ivory, armed poachers are also present in the Project Area. In January of 2012, one ranger was killed and a second severely injured in an ambush attack by poachers. In response to this incident, rangers have been outfitted with improved field medical kits designed for application in life-threatening situations in remote areas. Additionally, special training in the use of these kits has been provided to reduce the risk of serious injury or casualty. We provide full training and close guidance to our rangers, educating them on how to avoid conflict with armed poachers and dangerous wildlife. We also insure all our full-time employees under the National Health Insurance Fund (NHIF) and the National Social Security Fund (NSSF), which also covers spouse and children. In addition, as a company policy, we provide each employee with up to Ksh 10,000 worth of medical allowance at the local doctor in the town of Voi.

As part of our partnership with PUMA, we underwent a PumaSafe Audit. This was to ensure that the Wildlife Works EcoFactory met PUMA's standards for workers' rights, and health and safety. As part of this audit a first-aid room was built and equipped, as was a staff kitchen and canteen. The Kenyan Red Cross held two training sessions in first aid and personal health, training 40 EcoFactory workers, rangers and greenhouse staff.

Hazards associated with jobs performed are as follows;

Hazard	**Mitigation**
Sewing Factory Employees	All risks are identified in training manual provided to Validator along with how to avoid risk.
Needle sticking fingers	Finger guards are provided, sharps bin is provided for safe disposal of needles that are replaced
Inhalation of fibers	Face masks are provided
Fire	Fire exits clearly marked, no smoking in factory, firefighting stations in factory, three doors out of facility
Greenhouse Employees	All risks are identified in training manual provided to Validator along with how to avoid risk.

Exposure to Chemicals	Only non-toxic chemical free organic materials used in Greenhouse therefore no toxic or caustic chemical exposure. Rubber gloves and protective eye gear provided if needed.
Inhalation Hazard	Only non-toxic chemical free organic materials used in Greenhouse therefore no toxic or caustic chemical exposure. Masks provided during spraying of organic pesticides.
Temperature Extremes	Frequent breaks and availability of water during hot conditions. Shade cloth covering of work area.
Slip, Trip and Fall	Ensure work is clear of all slip or trip hazards before work begins.
Lifting	Use proper lifting techniques, always get help for lifting heavy objects.
Cuts	Wear gloves, keep tools sharp and always be aware of the proximity of fingers to blades when making cuts.
Electric Shock	There is no electricity at all at the Organic Greenhouse.
Pinching and Crushing Points	Wear gloves, keep tools sharp and always be aware of the proximity of fingers to blades when making cuts.
Inclement/Adverse Weather	Organic Greenhouse located adjacent to Ranger station, so employees can retreat indoors in adverse weather.
Snakes, animals	Keep greenhouse floor clear of organic debris for clear visibility, always be aware of the possibility for snakes, spiders, scorpions to be present, and do not approach or touch if seen.
Wildlife Works Rangers	All risks are identified in Ranger training manual provided to Validator along with how to avoid risk.
Elephants, Lions, Buffaloes, Snakes etc.	Training is given in how to approach, identify and stay a safe distance from potentially

	dangerous animals. First Aid training is provided in cuts, limb fractures, snakebites, dehydration and other possible health risks. Team design of 6 minimizes risk.
Poachers	Training is given in how to track, and peacefully apprehend poachers if possible and how to avoid confrontation with armed and aggressive poachers. Team design of 6 minimizes risk.
Sun Exposure, thorns etc.	Rangers are all provided with uniforms with long sleeves and long trousers and brimmed hats and boots. Lots of drinking water available at Ranger posts.
Wildlife Works Plot Sampling Team	All risks are identified in Plot Sampler training manual provided to Validator along with how to avoid risk.
Elephants, Lions, Buffaloes, Snakes etc.	Training is given in how to approach, identify and stay a safe distance from potentially dangerous animals. First Aid training is provided in cuts, limb fractures, snakebites, dehydration and other possible health risks. Team is designed to have sufficient numbers to improve lookout and minimize risk.
Poachers/Charcoalers	Team is instructed to avoid contact with any poachers or people producing charcoal. If the presence of any poacher or charcoaler is detected, the team is to immediately leave the area and notify the Head of Security when they are in a safe position.
Sun Exposure, thorns etc.	Each plot team member is all provided with uniforms with long sleeves and long trousers and boots. They are to bring lots of drinking water, which is available in the field at Ranger posts or other company and Ranch outposts.
Injuries from debris or tools during Soil Sampling	The plot team is also provided with personal protective equipment to help mitigate injuries. This includes safety glasses and long sleeves and trousers to protect against flying debris

	while digging. Additionally, they are provided with boots to protect their feet during digging.
WW/Tsavo Soap Factory	All risks are identified in Soap Factory Safety training manual provided to Validator along with how to avoid risk.
Lye	Comprehensive instructions are given on how to mix lye safely, and goggles and gloves are provided for employees.
Oils, Gas heating	Vegetable oils are only heated to 50-55° C, so are only hand warm. Gas stove is simple self-igniting LPG camp stove.

2.4.6 Financial Health of Implementing Organization(s) (G4.7)

Wildlife Works is responsible for project implementation and support with funding coming from successful sale of credits from Phase I and Phase II of the Project. Project financial information, including the project profit and loss statement and carbon credit sales all demonstrate the financial strength of this project. This information is commercially sensitive and will be shared with project auditors at the site visit upon request. All costs associated with carbon inventories and development of project design documents have been met by Wildlife Works.

Financial Health of Implementing Organizations

Wildlife Works Carbon LLC. is a Delaware registered Limited Liability Corporation in good standing, majority owned by Wildlife Works, Inc. and Mike Korchinsky.

Wildlife Works, Inc. is a US registered corporation and, as such, is governed by the corporation laws of California which ensure that, at all times, the company remain financially solvent and able to meet its liabilities.

The company is owned by independent shareholders of good standing and has a Board of

Directors comprised of 4 members. It is sufficiently capitalized through its Joint Venture with Wildlife Works Carbon LLC to ensure completion of the Project. Wildlife Works Carbon LLC has also received several high-profile investments from international corporations who support Wildlife Works' mission and believe wholly in its cause. Such deals include multi-million dollar investments from Allianz SE and PPR as well as advance purchases from BNP Paribas, Nedbank SA and PPR Home. For more information on the details of these investments and pledges, visit the following links:

PPR Home Invests in Wildlife Works

Wildlife Works / Nedbank Agreement

BNP Paribas Invests in Wildlife Works

Allianz Invests in Wildlife Works

Please see the CCB PDD, Section G3.11 for further details on project finance. All project financial information is held at the Carbon Office in Rukinga, Kenya. Wildlife Works also employs a full-time bookkeeper and accountant who is assigned to both the Phase I and Phase II projects.

2.5 Legal Status and Property Rights

2.5.1 National and Local Laws (G5.1)

Wildlife Works operates within all local and national employment laws, and has been doing so for over 14 years in the country of Kenya. Like any business, Wildlife Works is subject to periodic audits by the Government Employment Officer. We have always passed all inspections, whether from local officials or International agencies such as Verite.

There have been no local laws or regulations in Kenya that have gone into effect, changed or have been eliminated since the last verification event.

2.5.2 Free, Prior and Informed Consent (G5.3)

Wildlife Works conducted a full Free, Prior and Informed Consent campaign with the Ranch Owners during the project's development, please see the CCB PDD Section 5.3. Additionally, the Project Proponent continually holds meetings with project stakeholders and the surrounding communities to update them on the project and receive any comments or grievances.

2.5.3 Property Rights Protection (G5.4)

Currently and historically there have not been any communities or within the Project Area. Therefore, the Project does not and never has involved the relocation of any people. The Project will never re-locate any people that could encroach on the Project Area lands, although we actively prevent this from occurring. Prior to the project start date members of the community and/or immigrants had illegally cleared almost 4,000 hectares of the Project Area for farmland but those involved had returned to their home province or voluntarily relocated to the newly formed Sasenyi Valley Land Cooperative prior to the project start date.

2.5.4 Identification of Illegal Activity (G5.5)

The illegal activities that may be conducted from time to time in the Project Area include poaching of animals, both for animal products, such as elephants for their tusks, or for bush meat. Additionally, hardwood trees may be cut down for charcoal production or for building poles. Land could also be cleared for small-scale farms by members of the surrounding communities.

No project benefits are derived from any illegal activity. Wildlife Works has established a long and successful track record of monitoring the Project Area for any illegal activities and stopping them. As described in other sections of this report, our rangers have caught many poachers and charcoal burners before they were able to do significant damage to the ecosystem and have established a close working relationship with Kenyan government authorities. Wildlife Works always employs non-violent practices when dealing with perpetrators of illegal activities on the Project Area. Neither the Project, nor members of the community related to the Project, benefit in any way from these illegal activities.

3 CLIMATE

3.1 Monitoring GHG Emission Reductions and Removals

3.1.1 Data and Parameters Available at Validation

Data Unit / Parameter:	α
Data unit:	unitless
Description:	Effect of time on the cumulative proportion of conversion over time for the Project Accounting Area
Source of data:	Reference area and historic reference period
Value applied:	-1.0804558
Justification of choice of data or description of measurement methods and procedures applied:	Time and place in which the logistic model is fit
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	β
Data unit:	unitless
Description:	Effect of time on the cumulative proportion of conversion over time for the Project Accounting Area
Source of data:	Reference area and historic reference period
Value applied:	0.0003792
Justification of choice of data or description of measurement methods and procedures applied:	Time and place in which the logistic model is fit
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data / Parameter	$\hat{\eta}$
Data unit	Real
Description	Estimated linear predictor of cumulative deforestation model.
Source of data	Calculated using Equation 7. Equation 7 is fit using historic observations of forest state in the reference area.
Value applied	0.031649

Justification of choice of data or description of measurement methods and procedures applied	The linear predictor is used to predict the future degree of forestation in the Project Area at any point in time after the project start date.
Purpose of the data	Determination of baseline scenario
Comments	

Data Unit / Parameter:	$\boldsymbol{\theta}$
Data unit:	unitless
Description:	Effect of certain covariates on the cumulative proportion of conversion over time
Source of data:	Reference area and historic reference period
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	Time and place in which the logistic model is fit
Purpose of Data:	Determination of baseline scenario
Any comment:	Parameter not used

Data / Parameter	$\delta_{LE}, \hat{\delta}_{LE}$
Data unit	Time
Description	Lag parameter of leakage model.
Source of data	The parameter is estimated from the observed cumulative forest degradation and deforestation, $\hat{d}_t$, observed at the beginning of the Project, t0. This proportion is observed using a sample of plots in the leakage area, and the parameter is calculated using equation 9.
Value applied	-0.762
Justification of choice of data or description of measurement methods and procedures applied	To produce a parameterized leakage model that can be used to predict cumulative deforestation and degradation at any point in time.
Purpose of the data	Determination of baseline scenario
Comments	

Data Unit / Parameter:	$\hat{\lambda}$
Data unit:	proportion (unitless)
Description:	Exponential soil carbon decay parameter
Source of data:	Calculated using empirically measured, project specific data.
Value applied:	0.55
Justification of choice of data or description of measurement methods and procedures applied:	To predict the decay of soil organic matter in the Project Area under the project scenario.
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	$\hat{\ell}_{max}$
Data unit:	Proportion
Description:	The estimated maximum proportion of soil carbon lost over time.
Source of data:	Measured and calculated by quantifying soil carbon in cultivated areas within the reference area where the time of deforestation is known. The mean soil content from these measurements is then divided by the mean soil carbon measured within the Project Area.
Value applied:	0.4557
Justification of choice of data or description of measurement methods and procedures applied:	Used to determine the proportion of the total soil carbon in the Project Area that would be lost under the without-project deforestation scenario.
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	ℓ_{max}
Data unit:	Proportion
Description:	The maximum proportion of soil carbon lost over time.
Source of data:	Measured and calculated by quantifying soil carbon in cultivated areas within the reference area where the time of deforestation is known. The mean soil content from these measurements is then divided by the mean soil carbon measured within the Project Area.
Value applied:	0.4557

Justification of choice of data or description of measurement methods and procedures applied:	Used to determine the proportion of the total soil carbon in the Project Area that would be lost under the without-project deforestation scenario.
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	$\mathcal{A}$
Data unit:	Set
Description:	The set of all sampled farms in the reference area used to estimate the maximum proportion of soil carbon loss
Source of data:	A sample of farms in the reference area.
Value applied:	See soil sampling records
Justification of choice of data or description of measurement methods and procedures applied:	Observed once prior to the end of the first monitoring period, held constant over entire project lifetime.
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	n_{SCL}
Data unit:	Count
Description:	The actual sample size used to estimate the maximum proportion of soil carbon loss.
Source of data:	Is equal to the variable $\mathcal{A}$, the set of all sampled farms in the reference area to estimate $\hat{\ell}_{max}$, the maximum proportion of soil carbon loss.
Value applied:	25
Justification of choice of data or description of measurement methods and procedures applied:	Used in equation 19 to determine the uncertainty in the soil carbon loss model.
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{DF}$
Data unit:	standard deviation (unitless)

Description:	The estimated standard deviation of the state observations used to fit the logistic function for the Project Accounting Area BEM
Source of data:	Value calculated from the point observations in the cumulative deforestation model using Equation 17.
Value applied:	0.3127
Justification of choice of data or description of measurement methods and procedures applied:	Used to determine the uncertainty in the cumulative deforestation model and number of leakage plots required.
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	$\mathcal{C}$
Data unit:	set
Description:	The set of all selected carbon pools
Source of data:	Monitoring records
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Calculation of baseline emissions
Any comment:	

Data Unit / Parameter:	$\mathcal{I}$
Data unit:	set
Description:	The set of all observations of conversion. When superscripted with a monitoring period, the conversion observations are taken for leakage analysis.
Source of data:	Remote sensing image interpretation or field observations in the leakage area.
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Calculation of baseline emissions

Any comment:	

Data Unit / Parameter:	$a_{project}$
Data unit:	ha
Description:	Area of Project Area
Source of data:	GIS analysis prior to sampling
Value applied:	30,168.66
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Calculation of baseline emissions
Any comment:	

Data Unit / Parameter:	p_{forest}
Data unit:	Proportion
Description:	The proportion of the Project Area that is forested.
Source of data:	Measured using GIS and remote sensing analysis.
Value applied:	0.92
Justification of choice of data or description of measurement methods and procedures applied:	Used to determine the total amount of the Project Area that is forested. Used in equation 33.
Purpose of Data:	Calculation of baseline emissions
Any comment:	

Data Unit / Parameter:	a_{LE}
Data unit:	ha
Description:	Area of leakage area for the Project Area
Source of data:	GIS analysis prior to sampling
Value applied:	30,168.66
Justification of choice of data or description of measurement methods and procedures applied:	Used to define the area within which plots are established to measure any potential leakage from the Project Area.
Purpose of Data:	Calculation of baseline emissions

Any comment:	

Data Unit / Parameter:	$\widehat{m}_{LE}$
Data unit:	Count
Description:	The sample size in the leakage area.
Source of data:	Equation 10 calculates the sample size of plots needed in the leakage area.
Value applied:	38
Justification of choice of data or description of measurement methods and procedures applied:	To determine the number of sample plots needed to measure forest degradation and deforestation in the leakage area with the desired confidence levels.
Purpose of Data:	Calculation of baseline emissions
Any comment:	

Data Unit / Parameter:	$\boldsymbol{n_{DF}}$
Data unit:	count
Description:	Total number of state observations made to fit the cumulative deforestation model
Source of data:	Remote sensing image interpretation
Value applied:	2000
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	$\boldsymbol{o_i}$
Data unit:	unitless
Description:	State observation for the ith sample point in the Project Accounting Area reference area
Source of data:	Remote sensing image interpretation
Value applied:	See cdm records
Justification of choice of data or description of	N/A

measurement methods and procedures applied:	
Purpose of Data:	Calculation of baseline emissions
Any comment:	

Data Unit / Parameter:	r_{sp}
Data unit:	unitless
Description:	Expansion factor for above-ground biomass to below-ground biomass (root/shoot ratio)
Source of data:	IPCC Guidelines for National Greenhouse Gas Inventories, 2006, Volume 4: Agriculture, Forestry and Other Land Use, Chapter 4: Forest Land, Table 4.4
Value applied:	0.4
Justification of choice of data or description of measurement methods and procedures applied:	IPCC default value for Tropical shrubland
Purpose of Data:	Calculation of baseline emissions
Any comment:	

Data Unit / Parameter:	t
Data unit:	days
Description:	Vector of observed times to forest state
Source of data:	Monitoring records
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	w
Data unit:	unitless
Description:	The initial vector of weights used when fitting the deforestation model using IRLS. See equation [7] and section 6.4.7 for details.
Source of data:	Remote sensing image interpretation

Value applied:	See cdm records
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	x_i
Data unit:	geographic coordinates
Description:	Latitude of the ith sample point
Source of data:	Remote sensing image interpretation
Value applied:	See cdm records
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	$x_{i,j,k}$
Data unit:	varies
Description:	The ith measurement in plot j in stratum k.
Source of data:	Field measurement
Value applied:	See plot sampling records
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	$x_{i,j,k,d}$
Data unit:	m
Description:	The diameter of ith piece of lying dead wood on transect j in stratum k, decay class d.

Source of data:	Field measurements
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	Should use the most accurate of the data sources if both are available
Purpose of Data:	Determination of baseline emissions
Any comment:	Parameter not used

Data Unit / Parameter:	y_i
Data unit:	geographic coordinates
Description:	Longitude of the ith sample point
Source of data:	Remote sensing image interpretation
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	Parameter not used

Data Unit / Parameter:	ρ_{sp}
Data unit:	$\mathrm{kg} \cdot \mathrm{m}^{-3}$
Description:	Wood density of species sp.
Source of data:	Literature
Value applied:	0.24
Justification of choice of data or description of measurement methods and procedures applied:	Value is used as the wood density of standing dead wood with decay class of II. It converts the calculated wood volume to biomass.
Purpose of Data:	Determination of baseline scenario
Any comment:	Value was taken from: Harmon, Woodall, Fasth, Sexton and Yatkov. 2011. Differences between standing and downed dead tree wood density reduction factors: A comparison across decay classes and tree species. Research Paper NRS-15. Newton Square, PA. U.S. Department of Agriculture, Forest Service, Northern Research Station.

Data Unit / Parameter:	p_{BGLT}
Data unit:	Proportion
Description:	Proportion of below-ground large tree biomass removed as a result of land conversion to agriculture.
Source of data:	Default value from methodology based on the fact that Project Area would be converted to agriculture in without project scenario.
Value applied:	1
Justification of choice of data or description of measurement methods and procedures applied:	Used in equation 24 to determine the baseline emissions in below-ground large tree biomass.
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	cf_{sp}
Data unit:	$\mathrm{t\,C \cdot t.\,d.\,m.^{-1}}$
Description:	Carbon fraction of dry matter for dead wood.
Source of data:	In cases where an adequate value is not available from peer-reviewed literature, the methodology calls for the IPCC default value of 0.5 to be used. In this project the IPCC default was used
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied:	Used to convert the calculated total dry biomass of wood to carbon for each tree measured.
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	r_{WP}
Data unit:	Proportion
Description:	Proportion of above-ground large tree biomass converted to long-lived wood products.
Source of data:	Expert local knowledge or peer reviewed literature.
Value applied:	0

Justification of choice of data or description of measurement methods and procedures applied:	To account for carbon stored in biomass from the Project Area that is converted to long-lived wood products during any monitoring period.
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	$d_{j,k}$
Data unit:	Meters (m)
Description:	Depth of soil sample in plot j in stratum k.
Source of data:	Measured, defined in the Soil carbon SOP "Standard Operating Procedure Kasigau - Soil v1.0_5_24_2011.pdf"
Value applied:	1
Justification of choice of data or description of measurement methods and procedures applied:	Used in the soil carbon model for estimating total soil carbon quantities.
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	$f_{sp}(\cdot)$
Data unit:	Function
Description:	Allometric equation for species sp.
Source of data:	Derived from destructive sampling of trees in the same region of the Project.
Value applied:	Please see section 5.1, List of Allometric Equations for a table displaying the species-specific allometric equations used in the carbon analysis.
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	$\mathcal{D}$
Data unit:	Set

Description:	The set of all decay classes
Source of data:	Field measurements
Value applied:	See biomass inventory records
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	$\mathcal{M}$
Data unit:	Set
Description:	The set of all monitoring periods prior to $[m]$
Source of data:	Field measurements
Value applied:	See biomass inventory records
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	–
Data unit:	Percent
Description:	Moisture content of Tree green biomass.
Source of data:	Measured on site by cutting discs from destructively harvested trees. The value was calculated by the difference of the disc's green mass and its dry mass.
Value applied:	50
Justification of choice of data or description of measurement methods and procedures applied:	To convert the green weight of tree biomass as calculated by the allometry to dry tree biomass.
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	–

Data unit:	Percent
Description:	Moisture content of Shrub green biomass.
Source of data:	Value was derived from the literature for African woody plants, based on moisture content at the Genus level for the primary shrub species. The source document is Simpson, William T., 1996. "Method to Estimate Dry-Kiln Schedules and Species Groupings: Tropical and Temperate Hardwoods." Research Paper FPL-RP-548. Madison, WI: United States Department of Agriculture, Forest Service, Forest Products Laboratory.
Value applied:	45
Justification of choice of data or description of measurement methods and procedures applied:	To convert the green weight of shrub biomass as calculated to dry shrub biomass.
Purpose of Data:	Determination of baseline emissions
Any comment:	

3.1.2 Data and Parameters Monitored

Data Unit / Parameter:	$\mathcal{E}$
Data unit:	Set
Description:	The set of all burning events
Source of data:	Records of biomass burning and charcoal production in the project area
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	N/A
Any comment:	Parameter not used

Data Unit / Parameter:	a_k
Data unit:	Hectares (ha)

<table>
<tr><td>Description:</td><td>Area of stratum k</td></tr>
<tr><td>Source of data:</td><td>Measured</td></tr>
<tr><td>Description of measurement methods and procedures to be applied:</td><td>GIS analysis is used for the mapping and measurement of the strata within the Project Area.</td></tr>
<tr><td>Frequency of monitoring/recording:</td><td>First monitoring period</td></tr>
<tr><td>Value applied:</td><td><table><tr><th>Stratum name</th><th>area (ha)</th></tr><tr><td>ag active</td><td>704.25</td></tr><tr><td>dryland forest strata 1+2</td><td>6,859.05</td></tr><tr><td>dryland forest strata 3</td><td>5,622.55</td></tr><tr><td>dryland forest strata 4</td><td>2,766.93</td></tr><tr><td>dryland forest strata 5</td><td>8,123.51</td></tr><tr><td>dryland forest strata 6</td><td>4,326.41</td></tr><tr><td>grassland</td><td>1,600.18</td></tr><tr><td>montane forest</td><td>56.98</td></tr><tr><td>out area</td><td>108.80</td></tr><tr><td>Total area</td><td>30,168.66</td></tr></table>Additionally, please see the Project Area and strata map in Section 5.1.</td></tr>
<tr><td>Monitoring equipment:</td><td>Supervised classification of the Project Area was accomplished using commercial software to perform Land-use/Land-cover classification, as well as to perform QA/QC procedures. Wildlife Works used a common software package to perform this stratification.</td></tr>
<tr><td>QA/QC procedures to be applied:</td><td>QC: Wildlife Works' VP Carbon Development checks the accuracy of the stratification with sample plot information sourced from the inventory data and also with other available geographical datasets.
QA: The accuracy of the classification is also checked partially by the CEO of Wildlife Works Carbon and by the other staff in the Carbon Development department, all of who possess GIS and remote sensing expertise.</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Calculation method:</td><td>Supervised classification of the Project Area was accomplished using commercial software to perform Land-use/Land-cover classification, as well as to perform</td></tr>
</table>

	QA/QC procedures. Wildlife Works used a common software package to perform this stratification.
Any comment:	

Data Unit / Parameter:	$a_{j,k}$
Data unit:	Hectares (ha)
Description:	Area of plot j in stratum k
Source of data:	Measured
Description of measurement methods and procedures to be applied:	Measuring tapes used to establish plot area.
Frequency of monitoring/recording:	First monitoring period
Value applied:	0.196 and 0.02
Monitoring equipment:	Tape measure
QA/QC procedures to be applied:	QC: Wildlife Works' VP Carbon Development checks the accuracy of the stratification with sample plot information sourced from the inventory data and also with other available geographical datasets. QA: The accuracy of the classification is also checked partially by the CEO of Wildlife Works Carbon and by the other staff in the Carbon Development department, all of who possess GIS and remote sensing expertise.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Supervised classification of the Project Area was accomplished using commercial software to perform Land-use/Land-cover classification, as well as to perform QA/QC procedures. Wildlife Works used a common software package to perform this stratification.
Any comment:	

Data Unit / Parameter:	a_{plot}
Data unit:	Hectares (ha)
Description:	Area of plot j in stratum k
Source of data:	Measured

Description of measurement methods and procedures to be applied:	Measuring tapes used to establish plot area.
Frequency of monitoring/recording:	First monitoring period
Value applied:	0.196 and 0.02
Monitoring equipment:	Tape measure
QA/QC procedures to be applied:	QC: Wildlife Works' VP Carbon Development checks the accuracy of the stratification with sample plot information sourced from the inventory data and also with other available geographical datasets. QA: The accuracy of the classification is also checked partially by the CEO of Wildlife Works Carbon and by the other staff in the Carbon Development department, all of who possess GIS and remote sensing expertise.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Supervised classification of the Project Area was accomplished using commercial software to perform Land-use/Land-cover classification, as well as to perform QA/QC procedures. Wildlife Works used a common software package to perform this stratification.
Any comment:	

Data Unit / Parameter:	$cf_{soil,j,k}$
Data unit:	Dimensionless: (kg · kg-1; kilogram Carbon per kilogram soil)
Description:	Carbon fraction of soil sample j in plot in stratum k
Source of data:	Measurement
Description of measurement methods and procedures to be applied:	Measured according to the SOP: 'Standard Operating Procedure Kasigau - Soil v1.0_5_24_2011.pdf'.
Frequency of monitoring/recording:	Updated at the monitoring event at least once every five years.
Value applied:	See soil sampling records
Monitoring equipment:	As described in the SOP: 'Standard Operating Procedure Kasigau - Soil v1.0_5_24_2011.pdf'. Handheld GPS receiver Shovel(s)

	Garden hoe Large tarp Sharpie markers Soil collection bags.
QA/QC procedures to be applied:	QC: The Director of Regional Operations, Kasigau Corridor are in charge of carrying-out consistency checks of all data and confirming that the field team has followed the SOPs, and they perform regular field audits and data collection checks. QA: The processing of the samples and the soil analysis is done by a third party laboratory, "Cropnuts". The Laboratory has its own measures of control and its management is independent to that of the Project Proponent. A complete description of the company and its procedures can be found at http://www.cropnuts.com
Purpose of data:	Calculated from laboratory analysis.
Calculation method:	Updated at the monitoring event at least once every five years.
Any comment:	

Data Unit / Parameter:	$\mathrm{dbh}_{\mathrm{i,j,k}}$
Data unit:	Centimeters (cm)
Description:	Diameter at breast height (DBH) of the ith tree in plot j in stratum k.
Source of data:	Measurement
Description of measurement methods and procedures to be applied:	Tree diameter is measured with a metric diameter tape according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Frequency of monitoring/recording:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for $dbh_{i,j,k}$ for all plots.
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized: Handheld GPS (with plot coordinates pre-entered in UTM)

	Steel rebar and plot-center caps for marking plot centers Diameter tape (D-tape) for measuring DBH Metric tape at least 50m long, preferably fiberglass or weatherproof material Tree tags (preferably aluminum to prevent rusting, stamped with successive numbers) Flagging tape, multicolored for marking direction, etc. Compass, preferably with mirror Clinometer / Inclinometer for measuring tree height Notepads/plot sheets, preferably waterproof Pens, preferably waterproof Backpack, equipment holder Water, food, sunscreen, bug spray First-aid kit Cell phone, sat-phone or 2-way radios
QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Quality Control Procedure v1.6.pdf'.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Field measurement
Any comment:	

Data Unit / Parameter:	$h_{i,j,k}$
Data unit:	Meters (m)
Description:	Height of the ith tree in plot j in stratum k.
Source of data:	Measurement
Description of measurement methods and procedures to be applied:	Tree height is measured with a metric measurement stick according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf.'
Frequency of monitoring/recording:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for $h_{i,j,k}$ for all plots.
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized: Tree height measurement stick and/or clinometer

QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Quality Control Procedure v1.6.pdf'.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Field measurement
Any comment:	

Data Unit / Parameter:	ν
Data unit:	Count
Description:	Shrub size class per species.
Source of data:	Measurement.
Description of measurement methods and procedures to be applied:	Shrub count is measured using ocular methods according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Frequency of monitoring/recording:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the full database of shrub counts for each plot.
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized: Shrub height measurement stick and field metric measurement tape.
QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Quality Control Procedure v1.6.pdf'.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Field Measurement
Any comment:	

Data Unit / Parameter:	$m_{dry,j,k}$
Data unit:	Kilograms (kg)
Description:	Dry mass of non-tree sample harvested from clip plots in plot j, stratum k.
Source of data:	Measurement.

Description of measurement methods and procedures to be applied:	Dry mass of non-tree sample *is measured using destructive harvesting methods according to the procedures detailed in the SOP:* Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Frequency of monitoring/recording:	As required by the VCS Standard version 3 this parameter is remeasured at least once every five years.
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the full database of shrub counts for each plot.
Monitoring equipment:	As stated in the Biomass monitoring *SOP:* Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized: *Field metric measurement tape, clippers and a bag for the sample.*
QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Quality Control Procedure v1.6.pdf'.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Field Measurement
Any comment:	

Data Unit / Parameter:	$r_{BASE,i,j,k}$
Data unit:	Centimeters (cm)
Description:	Base radius of the ith standing dead, decay class II tree in plot j in stratum k.
Source of data:	Measured
Description of measurement methods and procedures to be applied:	Tree base diameter is measured at breast height with a metric diameter tape according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Frequency of monitoring/recording:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Value applied:	The file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' is the primary database and calculator for tree measurement and contains all values measured for $r_{BASE,i,j,k}$ $by\ plot$.
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized:

	Handheld GPS (with plot coordinates pre-entered in UTM) Steel rebar and plot-center caps for marking plot centers Diameter tape (D-tape) for measuring DBH Metric tape at least 50m long, preferably fiberglass or weatherproof material Tree tags (preferably aluminum to prevent rusting, stamped with successive numbers) Flagging tape, multicolored for marking direction, etc. Compass, preferably with mirror Clinometer / Inclinometer for measuring tree height Notepads/plot sheets, preferably waterproof Pens, preferably waterproof Backpack, equipment holder Water, food, sunscreen, bug spray First-aid kit Cell phone, sat-phone or 2-way radios
QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Quality Control Procedure v1.6.pdf'.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Field measurement
Any comment:	Carbon pool not included

Data Unit / Parameter:	$r_{TOP,i,j,k}$
Data unit:	Centimeters (cm)
Description:	Top radius of the ith standing dead, decay class II tree in plot j in stratum k.
Source of data:	Estimated.
Description of measurement methods and procedures to be applied:	The top diameter of standing dead, decay class trees is conservatively estimated to be 0 cm. This is the most conservative value for top diameter since the standing dead bole volume is calculated with the equation of a truncated cone, using Equation 52.
Frequency of monitoring/recording:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Value applied:	0

	The 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' is the primary database and calculator for tree measurement and shows that the values estimated for $r_{TOP,i,j,k}$ are all 0.
Monitoring equipment:	N/A.
QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Quality Control Procedure v1.6.pdf'.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Field measurement
Any comment:	Parameter not used

Data Unit / Parameter:	$v_{i,j,k}$
Data unit:	m^3
Description:	Volume of the ith standing dead, decay class II tree in plot j in stratum k.
Source of data:	Calculated from equation 51 in the methodology.
Description of measurement methods and procedures to be applied:	N/A.
Frequency of monitoring/recording:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Value applied:	Please see the *file* 'Rukinga Carbon Model and NERs_M=5_v3.xlsm', which *is* primary database and calculator for the tree measurement and contains all values measured for $r_{BASE,i,j,k}$ by plot.
Monitoring equipment:	N/A.
QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Quality Control Procedure v1.6.pdf'.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Calculated from equation 51 in the methodology.
Any comment:	

Data Unit / Parameter:	$y_{INTACT,j,k}$
Data unit:	Tonnes CO2e • ha-1
Description:	Carbon stock in standing dead trees in decay class I, plot j, stratum k.

Source of data:	Measurement.
Description of measurement methods and procedures to be applied:	Carbon stock is measured using a diameter tape according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Frequency of monitoring/recording:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the full database of standing dead trees in decay class I for each plot.
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized: GPS unit, diameter tape and field metric measurement tape.
QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Quality Control Procedure v1.6.pdf'.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Summation across plots
Any comment:	

Data Unit / Parameter:	$y_{DECAYED,j,k}$
Data unit:	Tonnes CO2e / ha
Description:	Carbon stock in standing dead trees in decay class II, plot j, stratum k.
Source of data:	Measurement.
Description of measurement methods and procedures to be applied:	Carbon stock is measured using a diameter tape according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Frequency of monitoring/recording:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the full database of standing dead trees in decay class II for each plot.
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized:

	GPS unit, diameter tape and field metric measurement tape.
QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Quality Control Procedure v1.6.pdf'.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Field measurement
Any comment:	

Data Unit / Parameter:	$y_{j,k}$
Data unit:	Varies
Description:	Attribute of plot j, stratum k
Source of data:	Field measurements
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Parameter not used

Data Unit / Parameter:	y_k
Data unit:	Varies
Description:	Attribute of stratum k
Source of data:	Field measurements
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A

Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Parameter not used

Data Unit / Parameter:	ρ_{mesoil}
Data unit:	kg/m3
Description:	Mass-equivalent bulk density of fine portion pf soil sample
Source of data:	Measurement.
Description of measurement methods and procedures to be applied:	Bulk density is measured using the procedures detailed in the SOP: 'SOP - Kasigau Soil Field Sampling v3.6 2017-10-05.pdf'.
Frequency of monitoring/recording:	100% of soikl sample plots are measured once every five years.
Value applied:	Please see the file 'Kasigau Corridor Soil Calc v2.xlsx' for the full database of soil sampling data and calculations.
Monitoring equipment:	The monitoring equipment is listed in the soil carbon monitoring SOP: 'SOP - Kasigau Soil Field Sampling v3.6 2017-10-05.pdf'.
QA/QC procedures to be applied:	The QA/QC procedures are listed in the soil carbon monitoring SOP: 'SOP - Kasigau Soil Field Sampling v3.6 2017-10-05.pdf'.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Field measurement
Any comment:	

Data Unit / Parameter:	$C_{AGLT}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated carbon stock in above-ground large trees at monitoring period $[m]$.
Source of data:	Carbon stock is measured using a diameter tape according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Description of measurement methods and procedures to be applied:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.

Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	1,587,570.36
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized: GPS unit, diameter tape and field metric measurement tape.
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Value calculated using the procedures described in Section 13.5.1 of the VCS methodology VM0009 v1.1.
Any comment:	

Data Unit / Parameter:	$C_{AGNT}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated carbon stock in above-ground non-tree biomass at monitoring period $[m]$.
Source of data:	Carbon stock is measured using a diameter tape according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Description of measurement methods and procedures to be applied:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	201,806.85
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized: GPS unit, diameter tape and field metric measurement tape.
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Value calculated using the procedures described in Section 13.5.1 of the VCS methodology VM0009 v1.1.

Any comment:	

Data Unit / Parameter:	$C_{AGST}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated carbon stock in above-ground small tree biomass at monitoring period $[m]$.
Source of data:	N/A
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Parameter not used

Data Unit / Parameter:	$C_{BGLT}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated carbon stock in below-ground Large tree biomass at monitoring period $[m]$.
Source of data:	Carbon stock is measured using a diameter tape according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Description of measurement methods and procedures to be applied:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	633,242.45
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized:

	GPS unit, diameter tape and field metric measurement tape.
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Value calculated using the procedures described in Section 13.5.1 of the VCS methodology VM0009 v1.1.
Any comment:	

Data Unit / Parameter:	$C_{BGNT}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated carbon stock in below-ground Large tree biomass at monitoring period $[m]$.
Source of data:	Carbon stock is measured using a diameter tape according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Description of measurement methods and procedures to be applied:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	80,723
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized: GPS unit, diameter tape and field metric measurement tape.
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Value calculated using the procedures described in Section 13.5.1 of the VCS methodology VM0009 v1.1.
Any comment:	

Data Unit / Parameter:	$C_{BGST}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated carbon stock in below-ground small tree biomass at monitoring period $[m]$.

Source of data:	N/A
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Parameter not used

Data Unit / Parameter:	$C_{SDW}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated carbon stock in standing dead wood at monitoring period $[m]$.
Source of data:	Carbon stock is measured using a diameter tape according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Description of measurement methods and procedures to be applied:	20% of biomass plots are measured at each monitoring event, so that 100% of plots are measured once every five years.
Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	50,861.56
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf', the following equipment is utilized: GPS unit, diameter tape and field metric measurement tape.
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Value calculated using the procedures described in Section 13.5.1 of the VCS methodology VM0009 v1.1.
Any comment:	

Data Unit / Parameter:	$C_{LDW}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated carbon stock in lying dead wood at monitoring period $[m]$.
Source of data:	N/A
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Carbon pool not included in Project

Data Unit / Parameter:	$C_{SOIL}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated carbon stock in standing dead wood at monitoring period $[m]$.
Source of data:	Carbon stock is measured using a diameter tape according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015-01-20.pdf'.
Description of measurement methods and procedures to be applied:	100% of soil sample plots are remeasured once every five years.
Frequency of monitoring/recording:	Updated at least every five years.
Value applied:	12,192,477.26
Monitoring equipment:	As stated in the Soil monitoring SOP 'SOP - Kasigau Soil Field Sampling v3.6 2017-10-05.pdf', the following equipment is utilized: GPS unit, diameter tape and field metric measurement tape.
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions

Calculation method:	Value calculated using the procedures described in Section 13.9 of the VCS methodology VM0009 v1.1.
Any comment:	

Data Unit / Parameter:	$C_{Total}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated carbon stock in the project area at monitoring period $[m]$.
Source of data:	Calculated as the sum of all required and optional carbon pools using equation [20].
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	14,690,541.94
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Value calculated using the procedures described in Section 13.12 of the VCS methodology VM0009 v1.1.
Any comment:	

Data Unit / Parameter:	$C_{BE}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated baseline emissions
Source of data:	Equation [20].
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	1,029,970
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions

Calculation method:	Value calculated using the procedures described in Section 8 of the VCS methodology VM0009 v1.1.
Any comment:	

Data Unit / Parameter:	$\bar{C}$
Data unit:	Tonnes CO2e / ha
Description:	Estimated mean carbon stock in the project area
Source of data:	Estimated based on the carbon inventory
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	May be updated at every monitoring period.
Value applied:	82.98
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Value calculated using the procedures described in Section 13 of the VCS methodology VM0009 v1.1.
Any comment:	

Data Unit / Parameter:	$C_{LE}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated emissions from leakage
Source of data:	Equation [32].
Description of measurement methods and procedures to be applied:	Leakage is measured according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Leakage v1.0_01_01_2011.pdf.
Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	0
Monitoring equipment:	Monitoring equipment list is provided in leakage monitoring SOP 'Standard Operating Procedure Kasigau - Forest Leakage v1.0_01_01_2011.pdf'.
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of leakage

Calculation method:	Value calculated using the procedures described in Section 10 of the VCS methodology VM0009 v1.1.
Any comment:	

Data Unit / Parameter:	$C_{PE}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Estimated project emissions
Source of data:	Equation [31].
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of Project Emissions
Calculation method:	Value calculated using the procedures described in Section 9 of the VCS methodology VM0009 v1.1.
Any comment:	

Data Unit / Parameter:	$C_{U}^{[m]}$
Data unit:	Tonnes CO2e
Description:	Confidence deduction
Source of data:	Equation [35].
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of Baseline Emissions
Calculation method:	Value calculated using the procedures described in Section 13.11 of the VCS methodology VM0009 v1.1.

Any comment:	

Data Unit / Parameter:	$C^{[m]}$
Data unit:	Tonnes CO2e
Description:	Quantified emissions reductions and/or removals
Source of data:	Project accounting area sampling
Description of measurement methods and procedures to be applied:	Value calculated using the procedures described in Section 9 of the VCS methodology VM0009 v1.1.
Frequency of monitoring/recording:	Every monitoring period
Value applied:	774,295
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [B.31]
Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{SE,AGLT}$
Data unit:	Tonnes CO2e
Description:	Estimated standard error of carbon stocks in above-ground large trees at monitoring period [m]
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the full database of standard error calculations and values for the carbon pools selected.
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation

Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{SE,AGNT}$
Data unit:	Tonnes CO2e
Description:	Estimated standard error of carbon stocks in above-ground non-trees at monitoring period [m]
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the full database of standard error calculations and values for the carbon pools selected.
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation
Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{SE,AGST}$
Data unit:	Tonnes CO2e
Description:	Estimated standard error of carbon stocks in above-ground small trees at monitoring period [m]
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation

Any comment:	Carbon pool not included in Project

Data Unit / Parameter:	$\hat{\sigma}_{SE,BGLT}$
Data unit:	Tonnes CO2e
Description:	Estimated standard error of carbon stocks in below-ground large trees at monitoring period [m]
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the full database of standard error calculations and values for the carbon pools selected.
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation
Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{SE,BGNT}$
Data unit:	Tonnes CO2e
Description:	Estimated standard error of carbon stocks in below-ground non-trees at monitoring period [m].
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the full database of standard error calculations and values for the carbon pools selected.
Monitoring equipment:	N/A

QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation
Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{SE,BGST}$
Data unit:	Tonnes CO2e
Description:	Estimated standard error of carbon stocks in below-ground small trees at monitoring period [m]
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation
Any comment:	Carbon pool not included in Project

Data Unit / Parameter:	$\hat{\sigma}_{k}$
Data unit:	Tonnes CO2e
Description:	Estimated standard deviation of carbon stocks in stratum k.
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the full database of standard error calculations and values for the carbon pools selected.
Monitoring equipment:	N/A

QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation
Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{SE,LDW}$
Data unit:	Tonnes CO2e
Description:	Estimated standard error of carbon stocks in lying dead wood at monitoring period [m]
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation
Any comment:	Carbon pool not included in Project

Data Unit / Parameter:	$\hat{\sigma}_{SE,SDW}$
Data unit:	Tonnes CO2e
Description:	Estimated standard error of carbon stocks in standing dead wood at monitoring period [m].
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the full database of standard error calculations and values for the carbon pools selected.
Monitoring equipment:	N/A

QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation
Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{SE,SOIL}$
Data unit:	Tonnes CO2e
Description:	Estimated standard error of carbon stocks in soil carbon at monitoring period [m].
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	Please see the file 'Kasigau Corridor Soil Calc v2.xslx' for the full database of standard error calculations and values for the soil carbon pool.
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation
Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{SE,Total}$
Data unit:	Tonnes CO2e
Description:	Estimated standard error of total carbon stocks in the project area at monitoring period [m]
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	641,773.37
Monitoring equipment:	N/A

QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation
Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{\bar{C}}$
Data unit:	Tonnes CO2e
Description:	Estimated standard error of carbon stocks in above-ground non-trees at monitoring period [m]
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Calculated using the procedures described in section 13.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the full database of standard error calculations and values for the carbon pools selected.
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	calculation
Any comment:	Carbon pool not included in Project

Data Unit / Parameter:	cf_{dw}
Data unit:	Tonnes carbon per tonne dry matter
Description:	Carbon fraction of dry matter for dead wood
Source of data:	Project accounting area sampling
Description of measurement methods and procedures to be applied:	Measurement procedures are described in the biomass measurement SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.9_2015.01.20.pdf'.
Frequency of monitoring/recording:	Held constant throughout project lifetime
Value applied:	Please see the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' to see the values used for the different decay stages of dead wood.

Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	Calculation of baseline emissions
Calculation method:	Literature
Any comment:	

Data Unit / Parameter:	$cf_{soil,j,k}$
Data unit:	kg carbon per kg soil
Description:	Carbon fraction of soil sample in plot j in stratum k
Source of data:	Laboratory analysis of field samples.
Description of measurement methods and procedures to be applied:	Measurement procedures are described in the soil carbon measurement SOP 'SOP - Kasigau Soil Field Sampling v3.6 2017-10-05.pdf'.
Frequency of monitoring/recording:	Monitoring is performed at least every five years.
Value applied:	Please see the file 'Kasigau Corridor Soil Calc v2.xlsx' to see the carbon fraction for each plot.
Monitoring equipment:	See the SOP 'SOP - Kasigau Soil Field Sampling v3.6 2017-10-05.pdf'.
QA/QC procedures to be applied:	See the SOP 'SOP - Kasigau Soil Field Sampling v3.6 2017-10-05.pdf'.
Purpose of data:	Calculation of baseline emissions
Calculation method:	Laboratory analysis
Any comment:	

Data Unit / Parameter:	c_k
Data unit:	US Dollars
Description:	Relative cost of making an observation in stratum k.
Source of data:	Pilot study and literature
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A

QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Parameter not used.

Data Unit / Parameter:	$\bar{E}$
Data unit:	Percent
Description:	Result of cross-validation of newly developed allometric equations.
Source of data:	N/A
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	Parameter not used.
Any comment:	N/A

Data Unit / Parameter:	$\hat{e}_i$
Data unit:	kg
Description:	Estimated cross-validated residual for observation i.
Source of data:	N/A
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	Parameter not used.

Any comment:	N/A

Data Unit / Parameter:	$f_{-i}(\bullet)$
Data unit:	Function
Description:	Allometric function re-fit without observation i
Source of data:	Intermediate variable used in cross-validation of newly developed allometric equations.
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	Parameter not used.
Any comment:	N/A

Data Unit / Parameter:	$G(t, \lambda)$
Data unit:	Proportion
Description:	Proportion of soil lost at time t with decay parameter λ
Source of data:	Calculation
Description of measurement methods and procedures to be applied:	Exponential decay model. See equations [11] and [13].
Frequency of monitoring/recording:	Re-evaluated whenever the baseline model is re-assessed.
Value applied:	Please see the file 'Kasigau Corridor Soil Calc v2.xslx'.
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	
Any comment:	

Data Unit / Parameter:	F_{DF}
Data unit:	Proportion
Description:	Proportion of cumulative deforestation
Source of data:	Estimated from a model. See equation [16]
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6.4.8
Frequency of monitoring/recording:	Predicted from model at each monitoring event
Value applied:	0.64
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [16]
Any comment:	

Data Unit / Parameter:	F_{LE}
Data unit:	Proportion
Description:	Proportion cumulative deforestation and degradation predicted by the leakage model.
Source of data:	Estimated from a model. See equation [8].
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 10.3.3.
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	0.79
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of Leakage
Calculation method:	Equation [8]
Any comment:	

Data Unit / Parameter:	$\hat{r}_{LE}^{[m]}$
Data unit:	Proportion

Description:	The estimated leakage factor as a proportion of baseline emissions
Source of data:	Estimated based on the difference between observed deforestation in the reference area and predicted deforestation in the reference area as described in section 10.4.
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 10.4
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	0
Monitoring equipment:	See the SOP 'Standard Operating Procedure Kasigau - Forest Leakage v1.0_01_01_2011.pdf'
QA/QC procedures to be applied:	See the SOP 'Standard Operating Procedure Kasigau - Forest Leakage v1.0_01_01_2011.pdf'
Purpose of data:	Calculation of Leakage
Calculation method:	Calculation
Any comment:	

Data Unit / Parameter:	l_j
Data unit:	meters
Description:	Length of transect j used for measuring lying dead wood.
Source of data:	Field measurements.
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Carbon pool not included in Project

Data Unit / Parameter:	$m_{burned,i}$

Data unit:	Tonnes
Description:	The mass of wood burned during the ith event
Source of data:	Records of biomass burning and charcoal production in the project area
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	Calculation of project emissions
Calculation method:	Measurement
Any comment:	Parameter not used.

Data Unit / Parameter:	$\widehat{m}_{DF}$
Data unit:	Count
Description:	The estimated sample size in the space of the reference area given the pilot sample data
Source of data:	Equation **Error! Reference source not found.**
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6.4.3
Frequency of monitoring/recording:	Reevaluated whenever the baseline is reassessed.
Value applied:	1,877
Monitoring equipment:	Equipment list in Annex 17
QA/QC procedures to be applied:	Review of GER calculations
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation F.53
Any comment:	

Data Unit / Parameter:	$m_{soil,j,k}$
Data unit:	kg
Description:	Dry mass of soil sample taken from plot j in stratum k.

Source of data:	Field measurements
Description of measurement methods and procedures to be applied:	Please see the SOP 'SOP - Kasigau Soil Field Sampling v3.6 2017-10-05.pdf'
Frequency of monitoring/recording:	At a minimum of every five years.
Value applied:	See the file 'Kasigau Corridor Soil Calc v2.xlsx' for the records of all soil samples.
Monitoring equipment:	Equipment list in the SOP 'SOP - Kasigau Soil Field Sampling v3.6 2017-10-05.pdf'
QA/QC procedures to be applied:	Review of GER calculations
Purpose of data:	Calculation of baseline emissions
Calculation method:	Field measurement
Any comment:	

Data Unit / Parameter:	$m_{rf,j,k}$
Data unit:	kg
Description:	Dry mass of rock fraction of soil sample in plot j in stratum k
Source of data:	Field measurements. Soil samples must be sieved to 2 mm and fragments larger than 2mm weighed.
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Parameter not used.

Data Unit / Parameter:	$m_{dry,subsample}$
Data unit:	Kg
Description:	Dry mass of subsample of non-tree biomass collected to estimate dry:wet ratio

Source of data:	Field measurements
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Parameter not used.

Data Unit / Parameter:	$m_{wet,j,k}$
Data unit:	kg
Description:	Wet mass of non-tree sample harvested from clip plots in plot j, stratum k
Source of data:	Field measurements
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Parameter not used.

Data Unit / Parameter:	$m_{wet,subsample}$
Data unit:	kg
Description:	Wet mass of subsample of non-tree biomass collected to estimate dry:wet ratio
Source of data:	Field measurements

Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Parameter not used.

Data Unit / Parameter:	$\hat{n}_k$
Data unit:	Count
Description:	Estimated total number of plots required in stratum k.
Source of data:	Calculated using equation [38] or equation [42].
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	May be updated if a new sample with greater precision is desired at a monitoring period.
Value applied:	See the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the number of plots per strata
Monitoring equipment:	BN/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [38] or equation [42].
Any comment:	

Data Unit / Parameter:	N_P
Data unit:	Count
Description:	Total number of possible plots in project area
Source of data:	Calculated.

Description of measurement methods and procedures to be applied:	GIS analysis at the time of stratification.
Frequency of monitoring/recording:	Updated whenever stratification of the Project Area is updated.
Value applied:	1,500,466.05
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Calculated with the Equation $N_P = \frac{a_{project}}{a_{plot}}$
Any comment:	

Data Unit / Parameter:	$N_{P,k}$
Data unit:	Count
Description:	Total number of possible plots in stratum k.
Source of data:	Calculated.
Description of measurement methods and procedures to be applied:	GIS analysis at the time of stratification.
Frequency of monitoring/recording:	Updated whenever stratification of the Project Area is updated.
Value applied:	<table><tr><th>Stratum name</th><th>Total number of possible plots</th></tr><tr><td>**ag active**</td><td>35,026.51</td></tr><tr><td>**dryland forest strata 1+2**</td><td>341,141.20</td></tr><tr><td>**dryland forest strata 3**</td><td>279,642.67</td></tr><tr><td>**dryland forest strata 4**</td><td>137,615.93</td></tr><tr><td>**dryland forest strata 5**</td><td>404,030.06</td></tr><tr><td>**dryland forest strata 6**</td><td>215,177.99</td></tr><tr><td>**grassland**</td><td>79,586.37</td></tr><tr><td>**montane forest**</td><td>2,834.05</td></tr></table>
Monitoring equipment:	Supervised classification of the Project Area was accomplished using commercial software to perform Land-use/Land-cover classification, as well as to perform QA/QC procedures. Wildlife Works used a common software package to perform this stratification. ArcGIS

	software is used for area measurement of the Project Area and strata.
QA/QC procedures to be applied:	QC: Wildlife Works' VP Carbon Development checks the accuracy of the stratification with sample plot information sourced from the inventory data and also with other available geographical datasets. QA: The accuracy of the classification is also checked partially by the CEO of Wildlife Works Carbon and by the other staff in the Carbon Development department, all of who possess GIS and remote sensing expertise.
Purpose of data:	Calculated with the Equation $N_{P,k} = \frac{a_k}{a_{plot}}$
Calculation method:	Supervised classification of the Project Area was accomplished using commercial software to perform Land-use/Land-cover classification, as well as to perform QA/QC procedures. Wildlife Works used a common software package to perform this stratification. ArcGIS software is used for area measurement of the Project Area and strata.
Any comment:	

Data Unit / Parameter:	$\hat{n}_{total}$
Data unit:	Count
Description:	Estimated total number of plots required.
Source of data:	Calculated using equation [37] or equation [41].
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.6.1, 8.1.6.2, 8.1.6.3
Frequency of monitoring/recording:	May be updated if a new sample with greater precision is desired at a monitoring period.
Value applied:	See the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the number of plots per strata
Monitoring equipment:	BN/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [37] or equation [41].
Any comment:	

Data Unit / Parameter:	$o_i^{[m]}$

Data unit:	Binary
Description:	State observation for the ith sample point during monitoring period [m].
Source of data:	Field observation
Description of measurement methods and procedures to be applied:	See the SOP 'Standard Operating Procedure Kasigau - Forest Leakage v1.0_01_01_2011.pdf.'
Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	See the file 'Phase I Leakage Model_M5_v1.xlsx' for the values.
Monitoring equipment:	See the SOP 'Standard Operating Procedure Kasigau - Forest Leakage v1.0_01_01_2011.pdf.'
QA/QC procedures to be applied:	ee the SOP 'Standard Operating Procedure Kasigau - Forest Leakage v1.0_01_01_2011.pdf.'
Purpose of data:	Calculation of leakage
Calculation method:	Field measurement
Any comment:	

Data Unit / Parameter:	$\bar{o}^{[m]}$
Data unit:	Binary
Description:	Average of state observation for the ith sample point during monitoring period [m].
Source of data:	Field observation
Description of measurement methods and procedures to be applied:	See the SOP 'Standard Operating Procedure Kasigau - Forest Leakage v1.0_01_01_2011.pdf.'
Frequency of monitoring/recording:	Updated at every monitoring period.
Value applied:	See the file 'Phase I Leakage Model_M5_v1.xlsx' for the values.
Monitoring equipment:	See the SOP 'Standard Operating Procedure Kasigau - Forest Leakage v1.0_01_01_2011.pdf.'
QA/QC procedures to be applied:	See the SOP 'Standard Operating Procedure Kasigau - Forest Leakage v1.0_01_01_2011.pdf.'
Purpose of data:	Calculation of leakage
Calculation method:	Field measurement
Any comment:	

Data Unit / Parameter:	$P(t_i)$
Data unit:	Probability
Description:	Probability of making an observation at time t_i
Source of data:	Equation [4]
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6.4.1
Frequency of monitoring/recording:	Reevaluated whenever the baseline model is reassessed.
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [4]
Any comment:	Parameter not used

Data Unit / Parameter:	$P(t_i, x_i, y_i)$
Data unit:	Probability
Description:	Probability of observing a sample point in the reference area located at (x_i, y_i) at time t_i
Source of data:	Equation **Error! Reference source not found.**
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6.4.1
Frequency of monitoring/recording:	Reevaluated whenever the baseline model is reassessed.
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [4]
Any comment:	Parameter not used

Data Unit / Parameter:	$P(x_i, y_i \mid t_i)$
Data unit:	Probability

Description:	probability of observing location (x_i, y_i) given on observation is made at time t_i
Source of data:	Equation [3]
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6.4.1
Frequency of monitoring/recording:	Reevaluated whenever the baseline model is reassessed.
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [4]
Any comment:	Parameter not used

Data Unit / Parameter:	t_i
Data unit:	Time
Description:	The time of the ith sample point
Source of data:	Remote sensing image interpretation
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6
Frequency of monitoring/recording:	Reevaluated whenever the baseline model is re-assessed.
Value applied:	See CDM records
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	N/A
Any comment:	

Data Unit / Parameter:	$U^{[m]}$
Data unit:	Percent
Description:	Average uncertainty in carbon stocks and the baseline model
Source of data:	Equation [36]

Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 13.11
Frequency of monitoring/recording:	Updated at every monitoring period
Value applied:	7.57
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [36]
Any comment:	

Data Unit / Parameter:	U_{SCL}
Data unit:	Percent
Description:	Estimated uncertainty in the soil carbon loss model.
Source of data:	Calculated from Equation 19.
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6.5.7.
Frequency of monitoring/recording:	Reevaluated whenever the baseline model is reassessed.
Value applied:	13.9
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [19]
Any comment:	

Data Unit / Parameter:	U_{DF}
Data unit:	Percent
Description:	Estimated uncertainty in the cumulative deforestation model
Source of data:	Equation [15]
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6.4.9.

Frequency of monitoring/recording:	Reevaluated whenever the baseline model is reassessed.
Value applied:	5.9
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [15]
Any comment:	

Data Unit / Parameter:	$U_{TOTAL}^{[m]}$
Data unit:	tCO2e
Description:	Estimated uncertainty of total carbon stocks
Source of data:	Equation [67]
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 13.11
Frequency of monitoring/recording:	Every monitoring period
Value applied:	9.5
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [67]
Any comment:	

Data Unit / Parameter:	$v_{soil,j,k}$
Data unit:	m^3
Description:	Total volume of soil sample in plot j in stratum k
Source of data:	Field measurements
Description of measurement methods and procedures to be applied:	See SOP 'SOP - Soils Bulk Density v1.6 2017-07-27.pdf'
Frequency of monitoring/recording:	Monitored at a minimum of once every five years.
Value applied:	See file 'Kasigau Corridor Soil Calc v2.xlsx' for records
Monitoring equipment:	See SOP 'SOP - Soils Bulk Density v1.6 2017-07-27.pdf'

QA/QC procedures to be applied:	See SOP 'SOP - Soils Bulk Density v1.6 2017-07-27.pdf'
Purpose of data:	Calculation of baseline emissions
Calculation method:	measurement
Any comment:	

Data Unit / Parameter:	$v_{rf,j,k}$
Data unit:	m^3
Description:	Volume rock fragments (> 2mm) in soil sample taken in plot j in stratum k
Source of data:	Field measurements
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of data:	N/A
Calculation method:	N/A
Any comment:	Parameter not used

Data Unit / Parameter:	w_i
Data unit:	Unitless
Description:	The weight applied to the ith sample point
Source of data:	VCS Methodology VM0009 Section 6.4.1 and 6.4.3
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6.4.1 and 6.4.3
Frequency of monitoring/recording:	Reevaluated whenever the baseline model is re-assessed.
Value applied:	See CDM records
Monitoring equipment:	N/A
QA/QC procedures to be applied:	VCS Methodology VM0009 Section 6.4.1 and 6.4.3
Purpose of data:	Calculation of baseline emissions
Calculation method:	N/A

Any comment:	

Data Unit / Parameter:	$w_i^{[m]}$
Data unit:	Unitless
Description:	The weight of the ith sample point during monitoring period $[m]$
Source of data:	Equation [5]
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6.4.1 and 6.4.3
Frequency of monitoring/recording:	Reevaluated whenever the baseline model is re-assessed.
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	VCS Methodology VM0009 Section 6.4.1 and 6.4.3
Purpose of data:	Calculation of baseline emissions
Calculation method:	N/A
Any comment:	Parameter not used.

Data Unit / Parameter:	w_k
Data unit:	Unitless
Description:	Proportion of plots allocated to stratum k.
Source of data:	Calculated using equation [39] or [40].
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 13.3.1
Frequency of monitoring/recording:	May be updated at each monitoring period.
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	VCS Methodology VM0009 Section 13.3.1
Purpose of data:	Calculation of baseline emissions
Calculation method:	N/A
Any comment:	Parameter not used.

Data Unit / Parameter:	x

Data unit:	Real, vector
Description:	Vector of observed covariates to deforestation
Source of data:	Independent variable used in deforestation model. See equation [7] and section 6.4.7 for details.
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Reevaluated whenever the baseline model is re-assessed.
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	N/A
Any comment:	Parameter not used.

Data Unit / Parameter:	$\boldsymbol{o}$
Data unit:	Real, vector
Description:	Vector of observed forest states
Source of data:	The response variable used to fit the cumulative deforestation model using IRLS. See equation [7] and section 6.4.7 for details.
Description of measurement methods and procedures to be applied:	See section 6.4.7
Frequency of monitoring/recording:	Reevaluated whenever the baseline model is re-assessed.
Value applied:	See CDM records
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	N/A
Any comment:	

Data Unit / Parameter:	$\boldsymbol{x}^{[m]}$

Data unit:	varies
Description:	Covariate values
Source of data:	Participatory Rural Appraisal, analysis of public records, and/or expert interpretation of inventory data or remotely sensed imagery
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	N/A
Any comment:	

3.1.3 Monitoring Plan

The following is an overview of the monitoring plan, a detailed rendition of which can be found in the PD under Section 13.14 Monitoring of Carbon Stocks in the Project Area (the field procedures are detailed in the documents 'Standard Operating Procedure - Biomass' and 'Standard Operating Procedure – Soils').

In order to most accurately estimate biomass in the Phase I Project Area, with reasonable time and expense, we divided the area into 9 landcover strata based on ecosystem type. This was done as there exists a high perceived variation in average biomass across the 8 forest strata, with larger trees in high density in the dense montane forest stratum, medium to large trees and lots of shrubs in the middle dryland forest strata and scattered trees, very few shrubs and heavy grass cover in the grassland / sparse stratum. An additional stratum was created that encompasses all of the roads and developed areas in the Project Area, which are all excluded from the carbon accounting. Overall, the 9 strata sum to the total project land area, depicting the Project Area's overall landcover as shown in Figure 4 below.

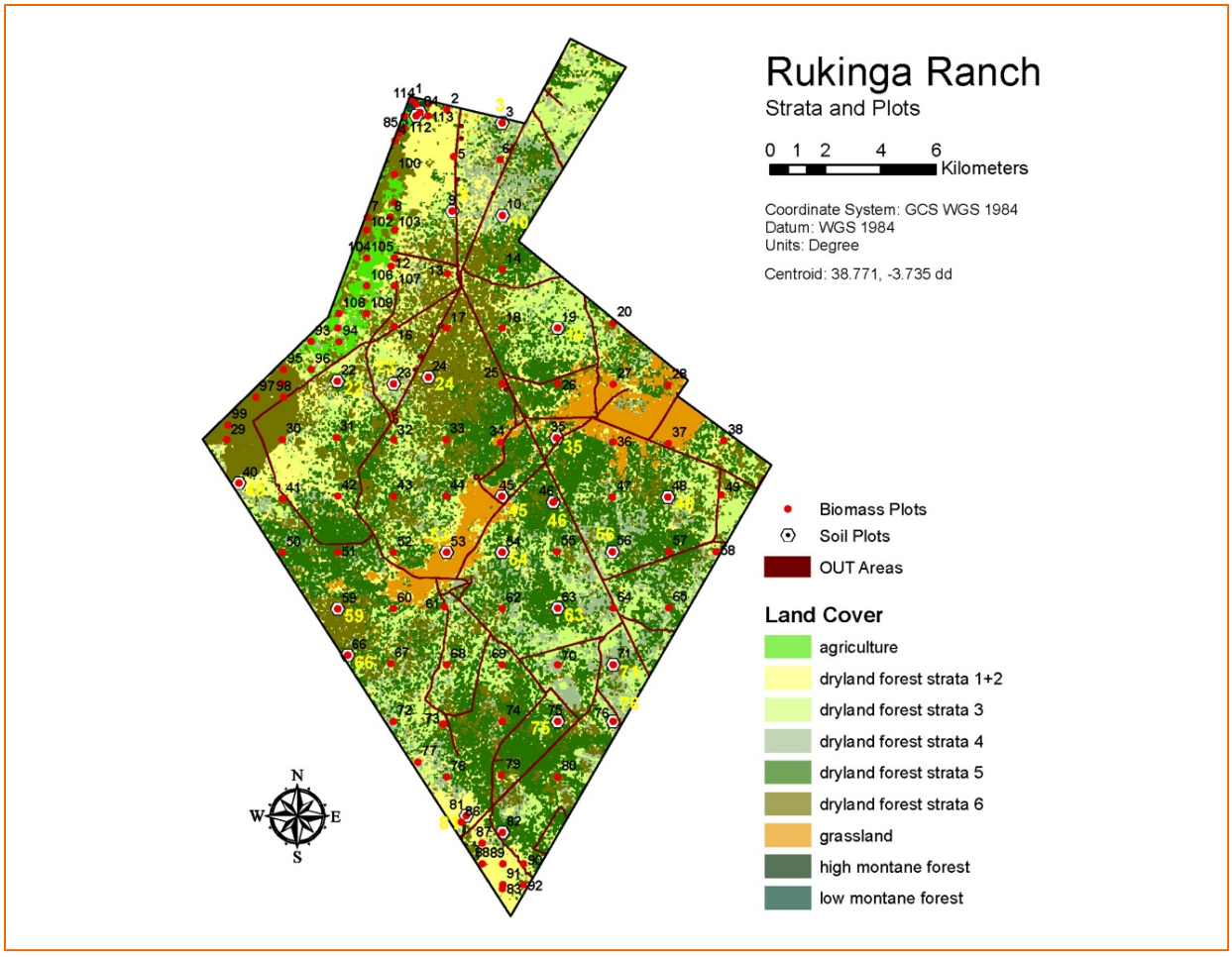


Figure 4: The Kasigau Corridor REDD+ Project Phase I – The Rukinga Sanctuary landcover strata and biomass and soil plot locations.

Biomass plot sampling was conducted throughout the monitoring period under the supervision of Wildlife Works VP Carbon Development Jeremy Freund and VP African Field Operations Rob Dodson. All plot sampling was conducted using the same successful, exacting protocol that was used for the first monitoring period for this project. Proper adherence to the updated SOP was ensured throughout the sampling process.

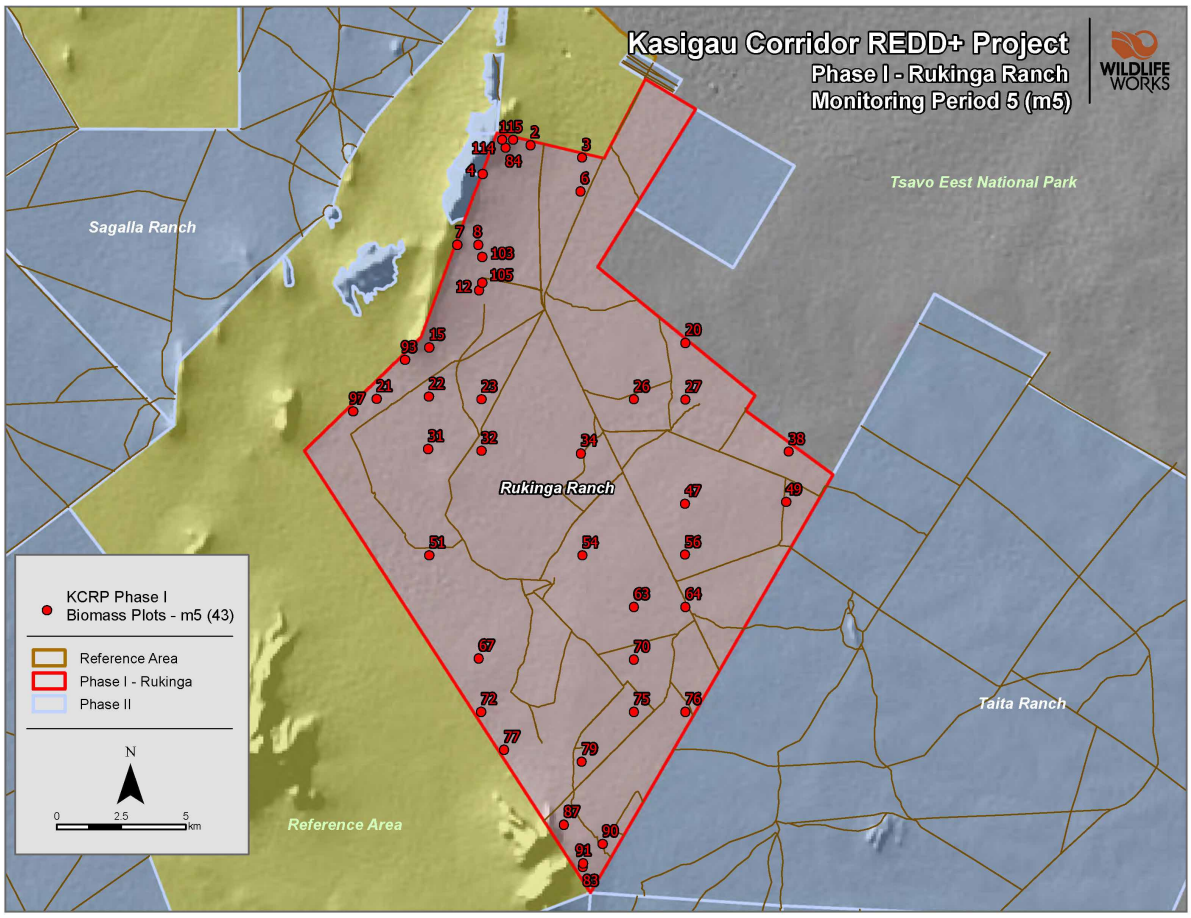


Figure 5: Biomass plots for M_5 – 20% of the 115 permanent plots are measured for each year in the monitoring period

A total of 115 plots were placed in the Rukinga Sanctuary Project Area. 83 plots were placed utilizing a systematic sampling method to overlay a 2 km x 2 km grid over the sanctuary and select sample plot centers at the center point of each square. The upper left corner of the grid was randomly positioned to ensure the ultimate random nature of the individual plots. 32 plots were overlaid on the ranch in a stratified random pattern. The methods described in the Biomass SOP were used to collect a comprehensive forest inventory. It was determined that it was both unnecessary and too time consuming to monitor every plot each monitoring period, so the decision was made to monitor 100% of the plots every five years, thereby monitoring 20% of the plots (selected at random) for each year in the monitoring period. For this monitoring period (m_5), 43 plots were measured across the Rukinga Sanctuary.

Leakage plots are assessed differently than biomass plots. Although they are permanent, they are located in the leakage area, and necessarily placed in random spatial locations. They therefore cannot be conspicuously marked as are the biomass plots. The Northeast corner of each leakage plot is recorded in a GIS system, and the plot is evaluated by the leakage plot sampling team using two walking transects per plot. The teams were specially trained by Jamie Hendriksen, Wildlife Works' Operations Manager, to

recognize and measure degradation due to charcoal burning and kilning, a phenomenon that is typical to this particular area.

The leakage assessment is a qualitative analysis based on the trained judgment of the team members to assign a leakage factor, an amount of forest degradation, to each plot. Two team members walk each plot, and their results are compared to get a leakage factor for each plot. Since this is a qualitative factor, dependent on the personal assessment of plot team members, the cumulative leakage factor reported for a plot could conceivably decrease from one year to the next. This could be due to a difference in plot team member judgment, time of day of measurement, or the forest degradation state of plots measured previously in the day. If the reported leakage factor of a plot is more than 2 bins lower than the previous years reported factor, then the previous year's factor will be used. If more than 10% of leakage plots have a reported leakage factor more than 2 bins lower than the previous year's factor than these leakage plots will be remeasured.

A detailed rendition of the degradation estimation procedure is listed in Standard Operating Procedure - Leakage provided to the validators.

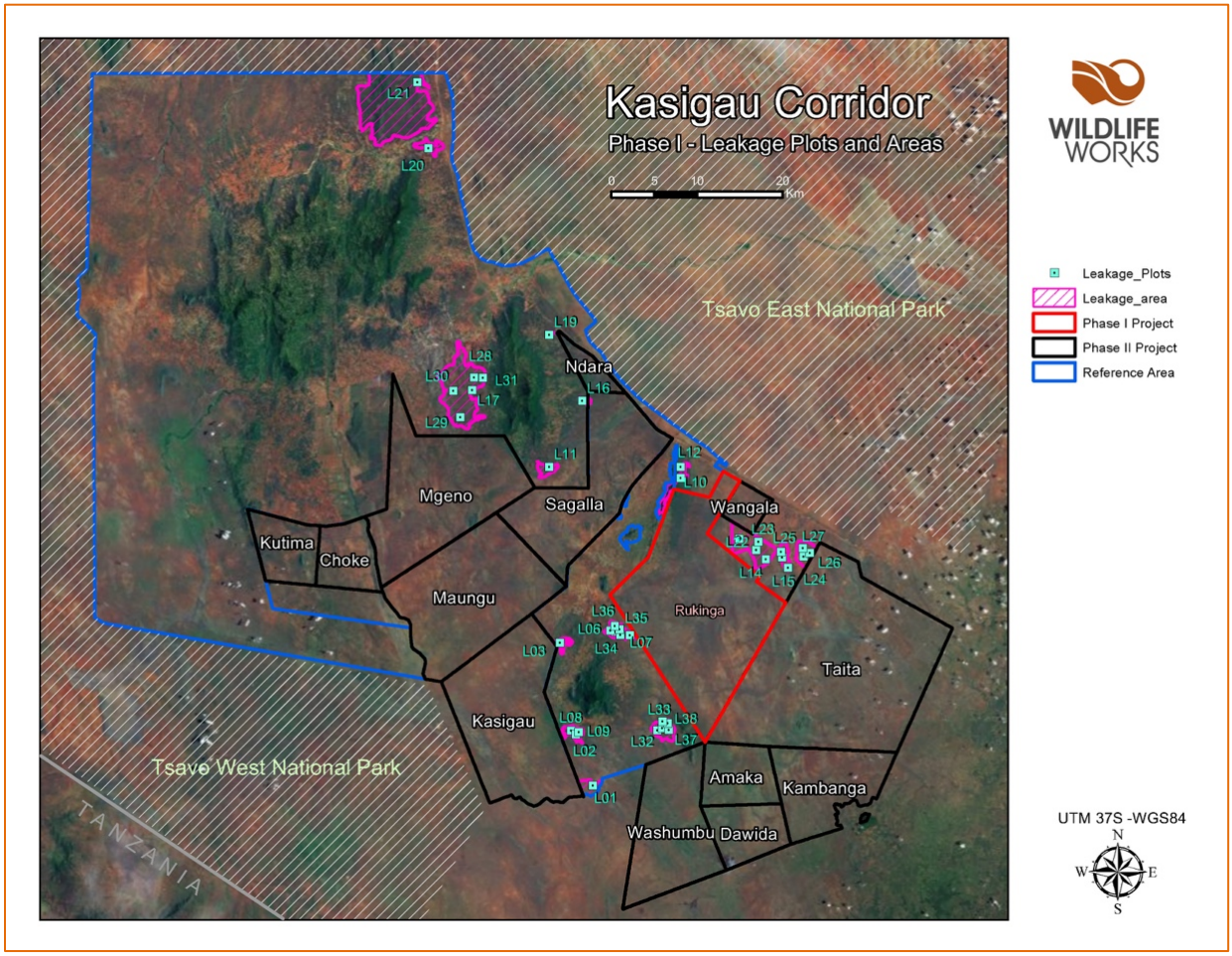


Figure 6: Leakage plot locations for Kasigau Corridor REDD+ Project Phase I.

Organizational Structure

Wildlife Works has 2 dedicated plot sampling teams, with each team containing 8 sampling specialists. The teams are under the supervision of Jamie Hendriksen, Director of Regional Operations. Each team is directed by a team leader, who is trained in GPS operation and forest sampling techniques. The team leader must additionally demonstrate proficiency in species identification and biometric estimation techniques (calculating DBH, height, measuring angle from north, etc.). These team leads have typically grown into their position with experience and proven acumen in the field, and this position is coveted within the Wildlife Works hierarchy. The overall team leader is Muasa Mwololo, while each team also has an operation leader: Joshua Kitiro and Mattias Kakoi. Collectively, these three are responsible for all data collection and its transfer to the main Rukinga office. Their names are attached to each and every soil, leakage and biomass plot data sheet. All discrepancies can be easily traced back to date and time of collection, as well as team members who collected the data. In an effort to minimize any conflict between team members, or complacency in their job, plot team members continuously change jobs, and the team members are mixed between teams.

As mentioned above, leakage plot teams are specially trained by the project management to recognize the specific type of forest degradation typical of the Kasigau Corridor. An internal audit was conducted prior to project validation to ensure consistent measurement techniques; such an audit will be carried out every monitoring period. Additionally, at each monitoring period 5% of the measured plots are remeasured by a different plot team as part of the QA/QC process.

Data Collection, Storage and Aggregation

Data collected in the field is systematically translated into the carbon model developed by Jeremy Freund, VP of Carbon Development. The carbon model contains dropdown lists and pre-filled formulas to ensure accuracy of entry and minimize human translation error. Data for this monitoring period were entered by Defence Mghoi, who was trained by Rob Dodson, the VP of African Field Ops, and now is trained by Mwangi Githiru. Data entry is crosschecked internally, as well as by staff in the US office. The data goes through a final check by the U.S. based carbon development staff, where any outlying or otherwise inconsistent or unusual data is analyzed.

Carbon model aggregation is ultimately the responsibility of the VP of Carbon Development, and all Carbon accounting procedures were developed by him, and adhere to the VCS methodology. Digital copies of all data and models are maintained at Wildlife Works' San Francisco office.

Field Training

The standard operating procedures (SOP) for biomass and soils were produced using the experiences and expertise of field techniques by the initial plot sampling team. Whenever necessary, the biomass and soil sampling SOPs are revised to encompass new techniques, methods or metrics. Two teams have been trained using this procedure and undergo several checks to ensure consistency in method. Before each monitoring event, plot teams undergo field training from Mwangi Githiru and Jamie Hendrickson to refresh their knowledge and incorporate any additions to the SOP.

Internal Auditing

Internal checks are routinely performed on biomass, soil and leakage plots. The VP of Carbon Development, Director of Forest Science and Project Management embark on "check cruises" to evaluate the employees' work, and often, management will audit individual measurements on an as-needed basis. Wildlife Works has also instituted an official Quality Assurance and Quality Control system for biomass plots, which has been reviewed by the validators (see QA / QC Standard Operation Procedure). As

mentioned above, once the data is translated into electronic format, various internal checks are performed to eliminate errors. Wildlife Works management continually reviews the work done by other members of management to ensure there are no outlying data or unexplained inconsistencies. It is the policy of Wildlife Works that all work products shall be internally reviewed by a second person before publication.

The following is a summary of the plans to monitor Climate, Community and Biodiversity (CCB) impacts on the environment because of the carbon Project's direct influence. For a detailed monitoring plan please refer to the CCB Project Monitoring Plan (PMP), which was provided to the CCB validation auditors at the time of project validation. Please also refer to Sections CL3, CM3 and B3 for Climate, Community and Biodiversity monitoring plans, respectively, in the Project's CCB PDD.

Climate Monitoring

As this project seeks full CCB/VCS accreditation, all climate monitoring is assumed to fall under the VCS monitoring plan, which is fully described in the Project Monitoring Plan sections above, and also in the Project's VCS PD Section 13.14 Monitoring of Carbon Stocks in the Project Area. Additional specific monitoring information can be found in the Standard Operating Procedures for Biomass, Soil and Leakage. All of the aforementioned documents were made available for review by the validation/verification team.

The following Carbon Pools will be monitored, as specified under the VCS methodology VM0009 Methodology for Avoided Deforestation of Tropical Forests v1.1:

Table 1: The Carbon Pools that are included in the Kasigau Corridor REDD+ Project Phase I

Pool	Required	Included in Project?	Justification
Above-ground large tree biomass	Yes	Yes	Major pool considered
Above-ground small tree biomass	Yes	Yes	Major pool considered
Above-ground non-tree biomass	Optional	Yes	Major pool considered
Below-ground large tree biomass	Optional	Yes	Major pool considered
Below-ground small tree biomass	Optional	Yes	Major pool considered
Below-ground non-tree biomass	Optional	Yes	Major pool considered
Litter	No	No	Conservatively excluded
Standing dead wood	Optional	Yes	Major pool considered
Lying dead wood	Optional	No	Conservatively excluded
Soil	Optional	Yes	Major pool considered
Long-lived wood products	Yes	Yes	May be a significant reservoir under the baseline scenario

The purpose of the carbon-monitoring plan is to ensure:

- That the Project has protected the dryland forest within the Project Area from any unplanned GHG emissions during the project crediting period, and;
- That no identifiable leakage has occurred that can be attributed to this project.

Emissions reductions calculations were based on two models, both according to the VCS methodology VM0009. The first is a current carbon inventory of the Project Area, conducted using a stratified-random, fixed permanent plot methodology, which is accepted as a more accurate method for forest carbon inventory than remote sensing. The second model is based on satellite imagery of the Reference Area covering a period of 20 years prior to the beginning of the Project, clearly and empirically demonstrating the deforestation rate in the Project Area.

For the first model, we carry out a resampling of 20% of the total number of permanent plots per year included in the monitoring period originally created for the forest inventory. The plot sampling is normally performed at the same time of year as the initial inventory to ensure minimum seasonal variability in carbon stocks, which in southeastern Kenya can be considerable. We re-measure the diameter at breast height (dbh), height, and status of each tree for each plot. Annual resampling is rotated such that every five years we have performed a complete (100%) resampling of the forest biomass plots. We will also fund the external auditors of our project to verify our sampling plan on an annual basis.

Soil carbon is monitored once every five years. We monitor this pool less regularly as soil carbon content changes on a much slower timeframe than biomass. It is additionally very difficult and expensive to collect the number of soil samples needed to run our very robust soil carbon model. The methodology employs a soil carbon decay model, which estimates the release of carbon from soil after being converted from forested land to cropland. This soil model, accepted at the validation of this project, does not require yearly re-measurement of each soil carbon plot to maintain an accurate depiction of soil carbon behavior.

Disturbance Monitoring

We have developed a monitoring system and plan for disturbances, reversals, catastrophic events and any other potential large negative effect on carbon levels within the Project. This system is described as follows.

Identification of Disturbances

In order to quickly identify disturbances in the Project Area resulting from natural events (e.g., fires) or encroachment, the Project Proponent performs the following monitoring activities:

a) Forest ranger patrols and community scouts: Regular patrols of the Project Area are carried out in order to detect encroachment or other disturbance. In addition, designated ‘community scouts’ have been instructed to notify the Project Proponent when they observe newly disturbed areas within the Project Area.
b) Analysis of imagery: Analysts periodically examine one or more imagery products in order to detect encroachment or other disturbance. Imagery products may include Landsat, MODIS, FEWS NET, Google Earth imagery, or aerial imagery or videography collected by the Project Proponent.

Frequency of Disturbance Monitoring

In addition to the regular forest patrols, Project Proponents use aerial imagery each year in order to quickly and accurately identify potential disturbances within the Project Area.

Definition of a Significant Disturbance

A disturbance is considered significant if:

The disturbed area is greater than 250 ha, or the disturbance results in a decrease in carbon stock estimates (tCO2e/ha) of greater than 5%. The magnitude of the change in carbon stocks shall be determined by comparing the carbon stock estimates of the disturbed area's stratum prior to disturbance with the results of a pilot sample of approximately 5 plots in the disturbed area.

Accounting of Disturbances

If a disturbance is determined to be significant according to the criteria listed above, the Project Proponent shall do the following:

a) Delineate a new stratum for the disturbed area. This delineation can be performed in the field using a GPS or using a remote sensing product.
b) Install plots and re-measure above- and below-ground biomass.
c) Determine new Project Area carbon stocks with the new stratum included.

Community Monitoring

Wildlife Works gathers data relevant to community impact in a variety of ways and at a range of frequencies. At one end of the spectrum is human population data for the Project Reference Area are gathered every ten years from Kenya's national census data. At the finer scale, Dr. Mwangi Githiru conducts annual household surveys amongst the communities in the Project Area. The focus of these surveys is to collect vital data on population, household size and composition and livelihoods. This household survey is described in detail above in Section 2.2.14.8. To collect suggestions and grievances from communities in the Project Zone 5 suggestion boxes have been placed village chief offices.

Sales and production data are collected by each of the Project Activities, such as the nursery operations, and reported to the main office at Rukinga. This information is then reported annually in this report as metrics of their success. Employment, both permanent and temporary, is tracked by the HR department and reported annually in this report.

As mentioned above in the Climate Impact Monitoring section, Wildlife Works will conduct verifications annually against the VCS and CCB standards. Therefore, once a year, we summarize all of the data collected and include that summary in the CCB and VCS Verification reports for each monitoring period.

Biodiversity Monitoring

Wildlife Works has been gathering data on wildlife populations for over 10 years. Dr. Mwangi Githiru continues to function as Wildlife Works' Biodiversity and Social Monitoring Director. He is in charge of the Biodiversity team, whose role is to gather, verify, analyze and report key biodiversity indicators. Additional biodiversity data is collected by the forest rangers, who record the location of HCV wildlife and other points of interest throughout their daily activities. The goal is to demonstrate that the Project is delivering on the stated commitment to improving the situation of the HCV species present in the Project Area. All of the biodiversity data that is collected is managed and analyzed by Dr. Githiru and his team at the Rukinga Sanctuary. Dr. Githiru produces a robust Biodiversity and Social Monitoring Report yearly. The data and biodiversity trends seen are also summarized annually in this report (see section 2.2.14).

3.1.4 Dissemination of Monitoring Plan and Results (CL3.2)

The full results of the climate monitoring are included in this project monitoring report, which is being made publicly available in the Project Area by having a hard copy available for review at the Project Office. Additionally, a monitoring report summary has been written and provided to communities throughout the Project Area in English and Swahili. The monitoring report has additionally been posted to the website of the CCB for public review and comment.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

The Cumulative Deforestation Model (CDM) and the coil emissions Model (SEM) were used to calculate the emissions that would occur under the baseline scenario in the absence of the Project. The CDM predicts the cumulative emissions from biomass as a result of deforestation. The CDM is parameterized using observations of historic imagery from the reference area. The soil emissions model is based on a logistic model of ecosystem conversion and assumes that soil organic carbon (SOC) begins to decay in the Project Area at the point in time the patch of land is cleared to a deforested state. This approach dramatically simplifies baseline accounting

The CDM curve is used throughout the Project's lifetime, for the current monitoring period as was all previous periods. The CDM (baseline) will be re-evaluated at the 10-year mark, but not before. As stated in last monitoring period's report, Wildlife Works chose a conservative linear baseline prediction for baseline emissions, based on historical deforestation observations and modeled with a logistical deforestation curve. This linear deforestation rate follows the stipulation in VM0009 v1.1, section 6.4.8 Linear Prediction of Deforestation. Both the logistical CDM and chosen conservative linear deforestation rate are depicted in the chart below.

Baseline emissions for the current monitoring period (m_5) are calculated as follows:

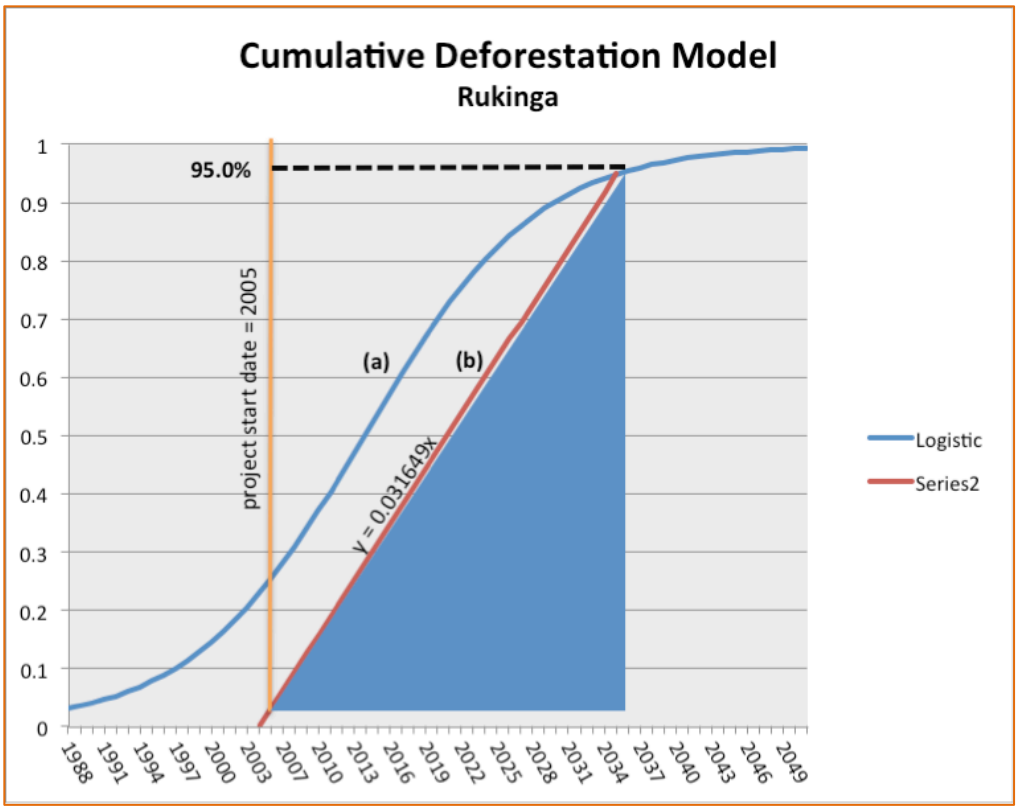


Figure 7: The cumulative deforestation model for Kasigau Corridor REDD+ Project Phase I

Table 2: Baseline carbon emissions and reductions to date from the Kasigau Corridor REDD+ Project Phase I.

Component	First monitoring period (m_1)	Second monitoring period (m_2)	Third monitoring period (m_3)	Fourth monitoring period (m_4)	Fifth monitoring period (m_5)	Total to date
Baseline deforestation %	11.1%	22.15%	25.32%	31.65%	41.14%	41.14%
Gross ERs (t CO2e)	1,450,329	250,465	244,944	500,831	774,295	3,218,693
Buffer tonnes to VCS (t CO2e)	290,066	37,570	36,742	75,125	100,658	483,501
Total ERs (t CO2e)	1,160,263	212,895	208,202	425,706	744,707	2,735,191

3.2.1.1 Calculating Baseline Emissions from Biomass

Carbon stocks have been estimated using the Verified Carbon Standard (VCS) methodology VM0009 'Methodology for Avoided Ecosystem Conversion' v1.1. This methodology was originally validated with

VCS in January 2011. Subsequent versions of this methodology have been released since this time in order to widen its applicability to new geographies and forest types, however the KCRPI has remained validated on the version 1 of the methodology.

All biomass plots must be re-measured at a minimum every five years. Approximately 20% of the biomass plots will be re-measured each year, achieving 100% sample plot coverage within every five-year period. Biomass plot locations are depicted below in Figure 8. Changes in project carbon stocks are calculated as the difference in project stocks in each stratum between the current and prior monitoring periods, as determined from in-situ measurement of biomass plots.

Carbon stocks that are lost to burning, wood products, and leakage are accounted for using the procedures and equations included in the methodology. Please refer to the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm'to view the forest inventory data and the calculations.

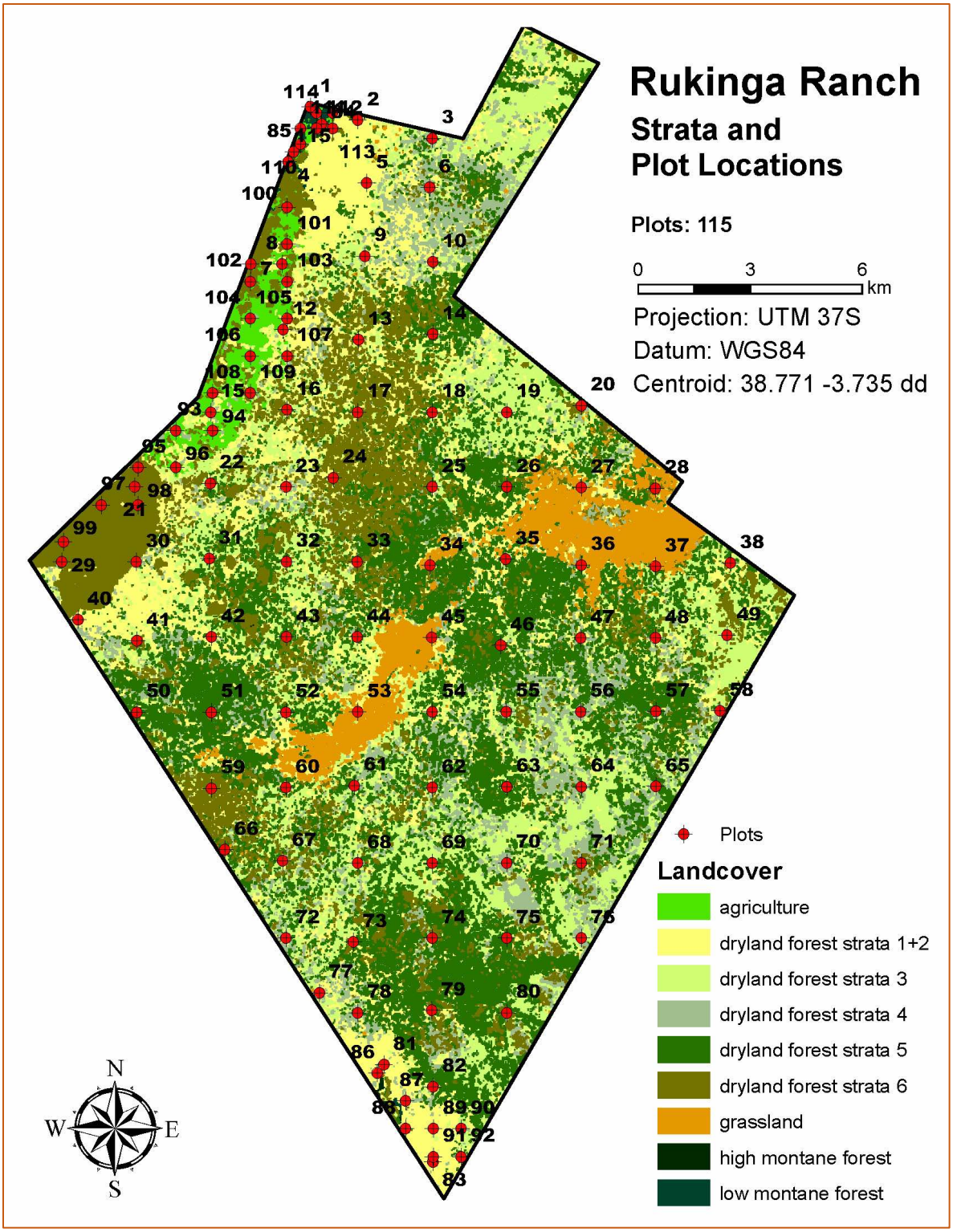


Figure 8: Biomass plot locations in Kasigau Corridor REDD+ Project Phase I

Table 3 depicts current measured above- and below-ground biomass carbon stocks by land cover

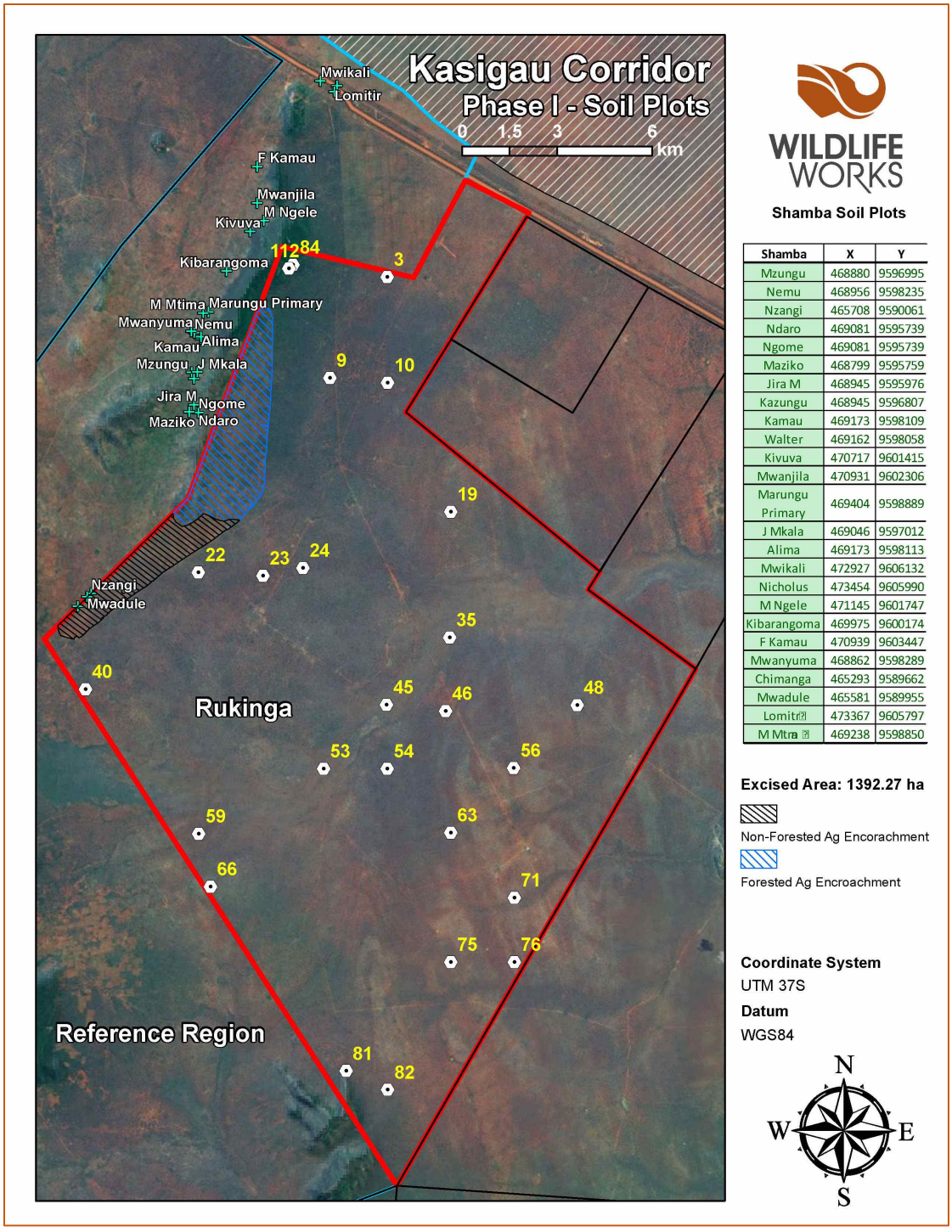
stratum. Values below have been calculated using the methods of carbon accounting detailed in the VCS Methodology VM0009 and the VCS / CCB validated PD for the KCRPI.

Table 3: A summary of current biomass carbon stocks as measured in M_5 within the KCRPI Project Area

Stratum	Area (ha)	Mean carbon stock (t CO2e / ha)
ag active	704.25	99.09
dryland forest strata 1+2	6,859.05	59.22
dryland forest strata 3	5,622.55	88.85
dryland forest strata 4	2,766.93	99.94
dryland forest strata 5	8,123.51	102.01
dryland forest strata 6	4,326.41	88.50
grassland	1,600.18	17.68
montane forest	56.98	107.46
out	108.80	0.00
Total	**30,168.66**	**91.64**

3.2.1.2 Calculating Baseline Emissions from Soil Carbon

For soil carbon, we must use a separate model, as unlike with forest carbon, complete soil carbon loss does not occur in the baseline scenario. All soil plots were remeasured for this M_5 monitoring period, as this is the 5th monitoring event in the project's lifetime. Please see Figure 9 for a map showing the soil sample plot locations. We again followed the VCS methodology VM0009 Methodology for Avoided Mosaic Deforestation of Tropical Forests v1.1 for soil carbon, which dictates a decay curve that eventually settles on a mean loss value for soil carbon lost through clearing of agricultural land. At project development we measured soil carbon in a number of proxy sites immediately adjacent to the Project Area, on farm land with identical soil, rainfall and climate, which in all cases had been forest less than 20 years before. The sampling methodology was identical to that used for the soil carbon estimates within the Project Area: 1 m pits dug in two lifts, 0-30 cm and 31-100 cm and samples from each layer were thoroughly mixed, bagged and sent to an independent soil testing lab for bulk density and soil organic matter (SOM) analysis. The results of the soil carbon analysis are in the file 'Kasigau Corridor Soil Calc v2.xlsx', which was provided to the project validators/verifiers.



Shamba	X	Y
Mzungu	468880	9596995
Nemu	468956	9598235
Nzangi	465708	9590061
Ndaro	469081	9595739
Ngome	469081	9595739
Maziko	468799	9595759
Jira M	468945	9595976
Kazungu	468945	9596807
Kamau	469173	9598109
Walter	469162	9598058
Kivuva	470717	9601415
Mwanjila	470931	9602306
Marungu Primary	469404	9598889
J Mkala	469046	9597012
Alima	469173	9598113
Mwikali	472927	9606132
Nicholus	473454	9605990
M Ngele	471145	9601747
Kibarangoma	469975	9600174
F Kamau	470939	9603447
Mwanyuma	468862	9598289
Chimanga	465293	9589662
Mwadule	465581	9589955
Lomitr	473367	9605797
M Mtma	469238	9598850

Figure 9: Soil sample plot locations in the Kasigau Corridor REDD+ Project Phase I

This analysis yielded a mean difference in soil carbon between the “with-project” and “without project” of 185 tonnes GHG per ha converted to farm land under annual crops, or a 45% reduction in soil carbon value on conversion.

Table 4: A summary of current soil carbon stocks as measured in m_5 within the KCRPI Project Area

Area	Soil accounting area (ha)	Mean carbon stock (t CO2e / ha)	Standard error (t CO2e /ha)
Project Area	30,059.86	405.61	18.8
Proxy Area	N/A	224.01	15.9

3.2.1.3 Calculating Baseline Emissions from All Pools

Summarizing for all pools the GHG loss in Baseline is:

Table 5: A summary of all carbon pools in the Kasigau Corridor REDD+ Project Phase I

Pool	Total GHG (t CO2e)	Loss in Baseline over 30 years (t CO2e)
Aboveground and Belowground forest biomass (trees, shrubs, grasses)	2,498,064.68	2,371,842
Soils	12,192,477.26	5,180,301
Total	**14,690,541.94**	**7,552,143**
Average Annual loss over 30 years (m.t. GHG) – GROSS ERs		**224,373**

3.2.2 Project Emissions

Project emissions are estimated as follows:

- All eligible carbon pools fell under the *de minimis* limit as described in the VCS Methodology VM0009, section 9 Project Emissions and in VCS 2007.1;
- There were no significant fire events in this monitoring period (m_5). If a significant fire event were to occur, Wildlife Works would be required to produce a map of the boundaries for the fire prior to the subsequent monitoring period, as stipulated in VM0009 v1.1;
- Burning of woody biomass (see VM0009, section 9 Project Emissions) in the Project Area falls below the *de minimis* threshold for this monitoring period (m_5).

3.2.3 Leakage

3.2.3.1 Leakage Mitigation Strategies (CL2.2.)

All Project Activities are described in full detail in Section 2.2. These Project Activities were designed to mitigate deforestation and human-wildlife conflict, and therefore by default serve to mitigate leakage and uphold project permanence. Please refer to this section for a detailed description of the status of implementation for each Project Activity.

3.2.3.2 Activity-Shifting Leakage (CL2.1.)

During the first monitoring period (m1), the leakage lag period, $\hat{\delta}_{LE}$, was measured using empirical leakage plot data. The leakage model was built from this data (see below) and used to measure adjustments for leakage in the current and subsequent monitoring periods, until baseline reevaluation. Leakage was calculated and deducted from gross emission reductions as follows:

$$\hat{\delta}_{LE} \text{ (t=0) = -0.762}$$

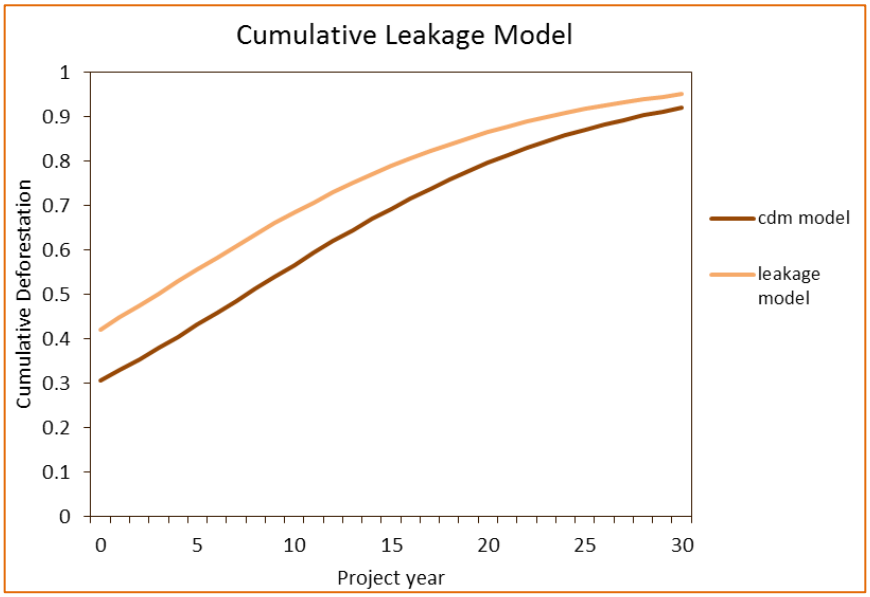


Figure 10: The cumulative deforestation model and leakage model for the Kasigau Corridor REDD+ Proejct Phase I

For this 5th monitoring period, $\hat{\delta}_t$ is measured as the estimate of cumulative deforestation and degradation in the leakage plots:

$$\hat{\delta}_4 = 0.421$$

And compared to the cumulative leakage model at time t=3, per VM0009 v1.1, equation [33]:

$$\hat{r}_{LE}^{[3]} = 0\%$$

We then calculate leakage for the current monitoring period, per VM0009 v1.1 equation [32]:

$$C_{LE}^{[3]} = \hat{r}_{LE}^{[3]} C_{BE}^{[3]} = 0 \cdot 869{,}555 = \mathbf{0}$$

3.2.3.3 Market Leakage (CL3.1.)

Market leakage can occur if a project reduces the supply of market goods, such as timber, relative to the baseline. As described in Section 6 of the Project's VCS PD, the most likely baseline scenario is conversion of forest and native grassland to agriculture. This agriculture is primarily subsistence, with little production remaining beyond household consumption. Food security is a serious issue, as discussed in Project's CCB PDD, in the Project Zone. Without the Project there would be increasing demand for land

and continued low productivity of agricultural production, crop failures from droughts, and few alternatives for income generating activities available to local communities. Given that the agents and drivers practice subsistence farming, and a key Project Activity is to work with local farmers to increase yields on land that is currently farmed, no net reduction in agricultural production due to the Project is anticipated.

3.2.4 Net GHG Emission Reductions and Removals

3.2.4.1 Determining Reversals

There have been no reversals in the KCRPI during this M5 monitoring period, or at any point during the Project's lifetime.

3.2.4.2 Determining Deductions for Uncertainty

Error analysis for the current monitoring period m_5 is also included in the table below. It should be noted that the error analysis was performed on the full set of plot monitoring data, with the re-measured plots being pooled with the data from the previous monitoring period for the plots not selected for re-measurement at the m_5 monitoring period.

The standard error is first calculated for each component of the baseline emissions calculations, including Equation [15] for the CDM, Equation [67] for the biomass carbon pool and Equation [19] for the soil carbon pool. Equation [36] is then used to combine these standard errors into a uncertainty percent for the total carbon stock. Equation [35] is used to determine if an uncertainty deduction is required, and if so, the amount of deduction. For the M_5 monitoring period the KCRPI is not required to make a deduction for uncertainty. Please see Based on all of the above factors, Table 6 shows the final quantification of the KCRPI emission reductions.

Table 6 for results of this process and refer to the file 'Rukinga Carbon Model and NERs_M=5_v3.xlsm' for the detailed equations and calculations.

3.2.4.3 Determining Buffer Account Allocation

Buffer account allocation was calculated according to VCS Standard 3.7, VCS Registration and Issuance Process requirements v3.8 and the VCS Non-Permanence Risk Tool v3.3. Overall risk rating was calculated at 13% and buffer account allocation for KCRPI is summarized below. Note the buffer account return for vintage year 2015:

Table 6: KCRPI Buffer Account Allocation.

Component	2015 (t CO_2e)	2016 (t CO_2e)	2017 (t CO_2e)	Total (t CO_2e)
Gross GHG emission reductions or removals (tCO2e), m_5	263,855	255,298	255,141	**774,295**
Emissions from Leakage, m_5	0	0	0	**0**
ERs to VCS pooled buffer account (13%)	34,301	33,189	33,168	**100,658**
VCS pooled buffer account return	71,071	0	0	**71,071**
Total Emission Reduction Issuance, m_5	300,625	222,109	221,973	**744,707**

3.2.4.4 Quantifying Net Emission Reductions (CL1.1)

Based on all of the above factors, Table 7 shows the final quantification of the KCRPI emission reductions.

Table 7: The Baseline deforestation percentage, Baseline Emissions, Total Emission Reductions and VCS Buffer Pool contribution for the M_5 monitoring period for the Kasigau Corridor REDD+ Project Phase I

Component	Value
Baseline deforestation percentage, m_5	41
Project Emission, m_5	0
Project Reversal, m_5	0
Uncertainty Deduction	0
Project Emissions, m_5	0
Emissions from Leakage, m_5	0
Baseline emissions, m_5	774,295
ERs to Buffer Pool, (13%), m_5	100,658
Total emission reductions (ERs), m_5	**744,707**
Standard error of the total carbon stock	567,324.25
Error (%)	**7.57%**

3.2.4.5 Estimation of NERs (CL1.2 & 1.4)

Table 8 shows the quantification of KCRPI GHG reductions. Net GHG emission reductions or removals are calculated according to equation [34] in the applied methodology and therefore do not reflect risk of reversal buffer removals or releases. Therefore, in this particular case, Baseline emissions or removals are identical to Net GHG emission reductions or removals.

Table 8: The GHG reductions, Project Emissions, Leakage Emissions and Net Emission Reductions (NERs) for the monitoring period, specified by vintage.

Year	Baseline emissions or removals (tCO2e)	Project emissions or removals (tCO2e)	Leakage emissions (tCO2e)	Net GHG emission reductions or removals (tCO2e)
2015	263,855	0	0	263,855
2016	255,298	0	0	255,298
2017	255,141	0	0	255,141
Total	774,295	0	0	774,295

3.3 Optional Criterion: Climate Change Adaptation Benefits

Africa is identified as the continent that will be struck most severely by the impacts of climate change (IPCC, 2007). Given its geographical position, the continent will be particularly vulnerable due to the considerably limited adaptive capacity, exacerbated by widespread poverty and the existing low levels of development (ibid). The IPCC report further predicts that by 2020, between 75 and 250 million people in Africa are projected to be exposed to increased water stress due to climate change. In addition, also by 2020, in some countries, yields from rain-fed agriculture could be reduced by up to 50%. Agricultural production, including access to food, in many African countries is projected to be severely compromised, which would further adversely affect food security and exacerbate malnutrition (ibid.). It is expected that these impacts hold true for the communities living in the Project Zone and would therefore severely impact the communities' well-being. This indicates a pressing need to focus on adaptation and climate change mitigation measures.

3.3.1 Activities and/or Processes Implemented for Adaptation (GL1.4, V3: GL1.3.).

The following are some examples of Project Activities that could assist communities and/or biodiversity to adapt to the probable impacts of climate change.

Table 9: Project climate change adaptation Benefits

Climate change risks	Potential effects	Potential mitigative/adaptive strategies
More intense and longer droughts	Low land productivity or complete crop failure, less pasture for livestock and wildlife, more severe fires	Reduce dependence on livestock and land through alternative IGAs, promote cultivation of drought resistant crops, improve storage facilities and management of crops, water harvesting and water storage, raise awareness of danger of fires.
Seasonal rivers drying out	Negative effects on water availability	Water harvesting methods could be implemented, construction of boreholes.
Low capacity of local populations to adapt to frequent natural disasters	Increase in periods of food insecurity, potential increase in disease and deaths with continuing very low health standards, potential for increasing inter-community conflict	Increase support of local institutional structures including the norms and rules of governance to help develop adaptive strategies, increase literacy levels, diversification of livelihood activities and income generation projects, involve women to a greater degree in decision making processes, increase general participation in decision making at the local level
Decreased biodiversity, loss of forest cover to drought, temperature change	Reduction in species, more species at risk	Help to maintain intact and interconnected ecosystems through protection of ecosystems, ensure landscape connectivity to allow migration, regeneration activities using indigenous, drought-resistant trees

3.3.2 Activities and/or Processes Implemented for Adaptation (GL1.4)

Wildlife Works' approach in the face of this threat has been to search for economic development opportunities that are sustainable and not dependent on the dry land forest. Our first initiative was to build a factory and teach the local women how to sew, a radical departure from traditional conservation thinking. This approach was designed to reduce the communities' dependence on slash and burn agriculture and other activities that lead to deforestation through the development of alternative income sources.

The expansion of our project to include revenues from carbon credit sales derived from the protection of the forest will increase the options for the creation of additional alternative, non-destructive jobs. This will enable us to employ more community members, and to further decrease the number of community members solely reliant on small subsistence agriculture.

The funding from carbon credit sales will additionally enable the expansion of our dryland-farming scheme. We are exploring the use of Jojoba, chili pepper and citrus trees as cash crops. These species have been selected since they can survive in very arid conditions with little to no water and are much more productive per hectare than maize or the other annual crops traditionally grown by the community. As these crops require much less land, they can be irrigated from the existing pipeline, which the Kenyan government recently extended down into the villages around the Project Area. This would be highly beneficial in the event that natural rains fail for an extended period, and the income from the crops will justify to the farmers the additional expense of irrigation. This cannot be said for Maize, which is not a valuable enough crop to justify irrigation from the pipeline. Please refer to Section 2.2 for the current implementation status and achievements of each activity assisting in the adaptation of communities.

4 COMMUNITY

4.1 Net Positive Community Impacts

4.1.1 Community Impacts (CM1.1)

In measuring and monitoring impacts of the KCRPI on the local communities, Wildlife Works applies the cause-and-effect logic and associated theories of change. A theory of change is a hypothesis about how a project intends to achieve its intended objectives. Because they are based on several assumptions about the cause-and-effect relationships, carefully selected indicators are needed to monitor these assumptions in a causal chain analysis. The main strength of this logic lies in presenting a credible response to the challenge of attribution: indicators measure progress towards achieving the desired project outcomes and impacts from project activities and strategies. To design this, Wildlife Works holds Social and Biodiversity Impact Assessment (SBIA) community workshops to engage the community in thinking about how things would have been without the project, envisage how they may be with the project, and identify any potential risks and negative impacts.

For the KCRPI, Wildlife Works has had a permanent, day to day management presence since 1998. When WWC first began operating on the landscape we sought out the consent of the surrounding communities and stakeholders. Throughout our history we have continued in a near constant consultation and feedback gathering process. With the development of the REDD+ mechanism in 2008, WWC sought to utilize it as a long-term, sustainable funding mechanism. In 2009 WWC began a formal consultative process with the stakeholders of the Project Area and to the surrounding communities. These formed the

basis of the SBIA community workshop process. Through these we identified the following five Focal Issues that they felt the project should address: (i) Governance: incorporating leadership and gender inclusivity; (ii) Poverty: jobs and income-generating activities; (iii) Human-wildlife conflict; (iv) Environmental degradation: including deforestation and agricultural issues; and (v) Education. Five result chain diagrams were then produced, and their associated theory of change statements. This formed the basis of indicator identification and the monitoring plan (the original workshop proceedings are available and can be provided to the auditor on request).

4.1.1.1 Risks and negative impact analysis (CM2.1.)

The SBIA community workshop participants were also tasked with identifying possible risks to project success, plus unexpected side effect(s) from the REDD+ Project successfully realizing the desired results (based on the Focal Issues they identified and associated theories of change above). Additionally, they were also required to gauge the likelihood and magnitude of these unintentional side effects then propose possible mitigation which formed the basis of the risks and negative impact assessment from the community's perspective.

4.1.1.2 Describe the expected changes in the well-being conditions and other characteristics of Communities under the without-project land use scenario

Participants in the community workshop were then divided into working groups, one for each focal issue. Given these were the main issues they identified that they would like the project to address, they were used as the basis for undertaking without-project projections. First, they had to produce **problem flow diagrams** which provide an analysis of the status quo with these problems i.e., direct and indirect factors contributing to the focal issue problems. They then projected what they thought would happen with the major direct threats (causes) identified for each Focal Issue in the short-to-medium term in the absence of the REDD+ project (i.e., without-project – baseline – scenarios). Overall, Governance was projected to improve due to devolution under the (then) New Constitutional dispensation, while the others were projected to get progressively worse. This meant that the REDD+ project activities could initially focus on any of the four issues projected to get worse without the project.

4.1.2 Net Positive Community Well-Being Impacts (CM1.1)

The community project activities undertaken and summarized under Section 2.2 were all determined by the community themselves (through their elected representatives to the Location Carbon Committees – LCCs); LCCs are the community organs with executive authority on making decisions on community projects to be undertaken. Their decisions are based on the outcomes of the SBIA Workshop on the main (focal) issues that the project should undertake as described under Section 4.1.1 above.

Consequently, based on the theory of change logic, we argue that the project is having positive impacts to the local communities by addressing the main problems they identified e.g., through water projects, school infrastructure improvement, bursary schemes etc. and whereas the impact are sometimes going to take a long time to be felt, the results chain demonstrate how these will come about from the current project activities (Table 10).

Table 10: The without-project projections for the key causes of the focal issue problems identified during the community SBIA workshop, and the ongoing project activities to improve them

Focal Issue	Focal Issue Aspect	Projected status in short to medium term	Project activities so far
Human-wildlife conflicts	Lack of vegetation and water	Will worsen because of increasingly unpredictable weather patterns	Dam scooping within the KCRPI area to help keep elephants on ranches longer after rainy season
	Poaching	Will increase as the increasing population seek means of survival	Employment and equipping a ranger force of about 100 with 6 outposts for better patrolling and enforcement
Poverty	Lack of education and awareness	Worsen with recycling the same problems due to lack of awareness, fees and negative attitudes to education	Improved school infrastructure and bursary scheme will reduce household pressure with fees payment and eventually improve education access
	Food insecurity	Worsen with decreasing yields	Agri-business project and training through the greenhouse will lead to agriculture diversification and improvement
	Low income	Will decline leading to increasing crime and disputes over resources	Job creation at Wildlife Works and through various project activities and enterprises, as well as Landowner payments from carbon revenue share contribute to household incomes in the KCRPI
Governance	Poor application of laws	Fair: new constitution promises a new dispensation of justice and reform of the judicial system that will lead to better application of laws	The ranger force undergoes training on better evidence gathering and handling of crime scenes to improve chances of prosecution for wildlife crimes
Education	Negative attitude towards education	Better: through various sources, parents are beginning	Wildlife Works' community engagement department as well as other initiatives like GLOW described under section 2.1.1

		to appreciate the importance of education	undertake frequent motivational engagements in schools and the community to promote the importance of education
	Poor infrastructure (mainly buildings and teaching material)	Better: improvements underway as the Government allocates more money in the education sector	School classroom construction, renovation and provision of critical infrastructure like desks
	Lack of school fees	Slight improvement: government, donors and well-wishers providing bursaries and scholarships to needy children	Wildlife Works' Bursary Scheme complements these other efforts and provides critical full or partial funding to needy and able students
Environmental degradation	Deforestation	Increase: tree cutting will continue leading to more aridity	Wildlife Works' greenhouse's organic tree nursery initiative encourages the community to plant tree through purchasing seedlings from them, nurturing them and giving them back to the community to enhance tree cover outside KCRPI ranches
	Poor farming methods	Worsen: little soil and water conservation measures	Ongoing agricultural greenhouse and other planned farming projects (e.g., through the Earthwatch Institute supported Sustainable Agriculture and Elephant Project) will improve farming techniques and reduce associated degradation

4.1.3 Protection of High Conservation Values (CM1.2)

The main HCV identified in the KCRPI related to community well-being is the Mt. Kasigau ecosystem which provides critical ecological services (especially water) and other cultural values. Wildlife Works' Greenhouse provides tree seedlings to the community and individuals around the mountain to reduce pressure on harvesting trees from the landscape in the long term. Additionally, the Bungule Community Greenhouse is also meant to promote tree planting alongside agri-business ventures. Lastly, Wildlife Works continues to support the Kasigau Development Trust (KDT), a community-based organization which has one of its long-term goals as protecting and preserving the Mt. Kasigau forest and the services associated with the ecosystem.

4.2 Offsite Stakeholder Impacts

4.2.1 Mitigation of Negative Impacts on Other Stakeholders (CM2.2)

Wildlife Works strongly believes that there are no net negative impacts on offsite stakeholders as a result of the KCRPI because there was no legal harvest of forest resources or wildlife from the Project Area. On the contrary we believe that Wildlife Works has had a very positive impact on offsite stakeholders, regionally in the Project Zone, nationally in Kenya, and internationally. Regionally, we have encouraged communities to set aside additional threatened land for conservation. Nationally, we have been

recognized within Kenya for our innovative approach to balancing the needs of communities with the needs of wildlife. Internationally, the KCRPI has become perhaps the flagship REDD+ project, as evidenced by the many large conservation organizations utilizing the example that Wildlife Works has set.

4.2.2 Net Impacts on Other Stakeholders (CM2.3)

We believe that though our various projects related to reducing human-wildlife conflicts (through active patrols an d response, testing various deterrents and improved farming methods), diversifying the incomes of the community to reduce reliance on Wildlife Works as the sole employer, and working with the communities to resolve their grazing issues (e.g., through improving their stock and reducing the need to give grazing leases which are frequently abused), the net impacts from the KCRPI are positive to the local communities within and outside the Project Zone.

4.3 Community Impact Monitoring

4.3.1 Community Monitoring Plan Development (CM3.3)

The community monitoring plan was developed following the SBIA processes outlined under Sections 4.1.1 and 4.1.2. From the theory of change process, appropriate indicators were developed from the community workshop and reviewed and revised into a final list of indicators for the KCRPI. These range from output to impact indicators reflecting the various stages (operations and outcomes) expected of a 30-year project such as the KCRPI (see details under Section 4.3.2).

4.3.2 Community Monitoring Plan Results (CM3.1, CM3.2, GL2.5)

The following Table 11 provides additional detail and data on the indicators described following the community SIA workshop.

Table 11: KCRPI's social and biodiversity monitoring plan and associated indicators developed from the community SIA and expert BIA workshops

Focal Issue	Direct Result	#	Indicator description	Type	Lead	Result	Notes
Human-wildlife conflicts	Adequate vegetation and water	1	# water holes scooped within the Project Zone for wildlife and/or cattle	Output	Ops	4	Including a borehole drilled at Salama Dam
		2	# wildlife/cattle using the water holes year-round	Outcome	BSMT		
		3	# households/persons accessing new water sources	Outcome	WWCT	700	Pipeline and tanks built for schools and community
	Reduced encroachment and poaching	4	# rangers employed	Output	HR	100	

		5	# training courses held for skills development	Output	HR	25	Mainly health and safety and ranger training
		6	# outposts established and operational	Output	Security	6	Outposts' maintenance
		7	# patrols and/or distance travelled	Outcome	Security	>1000 annual patrols 15/month aerial	Patrols were either on foot or driving
		8	# poachers arrested	Outcome	Security	72	Between 2015-2017
		9	# snares recovered	Outcome	Security	110	Between 2015-2017
		10	# carcasses/injured animals recorded	Impact	Security	89	Between 2015-2017
		11	# hectares deforested, excised or converted into farmland	Impact	RS/GIS	2000ha	Excised from Izera Ranch
	Better wildlife containment	12	# and type of deterrents deployed	Output	Ops	3 months	Thunder flares & response teams
		13	# human-wildlife conflict encounters	Impact	Sec/BSMT	757	Based on 7 community monitors' data for 2015-17
Education	Increased enrolment	14	# awareness meetings/events/activities on REDD+ and education matters in schools	Output	Community Liaison	98	Mainly primary and secondary school meetings
		15	# students supported by the WW bursary scheme	Output	WWCT	2,961	62 Full scholarship and 2899 partial

		16	Amount of money spent on WW bursary scheme	Output	WWCT	KES 16,468,701	5,393,601 on full and 11,075,100 on partial
		17	% students not in school due to lack of fees	Impact	BSMT	25% secondary; 67% tertiary	
		18	Performance of pupils supported (full scholarship)	Impact	Community Liaison	57 of 62 passed	34 over the university entry cut-off mark
	Better education infrastructure	19	# classrooms constructed or other school renovations	Output	Ops/WWCT	4	Including water tanks, playing fields and wiring
		20	# and type of education infrastructure installed	Output	Ops/WWCT	≈150	Desks and chairs at Bughuta sec.
		21	# pupils using the infrastructure built	Outcome	Community Liaison	≈1000	Including Bughuta and MacKinnon sec.
Environmental degradation	Increased tree cover in landscape	22	# and types of trees propagated in the WW nursery	Output	Ops/GH	≈12,700	Mean monthly #: 10,000 indigenous and 2700 fruit trees
		23	# trees planted and surviving beyond the 3rd year outside the KCRPI	Outcome	GH	≈2,250	About 15,000 seedlings planted annually with 30% survival in 1st year and 15% by 3rd yr
		24	% households obtaining fuelwood and other	Impact	BSMT	≈25%	From ranches and other off-farm sources

			needs from the Project ranches				
	Improved forest quality and cover	25	# charcoal bags and kilns recorded	Outcome	Sec/BS MT	243	Between 2015-2017
		26	# log heaps recorded	Outcome	Sec/BS MT	253	Between 2015-2017
		27	# and diversity of wildlife in the project ranches year-round	Impact	BSMT	All HCVs	Between 2015-2017, including breeding
Governance	Good leadership	28	# and location of Notice Boards and Suggestion Boxes used for KCRPI purposes	Output	WWCT	6	Currently located at Chief's Offices
		29	# community awareness meetings/events/activities on REDD+ and other matters	Output	Community Liaison	361	Community (barazas) and committee meetings
		30	# complaints on project implementation and LCC's functioning filed and acted upon	Outcome	WWCT	10	All were resolved mainly through provision of additional information
		31	% community understanding link between environmental protection, REDD & livelihoods	Output	BSMT	30%	About 30% had a livelihood-related interaction with the KCRPI
Poverty	Diversified livelihoods & food security	32	# agro-processing, value-addition, storage initiatives	Output	Ops/WWCT	0	
		33	total # products produced on-farm for home use or sale	Impact	BSMT		

		34	# agriculture-related training courses or extension events	Output	Greenhouse	29	Educational visits to the Greenhouse involving 426 individuals
		35	# new/improved practices on farms	Output	Ops/BSMT		
		36	# community (agri-business) greenhouses established	Outcome	Greenhouse	2	Bungule and Losario community greenhouses
	Increased and stable income	37	# local community members employed at WW	Output	HR	324	These are Kenyan employees of which about 90% are from the Project Area
		38	# training courses/workshops held for skill/personal development	Output	HR	8	Mainly accounting and audits, HR and EPZ
		39	total amount and sources of income earned by household (on- and off-farm)	Impact	BSMT		

4.3.2.1 Project Activity M_5 Implementation Status

The following is a list of Project Activities for KCRPI (in most cases, the activities for KCRPI also apply to KCRPII, but some activities for KCRPI do not apply to KCRPII). All projects are currently operational and were operational during this monitoring period. The current description of the implementation status is provided below in this section.

Wildlife Works Carbon Trust

- Wildlife Works Carbon Trust: School Construction, Bursary Scheme, and Water projects
- Support to Community Based Organizations: Sagalla Conservation and Development Forum (SCDF), Mwatate District Stakeholders' Forum (MDSF) and Mwachabo Development Forum (MDF), Marungu Hill Conservancy Forum (MHC), Kasigau Development Trust (KDT) and Mackinnon Road CBO.
- Financial Aid to Community Organizations, such as Marungu Hill Conservancy Association

Wildlife Works business activities

- EcoFactory expansion and print factory
- Local Production Clothing Factory
- Wildlife Works Soap Factory
- Wildlife Works Greenhouses and selling point
- Tree nursery and Amiran Greenhouses
- Jojoba propagation
- Reforestation of Mt. Kasigau and surrounding area
- Wildlife Works Eco-Charcoal Production Facility
- Ecotourism Projects
- Support to establishing the Tsavo Conservancy
- Wildlife Works Health Projects
- Community Wildlife Scouts
- Project Product Sales and Marketing

Conservation and project infrastructure

- Forest and Biodiversity monitoring
- Security and Ranger patrols
- REDD Carbon Inventory Monitoring
- Group Ranch Office Renovations / Construction

All Project Activities are described in full detail in the PD, section 6.1 Baseline Scenario. These Project Activities were designed to mitigate deforestation and human-wildlife conflict, and therefore by default serve to mitigate leakage and uphold project permanence. One proposed project activity described in the PD, mushroom farms from elephant dung, has been discontinued as it was found to not be feasible nor wanted by the communities.

Any potential leakage resulting from the Project Activity is measured through direct measurement in the Project's leakage area. The Project did not cause any leakage during this monitoring period. Please refer to sections 10.2 and 10.3 of the PD for descriptions of the delineation of the leakage area and the leakage measurement procedure. Section 3.2.3.2 of this monitoring report provides the results of the leakage area measurement for this (M_5) monitoring period.

The total GHG emission reductions for this (M_5) monitoring period are 869,555 t CO2e. There were no changes made to the Project since the last verification.

Project Activity M_5 Implementation Status

Employment

Wildlife Works retains a workforce of between 300-320 at the KCRPI most of the time. At the end of the reporting period, there were 312 employees in total, 14 in senior management positions. Of the 312, almost 30% (87) are female and more than 90% (286) were from the local area (i.e., from one of the Project Zone or larger Taita Taveta County). In 2017, 68 staff members attended various training courses, mainly on Health and Safety (34 individuals), and Greenhouse Operations and Management (23).

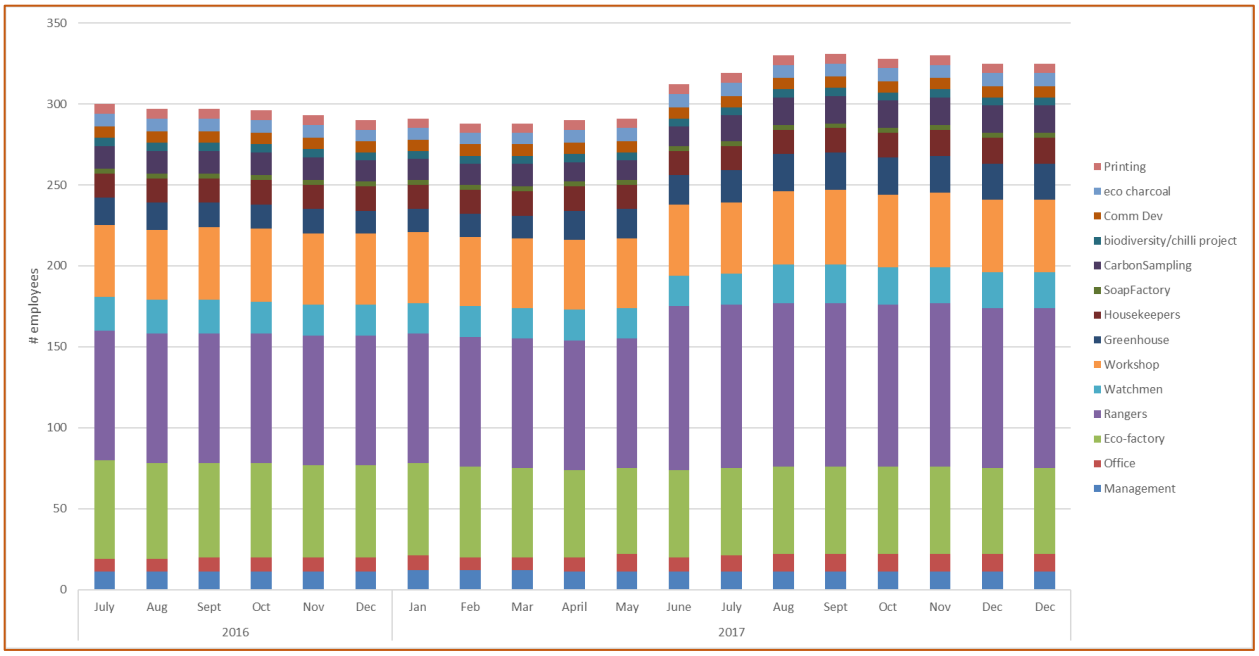


Figure 11: Wildlife Works' employee statistics and trends during the reporting period (July 2016 to Dec 2017) broken down by department

Wildlife Works Carbon Trust

Wildlife Works Carbon Trust (WWCT): The Trust is still in-charge of all projects funded by the community component of the carbon revenues. The Trust releases money for various community projects selected by the Locational Carbon Committees (LCCs). The major activities selected by the LCCs during the reporting period (2015-2017) included school construction or renovation projects, bursary schemes, agri-business and water projects. Aside from educational bursaries (next section), a total of nine projects were commissioned with six already completed and the rest ongoing (Table 12, Figure 12). Additionally, four projects including school and water construction projects that were initiated in the previous monitoring period were completed during this reporting period. School projects have predominantly involved construction and repair of classrooms as well as furniture provision, whereas water projects entail improvements to collection and harvesting, including pipeline construction. Overall, these 10 projects cost a total of KES 14,634,360 (≈USD 145,000).

Table 12: Description of the projects initiated during the monitoring period by the LCCs through the Wildlife Works Carbon Trust and project partners

Year	Location	Specific Area	Project Description	Start	End	Status	Cost (KES)
2015	Kasigau	Jora women group	Water harvesting & storage	02-Jan-15	30-Jan-15	Complete	27,882
2015	Kasigau	Buguta sec school	Classroom construction	21-Mar-15	21-Jun-15	Complete	2,500,000

2015	Kasigau	Bungule women group	Agri-business & forestry unit	24-Apr-15	31-Jul-15	Complete	800,000
2016	Mackinnon	Mackinnon Community	Water pipeline	14-Jan-16	03-Mar-16	Complete	3,044,454
2016	Kasigau	Buguta sec school	School furniture	21-Mar-16	30-Jun-16	Complete	158,260
2017	Kasigau	Buguta sec school	Water harvesting & storage	01-Mar-17	06-Jun-17	Complete	1,903,764
2017	Marungu	Miasenyi community	Agri-business & forestry unit	02-May-17		Ongoing	1,200,000
2017	Mackinnon	Mackinnon sec school	Water storage	04-Jul-17		Ongoing	1,000,000
2017	Mackinnon	Mackinnon Community	Water storage	02-Aug-17		Ongoing	4,000,000

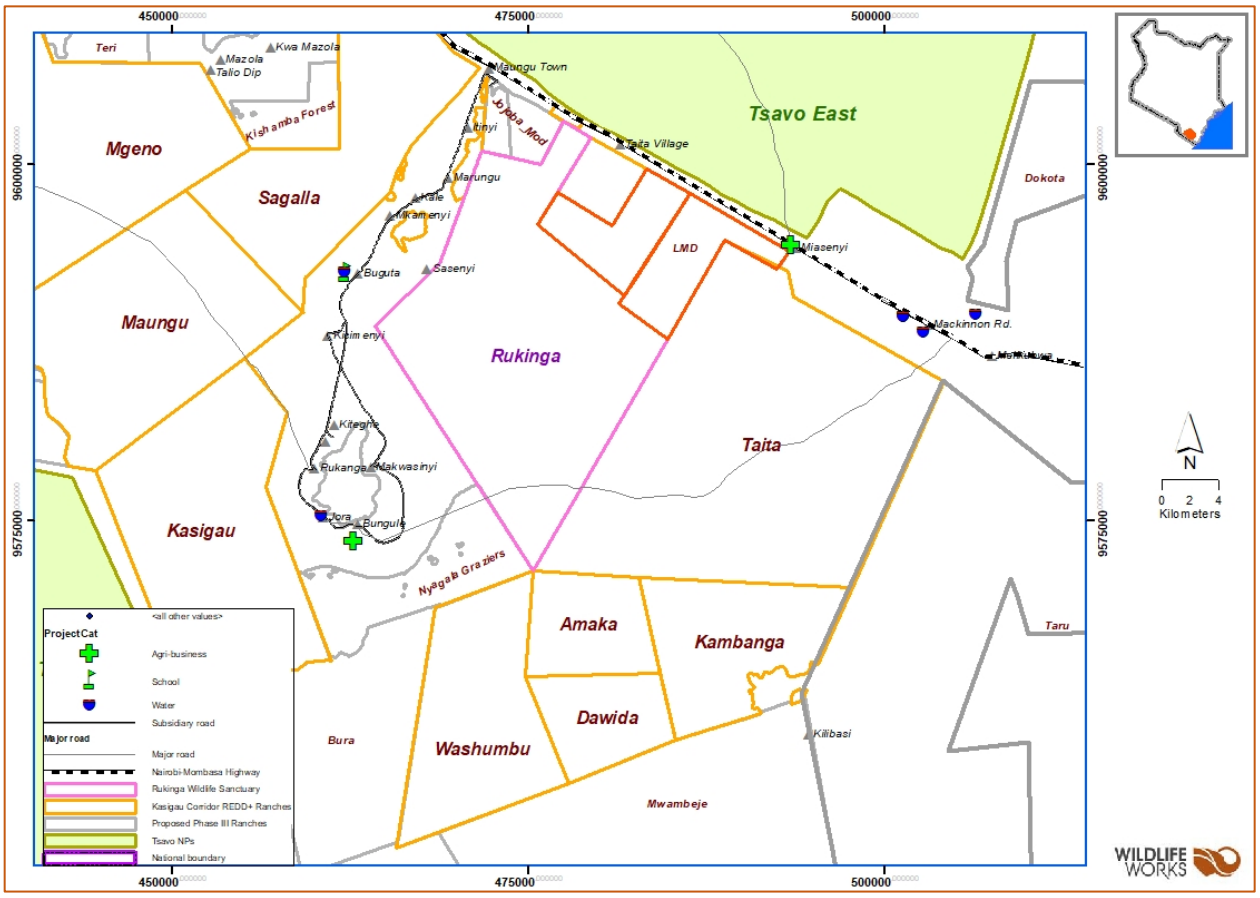


Figure 12: Distribution of the projects initiated through the WWCT during the reporting period 2015-2017 in the KCRPI

Bursary scheme: The WWCT through LCCs and the Bursary Sub-committees in every Location also administers school bursary program for students within the KCRPI. There are two sponsorship levels: Full scholarship and partial sponsorship:

- Between 2012 and 2014, 62 students received full scholarships for their education, mostly towards secondary school (60 students) and two university students (Figure 13). Being four-year programs, all these students completed their studies during the current reporting period, between 2015 and 2017. More than half of the secondary school students (34) scored above the minimum entry to public universities (C+), while all the rest were eligible for diploma and certificate programs in tertiary institutions; there were only five dropouts. Through the full scholarship scheme, a total amount of KES 12,002,197 (≈USD 120,000) has been spent with KES 5,393,601 (≈USD 54,000) being spent within the current reporting period 2015-2017 (Figure 14).

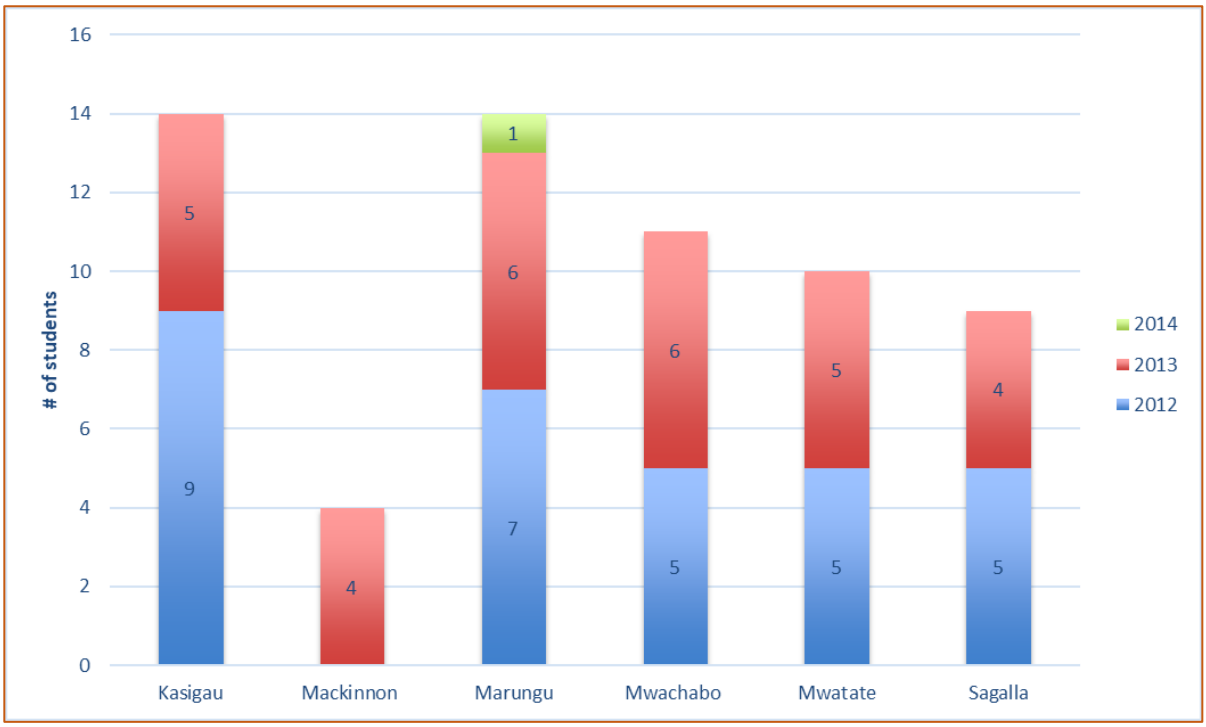


Figure 13: Number of fully sponsored students across the six Locations of the KCRPI.

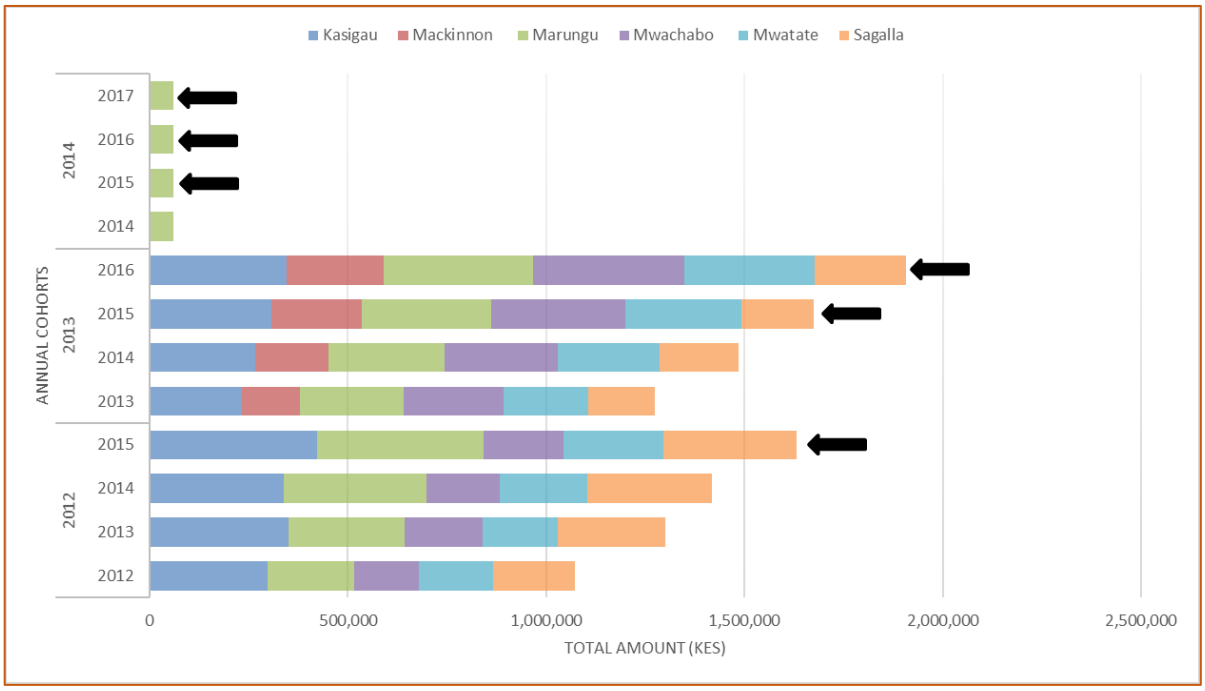


Figure 14: Total expenditure for fully sponsored students across the KCRPI, showing the amounts paid during the current reporting period (all 2015, 2016 & 2017 figures for each cohort).

- Between 2012 and 2017, a total of 5,370 students have received partial sponsorship through the Wildlife Works' bursary scheme, with slight over half of them being during the current reporting period (Figure 15); the total cost of sponsoring these students during the current reporting period was KES 11,075,100 (≈USD 110,000) (Figure 16).

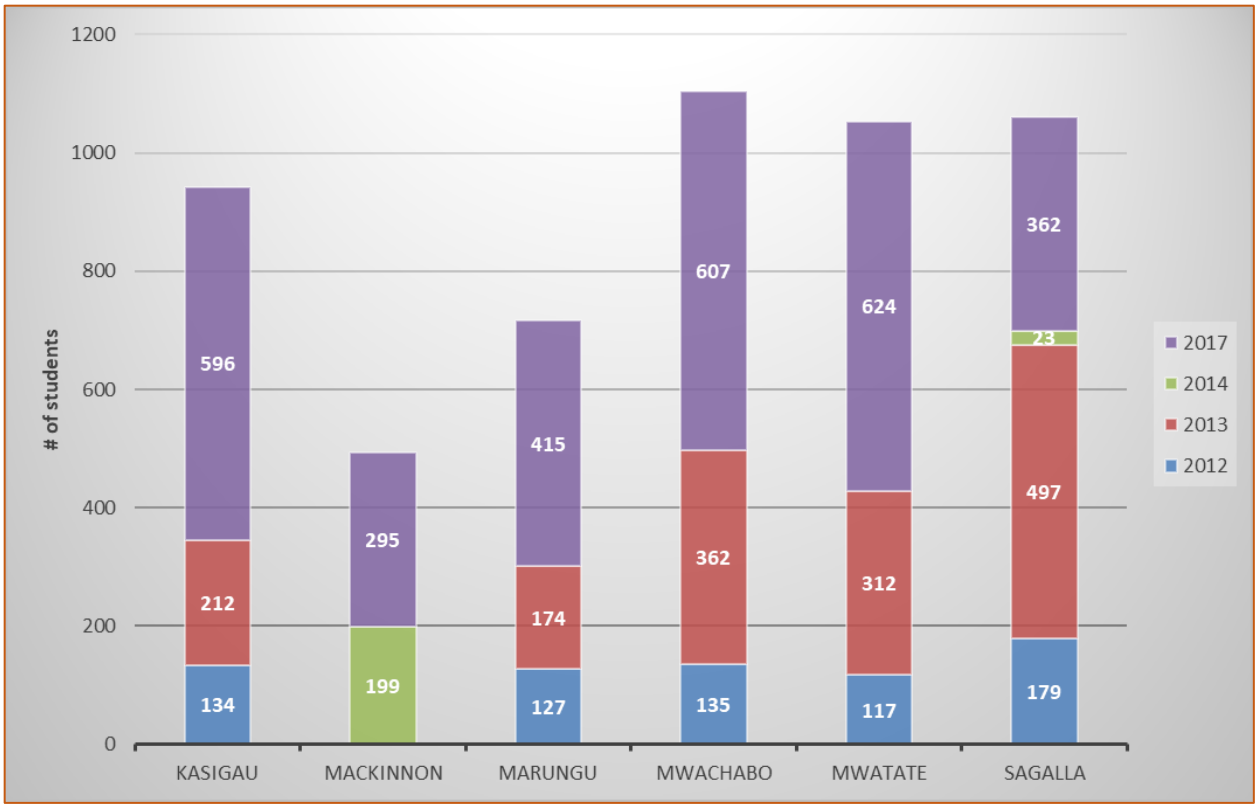


Figure 15: Number of partially sponsored students across the six Locations of the KCRPI.

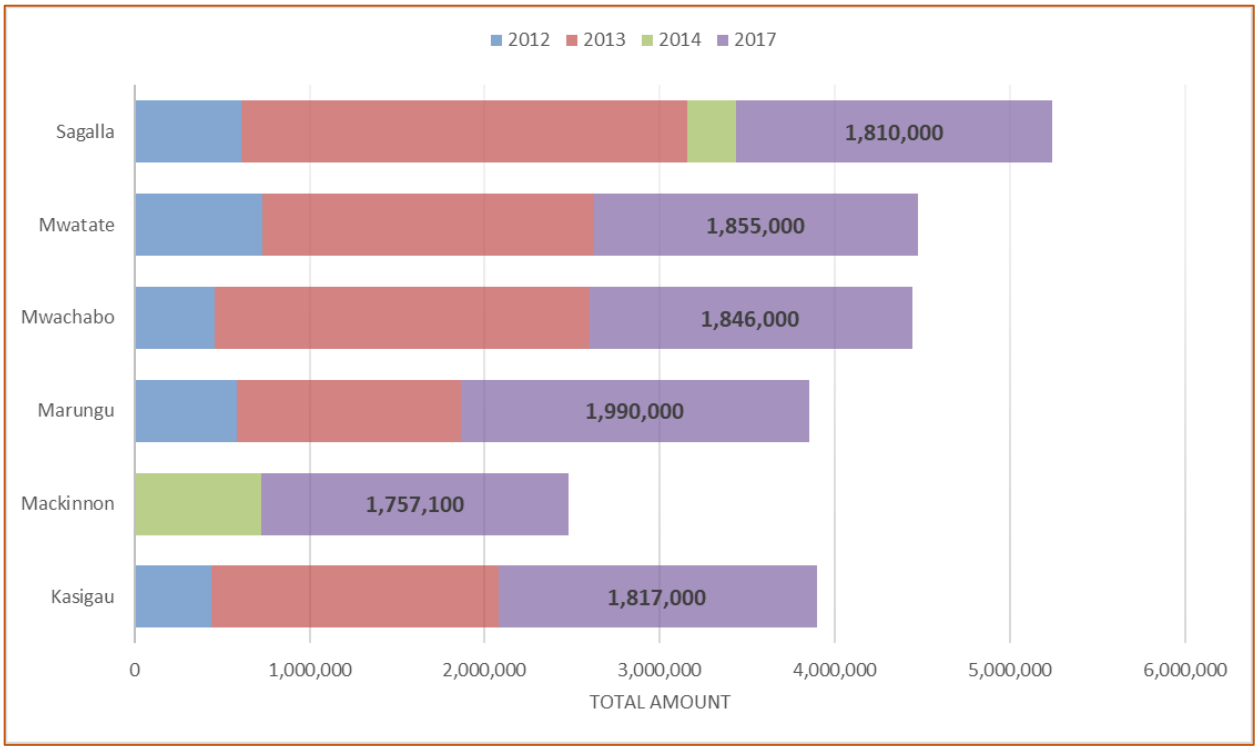


Figure 16: Total amounts spent on partially sponsored students across the KCRPI, showing the amounts paid during the current reporting period (under 2017) in each Location

Support to Community Based Organizations: Through the WWCT, the KCRPI still supports capacity development and some recurrent expenditure for the main CBOs that are in-charge of operating and reporting on selected community projects. These are: Sagalla Conservation and Development Forum (SCDF), Mwatate District Stakeholders' Forum (MDSF) and Mwachabo Development Forum (MDF), Marungu Hill Conservancy Forum (MHC), Kasigau Development Trust (KDT) and Mackinnon Road CBO. During the current reporting period, a total of KES 6,438,605 (≈USD 64,000) was spent on the CBOs across the six locations (Figure 17).

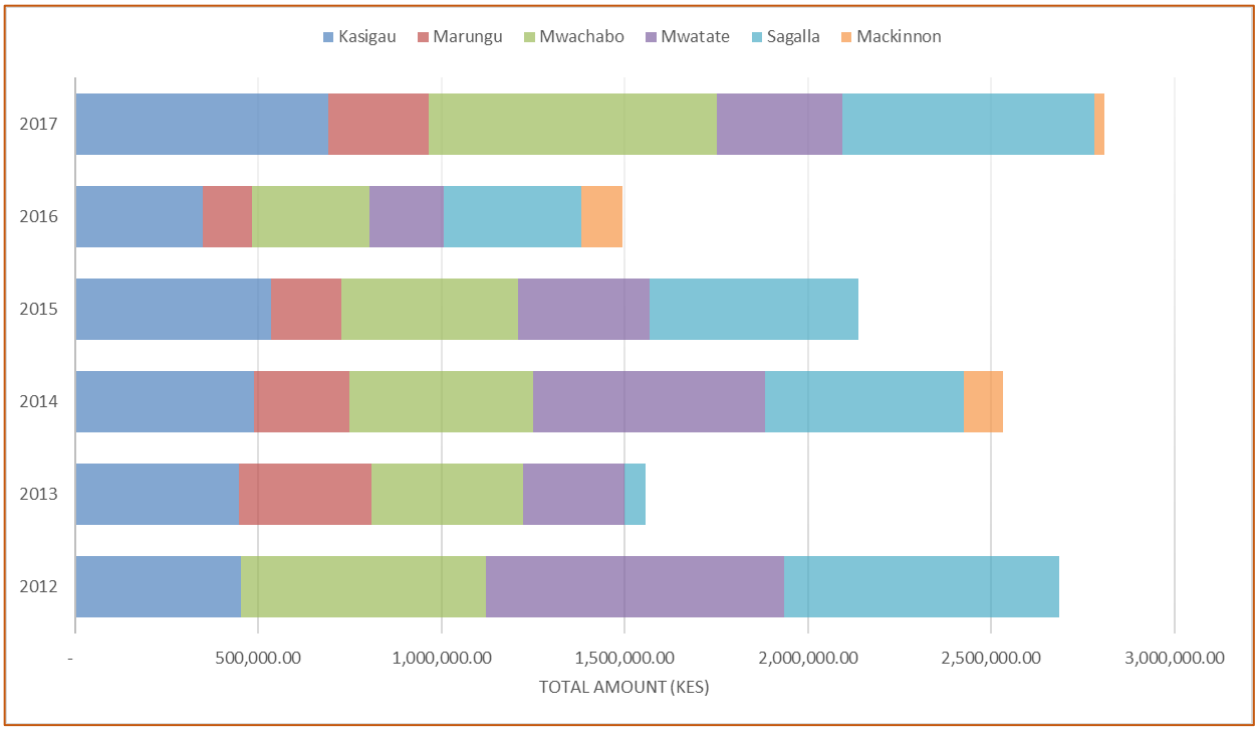


Figure 17: Total amount spent on CBOs development and operations (recurrent) between 2012 and 2017

Stakeholder Engagement and Community Meetings

During the reporting period, 361 Community meetings were held across the KCRPI dealing with diverse range of issues related to climate change and the KCRPI. These included 118, 105 and 138 in 2015, 2016 and 2017, respectively. A cumulative total of almost 24,000 local community members attended these meetings across all six locations (see Figure 18). In terms of mode of presentation, most of the meetings (82%) were discussion-type interactive meetings, while by attendees, most were general community meetings (46%) and LCC or CBO-related meetings (19%). Content-wise, they were quite varied with about 40 slightly different topics covered, the major topics covered were project implementation updates (38%), climate change and REDD+ (10%), financial management, water and human-wildlife conflict issues.

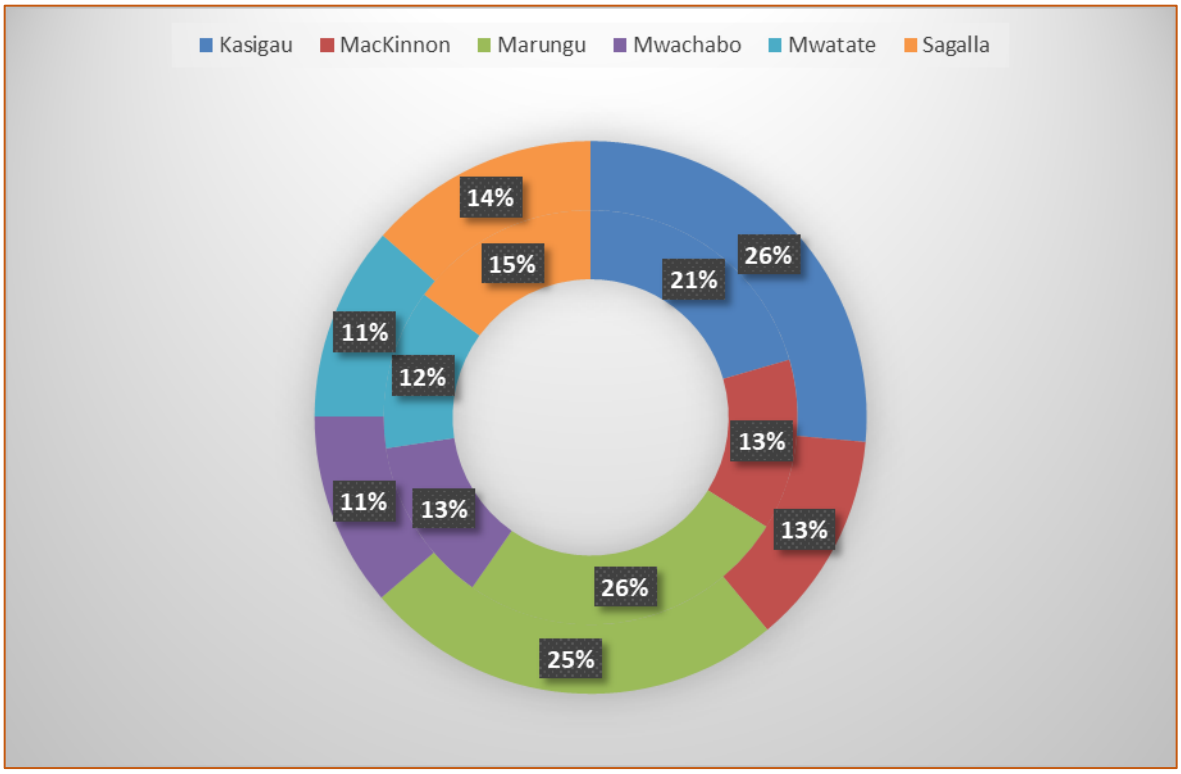


Figure 18: Distribution community meetings held during the reporting period disaggregated by Location: the outer ring represents the number of meetings held, while the inner ring is the total number of attendees

During the reporting period, a total of 98 awareness meetings were also held in local schools (11, 49, and 38 in 2015, 2016 and 2017, respectively), involving a cumulative total of 11,499 students. Of the 98 meetings, the majority (75%) were in primary-level schools, 17 in secondary schools and the rest in nursery schools and tertiary institutions. Most were interacting with Environmental Clubs in the schools (65%), while 17% addressed the entire school. The clear majority were interactive discussions (question-and-answer) (87%) while most of the rest were demonstrations and field visits. About 61% involved discussions about activities that the clubs could undertake towards conservation, about 15% were general climate change and REDD+ discussions, while the rest were a mix of tree-planting demonstrations, motivational talks and health-related. Finally, three full landowners' meetings were held between 2016 and 2017, largely addressing the financial position of the company, upcoming and projected deals and plans going forward.

Wildlife Works business activities

EcoFactory expansion and print factory: the eco-factory has continued to grow in strength and getting close to breaking even. Supported by the international marketing and design team based in California, production has been steady and number employees maintained at around 50-55 at all times. Wildlife Works was also able to attract a like-minded eco-factory from Mombasa to our EPZ area leading to greater employment opportunities for the local communities around the KCRPI. In conjunction with the new factory and external support, Wildlife Works was involved in the establishment of a Stitching Academy in Maungu Town where potential seamstresses are receiving specialized skills and training that

enable them directly work in any eco-factory at Wildlife Works' EPZ or elsewhere. During the reporting period, more than 70 local community members have been trained and employed in the EPZ, with close to ¾ being ladies. They are mainly trained as seamstresses but also in several printing and other support positions like sales and marketing.

- *Local Production Clothing Factory*: to support production in the EPZ, a printing arm was established comprising six employees at the moment. In addition, the printing arm acts as a local production factory outside of the EPZ and able to supply local demand, further growing production and local jobs
- *Wildlife Works Soap Factory*: the small Wildlife Works soap factory is still ongoing, with diversified production and three staff members. Different soaps are produced using locally sourced additives and extracts like jojoba oil, coconut milk, lime etc. and sold to niche markets in Nairobi and Mombasa, mainly comprising of lodges and hotels. For the reporting period, the number of pieces produced and sold every month ranges from 100-400 depending on production and demand, with production being often limited by seasonality and availability of the required additive e.g., jojoba oil.
- *Wildlife Works Greenhouse*: this comprises two related components. (i) the tree nursery and selling point, and (ii) agricultural greenhouses (see Figure 19). The Greenhouse team implementing and managing both components has grown to about 22-25 staff during the monitoring period. Production has grown and diversified beyond sale of grafted fruit tree seedlings (like citrus, mango and avocado) to include sale of organically produced vegetables and ornamental plants for landscaping purposes. A selling point was established by the main Nairobi-Mombasa Highway to grow sales. Lastly, this team has supported expansion of the greenhouse project to the local communities neighboring the KCRPI, with two community greenhouses (Lusario and Bungule) already established and in operation (see Figure 12 & Table 12).



Figure 19: Aerial photo of the Greenhouse area showing the two agriculture greenhouses and production demonstration area on right, the tree greenhouses in the middle section and jojoba experiment area at the top of the image

- *Indigenous seedling purchase*: Wildlife Works runs a seedling purchase program to stock the indigenous tree nursery. We buy seedlings of specified trees from the community members, nurture them to the point they can be transplanted, then provide them for free back to community mainly through schools and other groups. From Oct 2015 to Dec 2017, a total of 63,857 seedlings were bought from the community for a total of KES 888,305 (≈USD9,000) (Figure 20).

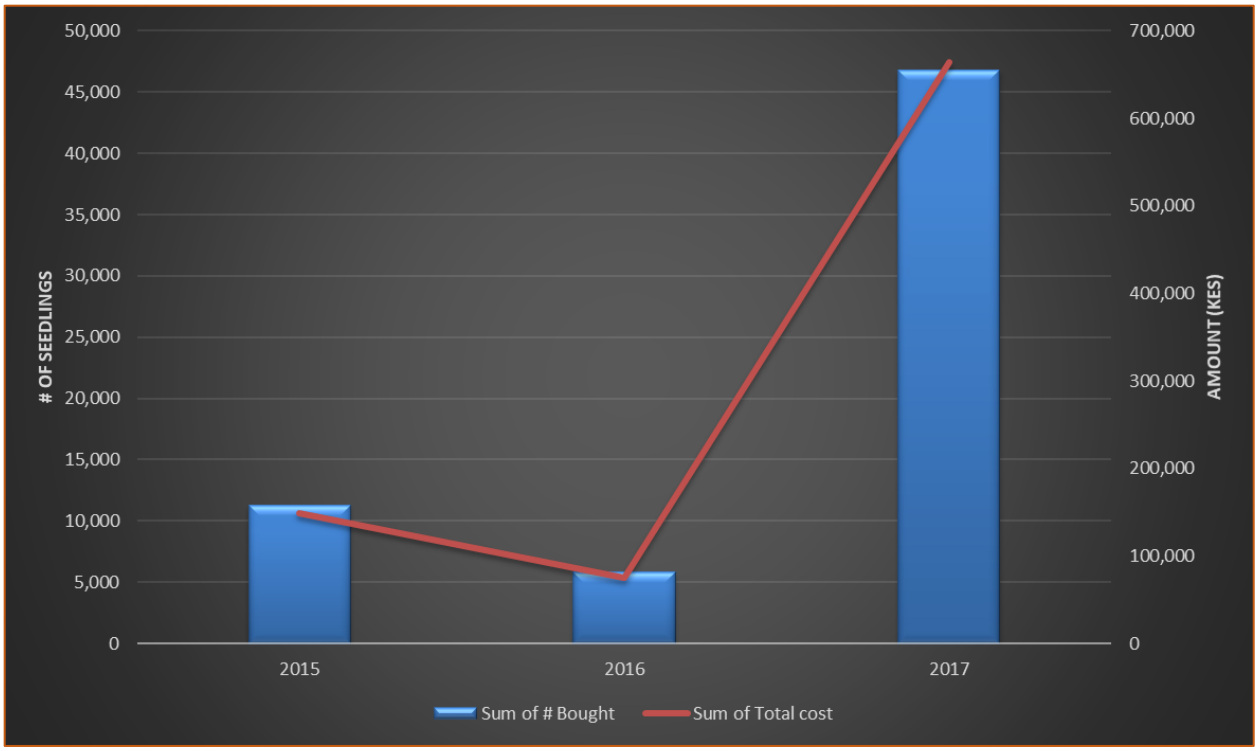


Figure 20: Number and total cost of seedlings bought from the local community members during the reporting period 2015-2017

- *Indigenous trees in nursery*: Of the indigenous trees bought from the community and nurtured at the Wildlife Works' greenhouse, *Melia volkensii* is by far the commonest species, followed by *Acacia robusta* (Figure 21). On average, there are around 10,000 indigenous trees in the nursery at any one time, though this varies based on out-planting seasons and purchasing times (Figure 22).

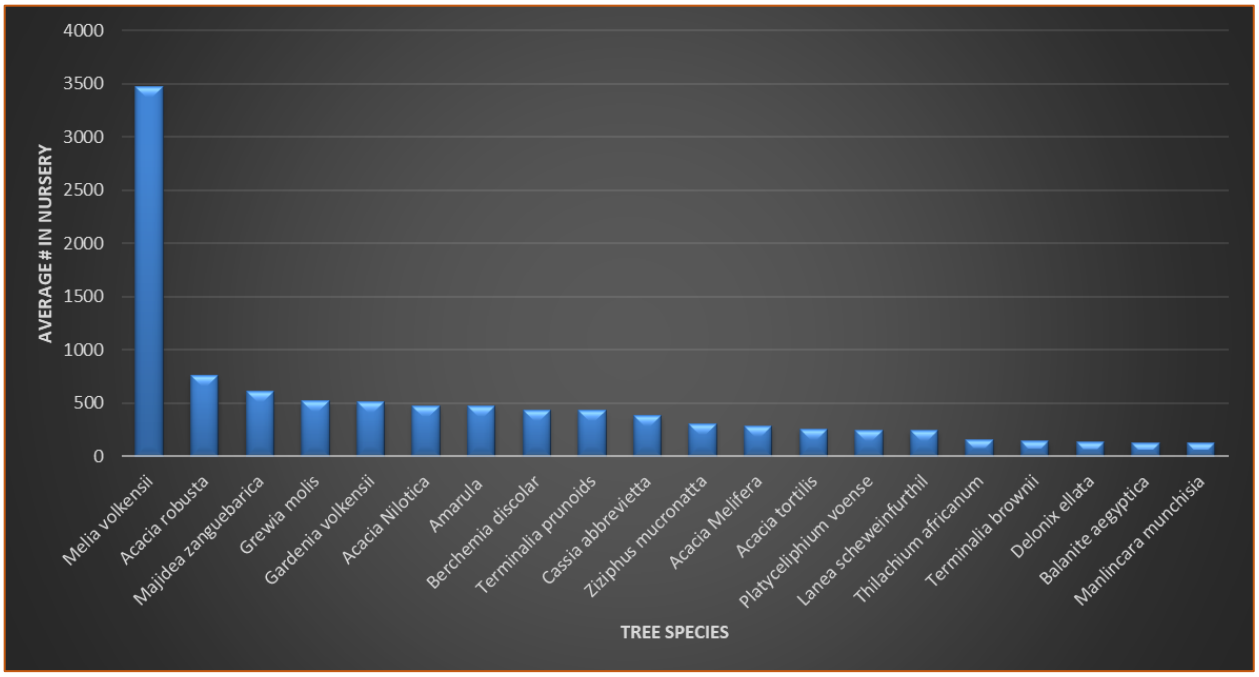


Figure 21: Mean monthly tally of top-20 commonest indigenous tree seedlings at the Wildlife Works' tree nursery

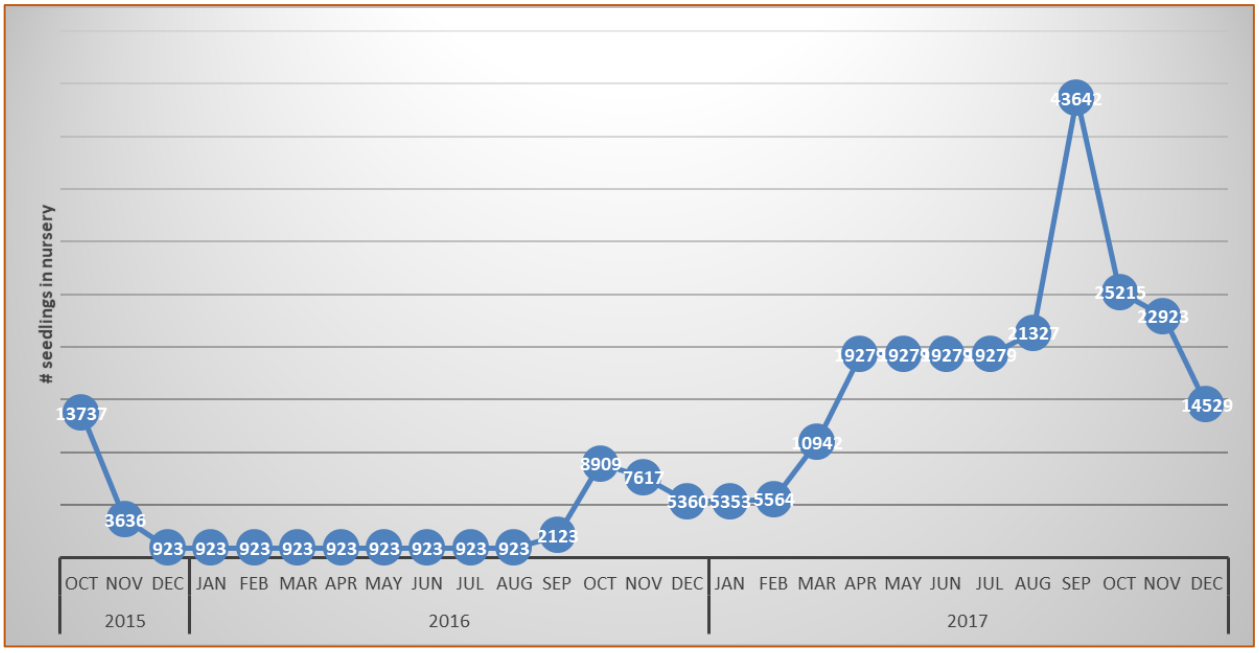


Figure 22: Total number of indigenous tree seedlings at the Wildlife Works' tree nursery each month

- *Fruit trees in nursery*: Of the fruit tree grafted and nurtured at the Wildlife Works' greenhouse, Yellow Passion is by far the commonest species, followed by Apple Mango (Figure 23). On

average, there are around 2,700 fruit tree seedlings in the nursery at any one time, though this varies based on sales (Figure 24).

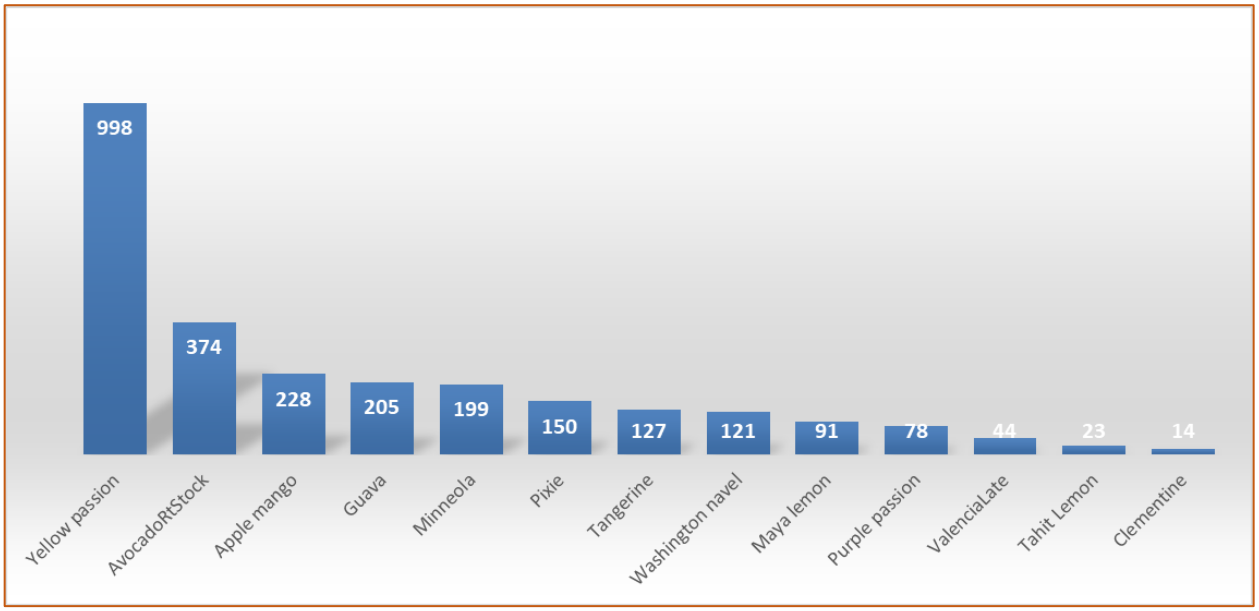


Figure 23: Mean monthly tally of fruit tree seedlings at the Wildlife Works' tree nursery

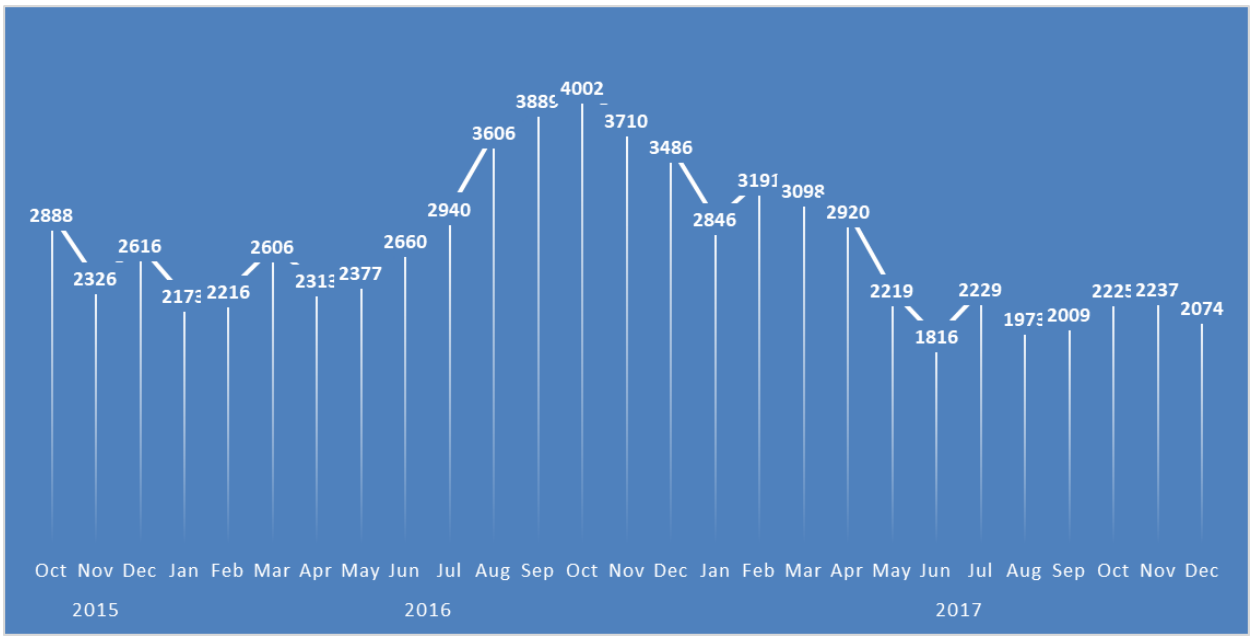


Figure 24: Total number of fruit tree seedlings at the Wildlife Works' tree nursery each month

- *Out-planting and monitoring*: during the reporting period, a total of 33,493 seedlings have been planted in the KCRPI Project Zone, on community and private lands: 16,453 in 2015, 661 in 2016 and 16,379 in 2017. Our long-term monitoring data show that there is about a 30% survival rate of the seedlings in the first year, dropping to about 15-20% by the third year then tapering off.

- *Outreach and training*: During the reporting period, a total of 29 visits were made to Wildlife Works' Greenhouse comprising 426 individuals for outreach, training or information purposes. The visitors came from diverse sources including schools, government, NGO, community groups and tertiary institutions (Table 13). Two community greenhouses (Bungule and Losario) are products of this outreach program, fulfilling the greenhouse's role as a test and training ground for the local community on agri-business and tree planting issues.

Table 13: Number and identity of visitors to Wildlife Works' Greenhouses during the reporting period

Year	Category	# of visits	# of individuals
2015	Charcoal producers	1	14
	County government	1	1
	National government	2	2
	Primary school	1	15
	Tertiary institution	1	2
	Youth group	1	1
2015 Total		7	35
2016	National government	2	30
	Primary school	8	145
	Secondary school	4	76
	Tertiary institution	1	15
	Women's group	1	18
2016 Total		16	284
2017	NGO	1	15
	Primary school	3	56
	Secondary school	1	15
	Women's group	1	21

2017 Total		6	107
Grand Total		29	426

- *Jojoba propagation*: under the Greenhouse team, Wildlife Works still runs an active Jojoba plantation as a breeding and test ground for production of Jojoba in this area (see Figure 19). We also acquired a Jojoba press to press oil which has a niche and growing market in Kenya, besides being used as a popular additive in our Soap Factory.
- *Reforestation of Mt. Kasigau and surrounding area*: During the reporting period, a total of 1,548 seedlings were planted around the mountain in neighboring schools and farms in an effort to reforest the landscape and also to reduce pressure on the trees on the mountain. Sites planted included: Bungule Primary and Polytechnic, Jora Primary, Rukanga Primary, Ngambenyi Primary, Moi High, Malewa Trust (private), Kiteghe Primary, Makwasinyi Primary and Kasigau Girls Secondary Schools
- *Wildlife Works Eco-Charcoal Production Facility*: Wildlife Works still maintains the eco-charcoal facility which has been moved to a larger production area near McKinnon Road township at an area reserved for this production by Taita Ranch. Eight staff members run all the current operations spanning harvesting, carbonation, briquetting and sales. At present, the team can press 1000-1500 0.5kg briquettes every week. The eco-charcoal production site was demarcated into a series of blocks and plots to enable sequential harvesting and monitoring (Figure 25); 12 of these plots have been harvested so far. An experiment was also set up to assess the long-term impacts of partial harvesting on the trees for sustainability of the venture, including an evaluation of the potential frequency of re-harvesting. Lastly, a business plan has been developed for expanding this venture towards full commercial scale, including improved harvesting and kilning processes (Figure 26) and automated briquetting. The plan was positively evaluated by the National Research Fund in 2016-2017 funding cycle and we are awaiting remittance of funds to begin the scaling up process, including mechanization of production and improving sales and marketing.

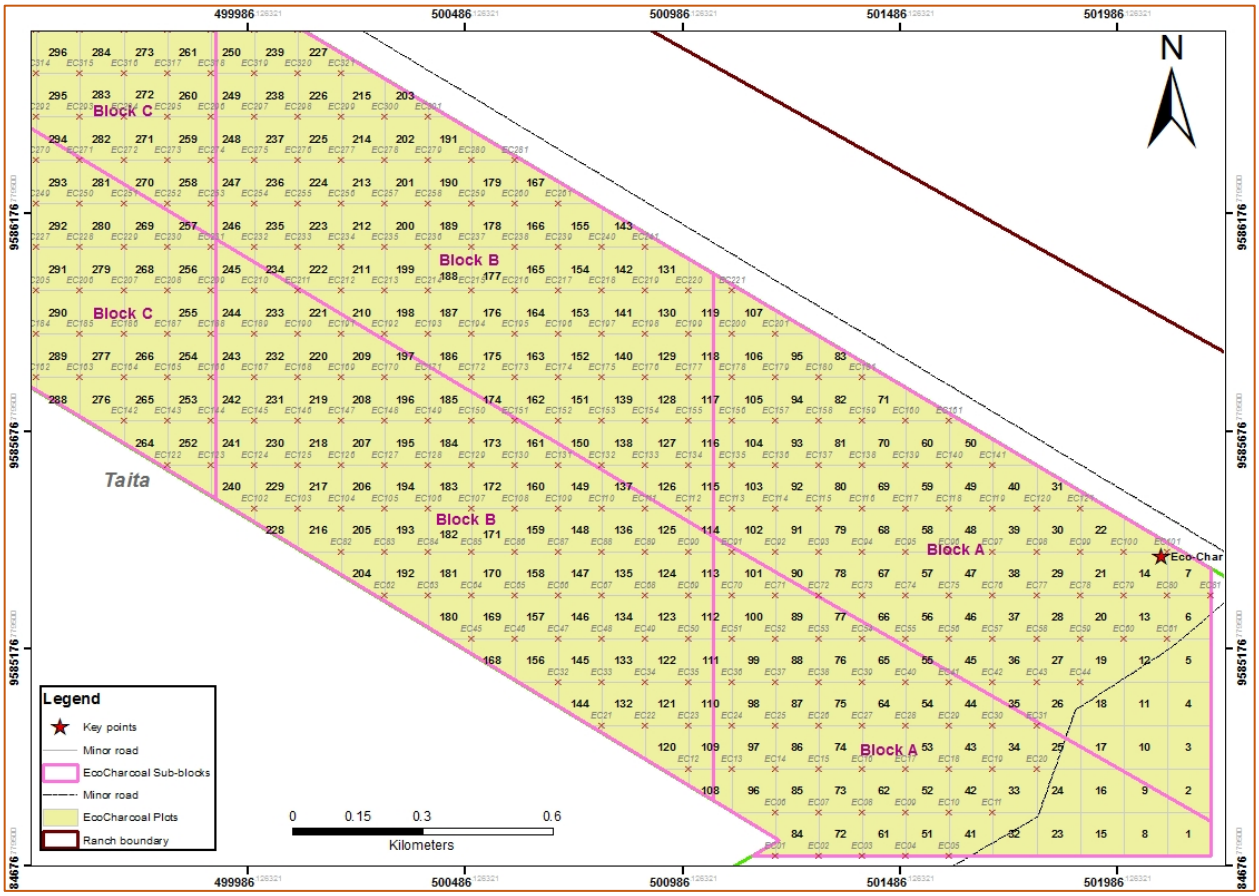


Figure 25: An example of the plot layout at the KCRPI's eco-charcoal production site in Taita Ranch. The plots are permanently numbered for sequential harvesting.



Figure 26: Setting up a test kiln at the new eco-charcoal production site

- *Ecotourism Projects*: Wildlife Works has been actively involved in the development and management of Kivuli Camp, plus supporting the development of Satao Camp at Kivuko on Taita Ranch. Kivuli Camp is fully operational and hosts a mix of foreign and local guests including tourists and educational visitors (http://tsavoconservancy.com/visit-us/kivuli-camp/). For instance, the Earthwatch Institute supports the Sustainable agriculture project around Sasenyi and volunteers are based at Kivuli during their stays (http://earthwatch.org/Expeditions/Elephants-and-Sustainable-Agriculture-in-Kenya). Kivuli Camp employs 4-10 staff members depending on season, mostly from the local community. During the reporting period, the number of guests at Kivuli Camp grew from 213 in 2015 (127 international and 86 national visitors) to 446 (230 international and 216 national visitors). The camp has also advanced from a loss-making position in 2015, to making a annual net profit of over USD 3,000 and 7,000 in 2016 and 2017, respectively.
- *Support to establishing the Tsavo Conservancy*: Progress towards establishing and formal registration of the Tsavo Conservancy slowed down in 2016-2017 due to bureaucratic uncertainties around the registration process under Kenya's devolved governance structure. The Kenya Wildlife Conservancy Association is ironing out the process with KWS and County governments. Nonetheless, Wildlife Works remains committed to supporting the process once it

is back on track, and in the meantime is actively laying the grounds, raising the profile and building the reputation of the area through its involvement with developing Kivuli and Satao Camps which are likely to be the Conservancy's hub

- *Wildlife Works Health Projects*: Wildlife Works is committed to supporting community projects as we feel these can be the most important tools to developing self-sufficient and self-governing communities. One of our main focuses is on education, especially for women and girls. During the reporting period, we held a series of sexual health and sanitation sessions for young girls in various schools within the KCRPI under the GLOW program (Figure 27). GLOW (Girls Leading Our World) is supported by Wildlife Works in conjunction with other partners, and is run by Monica, a local Kenyan lady who volunteers her Saturdays to run these training sessions in local primary and secondary schools across the project area. Each girl selected to the training event is expected to serve as a peer educator and pass along the teachings to two others in the school. This program's ultimate goal is to enable girls to take charge of their own lives and education, especially as pertains to the menstrual cycle, as one of the biggest cause of absenteeism from school for girls is when they are on their periods

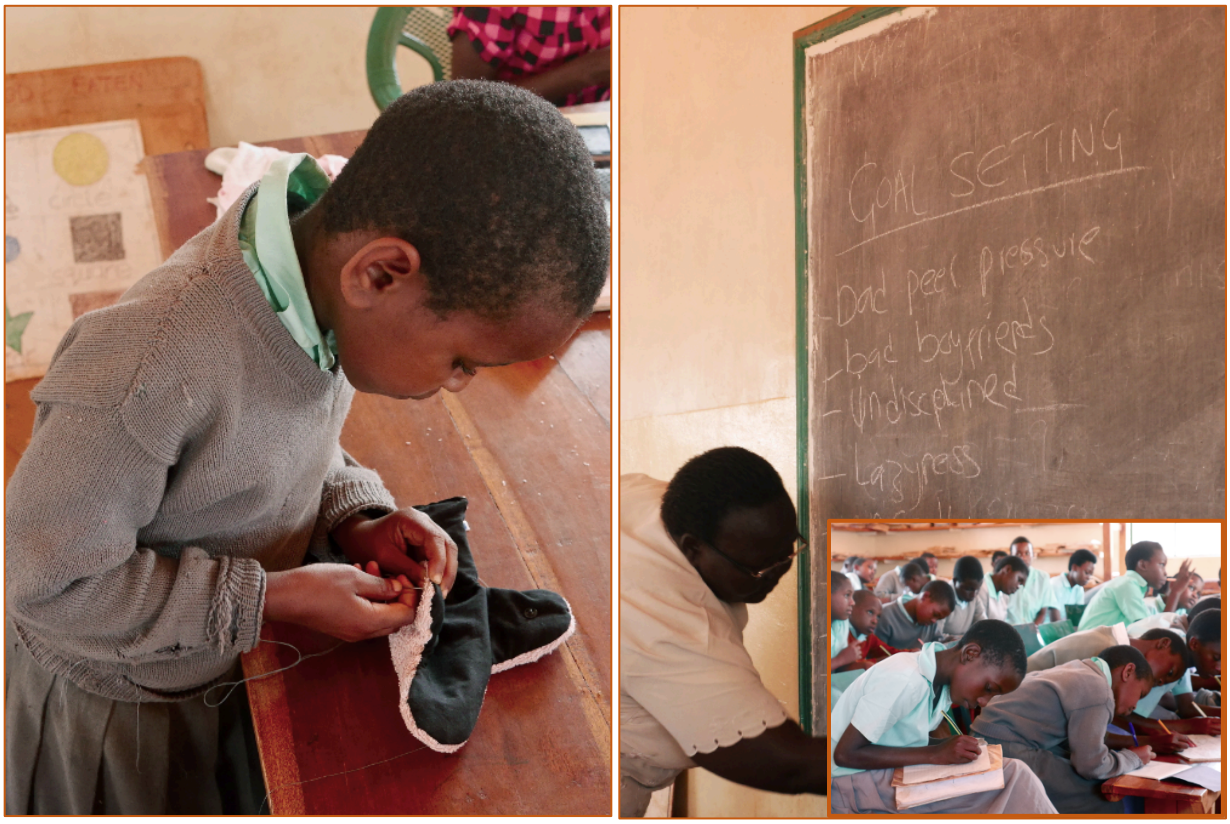


Figure 27: One of GLOW program's training session at Kiteghe Primary School showing Monica (trainer) and a student learning about making her own re-useable pad

- *Community Wildlife Scouts*: Wildlife Works maintains a community-based wildlife monitoring scheme, currently spread across the following eight areas within the KCRPI: Zongowani; Talio Dip/Mazola; Kajire/Kishamba; Makwasinyi; Jora; Bungule; Sasenyi; and Kale/Buguta/Mkamenyi/Birikani. In each of these sites, a community member records all

incidences of human-wildlife conflict. In addition to piloting for the national compensation scheme (run by KWS), these data show trends and patterns of crop-raiding and livestock predation, which Wildlife Works uses plan for swift response actions (e.g., deploying deterrents) and other mitigation measures.

- *Project Product Sales and Marketing*: Wildlife Works' core mission is to harness the strengths of the marketplace for conservation ends. Thus, improving access to markets through use of technology remains a critical component of our enterprise development model. This is best exemplified by our Export Processing Zone (EPZ) and local printing for apparel, and *Hadithi* for community crafts (https://www.hadithikenya.com/). The Local Printing Factory printed more than 8,000 t-shirts and other products (like bags) during 2017 (Table 14). Additionally, by 2017, 30 Women's Groups (Figure 28) and one Disabled Group had been subscribed under *Hadithi* comprising approximately 800 women and several men in the disabled group; this grew from 28 groups and 650 women in 2015-2016. *Hadithi* plays a supportive role for these groups by helping them to build their capacity, improve the quality of their products, improve sales through joint marketing efforts, and learn business and other important skills to improve their lives overall. Through these efforts, a substantial amount of revenue from salaries or sales accrues to these local communities, especially directed to women, which greatly empowers them and their societies in general. About KES 9,980,000 (≈USD 100,000) was paid directly to the groups for their crafts (1.6million in 2015, 3.5m in 2016 and 4.9m in 2017).

Table 14: An excerpt of the production orders for the Local Printing Factory in 2017

Client	Order description	# pieces/sets	Fabric type
Keba Clothing	Men's/Women's t-shirts	42	Conventional Jersey
Bonk	Men's, Women's, Kids and baby Tee's	1,015	Conventional/Organic jersey
Mille Collines	baby Onsie, tank tops, women tees	270	Conventional Jersey
Marlin Ray	Surf Ponchos	100	Kikoi / Toweling fabric
Slum Love	Men's Henley, men's crew neck, women crew necks	300	Conventional Jersey
Vintage	Men's, Women's Tee's (revised men's tee cropped)	504	convention and organic
Elephant Gin	Men's and women's t-shirt samples	150	Conventional jersey
George Mccalman order	T-shirts	35	Organic jersey/Canvas

George Mccalman order	Tote bags	30	Organic jersey/Canvas
Other WW orders	T-shirts	161	Organic jersey/Canvas
Other WW orders	Canvas bags	35	Organic jersey/Canvas
Lion Guardian	T-shirts	60	Organic or Conventional
Kijabe Forest Trust	Rangers Uniform's/Hats	16	Dacron fabric
Wildlife Works	Staff Uniforms	ALL	Dacron fabric
Keba Clothing	Men's/Women's t-shirts	42	Conventional Jersey
Bonk	Men's, Women's, Kids and baby Tee's	887	Conventional/Organic jersey
Friends of Karura	T-shirts	150	Conventional Jersey
Millie Collins	baby Onsie, tank tops, women tees	270	Conventional Jersey
Katungulu	Booro dress	44	Stretching jersey fabric
Elephant Research	T-shirts	16	Conventional Jersey
Kicheche	T-shirts	52	Conventional Jersey
Virunga	Men's and Women t-shirts	1,560	Conventional Jersey
Teach Rwanda	Men's and Women t-shirts	500	Organic jersey
Heaven Rwanda	Men's and Women t-shirts	1,990	Conventional Jersey
Kijabe Forest Trust	Rangers Uniform's/Hats	16	Dacron fabric
Friends of Karura	T-shirts	150	Conventional Jersey
Millie Collins	baby Onsie, tank tops, women tees	270	Conventional Jersey
Elephant Research	T-shirts	16	Conventional Jersey



Figure 28: Baskets lined up for purchase from Jora Women's Group in the KCRPI.

Conservation and project infrastructure

- *Forest and Biodiversity monitoring*: the detailed biodiversity and social monitoring activities (outlined in Sections 4 & 5) illustrate Wildlife Works' efforts to maintain high quality data collection to aid in evaluating project impacts and informing adaptive management. The Monitoring Department has four permanent staff for undertaking social and biodiversity surveys and assessments, with additional staff/volunteers/interns engaged during survey periods. The Wildlife Works' Research Camp has been maintained since 2012 and was expanded between 2014-2016 with the establishment of a fully functional camping facility. The campsite currently holds five safari tents available for providing extra accommodation for visiting researchers.
- *Security and Ranger patrols*: Wildlife Works has instituted several permanent initiatives to enhance security, especially around poaching including increasing our ranger force to about 100 (with about 10% being women) who undertake daily foot and driving patrols from 8 outposts distributed across the KCRPI. All ranger outposts (bases) are maintained to ensure they remain under good state of repair, especially in terms of reliable solar power supply. Because Wildlife Works rangers remain an unarmed force, a working relationship with the KWS Special Operations Teams initiated in 2012 has been maintained and mainstreamed. Currently, KWS has a permanent mobile team based on the ranches along the Kasigau Corridor (most of which are

within the REDD+ Project). Lastly, Wildlife Works has obtained services of a second gyrocopter that seeks external support to fly over the project area on an almost daily basis collecting vital information for security and biodiversity monitoring purposes.

- *REDD+ Carbon Inventory Monitoring*: As per VM0009 and the VCS Project Description (PD), 20% of the 115 forest biomass plots have been sampled per year of the monitoring period for the monitoring of the carbon stocks by Wildlife Work's team of 13 samplers. The soil carbon plots were all also resampled during this monitoring period. The teams have also worked on the Leakage and Quality Control plots.
- *Group Ranch Office Renovations / Construction*: To run the KCRPI, Wildlife Works maintains a Carbon office and equipment maintenance facility within the Project Area. This office is maintained with proceeds from carbon credit sales, in addition to all key amenities including water and power supply.

4.3.3 Dissemination of Monitoring Plan and Results (CM3.3)

The results from monitoring plan implementation are disseminated to the communities either through community meetings or barazas (see section 2.3 on Stakeholder Engagement) or the annual/biennial SIA Community Workshops (see section 4.1.1). During the reporting period, two SIA workshops were held: one in April 2015 and another in September 2017. During the 2015 workshop, results from the Household Survey 2014 were presented to and discussed by the workshop participants which served as the validation exercise for the key findings from that survey. The 2017 workshop was a Focal Issue re-validation workshop since it was five years since the inaugural 2011 SIA workshop. From this workshop, the following five issues were considered most important: Employment, Environmental conservation/Drought, Food security/Agriculture/Water, Human wildlife conflict and Education and awareness. These closely mirror the key issues identified in the original 2011 workshop, and thus continue to form the basis of project selection by LCCs for funding under the KCRPI.

4.4 Optional Criterion: Exceptional Community Benefits

The KCRPI has not sought out the Gold Level for exceptional community benefits.

4.4.1 Barriers to Benefits (GL2.3)

The KCRPI has not sought out the Gold Level for exceptional community benefits.

4.4.2 Protections for Poorer and More Vulnerable Households and Individuals (GL2.4)

The KCRPI has not sought out the Gold Level for exceptional community benefits.

Potential negative impact	Not Applicable
Households or individuals affected	Not Applicable
Impact aversion and mitigation	Not Applicable

5 BIODIVERSITY

5.1 Net Positive Biodiversity Impacts

5.1.1 Biodiversity Changes (B1.1)

5.1.1.1 Estimated Changes in Biodiversity in the Project Zone as a Result of the Project (B1.1.)

As for the community section above, Wildlife Works applied a similar cause-and-effect logic when measuring and monitoring impacts of the KCRPI on biodiversity. A theory of change is a hypothesis about how a project intends to achieve its intended objectives. Because they are based on several assumptions about the cause-and-effect relationships, carefully selected indicators are needed to monitor these assumptions in a causal chain analysis. The main strength of this logic lies in presenting a credible response to the challenge of attribution: indicators measure progress towards achieving the desired project outcomes and impacts from project activities and strategies. To design this, Wildlife Works holds Social and Biodiversity Impact Assessment (SBIA) workshops to engage experts and the community in thinking about how things would have been without the project, envisage how they may be with the project, and identify any potential risks and negative impacts.

For the KCRPI, Wildlife Works held the Biodiversity Impact Assessment (BIA) workshop in 2011 involving representatives from the various sections whose work touched on biodiversity issues. Additional insights were obtained from the SIA workshop described in the preceding section. They identified the following four Focal Issues that they felt the project should address: (i) safeguarding HCV wildlife – reducing poaching; (ii) protecting the habitat including Mt. Kasigau; (iii) Reducing human-wildlife conflicts; and (iv) Corridor maintenance. For each of these, the result chain diagrams were then produced and their associated theory of change statements. This formed the basis of indicator identification and the monitoring plan development.

As we demonstrate under the Monitoring Plan section further, Wildlife Works' core activities are aimed at protecting, safeguarding or improving the status of biodiversity and wildlife across the entire KCRPI, including the HCV species and ecological functions. Consequently, the monitoring plan results, based on the underlying causal logic in our theory of change analysis (see 5.3.1 for the Pressure-State-Response framework), indicate existing or potential improvement in the four Focal Issues above, in particular:

i. Safeguarding HCV wildlife – improved monitoring, patrol and law enforcement which will lead to reduced poaching, plus improved habitats (e.g., from water provision through dam scooping)
ii. Protecting the habitat including Mt. Kasigau – through planting of trees in the surrounding landscape to reduce future pressure on the forest resources on the mountain
iii. Reducing human-wildlife conflicts – through deployment of emergency response teams, continued close liaison with KWS Community Engagement Team and Problem Animal Control Units, and improvement of habitat within the KCRPI to retain wildlife within the ranches; and
iv. Corridor maintenance – by enhancing conditions within the KCRPI for wildlife including reduced poaching and improved habitats, the KCRPI as a whole is at a better position to function as a corridor habitat, both for dispersing wide-ranging species like elephants and big carnivores.

Comparison between the 'Without Project' and 'With Project' scenario

For the KCRPI, the baseline scenario was mainly rapid deforestation due to unplanned agricultural expansion by subsistence farmers. Charcoal production and pole harvesting were also sources of forest

degradation in this area. Other activities in the project area included grazing (through provision of grazing leases) and low-level ecotourism ventures. Under this baseline, or without-project scenario, biodiversity (both flora and fauna) would be adversely affected. It is difficult to determine with certainty whether there has been any increase in species abundance, population size, trends or range attributable to the project during this monitoring period. However, the successful protection of critical dryland forest demonstrated during this verification and documented throughout this report denotes that the size, quality and diversity of habitat has been maintained (and improved e.g., from the provision of water), as has overall landscape connectivity from avoided forest loss and fragmentation. This has provided an area of high quality habitat and a key corridor linking vital migratory regions, reducing the potential for the animals to cause conflict with communities and the risks to them that would result. These are clear pointers that the biodiversity within the KCRPI is better than it would have been in the absence of the Project.

5.1.2 High Conservation Value Protection (B1.2)

As indicated under Section 2.2.6, in addition to the fact that the KCRPI is set up on the whole to protect critical wildlife habitat and ecosystem functions, there were several actions specifically undertaken during the reporting period towards the enhancement of HCVs in the KCRPI including security, habitat enhancement and improved monitoring.

5.1.3 Invasive Species (B1.3)

No non-native species were used anywhere in the Project Accounting Area during the reporting period. All trees propagated in the Wildlife Works' Greenhouse that were used in any out-planting or reforestation within the Project Zone were native tree species that are initially germinated by the local communities themselves. All other plants grown in the Greenhouse including fruit trees that were not local have been propagated in this area for many years without any invasive tendencies (see section 5.1.4 below).

5.1.4 Impacts of Non-native Species (B1.4)

Species	Jojoba (Simmondsia chinensis)
Justification of Use	Potential commercial tree that is suited for arid conditions and not palatable to elephants
Adverse Effect	None known

Species	Various citrus species
Justification of Use	Commonly used fruit and grafted trees are adapted to drylands
Adverse Effect	None known

5.1.5 GMO Exclusion (B1.5)

No GMOs were used to generate GHG reductions or removals in the KCRPI, or in any associated project activities.

5.2 Offsite Biodiversity Impacts

5.2.1 Negative Offsite Biodiversity Impact Mitigation (B2.2)

The Project does not have any negative offsite biodiversity impacts. As described in the above sections the KCRPI has significant realized or potential positive impacts on biodiversity, across different wildlife species and spanning populations to ecological functions.

5.2.2 Net Offsite Biodiversity Benefits (B2.3)

5.3 Biodiversity Impact Monitoring

5.3.1 Biodiversity Monitoring Plan Development (B3.3)

Wildlife Works employed the Pressure-State-Response framework to develop the biodiversity monitoring plan for the KCRPI. The Pressure-State-Response framework relies on a causal chain whereby pressures or threats (e.g., deforestation, grazing, or hunting) negatively impact the state or status/condition of biodiversity (e.g., species abundance or habitat area), but responses or project interventions (e.g., tree planting or enhanced security) are taken to reduce pressure, which in turn is expected to improve the state of biodiversity. While state indicators most directly inform project managers of actual changes in biodiversity and hence project impacts, they are also often the hardest to measure and the slowest to change. In contrast, response indicators are relatively easy to measure and can change rapidly because they measure actual interventions that a project makes, but they are the least informative about changes in biodiversity because it is not clear whether the activities will reduce threats or otherwise improve the state of biodiversity. Pressure (or threat) indicators offer a good compromise: they are moderately easy to measure and provide a reasonably accurate image of the status of biodiversity on the ground.

Response indicators

These will be extracted from the Social Impact Assessment indicators and monitoring plan (see Section 4.3.2, Table 11) and includes indicators for the following aspects:

- Habitat improvement: both vegetation and water
- Security enhancement: rangers, equipment and infrastructure
- Other anti-poaching efforts: cameras, sniffer dogs
- Employment of locals: EPZ, soap
- Alternative sources of income or needs: eco-charcoal, ecotourism
- Human-wildlife conflict alleviation efforts: Jojoba hedges, deterrents, ranger response units

Pressure indicators

These will also be largely extracted from the Social Impact Assessment indicators (see Section 4.3.2, Table 11) and are grouped the following:

- Population size (from the Government census and other demographic data)
- Human-wildlife conflict (HWC) incidents: crops, livestock, human-related
- Other incidents: carcasses, snares, encroachment, fire, charcoal production and arrestees

State indicators

- The wildlife (especially HCVs)
    - Species richness, relative abundance and diversity
    - Species distribution and movement
- The vegetation
    - Species occurrence, composition and diversity (including structural)
    - Habitat disturbance – human, elephant, other
    - Vegetation regeneration – saplings, seedlings

5.3.2 Biodiversity Monitoring Results (B3.1, B3.2)

Monitoring plan development and data collection

The biodiversity-related indicators are also provided in Table 11 under Section 4.3.2, alongside community indicators. Two main strategies are used to obtain data for these indicators:

- In-house reporting: this pertains to all the indicators biodiversity or social indicators that different Wildlife Works' departments can report on based on their normal reporting. This is mostly for Response and Pressure indicators
- Fieldwork: data for most State indicators is collected through specially-designed surveys or other research projects. This mainly involves wildlife surveys and monitoring for all species including HCVs using permanent road transects, camera traps, during ranger patrols, aerial patrols, anecdotal records, and any other research project.

Wildlife monitoring results

- Road transects: Since 2011, a total of 20 road transect sessions have been carried out across the KCRPI (a transect session entails covering all of our 25-permanent road transects); during the reporting period, a total of six transect sampling sessions were conducted: 3, 2 and 1 in 2015, 2016 and 2017, respectively. Overall, total of 104 different wildlife species have been recorded along the road transects since 2011, with a relatively consistent trend over this time including during the reporting period (Figure 29). The commonest species encountered were Kirk's Dikdik and the unstriped squirrel. Based on encounter rates, livestock (cattle and shoats) numbers appear to be declining, especially in the Project Area compared to the Reference Area.

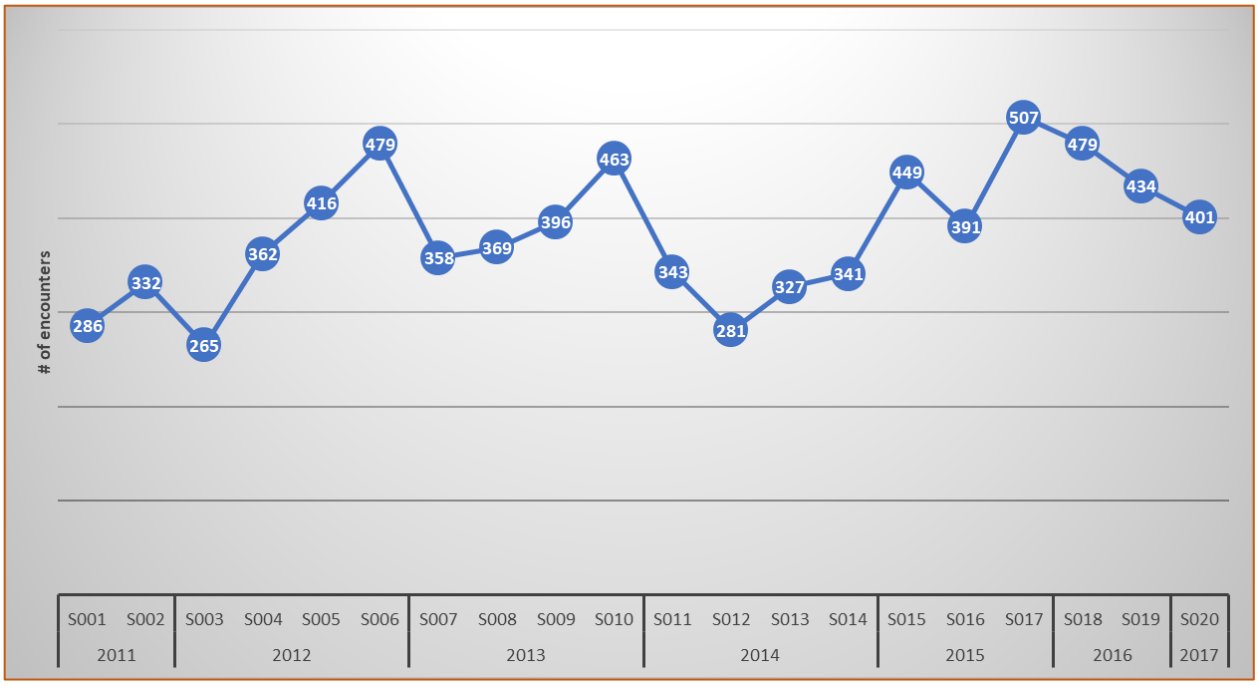


Figure 29: Total number of species encounters recorded on the 25-permanent road transects across the KCRPI since project start

- Camera traps: between 2011 and 2015, a total of 4882 independent photographs of 45 different species were taken from 24 random positions by six cameras in Rukinga Ranch. In 2014-2015, most photographed species were lesser kudu *Tragelaphus imberbis*, elephant *Loxodonta africana*, Giraffe *Giraffa camelopardalis*, common zebra *Equus burchellii* and African Buffalo *Syncerus caffer* (Figure 30), while the most common carnivores included aardwolf *Proteles cristata*, spotted hyena *Crocuta crocuta* and lion *Panthera leo*. During the reporting period, the camera traps detected seven High Conservation Value species that are listed under some category of threat globally in the latest IUCN Red List: Elephant, Grevy's zebra, Lion, African wild dog, Leopard, Cheetah and Secretarybird.

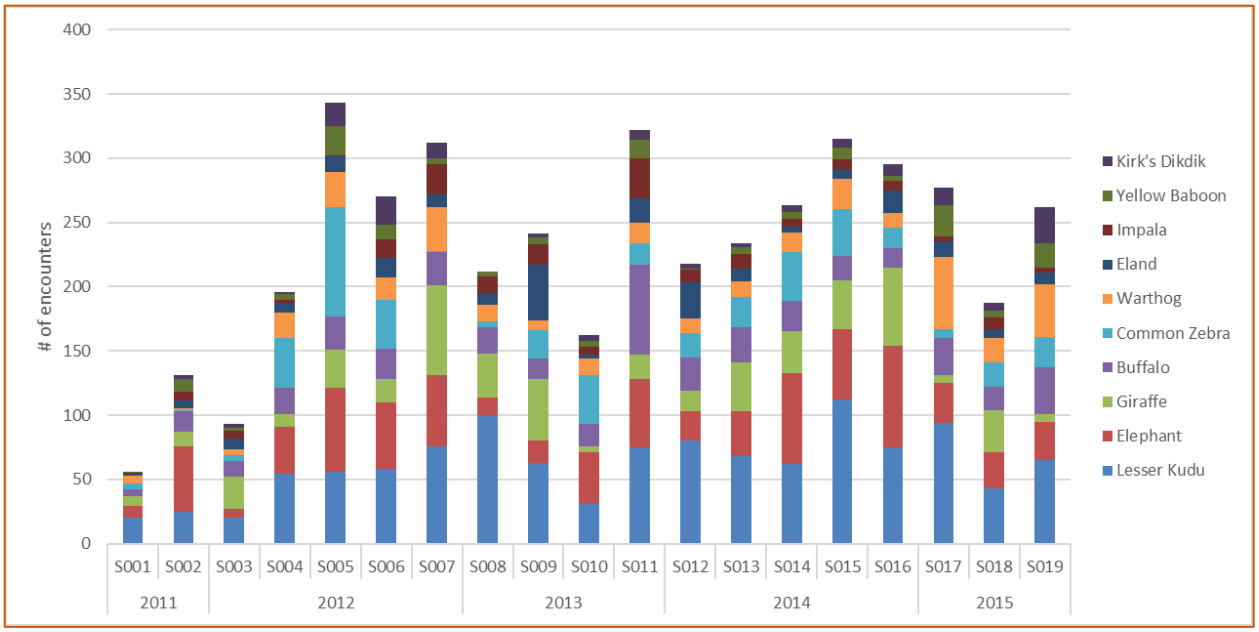


Figure 30: Top-ten commonest species recorded on the 24-permanent camera trap locations across Rukinga Ranch between 2011 and 2015

Ranger patrol dataset

- Effort: Wildlife Works' rangers ran a total of 3063 vehicle and walking patrols during the reporting period: 1012 in 2015, 1402 in 2016 and 649 in 2017 (Figure 31). While effort increased from 2015 to 2016, 2017 shows a declining trend due to (i) the fact that these data only run to August 2017, and (ii) because there were several joint operations involving several teams which were only recorded once. Overall, there was an increase in patrol effort and effectiveness during this period, especially considering the increased and consistent use of aerial patrols (see next section).

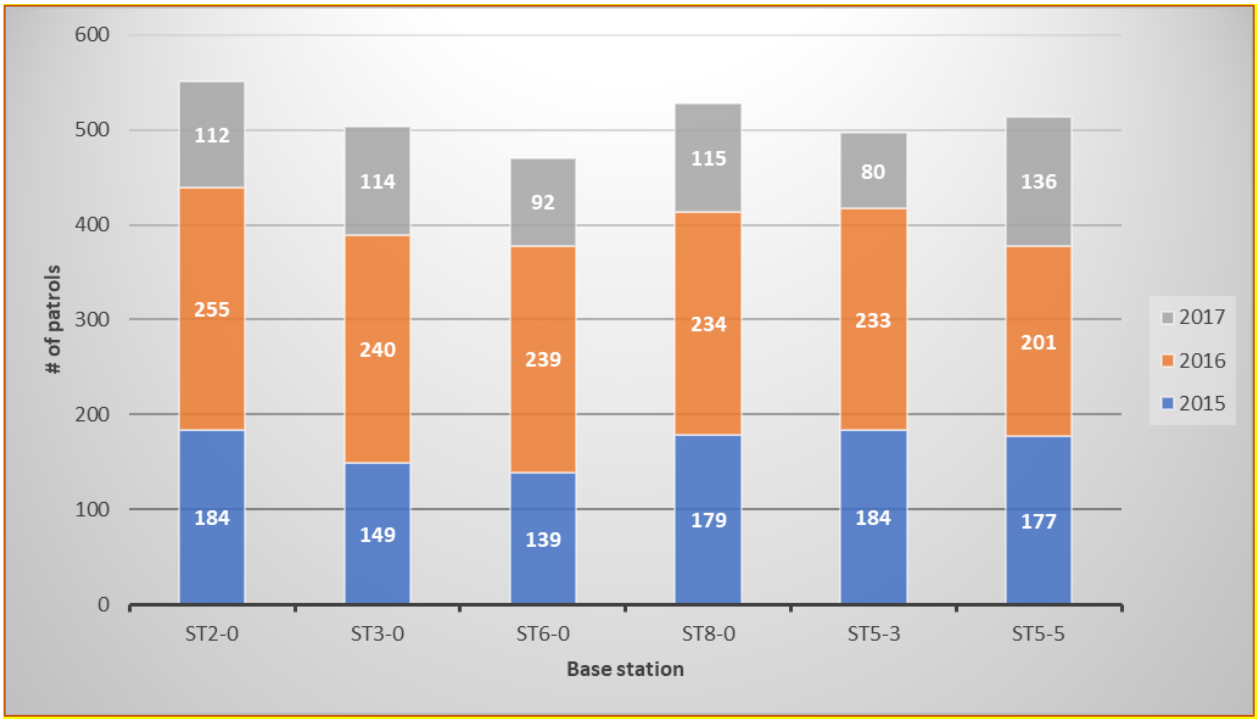


Figure 31: Number of patrols recorded for each of the six ranger outposts across the KCRPI between 2015 and 2017

- Species: Between 2015 and 2017, the ranger patrol teams recorded a total of 12,367 encounters with wildlife: 4804 encounters in 2015, 5248 in 2016 and 2315 in 2017. These comprised a total of 65 different species. Lesser Kudu, Elephant, Impala, Giraffe and Common Zebra were the most encountered species (Figure 32). Other species of conservation concern observed regularly included Grevy's Zebra, Secretary bird, Cheetah and Lion, while others were more rarely seen such as the African Wild Dog (spotted 4, 8 and only 1 time in 2015, 2016, and 2017 respectively) and the rarer Striped Hyaena spotted 14 times between 2015-2017.

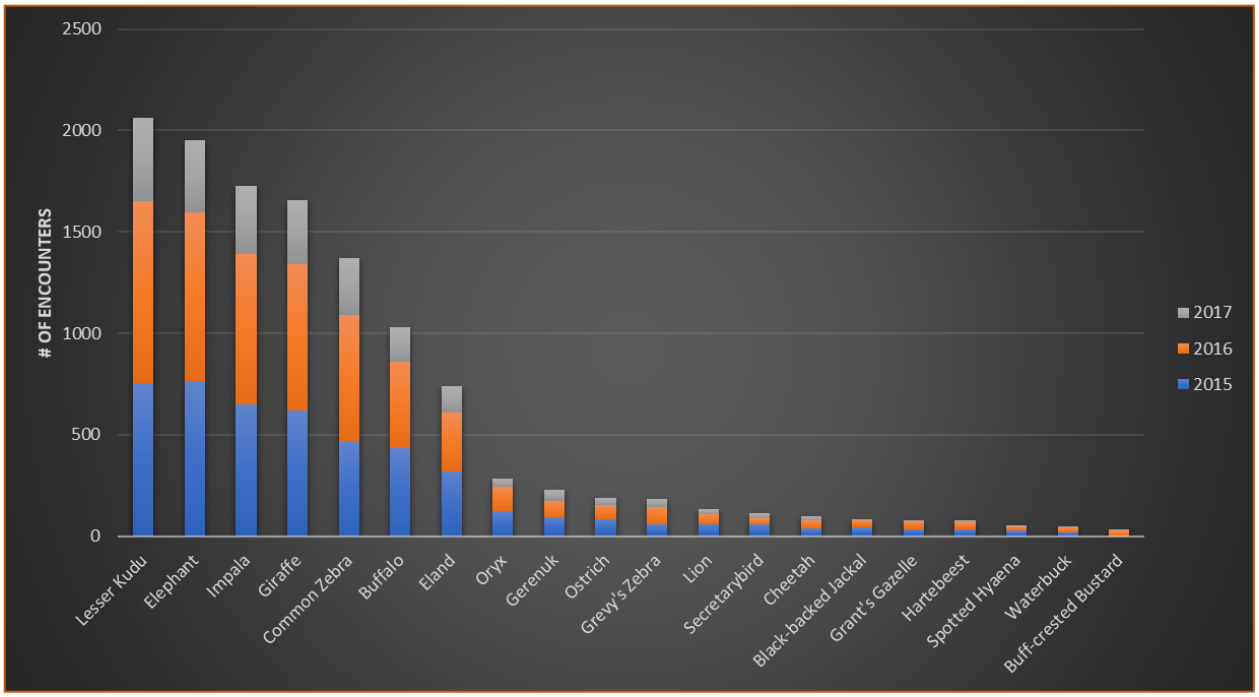


Figure 32: Top-20 commonest species encountered during ranger patrols across the KCRPI between 2015 and 2017.

- HCV: Overall, there was not a big change between 2015 and 2017 based on the ranger dataset in the total number of encounters of HCV species recorded in the KCRPI, although there was a general trend indicating fewer encounters in 2017 (Figure 33). As indicated for effort, this possibly due to a combination of the fact that the data run till August and joint patrols leading to lower coverage; there was also a prolonged dry season between 2016-2017 which could also have contributed, at least partially.

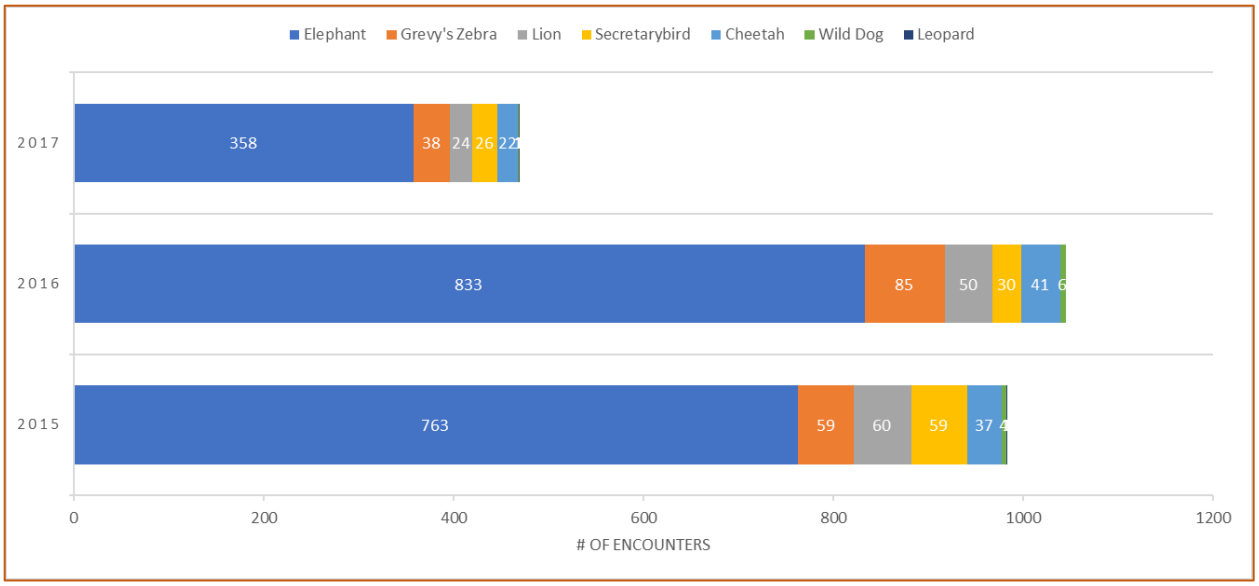


Figure 33: Total number of encounters of the key HCV species recorded by the six ranger outposts across the KCRPI between 2015 and 2017

- Incidents: a total of 892 incidents were recorded by rangers during their patrols during the reporting period: 323, 277 and 292 in 2015, 2016 and 2017, respectively, with relatively little variation across the years in incidence (Figure 34). This suggest that the incidents may actually be declining considering the consistent use of aerial patrols during the reporting period which enhanced effectiveness of locating incidents.

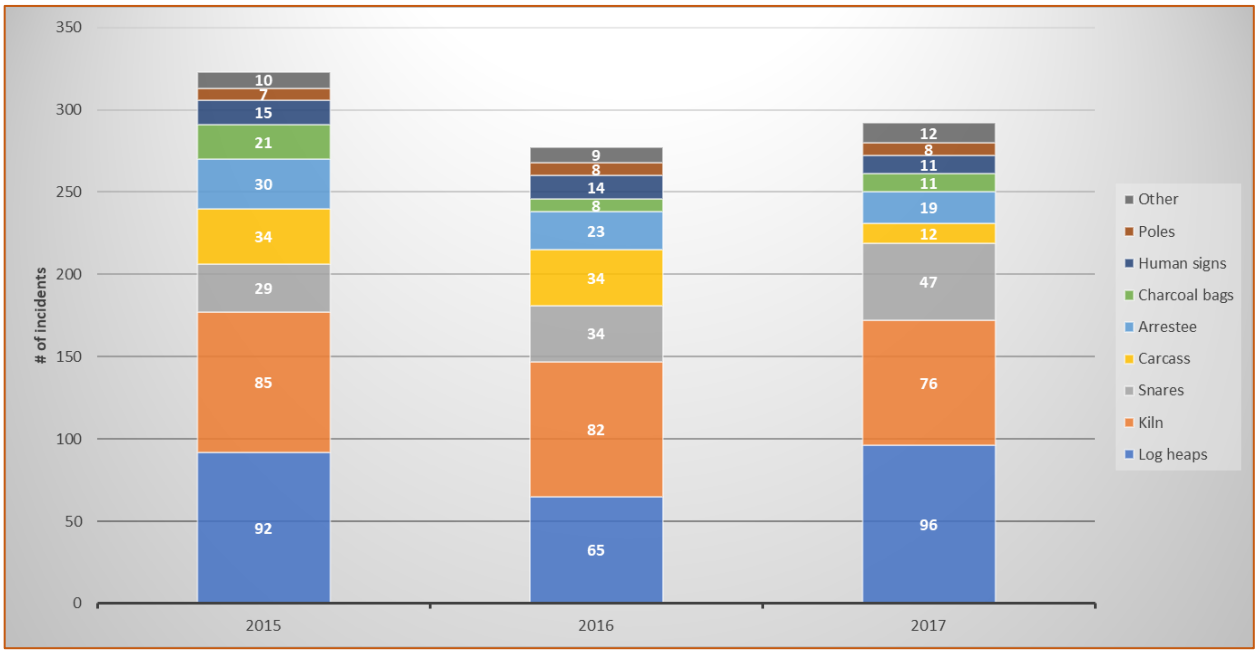


Figure 34: Total number of different incidents recorded by the six ranger outposts across the KCRPI between 2015 and 2017 (NB: Other category includes Armed contact, Camp, Encroachment, Fire, Human-wildlife conflict, Injured wildlife).

Aerial patrol dataset

There were increasingly more aerial patrols conducted during the reporting period which improved detection for both wildlife and other incidents. Between 2015 and 2017, aerial transects have been between 15 and 25 days every month, covering a total of 3000 to 6000km (e.g., see Figure 35) and traversing most of the project area (e.g., see Figure 36). Most of the incident and HCV species data from aerial transects are captured either under daily logs or ranger patrol data. See Figure 37 & Figure 38 for an extract for elephant and Grevy's zebra distribution, respectively, for the year May 2016-May 2017.

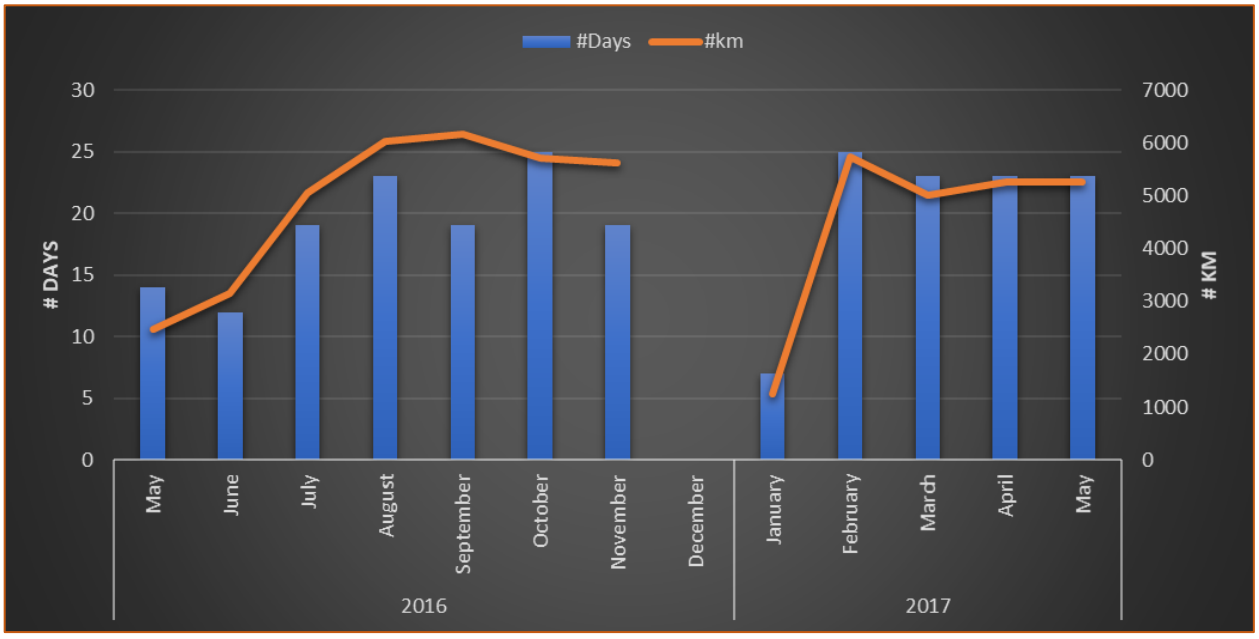


Figure 35: Number of aerial patrols conducted every month and distance covered across the KCRPI between May 2016 and May 2017

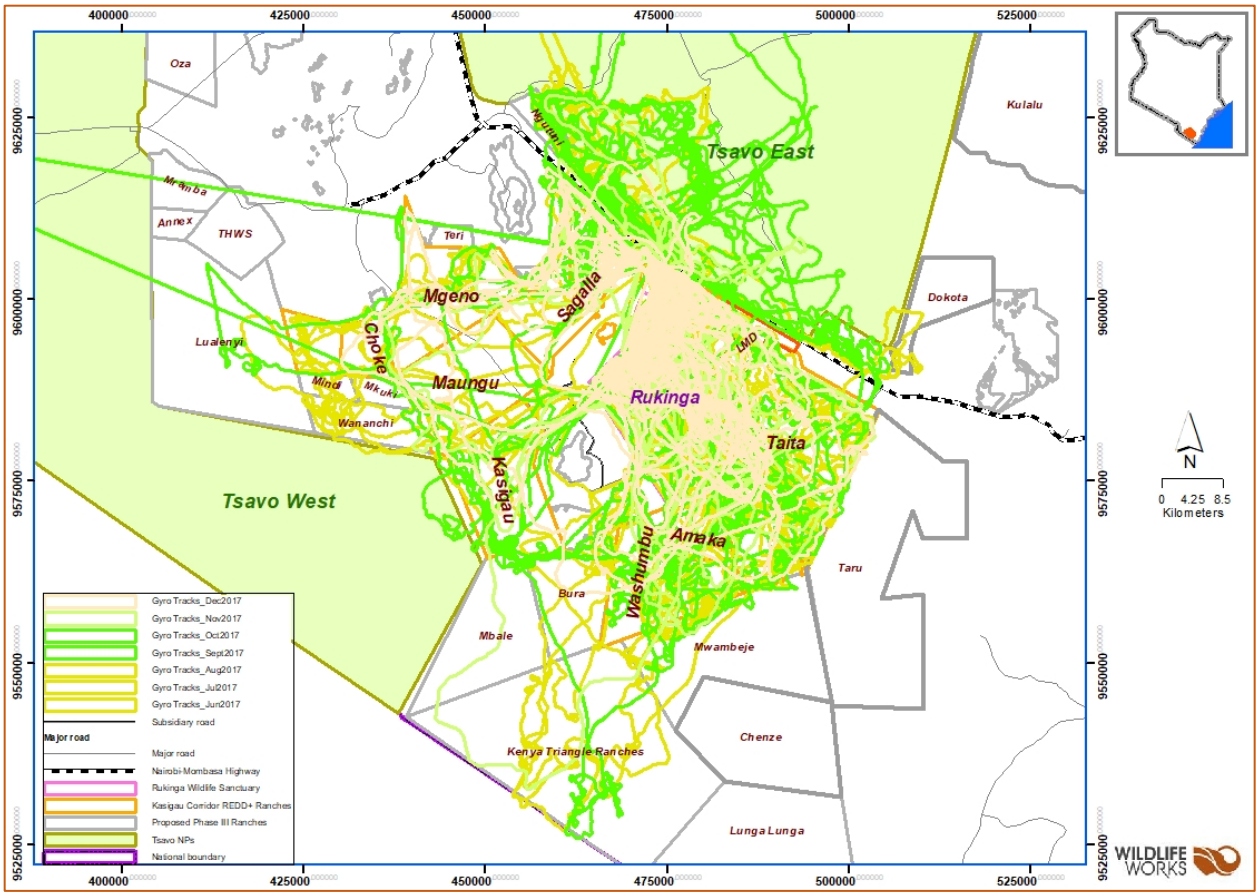


Figure 36: Monthly coverage by aerial patrols conducted across KCRPI between June and December 2017.

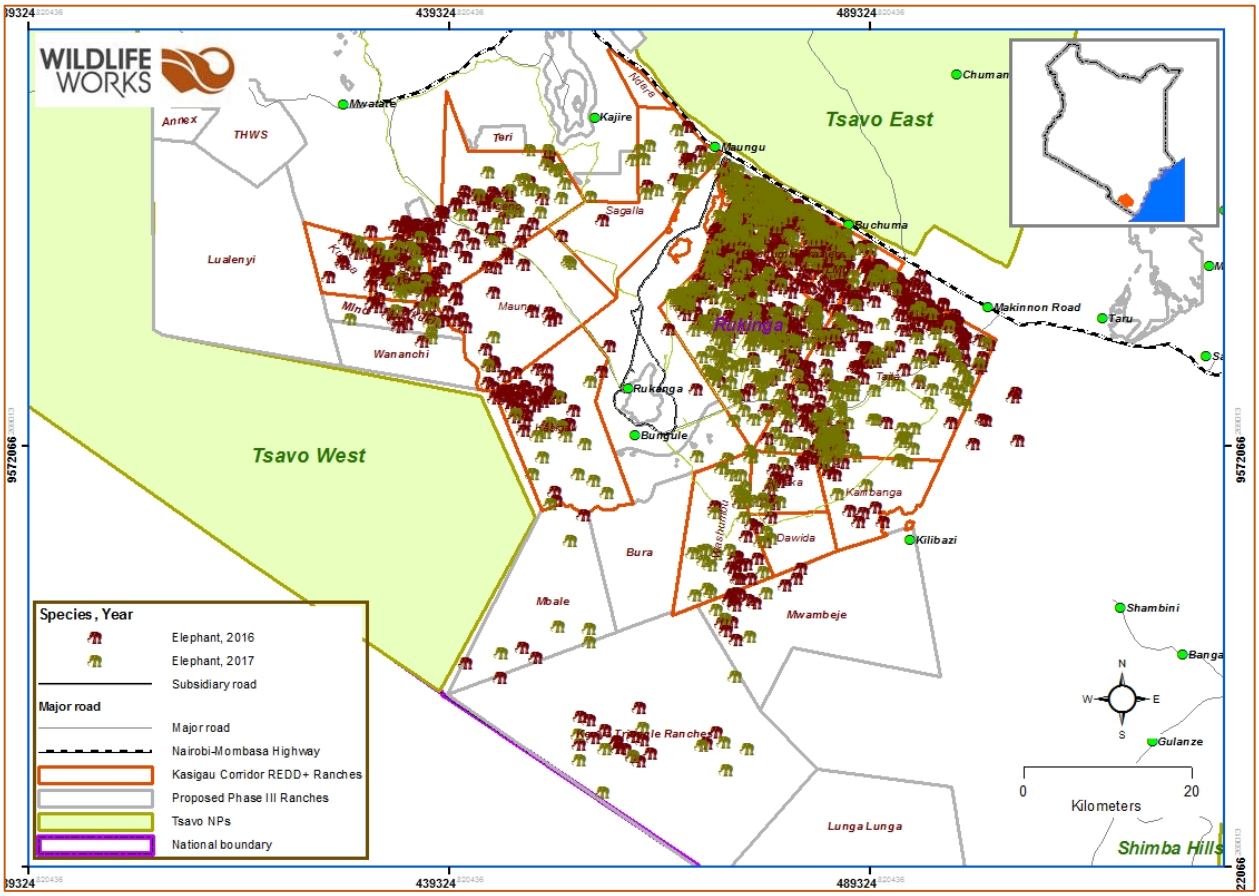


Figure 37: Distribution of elephant sightings across the KCRPI based on aerial patrols conducted from May 2016-2017

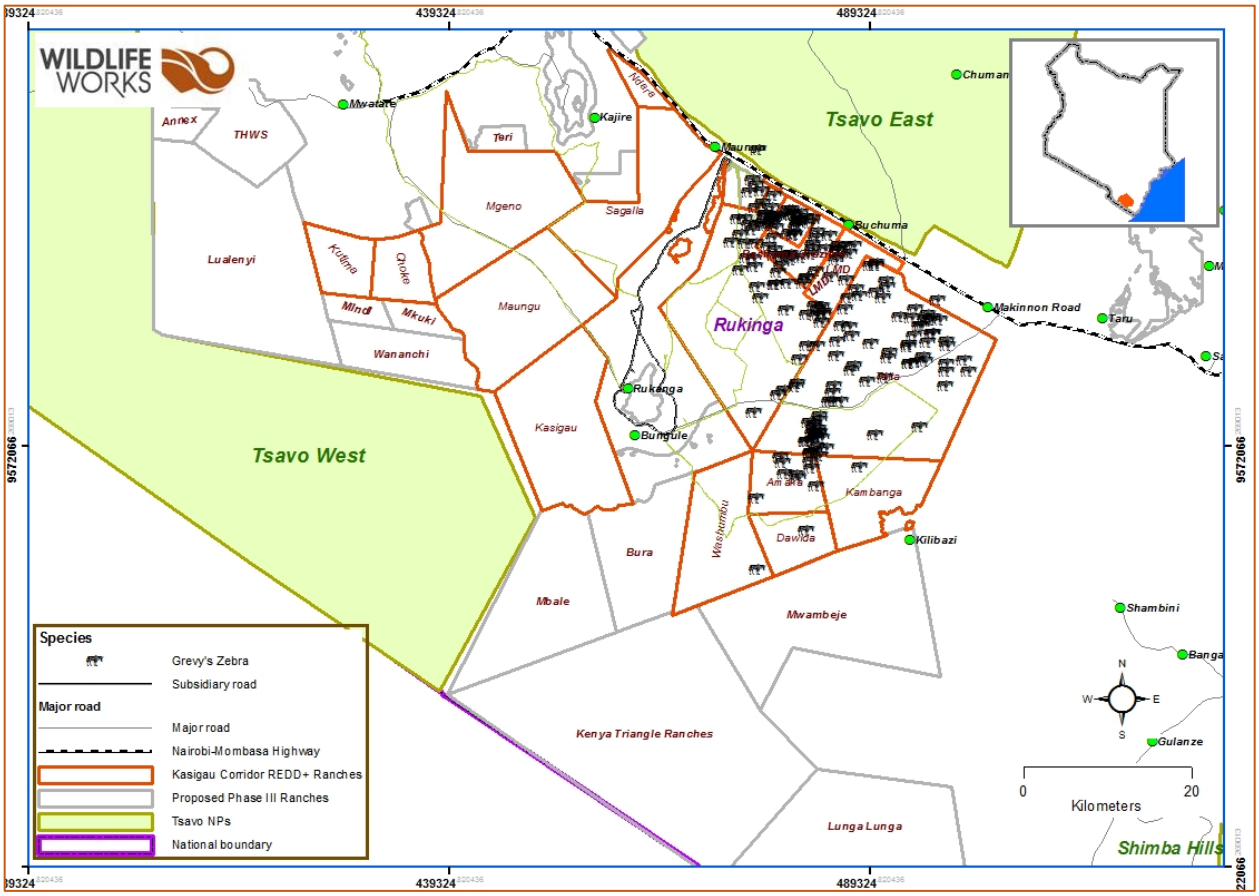


Figure 38: Distribution of Grevy's zebra sightings across the KCRPI based on aerial patrols conducted from May 2016-2017.

- Daily logs: Between 2015 and 2017, 3959 valid records have been obtained, mainly sightings (95%) but also some calls – these are sightings of key species recorded either during ranger or aerial patrols, or by other staff or visitors travelling within the project area for other reasons. Almost half of these have been in Rukinga Ranch but with increasingly more sightings from the other ranches, especially from the aerial patrols. Overall, sightings were dominated by elephants (43%) although these are not always reported; other commonly-spotted species of conservation interest (HCVs) were lion (5%), cheetah (9%), Grevy's zebra (4.5%) and secretary bird (8%), whilst others were less common such as the African wild dog, various vulture and raptor species. Crucially, daily log data enabled recording of two Wild dog dens across the KCRPI: the first in Rukinga Ranch (2014) and the second on 23 Feb 2017 in Sagalla Ranch (see e.g., Figure 39 & Figure 40).

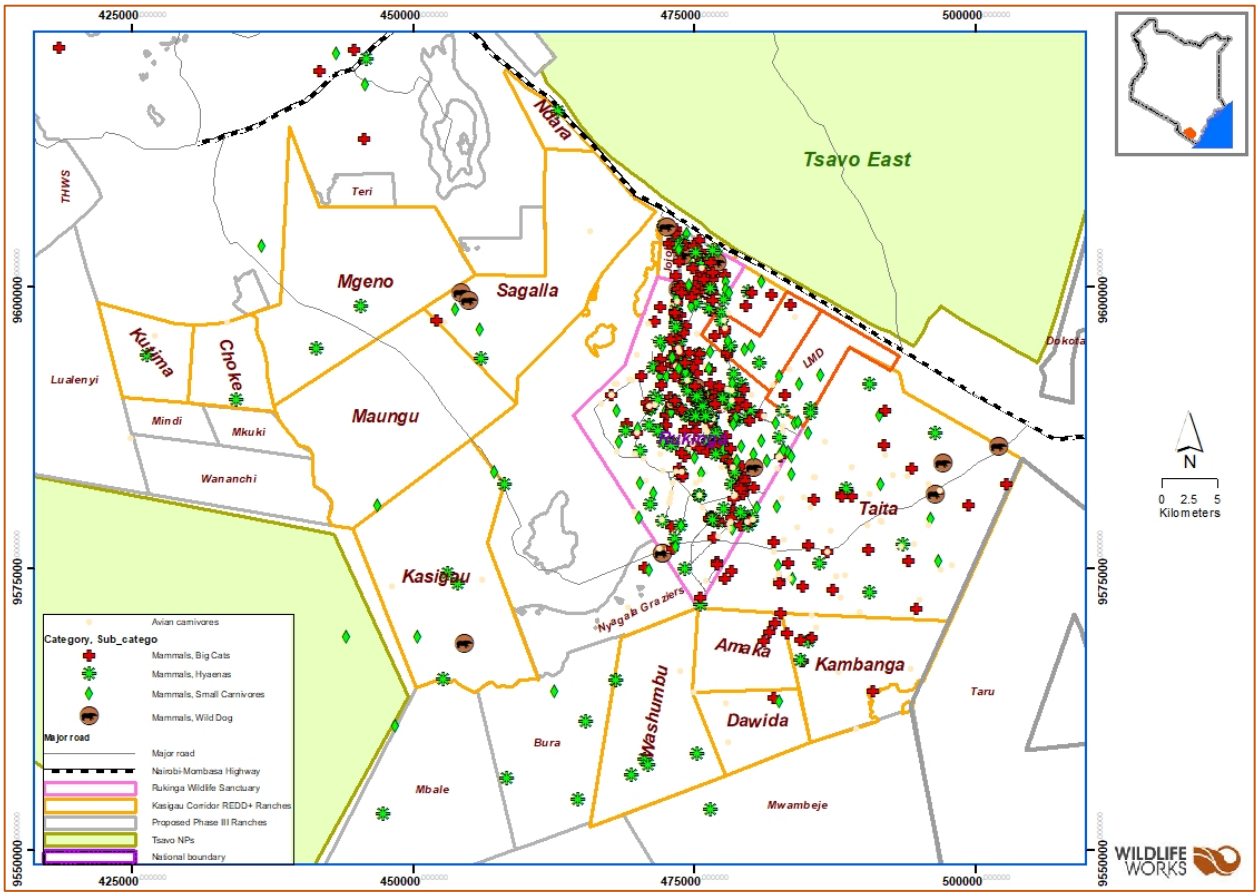


Figure 39: Presence and distribution of large carnivores based on anecdotal sightings across the KCRPI between 2015 and 2017

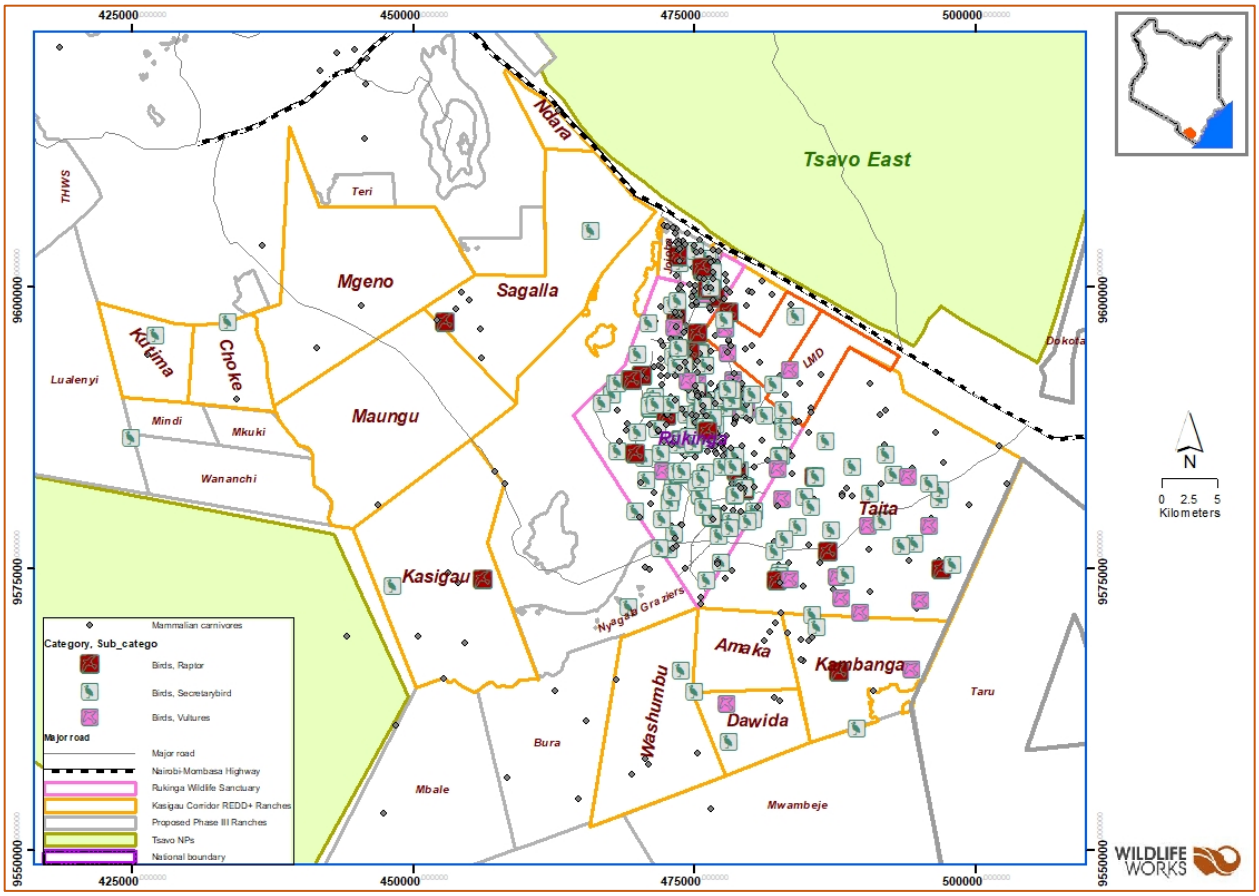


Figure 40: Presence and distribution of avian carnivores based on anecdotal sightings across the KCRPI between 2015 and 2017.

- Community monitors: During the current reporting period, a total of 757 human-wildlife conflict incidents were reported by our seven community monitors (356, 234 and 167 in 2015, 2016 and 2017, respectively). Most were in the Kajire/Kishamba and Teri 'B' Group Ranch which neighbor Sagalla and Ndara KCRPI ranches to the north and Mgeno and Maungu ranches to the south, and in Kamtonga area bordering Kutima and Choke ranches. Species-wise, elephants and spotted hyaena comprised about 73% and 20% of the reported incidents, respectively, all incidents were reported to KWS through our Head of Security for guiding planning of patrols and problem animal control activities.

5.3.3 Monitoring Plan and Results Dissemination (B3.3)

The results from monitoring plan implementation are disseminated on the internet through the VCS/CCB website and scientific publications, and key or relevant highlights disseminated to the communities either through community meetings or barazas (see Section 2.3 on Stakeholder Engagement) or the annual/biennial SIA Community Workshops (see Section 4.1.1). During the reporting period, two SIA workshops were held: one in April 2015 and another in September 2017. During the 2015 workshop, results from the Household Survey 2014 including some wildlife monitoring data were presented to and

discussed by the workshop participants. Additionally, several scientific publications have been published including:

- Recent records and conservation issues affecting the African wild dog *Lycaon pictus* in the Kasigau Corridor, SE Kenya
- The forgotten Grevy's zebra *Equus grevyi* population along the Kasigau Corridor ranches, SE Kenya: Recent records and conservation issues

5.3.4 Optional Criterion: Exceptional Biodiversity Benefits

5.3.4.1 Vulnerability: Critically Endangered (CR) and Endangered (EN) species - presence of at least a single individual (GL3.1)

As demonstrated in the preceding sections, all the key High Conservation Value species that are listed under some category of threat globally in the latest IUCN Red List – African elephant, Grevy's zebra, Lion, African wild dog, Leopard, Cheetah, Secretary bird, Martial eagle and several vulture species – were repeatedly recorded across the KCRPI during the reporting period, including two significant records: breeding Grevy's zebra and African wild dog dens.

5.3.4.2 Describe measures needed and taken to maintain or enhance the population status of each Trigger species in the Project Zone (CCB V3: GL3.3.).

As indicated under Section 5.1.1, the core of Wildlife Works' operations under the KCRPI are specifically towards improvement of the habitat and biodiversity. Additional measures towards HCV improvement during the reporting period are highlighted under Section 2.2.6.

5.3.4.3 Include indicators of the population trend of each Trigger species and/or the threats to them in the monitoring plan and demonstrate the effectiveness of measures needed and taken to maintain or enhance the population status of Trigger species (GL3.4.)

Given the long-term nature of wildlife impacts and building in natural population fluctuations, it is not possible to give a concrete indication of population trends at this juncture of the project for the Trigger species. Nonetheless, given our theory of change logic and baseline scenario of worsening habitats and escalated poaching activities, we believe that the consistent distribution and encounter of these species across the KCRPI – including new evidence of breeding Grevy's zebra and African wild dogs, alongside prior evidence of breeding elephants, lions and cheetah amongst others – strongly suggests that the activities are having a positive impact on these species which will become more apparent in the near future. This is demonstrated in the HCV distribution maps above, as well as data in the two peer-reviewed publications on the wild dog and Grevy's zebra.