The Kasigau Corridor REDD Project Phase I - Rukinga Sanctuary

2ND MONITORING REPORT (M_2)

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1 PROJECT DETAILS

1.1 Summary Description of Project

Through a combination of dryland forest protection and extraordinary community sustainable development activities, this project is estimated to avoid the emission of over 6 Million metric tonnes of CO_2e which would have been emitted due to slash and burn deforestation over the 30 year project life, or on average approximately 205,480 metric tonnes per year across the Carbon Pools of Above and Belowground Biomass (forest carbon), and Soil Carbon.

The Project Area is home to a fantastic diversity of mammals (over 50 species of large mammal, more than 20 species of bats), birds (over 300 species) and important populations of IUCN Red List species such as Grevy's zebra (Equus *grevyi),* Cheetah (Acinonyx *jubatus),* Lion (Panthera *leo)* as well as over 500 African elephants (Loxidonta *africana)* seasonally.

The project is clearly additional (under the project financial additionality tool) and the baseline, far from hypothetical, is an extension of actual deforestation that was occurring aggressively in the reference region immediately adjacent to the Project Area at the time Wildlife Works came on the scene, and that has been demonstrated clearly from historic satellite image analysis.

1.2 Sectoral Scope and Project Type

This project falls under VCS sectoral scope 14: Agriculture, Forestry and Other Land Uses, under project activities Reduced Emissions from Deforestation and Degradation (REDD), and most specifically, Avoiding unplanned mosaic deforestation and degradation (AUMDD). This project falls into this category by the definition provided in the VCS Program Update of May 24th 2010, by virtue of the fact that > 25% of the boundary of the Project Area is within 50m of land that was anthropogenically deforested in the ten years prior to the project start date, as illustrated in the PD Template 'Kasigau Corridor Phase I VCS Template PD'. This project is not a grouped project.

1.3 Project Proponent

The Project Proponent for the Kasigau Corridor REDD Project – Phase I Rukinga Sanctuary is Wildlife Works Inc., a California Corporation in good standing. Wildlife Works Inc. acquired the carbon rights from the landowner, Rukinga Ranching Company Ltd. after a process of Free Prior and Informed Consent, through a Carbon Rights Agreement/Easement that was approved by a full vote at an AGM of the Shareholders at Rukinga on February 13th 2009, at which AGM the Shareholders present were given an explanation of the potential of the Carbon project, a copy of which has been provided to the Validator, and following which the Shareholders unanimously approved the pursuit of this opportunity by the Managing Director and majority shareholder of the land, Mike Korchinsky. This decision was ratified again unanimously by an extraordinary general meeting of shareholders of Rukinga Ranching Company Ltd on December 9th, 2009.

The carbon project is managed in the field in Kenya by Wildlife Works Carbon LLC, a joint venture of Wildlife Works, Inc. and Colin Wiel Investments II, in return for which Wildlife Works Carbon LLC is eligible for a share of the proceeds from the sale of the carbon credits generated by the project. Details of this arrangement are specified in the Membership Agreement of Wildlife Works Carbon LLC, which was provided to the Validator.

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1.4 Other Entities Involved in the Project

Please see section 1.3 above.

1.5 Project Start Date

The Project Start Date is January 1st, 2005. This monitoring period ($m_{2)}$ is the second monitoring period and started on January 1st, 2011 and ends on December 31st, 2011.

1.6 Project Crediting Period

The Project Crediting Period starts on January 1st, 2005 and ends on December 31st, 2034 (30 years).

1.7 Project Location

The Kasigau Corridor REDD Project is located in SE Kenya, in the Marungu Sublocation, Voi Division, Taita Taveta District, Coast Province, Kenya, approximately 150 kms NW of the city of Mombasa.

This Phase I PD covers all the land known as Rukinga Sanctuary which is all that 74,516 acres (30,168.66 ha) of land originally known as LR 12263, historically 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 of land (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 Region 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[1] for at least 20 years and has been a primary forest since recorded times[2].

1.8 Title and Reference of Methodology

The project utilizes *VM0009 Methodology for Avoided Mosaic Deforestation of Tropical Forests V1-0*, approved by the VCS for Sectoral scope 14 on January 11th, 2011.

2 IMPLEMENTATION STATUS

[1] UN IPCC, Good Practice Guidance for LULUCF, Table 3A.1.8;
[2] 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]

2.1 Implementation Status of the Project Activity

All project activities described in the PD are underway during this monitoring period. The following is a list of project activities for Phase I (in most cases, the activities for Phase I also apply to Phase II, but some activities for Phase I do not apply to Phase II), all of which are operational currently and were operational during the monitoring period:

- Organic Greenhouses
- Financial Aid to Marungu Hill Conservancy Association
- Jojoba propagation & extension into the Community
- Mushroom Farms from Elephant Dung
- Reforestation of Mt. Kasigau
- Wildlife Works REDD Forest and Biodiversity monitoring
- Community Wildlife Scouts
- Kasigau Development Trust
- REDD Carbon Inventory Monitoring
- Ecotourism Projects
- School Construction and Bursary Scheme
- Group Ranch Office Renovations / Construction
- Wildlife Works Eco-Charcoal Production Facility for the Kasigau Corridor REDD Project
- Wildlife Works/Tsavo Soap Factory
- Wildlife Works REDD Project Product Sales and Marketing

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.

Updates to the project activities are as follows:

2.1.1 Organic Greenhouses

Wildlife Works is continuing its development of eco-friendly, water efficient income generating projects that can become an immediate solution for the Kasigau Corridor communities. Wildlife Works and Amiran Kenya have therefore agreed to collaborate in order to provide these communities with a reliable food source, and income generating business through the Farmer's Kit developed by Amiran for just these reasons. Working with local women's groups we have set up two greenhouses, one of which is completely organic, in order to test and potentially introduce these kits into our agricultural intensification program.

2.1.2 Financial Aid to Marungu Hill Conservancy Association

Wildlife Works has increased its support of MHCA to 94,500/= per month in order to incorporate salaries for a Project Coordinator, a Financial Manager, four Community Waste Technicians and six Community Wildlife Scouts. There has been an increased level of input in order to build capacity in the Community Based Organization.

2.1.3 Jojoba Propagation and Extension into the Community

Wildlife Works is working in conjunction with a PhD student from the Sokoine University of Agriculture in Tanzania in order to characterize, propagate and manage the disused Jojoba plantation adjacent to Rukinga Ranch. The aim is to determine the genetic diversity of the shrubs

and finesse their multiplication methods in order to improve growth. The overall goal is through improved management and capacity building to improve the livelihoods of poor farmers in the communities.

2.1.4 Mushroom Farms from Elephant Dung

Due to the amount of water that was required continuously throughout the year for this activity, as well as a change in the Chairlady of the women's group involved, there has been a change in direction. Efforts have now gone into funding the building of four bandas for housing long-term development volunteers. This will be income-generating as well as provide opportunities for increased skills disseminating into the community. More information on this new activity will be reported as it comes to fruition in subsequent monitoring periods.

2.1.5 Reforestation of Mt. Kasigau

The tree-planting program is ongoing. In November 2010, 15,940 tree seedlings were planted in the Kasigau corridor, with monitoring in February 2011 showing a survival rate of 62%. In April 2011, 27,387 tree seedlings were planted with monitoring in October 2011 showing a survival rate of 54%. In November 2011, 27,566 tree seedlings were planted, the monitoring of which will happen in mid-April 2012. The next planting will be done at the end of April 2012 towards the end of the rainy season.

2.1.6 Wildlife Works REDD Forest and Biodiversity Monitoring Plan

Biodiversity Monitoring Plan:

2.1.6.1 Road transects

We have established 27 10-15km long permanent transects for counting wildlife across all 15 ranches included in Phase I and II of the Kasigau REDD project, as well as the Reference Area. Transects are long roads which people can walk or drive very slowly counting all the animals seen. In addition to mammals, we also count a collection of other animals such as large birds (e.g., ostrich, bustards and raptors-bird of prey) and reptiles (e.g., snakes and monitor lizards). Transect counts will repeated once every 2-3 months mainly in the morning hours (0600-1100hrs) but occasionally in the evening too (1400-1900hrs). This will enable us to know population sizes, distribution and movements of these animals, hence fulfilling our commitments to CCB and VCS standards. It will also enable us make informed decisions on biodiversity management issues e.g., as pertains elephant-human conflicts.

2.1.6.2 Ranger and Community Scout Monitoring Transects

Teams of Rangers & Community Scouts (R&CS) who crisscross the entire project area (Kasigau Corridor) everyday both by foot and cars checking for presence of wildlife and for evidence of illegal activities such as snaring, wood harvesting, illegal grazing or charcoal production are a crucial cog to the biodiversity monitoring plan that will deliver WW's biodiversity monitoring commitments. On 16 September 2011, a cross-section of the R&CSs from all WW Base Stations were trained on the use of GPSs and binoculars. We have prepared a manual (Wildlife Works Ranger and Community Scouts Biodiversity Monitoring Manual) that will guide their work in

collecting the information required towards delivering WWs biodiversity-related commitments. This document will be available to other WW staff interested in identifying and knowing the animals they expect to encounter across the Kasigau project area.

2.1.6.3 Camera traps

As scientists, there is a limit to our capacity to observe and record wildlife activity. Remote photography is increasingly more widely used to sample wildlife populations especially for cryptic or shy species. Thus to add to the road transect monitoring efforts above, we have set up camera traps at 24 randomly selected sites on Rukinga Ranch. These are our 'eyes' in the field even in our absence; they enable us to observe and collect data on all animals passing near the camera, 24 hours a day, 7 days a week.

2.1.6.4 Daily logs

We are in the process of setting up a Daily Log system for recording HCV species (namely: Elephant, Lion, Cheetah, Leopard, Grevy's Zebra and African Wild Dogs) for which our commitments to protect are highest. As people go on with their daily activities, we will request for any information regarding the sighting of any of these species any place, any time. We only request them to note the following: Date, Species, approximate position (general area within the Kasigau Corridor) and where possible Number of individuals. There will be a sheet to fill at the HQs main office together with a map for placing approximate position. This is a good way of accumulating data on these key species, as well as helping everyone make a meaningful contribution whilst watching and enjoying wildlife as they go on with their everyday tasks.

2.1.6.5 Mt. Kasigau High Conservation Value (HCV) Area: Bird Monitoring

Besides planned vegetation monitoring, in July 2010 we set up an altitudinal experiment at Mt Kasigau to monitor long-term effects of climate change on biodiversity. This involved establishing four mistnetting lines, each 300m long, the first being near the base of the mountain (at approximately 850m above sea level) and the fourth at 1550m, which is close to the highest point of the mountain at about 1640m. Mistnets are fine-meshed nets that are used to safely capture birds for research purposes. We will be catching and ringing birds along the four net-lines 3-4 times annually in order to determine if climate change has an effect on bird distribution and movements. During the first session in July, we caught 161 birds comprising 26 species.

2.1.6.6 Social Monitoring Plan

Following the recommended seven SIA monitoring steps, we held a workshop where representatives of the local community identified the focal areas they feel the REDD project could/should address (see attached document). Following this workshops, indicators were selected, a questionnaire designed and a survey conducted across the entire project area at 150 randomly selected households (30 in each of the five administrative locations in the project area). This survey will be repeated annually to assess changes in the livelihoods that can be attributed to the REDD project.

2.1.7 Community Wildlife Scouts

Wildlife works is funding six CWSs in Marungu location and four CWSs in Kasigau location. Plans are ongoing to recruit similar numbers of CWS in the Mwachabo, Sagalla and Mwatate.

2.1.8 Kasigau Development Trust (KDT)

Wildlife Works has helped to renovate the KDT office in Rukanga and provide the office equipment required for their operations. Their support has increased in order to incorporate salaries for a Project Manager, an Accountant and four Community Wildlife Scouts. Again, there has been an increased level of input in order to build capacity in the Community Based Organization. KDT is about to start administering projects in the Kasigau Location and has already awarded educational bursaries through the Wildlife Works Carbon Trust.

2.1.9 REDD Carbon Inventory Monitoring

As per VM0009 and the VCS Project Description (PD), 20% of the 115 plots have been sampled for yearly monitoring of carbon by Wildlife Works' team of 13 samplers.

2.1.10 Ecotourism Projects

There are no major updates to the Ecotourism projects as of the current monitoring period.

2.1.11 School Construction and Bursary Scheme

Throughout the project area, the initial community income is being channeled into education, primarily though bursaries at this stage. Over 700 students have been given bursaries in the first few months of 2012, where the money goes directly to their schools to ensure their education is secure. The funding given ranges between on term to 4 years' sponsorship, depending on the candidate. Students have been funded to go to Universities, Colleges, Youth Polytechnics and Secondary Schools and the candidates include bright pupils, double orphans and vulnerable students. School construction and renovations have also been approved by Locational Carbon Committees, but vetting on the tenders is occurring at present.

2.1.12 Group Ranch Office Renovations / Construction

This activity has not yet commenced, but is still planned for a later point when additional carbon proceeds are realized.

2.1.13 Eco-Charcoal Production Facility

Throughout the last year, extensive testing has been carried out by Wildlife Works and we have gained valuable insight into the world of eco-charcoal and now have the knowledge to expand this project. By harvesting the annual re-growth of hardwood shrubs and bushes (and being very selective in the harvest size from each shrub), we make sure that after the rains the shrubs are able to grow back what was harvested. Rather than destroying a tree or shrub, we simply prune it to obtain our wood stock in clippings. This is then mixed with a binder and is put in a high-pressure press to create briquettes. Briquettes are then sun-dried and ready for use.

Wildlife Works has assisted the Kasigau Tree Farm in Kiteghe, to start manufacturing eco-charcoal, whilst also extensively planting indigenous trees on the same piece of land. Training and production has started, and there has been good progress. The next stage of our eco-charcoal project is to expand and increase production. We are working with the Kenya Forestry Service to facilitate the appropriate licenses and certificates for legal selling of the charcoal, which should be completed in the next few months.

2.1.14 Wildlife Works / Tsavo Soap Factory

Production is, as before, on a relatively small scale. We are working with our clients in order to produce even more desirable products with a greater range of options. There are also plans to produce gift sets incorporating high quality baskets produced in the Kasigau area.

2.1.15 Project Product Sales and Marketing

Wildlife Works has recently successfully negotiated the purchase of a roadside plot of land, where a quality vending point for Kasigau Corridor products will be built. This will provide a point of sale for quality crafts and art produced in the project area.

Meanwhile, through a small shop at Camp Tsavo on Rukinga Ranch and private sales, we have managed to increase the numbers of baskets sold from the Kasigau community. Working with a volunteer, quality baskets are encouraged in a variety of sizes to cater for different tastes and needs, and these are detailed with leather by a local craftsman.

2.2 Project Description 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.

2.3 Grouped Project

This project is not a grouped project; this section is therefore not applicable.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

The following data parameters were available *ex-ante* at the point of project validation. These include data for the baseline (without-project scenario) and project carbon pools (soil and forest).

Data Unit / 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, t_0. This proportion is observed using a sample of plots in the leakage area, and the parameter is calculated using equation 9.
Value applied:	-0.564
Purpose of the data:	To produce a parameterized leakage model that can be used to predict cumulative deforestation and degradation at any point in time.
Any comment:	

Data Unit / 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
Purpose of the data:	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.
Any comment:	

Data Unit / Parameter:	$\hat{\lambda}$
Data unit:	Proportion
Description:	Exponential soil carbon decay parameter
Source of data:	Calculated using empirically measured, project specific data.
Value applied:	0.55
Purpose of the data:	To predict the decay of soil organic matter in the project area under the project scenario.
Any comment:	

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
Purpose of the data:	Value is used as the wood density of standing dead wood with decay class of II. It converts the calculated wood volume to biomass.
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:	$\hat{\sigma}_{DF}$
Data unit:	Standard Deviation
Description:	The estimated standard deviation of the state observations used to fit the cumulative deforestation model.
Source of data:	Value calculated from the point observations in the cumulative deforestation model using Equation 17.
Value applied:	0.3127
Purpose of the data:	Used to determine the uncertainty in the cumulative deforestation model and number of leakage plots required.
Any comment:	

Data Unit / Parameter:	$a_{project}$
Data unit:	Hectares (ha)
Description:	Total project area
Source of data:	Measured using GIS analysis and from the land deed.
Value applied:	30,168.66
Purpose of the data:	Total project area used for determining total carbon quantities from inventory.
Any comment:	

Data Unit / Parameter:	a_{LE}
Data unit:	Hectares (ha)
Description:	Total leakage area.
Source of data:	Measured using GIS analysis.
Value applied:	30,168.66
Purpose of the data:	Used to define the area within which plots are established to measure any potential leakage from the project area.
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
Purpose of the data:	Used to convert the calculated total dry biomass of wood to carbon for each tree measured.
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
Purpose of the data:	Used in the soil carbon model for estimating total soil carbon quantities.
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 secton 5.1, List of Allometric Equations for a table displaying the species specfic allometric equations used in the carbon analysis.
Purpose of the data:	Used for calculating tree biomass.
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
Purpose of the data:	Used to determine the proportion of the total soil carbon in the project area that would be lost under the without-project deforestation scenario.
Any comment:	

Data Unit / Parameter:	$\hat{m}_{LE}$
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
Purpose of the data:	To determine the number of sample plots needed to measure forest degradation and deforestation in the leakage area with the desired confidence levels.
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
Purpose of the data:	Used in equation 19 to determine the uncertainty in the soil carbon loss model.
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
Purpose of the data:	Used to determine the total amount of the project area that is forested. Used in equation 33.
Any comment:	

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
Purpose of the data:	Used in equation 24 to determine the baseline emissions in below-ground large tree biomass.
Any comment:	

Data Unit / Parameter:	r_{sp}
Data unit:	Unitless
Description:	Ratio of below-ground biomass to above-ground biomass (root to shoot ratio) for species sp.
Source of data:	Value taken from the IPCC Guidelines for National GHG Inventories, for AFOLU (2006), Table 4.4. Value is for Tropical Shrubland, the Ecological type of the project area as determined from FAO Africover landcover dataset.
Value applied:	0.4
Purpose of the data:	Used in Equation 64 to estimate the belowground carbon stock in non-trees and trees from the above

	ground measured component.
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
Purpose of the data:	To account for carbon stored in biomass from the project area that is converted to long-lived wood products during any monitoring period.
Any comment:	

Data Unit / Parameter:	x
Data unit:	Real, vector
Description:	Vector of observed covariates to deforestation.
Source of data:	Independent variable used in the disforestation model, derived from expert local knowledge or peer-reviewed literature.
Value applied:	0
Purpose of the data:	Used in the parameterization of Equation 7, the linear predictor of deforestation, part of the logistic deforestation model.
Any comment:	

Data Unit / Parameter:	U_{DF}
Data unit:	Percent
Description:	Estimated uncertainty in the cumulative deforestation model.
Source of data:	Calculated from Equation 15.
Value applied:	5.9
Purpose of the data:	Used in Equation 36 to determine the average uncertainty in carbon stocks and the baseline model at monitoring period $[m]$.
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.
Value applied:	13.9
Purpose of the data:	Used in Equation 36 to determine the average uncertainty in carbon stocks and the baseline model at monitoring period [m].
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
Purpose of the data:	To convert the green weight of tree biomass as calculated by the allometry to dry tree biomass.
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
Purpose of the data:	To convert the green weight of shrub biomass as calculated to dry shrub biomass.
Any comment:	

3.2 Data and Parameters Monitored

The following data parameters were evaluated *ex-post* during this monitoring period subsequent to project verification. These include project carbon pools (forest) and leakage. Baseline data and soil carbon stocks are only measured at the point of baseline-reevaluation, and are therefore not measured during this monitoring period. Values for those parameters were measured at project validation, and are used within this monitoring report.

Data Unit / Parameter:	$\rho_{soil,j,k}$
Data unit:	$g \cdot cm^{-3}$
Description:	Mass-equivalent bulk density of fine portion of soil sample. ρ_{soil} is the lower of the two mean values for bulk density a) within the project area and b) in the reference area for all plots j across all strata k.
Source of data:	Measured in the project area and reference area.
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 monitored:	Please see table in Section 5.2
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: 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.
Calculation method:	Calculated using Equation 60.
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:	Plot radius, and therefore area, are determined according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.4_2012-01-18.pdf'.
Frequency of monitoring/recording:	20% of biomass plots are measured annually, so that 100% of plots are measured once every five years.
Value monitored:	Tree biomass plots have an area of either 0.02 or 0.2 ha (radius of 8 and 25 m) and Shrub biomass plots an area of either 0.005 or 0.07 ha (radius of 4 and 15 m) depending on the strata within which the plot is located. Please see the file 'Rukinga Carbon_M=2_Complete V2.13.xlsm' for area of specific plots.
Monitoring equipment:	Field measuring tapes for plot delineation and measurement.
QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Standard Operating Procedure Kasigau - Forest Inventory v2.4_2012-01-18.pdf'.
Calculation method:	N/A.
Any comment:	

Data Unit / Parameter:	a_k
Data unit:	Hectares (ha)
Description:	Area of stratum k
Source of data:	Measured
Description of measurement methods and procedures to be applied:	GIS analysis is used for the mapping and measurement of the strata within the project area.
Frequency of monitoring/recording:	Measured at each monitoring event.
Value monitored:	<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**</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 3.3.
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.
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.
Calculation method:	After identifying strata within the project, the classes are converted to GIS vectors (polygons) and their area calculated. A map is then created depicted the strata within the project.
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 monitored:	Please see Section 5.3
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 VP of African Field Ops and the Director of 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
Calculation method:	Calculated from laboratory analysis.
Any comment:	

Data Unit / Parameter:	$dbh_{i,j,k}$
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 v2.4_2012-01-18.pdf'.
Frequency of monitoring/recording:	20% of biomass plots are measured annually, so that 100% of plots are measured once every five years.
Value monitored:	Please see Section 5.4 for a list of tables displaying the values for $dbh_{i,j,k}$ for all plots. Additionally the file 'Rukinga Carbon_M=2_Complete V2.13.xlsm' is the primary database and calculator for tree measurement.
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.4_2012-01-18.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 Kasigau - Biomass v1.0.pdf'.
Calculation method:	N/A
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 v2.4_2012-01-18.pdf.'
Frequency of monitoring/recording:	20% of biomass plots are measured annually, so that 100% of plots are measured once every five years.
Value monitored:	Please see Section 5.5 for a list of tables displaying the values for $h_{i,j,k}$ for all plots. Additionally the file 'Rukinga Carbon_M=2_Complete V2.13.xlsm' is the primary database and calculator for tree measurement.
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Forest Inventory v2.4_2012-01-18.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 Kasigau - Biomass v1.0.pdf'.
Calculation method:	N/A
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 v2.4_2012-01-18.pdf'.
Frequency of monitoring/recording:	20% of biomass plots are measured annually, so that 100% of plots are measured once every five years.
Value monitored:	Please see the file 'Rukinga Carbon_M=2_Complete V2.13.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 v2.4_2012-01-18.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 Kasigau - Biomass v1.0.pdf'.
Calculation method:	N/A
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 v2.4_2012-01-18.pdf'.
Frequency of monitoring/recording:	AS required by the VCS Standard version 3 this parameter is remeasured at least once every five years.
Value monitored:	Please see the file 'Rukinga Carbon_M=2_Complete V2.13.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 v2.4_2012-01-18.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 Kasigau - Biomass v1.0.pdf'.
Calculation method:	N/A
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 v2.4_2012-01-18.pdf'.
Frequency of monitoring/recording:	20% of biomass plots are measured annually, so that 100% of plots are measured once every five years.
Value monitored:	The file 'Rukinga Carbon_M=2_Complete V2.13.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 v2.4_2012-01-18.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 Kasigau - Biomass v1.0.pdf'.

Calculation method:	N/A.
Any comment:	

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 annually, so that 100% of plots are measured once every five years.
Value monitored:	0 The file 'Rukinga Carbon_M=2_Complete V2.13.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:	N/A.
Calculation method:	N/A.
Any comment:	

Data Unit / Parameter:	$y_{INTACT,j,k}$
Data unit:	Tonnes $CO_2e \bullet ha^{-1}$
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 v2.4_2012-01-18.pdf'.
Frequency of monitoring/recording:	20% of biomass plots are measured annually, so that 100% of plots are measured once every five years.
Value monitored:	Please see the file 'Rukinga Carbon_M=2_Complete V2.13.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 v2.4_2012-01-18.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 Kasigau - Biomass v1.0.pdf'.
Calculation method:	N/A
Any comment:	

Data Unit / Parameter:	$y_{DECAYED,j,k}$
Data unit:	Tonnes CO_2e • ha^{-1}
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 v2.4_2012-01-18.pdf'.
Frequency of monitoring/recording:	20% of biomass plots are measured annually, so that 100% of plots are measured once every five years.
Value monitored:	Please see the file 'Rukinga Carbon_M=2_Complete V2.13.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 v2.4_2012-01-18.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 Kasigau - Biomass v1.0.pdf'.
Calculation method:	N/A
Any comment:	

Data Unit / Parameter:	$C_{AGLT}^{[m]}$
Data unit:	Tonnes CO_2e
Description:	Estimated carbon stock in above-ground large trees at monitoring period $[m]$.
Source of data:	Calculated
Description of measurement methods and	N/A

procedures to be applied:	
Frequency of monitoring/recording:	Updated at every monitoring period.
Value monitored:	1,549,476.71
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Calculation method:	Value calculated using the procedures described in Section 13.5.1 of the methodology.
Any comment:	

Data Unit / Parameter:	$C_{AGNT}^{[m]}$
Data unit:	Tonnes CO_2e
Description:	Estimated carbon stock in above-ground non tree biomass at monitoring period $[m]$.
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Updated at every monitoring period.
Value monitored:	267,636.99
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Calculation method:	Value calculated using the procedures described in Section 13.5.3 of the methodology.
Any comment:	

Data Unit / Parameter:	$C_{BGLT}^{[m]}$
Data unit:	Tonnes CO_2e
Description:	Estimated carbon stock in below-ground large tree biomass at monitoring period $[m]$.
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Updated at every monitoring period.
Value monitored:	619,790.68
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Calculation method:	Value calculated using the procedures described in Section 13.6.1 of the methodology.
Any comment:	

Data Unit / Parameter:	$C_{BGNT}^{[m]}$
Data unit:	Tonnes CO_2e
Description:	Estimated carbon stock in below-ground non tree biomass at monitoring period $[m]$.
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Updated at every monitoring period.
Value monitored:	107,054.79
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Calculation method:	Value calculated using the procedures described in Section 13.6.3 of the methodology.
Any comment:	

Data Unit / Parameter:	$C_{SDW}^{[m]}$
Data unit:	Tonnes CO_2e
Description:	Estimated carbon stock in standing dead wood at monitoring period $[m]$.
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Updated at every monitoring period.
Value monitored:	41,346.38
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Calculation method:	Value calculated using the procedures described in Section 13.7 of the methodology.
Any comment:	

Data Unit / Parameter:	$C_{SOIL}^{[m]}$
Data unit:	Tonnes CO_2e
Description:	Estimated carbon stock in soil carbon at monitoring period $[m]$.
Source of data:	Calculated
Description of measurement methods and	N/A

procedures to be applied:	
Frequency of monitoring/recording:	Updated at every monitoring period.
Value monitored:	12,370,530.22
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Calculation method:	Value calculated using the procedures described in Section 13.9 of the methodology.
Any comment:	

Data Unit / Parameter:	$o_i^{[m]}$
Data unit:	Proportion
Description:	Degradation proportion observation taken in each leakage plot i^{th} sample point at monitoring period m.
Source of data:	Measurement.
Description of measurement methods and procedures to be applied:	Leakage sampling point degradation is measured using ocular methods according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Leakage v1.0_01_01_2011.pdf'.
Frequency of monitoring/recording:	Updated at every monitoring period.
Value monitored:	Please see Section 5.6.
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Leakage v1.0_01_01_2011.pdf', the following equipment is utilized: Compass, metric tape measure, and handheld GPS unit.
QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Quality Control Procedure Kasigau - Biomass v1.0.pdf'.
Calculation method:	N/A.
Any comment:	

Data Unit / Parameter:	$\bar{o}^{[m]}$
Data unit:	Proportion
Description:	Average of state observations taken in the leakage area for monitoring period $[m]$.
Source of data:	Measurement.
Description of measurement methods and	Leakage sampling point degradation is measured

procedures to be applied:	using ocular methods according to the procedures detailed in the SOP: 'Standard Operating Procedure Kasigau - Leakage v1.0_01_01_2011.pdf'.
Frequency of monitoring/recording:	Updated at every monitoring period.
Value monitored:	0.557
Monitoring equipment:	As stated in the Biomass monitoring SOP 'Standard Operating Procedure Kasigau - Leakage v1.0_01_01_2011.pdf', the following equipment is utilized: Compass, metric tape measure, and handheld GPS unit.
QA/QC procedures to be applied:	Procedures applied according to the SOP: 'Quality Control Procedure Kasigau - Biomass v1.0.pdf'.
Calculation method:	N/A.
Any comment:	

Data Unit / Parameter:	F_{LE}
Data unit:	Proportion
Description:	Proportion cumulative deforestation and degradation predicted by the leakage model.
Source of data:	Calculated.
Description of measurement methods and procedures to be applied:	N/A.
Frequency of monitoring/recording:	Predicted from the model at each monitoring period.
Value monitored:	0.6112
Monitoring equipment:	N/A.
QA/QC procedures to be applied:	N/A.
Calculation method:	Calculated from a model, see Equatuion 8 in the methodology.
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:	Calculated
Description of measurement methods and procedures to be applied:	Estimated based on the difference between the observed deforestation in the reference area and predicted deforestation in the reference area as

	described in Section 10.4.
Frequency of monitoring/recording:	Updated at each monitoring period.
Value monitored:	0
Monitoring equipment:	N/A.
QA/QC procedures to be applied:	N/A.
Calculation method:	Value calculated using the procedures described in Section 10.4 of the methodology.
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 monitored:	1,500,466.05
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.
Calculation method:	Calculated with the Equation $N_P = \frac{a_{project}}{a_{plot}}$
Any comment:	

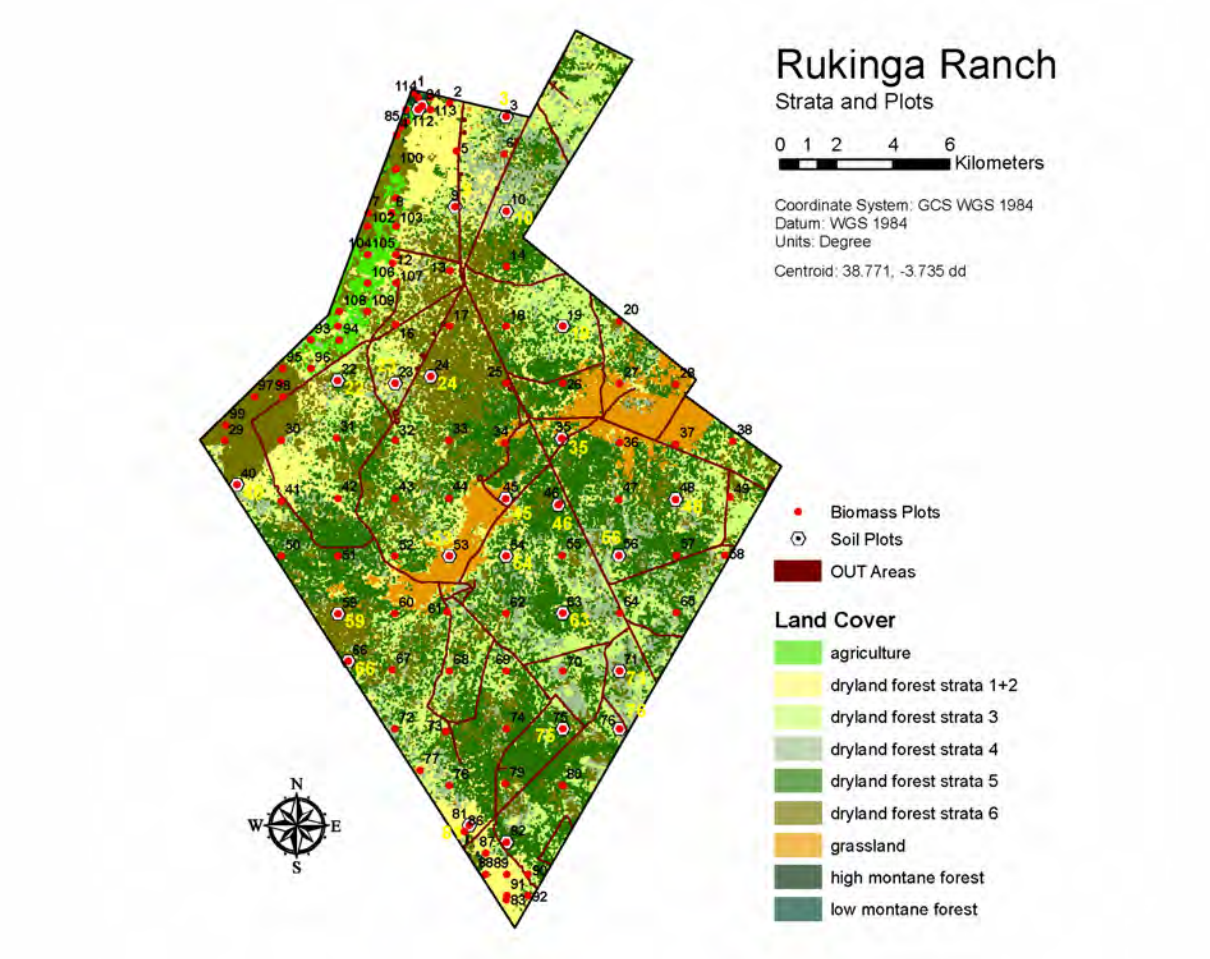
Data Unit / Parameter:	$N_{P,k}$
Data unit:	Count

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 monitored:	**Stratum name** / **Total number of possible plots** **ag active** 35,026.51 **dryland forest strata 1+2** 341,141.20 **dryland forest strata 3** 279,642.67 **dryland forest strata 4** 137,615.93 **dryland forest strata 5** 404,030.06 **dryland forest strata 6** 215,177.99 **grassland** 79,586.37 **montane forest** 2,834.05
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.
Calculation method:	Calculated with the Equation $N_{P,k} = \frac{a_k}{a_{plot}}$
Any comment:	

3.3 Description of the Monitoring Plan

In order to most accurately estimate biomass in the Phase I project area, with reasonable time and expense, we divided the area into 8 landcover strata based on ecosystem type. There is wide variation in average biomass between strata. The dense montane forest stratum has larger trees in high density, there are medium to large trees and lots of shrubs in the middle dryland forest strata and scattered trees, and very few shrubs and heavy grass cover in the grassland / sparse

stratum. In addition, a ninth stratum was created that includes all developed areas, such as roads, water tanks, and bomas. Overall, these 9 strata sum to the total project land area, depicting the overall landcover in the Phase I project.



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.

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 redundant 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) each yearly monitoring period. For this monitoring period (m_2), 21 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. A detailed rendition of the degradation estimation procedure is listed in Standard Operating Procedure - Leakage provided to the validators.

3.3.1 Organizational Structure

Wildlife Works has 13 dedicated plot sampling experts (divided into sampling teams), ultimately commanded by Rob Dodson, VP African Field Ops. Each team is directed by a team leader, who is trained in GPS operation and forest techniques, and must demonstrate proficiency in species identification, 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. Team leaders are responsible for data collection and transfer to the Rukinga office. Their names are attached to each and every soil and biomass plot; any discrepancies can be easily traced back to date and time of collection, as well as team members who collected the data.

As mentioned above, leakage plot teams are specially trained by the VP African Field Ops and the Operations Manager 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.

3.3.2 Data Collection, Storage and Aggregation

Data collected in the field is systematically translated into carbon workbooks developed by Jeremy Freund, VP Carbon Development. These "carbon models" contain dropdown lists and pre-filled formulas to ensure accuracy of entry and minimize human translation error. Data was entered by a dedicated office staff member, Defence, who has been trained by the VP Carbon development. Data entry is cross-checked internally, and additionally by staff in the US office. Several programmatic, automated data checks are also run on the data.

Carbon model aggregation is ultimately the responsibility of the VP Carbon Development, and all Carbon accounting procedures were developed by him, and adhere to the MED, VM0009.

All inventory data are stored in the United States in Wildlife Works' San Francisco offices, where it is backed up. The data is also aggregated reported from this location. The Wildlife Works technical team is currently designing an online, spatially-enabled data inventory for biomass, soil and biodiversity information collected by field crews. In the future, GIS server software will be utilized to perform spatial analysis (species distribution modeling) on animal sightings, calculations of biomass and other spatially tagged events.

3.3.3 Field Training

Field training was initially conducted in February 2009 for the first tree plot sampling team. This team consisted of;

- A local tree expert who was able to identify all the different Acacia and Commiphora species encountered in the sampling - Joel Mwandigha
- Mike Korchinsky – CEO, Wildlife Works
- Rob Dodson – VP African Field Operations
- Mwololo Muasa a Wildlife Works employee who subsequently became a permanent team lead and data recorder
- Three casuals to assist with carrying equipment into the field and marking the plots
- A driver
- A ranger for security

The Standard Operating Procedures for Biomass and Soils were produced following refinement of the field techniques by this initial team. Additional teams have been trained using this procedure, and accompany our permanent team periodically, to ensure consistency in method. Field training is continually performed by Jeremy Freund, VP Carbon Development and Rob Dodson, VP African Field Ops. Gordon Smith, Carbon Development Director has been charged with making updates to, and keeping current the Biomass and Soil sampling SOPs, and the documents have recently been given a major overhaul to include pertinent and relevant information gleaned from the 25+ projects around the world that Wildlife Works' is involved in.

3.3.4 Internal Auditing

Internal checks are routinely performed on biomass, soil and leakage plots. The VP Carbon Development, VP African Field Operations and Operations Manager routinely embark on "check cruises" to evaluate the employees' work, and often, management will audit individual measurements. Wildlife Works has also instituted an official Quality Control system for biomass plots which has been reviewed by the validators (see QC Procedure - Biomass). 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. It is a company policy that no significant results may be published or submitted without at least one set of eyes (other than the author's) having viewed the work to be published.

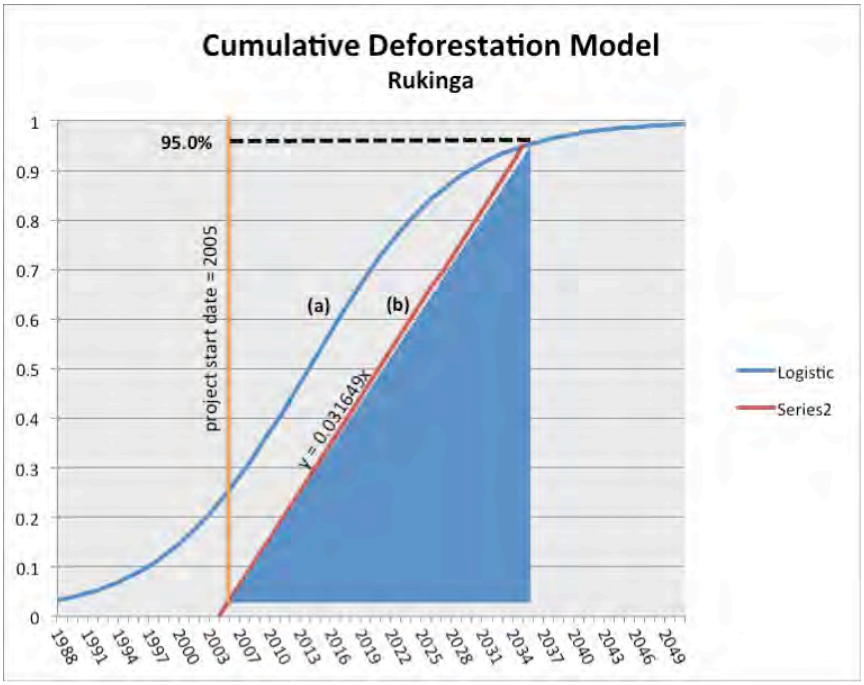
4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions for the current monitoring period (m_2) are calculated as follows:

The same Cumulative Deforestation Model (CDM) curve is used for the current monitoring period as was used for the previous period. 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.



The cumulative gross and net emission reductions (January 1, 2010 to December 31, 2011) are as follows, by year:

Monitoring Period	2005- 2010 (m_1)	2011 (m_2)	Cum. TOTAL
Baseline deforestation %	11.1%	22.15%	**33.25%**
Gross NERs	1,450,329	250,465	**1,700,794**
Percent of ERs to VCS pooled buffer account	20%	15%	**–**
Buffer tonnes to VCS	290,066	37,570	**327,636**
Net issued NERs	1,160,263	212,895	**1,373,158**

4.2 Project Emissions

Project emissions are estimated as follows:

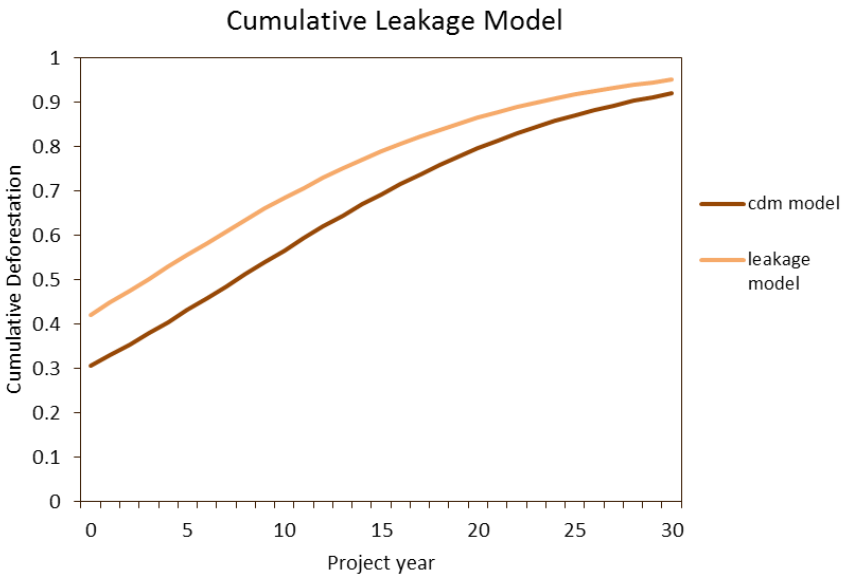
- All carbon eligible carbon pools fell under the *de minimis* limit as described in the MED, section 9 Project Emissions and in VCS 2007.1;
- There were no significant fire events in this monitoring period (m_2). If a significant fire event were to occur, Wildlife Works would be required to produce a map of the boundaries for the fire prior to the subsequent monitoring period, as stipulated in VM0009 V1.0;

- 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_2).

4.3 Leakage

During the second monitoring period (m_2), 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:

$$\hat{\delta}_{LE} \text{ (t=0) = -0.564}$$



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

$$\hat{\delta}_2 = -1.31$$

And compared to the cumulative leakage model at time t=2, per VM0009 V1.0, equation [33]:

$$\hat{r}_{LE}^{[2]} = 0\%$$

We then calculate leakage for the current monitoring period, per VM0009 V1.0 equation [32]:

$$C_{LE}^{[2]} = \hat{r}_{LE}^{[2]} C_{BE}^{[2]} = 0 \cdot 250{,}465 = \mathbf{0}$$

4.4 Summary of GHG Emission Reductions and Removals

Net emissions reductions to date are quantified from the components shown in the table below, which include estimated gross emissions reductions, any uncertainty deductions, deductions for leakage and deductions for the risk of reversal buffer pool. Error analysis for the current

monitoring period m_2 is also included 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_2 monitoring period (20%, randomly selected):

Component	Value
Baseline deforestation percentage, m_2	22.15
Uncertainty Deduction	0
Project Emissions, m_2	0
Emissions from Leakage, m_2	0
Gross emissions reductions, m_2	250,465
NERs to Buffer Pool, (15%), m_2	37,570
Net emissions reductions NERs, m_2	**212,895**
Standard error	641,816.03
Error percentage	**8.41%**

5 ADDITIONAL INFORMATION

5.1 List of Allometric Equations

$f_{sp}(\cdot)$ Allometric equation for species sp. For trees, this equation generally is based on dbh and possibly height to biomass.

All Equations follow the following format:

- If the tree DHB is less than 35cm, the following format is used

$$B_i = a \cdot DBH^b$$

where B_i is the Biomass of the tree calculated by the allometric equation;
DBH is the Diameter at Breast Height for the corresponding tree and
a and ***b*** are the allometric constants listed in the table below.

These power equations are based on regression of DBH vs. Biomass data obtained through a destructive harvest conducted by Wildlife Works at Rukinga HQ, but outside the project area.

- If the tree DBH is greater than or equal to 35cm, the following format is used

$$B_i = c \cdot DBH - d$$

Where B_i is the Biomass of the tree calculated by the allometric equation;
DBH is the Diameter at Breast Height for the corresponding tree and
c and ***d*** are the allometric constants listed in the table below.

These linear equations are based on the slope of a line drawn at the tangent of the all-species curve at 35cm DBH. For more information regarding the allometric model applied to this project, please see the VCS PD, Section 13 Monitoring. Note that a CAR was issued for Phase II of the Kasigau Corridor project resulting in the wholesale changing of the allometric model to incorporate linear models that are to be employed if a tree is measured greater than 35cm DBH. This change was then applied to the Phase I Project as well (this project). The details of this change can be found both in the Phase II CARs (Phase II CAR 13) as well as the VCS Phase II PD, Section 13 Monitoring.

Table of Allometric Constants

Species	< 35cm constant A	< 35cm constant B	> 35cm constant C	> 35cm constant D
Acacia bussei	3.380	1.642	80.292	1056.633
Acacia etbaica	1.142	1.995	80.292	1251.187
Acacia hockii	0.685	2.182	80.292	1205.526
Acacia mellifera	1.142	1.995	80.292	1251.187

Acacia melifera	1.142	1.995	80.292	1251.187
Acacia nilotica	1.362	1.951	80.292	1228.467
Acacia senegal	1.142	1.995	80.292	1251.187
Acacia thomasii	1.142	1.995	80.292	1251.187
Acacia tortilis	2.606	1.618	80.292	1274.403
Acacia zanzibarica	1.142	1.995	80.292	1251.187
Albizia anthelmintica	0.341	2.302	80.292	1551.378
Albizia harveyi	0.341	2.302	80.292	1551.378
Balanites aegyptiaca	0.341	2.302	80.292	1551.378
Balanites pedicellaris	0.341	2.302	80.292	1551.378
Boscia angustifolia	0.341	2.302	80.292	1883.692
Boscia coriacea	0.203	2.365	80.292	1883.692
Boswellia neglecta	1.303	1.833	80.292	1994.440
Cassia abbreviata	0.341	2.302	80.292	1551.378
Cassia siamea	0.341	2.302	80.292	1551.378
Cassipourea celastroides	0.341	2.302	80.292	1551.378
Commiphora africana	0.629	1.946	80.292	1622.071
Commiphora baluensis	0.105	2.665	80.292	1250.566
Commiphora campestris	0.068	2.816	80.292	1015.801
Commiphora confusa	0.115	2.663	80.292	1360.983
Commiphora edulis	0.105	2.665	80.292	1250.566
Commiphora eminii	0.105	2.665	80.292	1250.566
Commiphora holtziana	0.105	2.665	80.292	1250.566
Croton pseudopulchellus	0.341	2.302	80.292	1551.378
Delonix elata	0.341	2.302	80.292	1551.378
Diosporus consolatae	0.341	2.302	80.292	1551.378
Diospyros consolatae	0.341	2.302	80.292	1551.378
Erythrina abyssinica	0.341	2.302	80.292	1551.378
Euphorbia bussei	0.341	2.302	80.292	1551.378
Euphorbia quinquecostata	0.341	2.302	80.292	1551.378
Euphorbia tirucalli	0.341	2.302	80.292	1551.378
Haplocoelum foliolosum	0.341	2.302	80.292	1551.378
Lannea alata	0.560	2.103	80.292	1148.344
Lannea rivae	0.149	2.642	80.292	1058.718
Lannea schweinfurthii	0.329	2.323	80.292	1127.474
Manilkara mochisia	0.341	2.302	80.292	1551.378
Manilkara sulcata	0.341	2.302	80.292	1551.378
Melia volkensii	0.341	2.302	80.292	1551.378
Melia volkensil	0.341	2.302	80.292	1551.378
Mellia volkensii	0.341	2.302	80.292	1551.378
Newtonia hildebrandtii	0.341	2.302	80.292	1551.378

Pittosporum viridiflorum	0.341	2.302	80.292	1551.378
Platycelyphium voense	0.341	2.302	80.292	1551.378
Salvadora persica	0.341	2.302	80.292	1551.378
Sterculia africana	0.341	2.302	80.292	1551.378
Teclea divinorum	0.341	2.302	80.292	1551.378
Terminalia prunoides	0.341	2.302	80.292	1551.378
Terminalia spinosa	0.341	2.302	80.292	1551.378
Vepris simplicifolia	0.341	2.302	80.292	1551.378
Zanthoxyllum chalybeum	0.341	2.302	80.292	1551.378

5.2 Mass-equivalent bulk density of fine portion of soil sample, ρ_{soil}.

Rukinga			Reference		
Project plot	bulk density (g/cm^3) 0-30cm	bulk density (g/cm^3) 31-100cm	Reference plot	bulk density (g/cm^3) 0-30cm	bulk density (g/cm^3) 31-100cm
1	1.38	1.21	1	1.57	1.42
2	1.23	1.33	2	1.43	1.36
3	1.34	1.13	3	1.31	1.29
4	1.22	1.35	4	1.53	1.38
5	1.3	1.33	5	1.57	1.36
6	1.39	1.38	6	1.45	1.41
7	1.39	1.25	7	1.43	1.38
8	1.2	1.36	8	1.43	1.31
9	1.38	1.4	9	1.69	1.52
10	1.33	1.42	10	1.5	1.47
11	1.37	1.21	11	1.51	1.37
12	1.3	1.25	12	1.5	1.43
13	1.25	1.35	13	1.52	1.42
14	1.34	1.4	14	1.58	1.46
15	1.31	1.34	15	1.48	1.42
16	1.38	1.52	16	1.53	1.39
17	1.44	1.33	17	1.56	1.41
18	1.22	1.26	18	1.33	1.57
19	1.21	1.29	19	1.57	1.5
20	1.34	1.45	20	1.59	1.5
21	1.3	1.59	21	1.54	1.29
22	1.5	1.36	22	1.56	1.38
23	1.39	1.45	23	1.34	1.28
24	1.36	1.28	24	1.51	1.45
25	1.24	1.26	25	1.55	1.44

mean	**1.32**	**1.34**		**1.50**	**1.41**

5.3 Mass-equivalent bulk density of fine portion of soil sample, $cf_{soil,j,k}$

Rukinga plot	Carbon fraction (0-30cm)	Carbon fraction (31-100cm)
75	0.5930	1.6977
53	1.4709	0.7442
40	1.0872	1.8953
45	1.4942	0.6860
54	0.5872	0.8256
81	0.6105	1.0988
63	0.3837	0.7151
71	0.5174	0.6047
19	0.4419	0.7965
3	0.4012	0.8547
56	0.6512	1.2791
23	0.6512	1.0523
24	0.6860	0.9826
10	0.5233	0.7151
48	0.8721	0.6453
22	1.1279	0.5465
112	0.3488	0.7849
76	0.5407	1.3895
35	1.1919	1.1221
82	0.5407	0.7326
66	0.6744	0.5872
59	0.4767	1.0698
9	0.6221	0.4651
84	0.4360	0.8140
46	0.5058	0.9826
mean:	**0.6974**	**0.9235**

This table represents SOC % (carbon fraction) for each plot sample collected within the Rukinga Ranch (Project Area). Sample values were evaluated for both 0-30cm and 31-100cm at each plot. These 2 values were later combined to obtain total soil loss (which also requires measurement of soil outside the project area).

Mean carbon · ha^{-1} for the Project Area: **411.53 t · ha^{-1}**
(for details on this calculation, please see the Soil Carbon calculation Worksheet 'Rukinga Deep 1m Soil Analysis - RA V2.1.xls') also listed at the end of this document.

5.4 Diameter at breast height (DBH) of the ith tree in plot j in stratum k, $dbh_{i,j,k}$.

$dbh_{i,j,k}$ Diameter at breast height (DBH) measured for each tree for each plot monitored during this monitoring event (m_2).

In the case where a tree had more than one trunk (multi-trunk), an "effective DBH" was calculated using the following formula:

$$DBH_e = 2\sqrt{\left(\frac{dbh_1}{2}\right)^2 + \left(\frac{dbh_2}{2}\right)^2 + \left(\frac{dbh_3}{2}\right)^2 \cdots \left(\frac{dbh_n}{2}\right)^2}$$

where DBH_e = "effective DBH"
$dbh_1 \cdots dbh_n$ = DBH for each individual trunk
n = # of trunks

This effective DBH is listed in the following table when the tree contains more than one trunk. Otherwise, the single-trunk DBH is listed.

Table of DBH Values

Plot T05R

Tree Tag Number	Tree Species	Effective DBH
1	Commiphora confusa	18.30
2	Lannea rivae	15.02
3	Commiphora africana	10.60
4	Boscia coriacea	29.00
5	Acacia nilotica	9.55
6	Commiphora campestris	20.10
7	Commiphora confusa	9.60
8	Commiphora campestris	42.70
9	Boscia coriacea	23.90
10	Commiphora africana	14.80
11	Boscia coriacea	15.40
12	Commiphora africana	11.90
13	Commiphora africana	10.00
14	Commiphora africana	11.60
15	Boswellia neglecta	19.80
16	Sterculia africana	12.89
17	Commiphora africana	13.90
18	Commiphora confusa	7.50
19	Commiphora confusa	12.54
20	Commiphora campestris	15.00
21	Boscia coriacea	7.20

22	Commiphora africana	19.74
23	Commiphora campestris	11.30
24	Acacia bussei	41.58
25	Acacia nilotica	18.35
26	Acacia nilotica	12.80
27	Commiphora campestris	42.30
28	Acacia nilotica	26.45
29	Commiphora campestris	32.00
30	Acacia nilotica	33.23
31	Commiphora campestris	38.70
32	Commiphora campestris	26.50
33	Acacia nilotica	56.94
34	Lannea rivae	8.10
35	Commiphora africana	25.00
36	Commiphora confusa	16.02

Plot T13R

Tree Tag Number	Tree Species	Effective DBH
1	Commiphora confusa	25.69
2	Commiphora campestris	25.50
3	Commiphora campestris	46.01
4	Boscia coriacea	9.30
5	Commiphora campestris	26.83
6	Commiphora campestris	26.90
7	Commiphora campestris	27.80
8	Commiphora campestris	28.30
9	Commiphora campestris	18.80
10	Commiphora campestris	28.80
11	Commiphora campestris	25.00
12	Commiphora campestris	16.40
13	Commiphora campestris	27.10
14	Commiphora campestris	30.10
15	Commiphora campestris	30.30
16	Commiphora campestris	31.70
17	Commiphora campestris	37.10
18	Acacia hockii	7.10
19	Commiphora campestris	29.20
20	Commiphora confusa	9.12
21	Commiphora campestris	29.30
22	Acacia hockii	8.20
23	Commiphora campestris	38.89

24	Sterculia africana	15.29
25	Commiphora confusa	17.90
26	Commiphora campestris	25.20
27	Commiphora campestris	36.70
28	Commiphora campestris	48.17
29	Commiphora campestris	32.90
30	Boscia coriacea	16.44
31	Commiphora campestris	15.10
32	Commiphora campestris	27.70
33	Commiphora campestris	24.40
34	Commiphora campestris	33.70
35	Commiphora campestris	27.80
36	Commiphora campestris	35.58

Plot T19

Tree Tag Number	Tree Species	Effective DBH
1	Commiphora baluensis	5.60
2	Lannea alata	6.04
3	Commiphora confusa	9.20
4	Lannea alata	7.09
5	Commiphora confusa	6.10
6	Commiphora confusa	7.95
7	Commiphora confusa	16.76
8	Commiphora confusa	13.82
9	Platycelyphium voense	6.80
10	Boswellia neglecta	18.53
11	Lannea alata	7.07
12	Lannea alata	3.10
13	Lannea alata	6.40
14	Lannea alata	14.43
15	Lannea alata	11.19
16	Lannea alata	11.92
17	Lannea alata	8.07
18	Lannea alata	0.00
19	Commiphora baluensis	18.70
20	Platycelyphium voense	29.05
21	Boswellia neglecta	23.48
22	Boscia coriacea	19.00
23	Platycelyphium voense	22.97
24	Boswellia neglecta	21.99
25	Platycelyphium voense	10.24

26	Commiphora campestris	38.90
27	Platycelyphium voense	17.40
28	Commiphora confusa	11.82
29	Lannea schweinfurthii	20.63
30	Platycelyphium voense	15.40
31	Boscia coriacea	11.70
32	Platycelyphium voense	12.10
33	Boswellia neglecta	32.82
34	Lannea alata	15.57
35	Commiphora confusa	17.27
36	Boswellia neglecta	23.55
37	Commiphora confusa	20.59
38	Lannea alata	15.27
39	Commiphora confusa	6.30
40	Lannea alata	8.66
41	Platycelyphium voense	16.67
42	Commiphora confusa	5.50
43	Commiphora confusa	6.10
44	Lannea alata	10.10
45	Lannea alata	8.56
46	Lannea alata	6.60
47	Lannea alata	7.40
48	Lannea alata	9.68
49	Lannea alata	12.73
50	Lannea alata	8.80
51	Lannea alata	6.30
52	Lannea alata	9.05
53	Lannea alata	0.00
54	Lannea alata	9.75
55	Commiphora confusa	13.09
56	Lannea alata	6.70
57	Cassia abbreviata	27.31
58	Commiphora confusa	6.00
59	Lannea alata	9.09
60	Lannea alata	10.00
61	Lannea alata	11.88
62	Lannea alata	11.14
63	Commiphora confusa	14.71
64	Lannea alata	8.10
65	Boswellia neglecta	21.75

Plot T24R

Tree Tag Number	Tree Species	Effective DBH
1	Commiphora campestris	12.74
2	Commiphora confusa	14.40
3	Commiphora confusa	9.15
4	Commiphora confusa	14.74
5	Commiphora campestris	26.26
6	Sterculia africana	14.14
7	Commiphora campestris	27.80
8	Commiphora confusa	12.40
9	Commiphora campestris	29.40
10	Boscia coriacea	28.90
11	Commiphora campestris	31.10
12	Commiphora campestris	26.60
13	Commiphora campestris	9.70
14	Boswellia neglecta	33.99
15	Commiphora campestris	44.20
16	Acacia hockii	14.52
17	Acacia nilotica	7.90
18	Acacia hockii	24.71
19	Lannea rivae	6.90
20	Acacia hockii	8.50
21	Commiphora campestris	43.60
22	Acacia hockii	21.02
23	Boswellia neglecta	38.15
24	Commiphora campestris	6.90
25	Acacia hockii	17.20
26	Acacia hockii	25.42
27	Acacia hockii	13.73
28	Acacia hockii	6.72
29	Acacia hockii	13.70
30	Acacia hockii	13.43
31	Acacia hockii	16.05
32	Acacia hockii	8.41
33	Boscia coriacea	25.84
34	Acacia hockii	6.70
35	Lannea rivae	0.00
36	Commiphora campestris	15.60
37	Acacia nilotica	8.60
38	Commiphora campestris	10.45
39	Lannea rivae	19.23

40	Acacia hockii	9.21
41	Commiphora confusa	0.00
42	Commiphora campestris	6.80
43	Commiphora confusa	0.00
44	Acacia nilotica	9.20
45	Commiphora campestris	15.40
46	Commiphora campestris	38.24
47	Commiphora confusa	9.60
48	Commiphora confusa	18.29
49	Commiphora confusa	0.00
50	Boscia coriacea	11.50
51	Platycelyphium voense	0.00
52	Commiphora confusa	0.00
53	Commiphora campestris	31.50
54	Acacia nilotica	0.00

Plot T30

Tree Tag Number	Tree Species	Effective DBH
1	Commiphora confusa	8.50
2	Commiphora confusa	10.70
3	Acacia bussei	14.38
4	Commiphora campestris	39.00
5	Boswellia neglecta	0.00
6	Acacia hockii	8.00
7	Acacia bussei	13.00
8	Cassia abbreviata	10.40
9	Commiphora confusa	11.00
10	Commiphora confusa	0.00
11	Acacia bussei	17.20

Plot T35

Tree Tag Number	Tree Species	Effective DBH
1	Acacia zanzibarica	6.00
2	Acacia hockii	18.31
3	Acacia tortilis	7.00
4	Acacia tortilis	13.80
5	Acacia hockii	7.20
6	Commiphora africana	6.20
7	Acacia zanzibarica	5.80
8	Acacia tortilis	8.20

plot T37

Tree Tag Number	Tree Species	Effective DBH
1	Acacia tortilis	20.24
2	Lannea alata	7.70
3	Commiphora campestris	36.00
4	Lannea alata	19.30
5	Boscia coriacea	27.20
6	Lannea alata	11.42
7	Lannea alata	15.14
8	Lannea alata	12.73
9	Lannea alata	14.62
10	Lannea alata	11.35
11	Lannea alata	11.34
12	Commiphora confusa	22.13
13	Acacia nilotica	9.18
14	Boscia coriacea	11.94
15	Commiphora africana	16.40
16	Commiphora confusa	17.82
17	Commiphora campestris	31.50
18	Commiphora confusa	10.50
19	Lannea rivae	9.00
20	Commiphora confusa	6.50
21	Commiphora confusa	20.78
22	Lannea rivae	9.72
23	Lannea rivae	9.50
24	Lannea alata	13.60
25	Commiphora confusa	9.60
26	Acacia nilotica	35.05
27	Commiphora confusa	17.45
28	Acacia nilotica	23.56
29	Commiphora confusa	15.24
30	Acacia nilotica	32.46
31	Commiphora confusa	14.71
32	Lannea rivae	11.63
33	Acacia nilotica	15.60
34	Acacia tortilis	9.35
35	Commiphora confusa	19.34
36	Commiphora confusa	7.60
37	Commiphora confusa	12.73
38	Lannea alata	9.20
39	Commiphora confusa	13.57

40	Commiphora confusa	21.54
41	Acacia nilotica	25.18

Plot T43

Tree Tag Number	Tree Species	Effective DBH
1	Commiphora confusa	9.00
2	Commiphora campestris	27.70
3	Lannea alata	20.00
4	Commiphora confusa	19.00
5	Commiphora confusa	17.30
6	Commiphora campestris	30.00
7	Lannea alata	18.17
8	Boswellia neglecta	48.83
9	Commiphora confusa	25.05
10	Commiphora confusa	22.00
11	Acacia hockii	11.17
12	Acacia hockii	14.07
13	Acacia hockii	13.56
14	Commiphora confusa	10.80
15	Lannea alata	7.00
16	Boswellia neglecta	14.09
17	Commiphora confusa	10.00
18	Commiphora confusa	21.90
19	Boswellia neglecta	21.31
20	Boswellia neglecta	21.99
21	Commiphora confusa	24.75
22	Commiphora campestris	29.00
23	Commiphora campestris	33.59
24	Boswellia neglecta	32.04
25	Boswellia neglecta	33.28
26	Commiphora campestris	26.10
27	Commiphora campestris	33.66
28	Commiphora confusa	13.50
29	Commiphora campestris	21.00
30	Commiphora confusa	9.80
31	Commiphora campestris	24.04
32	Boscia coriacea	23.87
33	Boswellia neglecta	43.60
34	Commiphora confusa	24.20
35	Commiphora campestris	19.50
36	Commiphora confusa	26.52

37	Commiphora campestris	21.70
38	Commiphora campestris	20.82
39	Boswellia neglecta	17.40
40	Boswellia neglecta	36.84
41	Maerua angolensis	17.00
42	Commiphora campestris	18.50
43	Boswellia neglecta	14.10
44	Commiphora confusa	16.00
45	Commiphora confusa	17.70
46	Boswellia neglecta	29.90
47	Boswellia neglecta	36.75

Plot T44

Tree Tag Number	Tree Species	Effective DBH
1	Commiphora campestris	31.34
2	Acacia hockii	20.62
3	Commiphora campestris	27.15
4	Boswellia neglecta	25.21
5	Commiphora confusa	18.43
6	Lannea alata	11.21
7	Boswellia neglecta	28.58
8	Lannea alata	9.92
9	Commiphora confusa	15.80
10	Commiphora confusa	18.36
11	Boswellia neglecta	16.26
12	Commiphora confusa	15.68
13	Boswellia neglecta	22.73
14	Commiphora confusa	17.30
15	Boswellia neglecta	18.12
16	Commiphora confusa	17.62
17	Boswellia neglecta	38.12
18	Boswellia neglecta	23.88
19	Acacia tortilis	10.10
20	Boswellia neglecta	23.64
21	Commiphora campestris	19.70
22	Boswellia neglecta	21.73
23	Lannea alata	15.98
24	Boswellia neglecta	40.16
25	Lannea alata	16.21
26	Commiphora campestris	16.40
27	Acacia nilotica	16.50

28	Lannea alata	9.60
29	Boswellia neglecta	22.50
30	Commiphora campestris	35.18
31	Commiphora confusa	19.74
32	Acacia senegal	18.43
33	Boswellia neglecta	30.33
34	Boswellia neglecta	7.50
35	Commiphora confusa	8.80
36	Commiphora confusa	17.50
37	Lannea alata	17.54
38	Lannea alata	6.50
39	Commiphora confusa	11.80
40	Boswellia neglecta	26.33
41	Lannea alata	8.20
42	Boswellia neglecta	16.80
43	Commiphora confusa	28.35
44	Acacia nilotica	16.26
45	Commiphora confusa	15.30
46	Commiphora confusa	10.00
47	Commiphora confusa	8.70
48	Commiphora campestris	38.00
49	Commiphora confusa	19.46
50	Commiphora confusa	13.42
51	Acacia tortilis	12.00

Plot T45

Tree Tag Number	Tree Species	Effective DBH
1	Commiphora confusa	12.74
2	Acacia hockii	15.14
3	Terminalia spinosa	9.40
4	Acacia hockii	18.93
5	Acacia zanzibarica	5.00
6	Balanites aegyptiaca	12.48
7	Balanites aegyptiaca	8.00
8	Acacia tortilis	10.20
9	Acacia nilotica	5.33
10	Acacia nilotica	4.20
11	Acacia nilotica	4.40

Plot T52

Tree Tag Number	Tree Species	Effective DBH

1	Commiphora campestris	38.60
2	Commiphora campestris	36.91
3	Commiphora campestris	26.50
4	Commiphora campestris	20.70
5	Commiphora confusa	10.20
6	Commiphora campestris	27.88
7	Acacia tortilis	18.00
8	Commiphora confusa	12.00
9	Commiphora campestris	37.06
10	Acacia tortilis	9.76
11	Acacia tortilis	31.16
12	Commiphora confusa	6.30
13	Lannea alata	11.17
14	Acacia nilotica	14.50
15	Commiphora campestris	29.70
16	Acacia tortilis	9.50
17	Acacia tortilis	16.70
18	Commiphora campestris	29.50
19	Lannea alata	10.50
20	Commiphora campestris	17.50
21	Acacia tortilis	22.97
22	Lannea rivae	6.00
23	Lannea rivae	6.50

Plot T55

Tree Tag Number	Tree Species	Effective DBH
1	Boscia coriacea	16.76
2	Commiphora campestris	6.10
3	Lannea rivae	10.09
4	Commiphora confusa	10.20
5	Lannea rivae	10.42
6	Acacia nilotica	20.34
7	Commiphora campestris	35.90
8	Boswellia neglecta	19.90
9	Acacia hockii	84.96
10	Commiphora campestris	6.70
11	Commiphora campestris	20.04
12	Commiphora campestris	16.40
13	Boscia coriacea	5.40
14	Lannea rivae	6.30
15	Boswellia neglecta	32.11

16	Commiphora confusa	9.20
17	Commiphora confusa	12.45
18	Boswellia neglecta	25.29
19	Boswellia neglecta	29.53
20	Commiphora campestris	29.28
21	Commiphora campestris	27.30
22	Boscia coriacea	6.10
23	Boswellia neglecta	21.54
24	Commiphora confusa	7.10
25	Commiphora campestris	14.40
26	Lannea rivae	9.01
27	Lannea rivae	6.80
28	Commiphora confusa	26.00
29	Commiphora confusa	8.20
30	Commiphora campestris	17.80
31	Commiphora campestris	18.60
32	Commiphora campestris	24.25
33	Commiphora confusa	12.59
34	Commiphora confusa	9.22
35	Commiphora confusa	13.75
36	Commiphora confusa	18.16
37	Commiphora campestris	16.26
38	Acacia hockii	26.76
39	Commiphora confusa	14.09
40	Commiphora confusa	7.00
41	Boswellia neglecta	32.25
42	Commiphora confusa	11.76
43	Commiphora confusa	10.73
44	Boswellia neglecta	23.12
45	Boscia coriacea	11.28
46	Commiphora campestris	13.50
47	Boscia coriacea	17.50
48	Commiphora campestris	24.06
49	Sterculia africana	9.61
50	Commiphora confusa	16.29
51	Commiphora confusa	7.30
52	Acacia nilotica	21.98
53	Sterculia africana	9.70
54	Sterculia africana	13.32
55	Commiphora confusa	9.01
56	Boswellia neglecta	35.04

57	Sterculia africana	9.20
58	Boscia coriacea	10.26
59	Commiphora campestris	13.40
60	Boscia coriacea	22.37

Plot T57

Tree Tag Number	Tree Species	Effective DBH
1	Commiphora campestris	9.40
2	Boswellia neglecta	26.07
3	Commiphora campestris	24.60
4	Lannea alata	9.69
5	Commiphora campestris	29.30
6	Boswellia neglecta	11.51
7	Commiphora confusa	12.73
8	Lannea alata	13.37
9	Lannea alata	11.17
10	Boswellia neglecta	29.47
11	Lannea alata	9.01
12	Lannea alata	6.30
13	Boscia coriacea	9.60
14	Acacia senegal	15.24
15	Lannea alata	12.42
16	Boswellia neglecta	33.15
17	Lannea alata	12.13
18	Lannea alata	9.12
19	Lannea alata	10.26
20	Lannea alata	10.90
21	Lannea alata	9.22
22	Lannea alata	7.00
23	Lannea alata	7.50
24	Commiphora confusa	0.00
25	Commiphora africana	13.80
26	Lannea alata	11.23
27	Commiphora confusa	15.60
28	Commiphora africana	10.80
29	Boswellia neglecta	29.65
30	Commiphora confusa	15.15
31	Lannea alata	7.50
32	Lannea alata	11.68
33	Lannea alata	16.70
34	Lannea alata	7.50

35	Lannea alata	9.64
36	Lannea alata	6.20
37	Lannea alata	6.40
38	Lannea alata	13.58
39	Lannea alata	7.07
40	Lannea alata	5.20
41	Lannea alata	9.28
42	Commiphora confusa	6.80
43	Lannea rivae	7.40
44	Commiphora confusa	5.00
45	Lannea rivae	10.16
46	Commiphora campestris	34.60
47	Commiphora confusa	11.50
48	Commiphora confusa	16.00
49	Lannea alata	9.90
50	Commiphora confusa	7.20
51	Commiphora confusa	6.50
52	Commiphora africana	8.20
53	Cassia abbreviata	43.40
54	Boscia coriacea	18.77
55	Commiphora campestris	27.20
56	Commiphora confusa	7.00
57	Commiphora confusa	5.20
58	Boscia coriacea	6.50
59	Commiphora africana	16.90
60	Commiphora africana	13.20
61	Commiphora campestris	24.70
62	Boswellia neglecta	23.40
63	Commiphora confusa	12.09
64	Commiphora confusa	6.80
65	Commiphora confusa	9.99
66	Lannea alata	8.10
67	Lannea alata	6.90
68	Commiphora campestris	26.62
69	Lannea rivae	5.90
70	Boswellia neglecta	14.86
71	Boswellia neglecta	25.52
72	Boswellia neglecta	18.27
73	Lannea alata	5.60
74	Boscia coriacea	14.40
75	Commiphora campestris	25.90

76	Sterculia africana	7.50
77	Lannea alata	9.22
78	Lannea alata	7.20
79	Lannea alata	5.60
80	Boscia coriacea	9.00
81	Commiphora confusa	14.06
82	Commiphora campestris	23.71

Plot T69

Tree Tag Number	Tree Species	Effective DBH
1	Commiphora campestris	18.03
2	Commiphora campestris	9.86
3	Commiphora confusa	5.30
4	Lannea alata	12.13
5	Boswellia neglecta	33.21
6	Commiphora campestris	22.60
7	Commiphora campestris	5.50
8	Acacia bussei	13.50
9	Boswellia neglecta	37.97
10	Acacia nilotica	21.81
11	Lannea alata	15.69
12	Lannea alata	8.60
13	Commiphora confusa	8.96
14	Acacia tortilis	13.90
15	Commiphora confusa	18.90
16	Cassia abbreviata	46.90
17	Commiphora confusa	5.50
18	Commiphora campestris	14.99
19	Lannea rivae	7.07
20	Boswellia neglecta	33.38
21	Commiphora confusa	6.80
22	Commiphora confusa	6.10
23	Commiphora confusa	14.23
24	Commiphora campestris	28.40
25	Acacia tortilis	18.63
26	Lannea rivae	6.00
27	Lannea rivae	6.00
28	Acacia bussei	26.00
29	Commiphora africana	16.10
30	Commiphora campestris	8.87
31	Acacia bussei	38.29

32	Commiphora campestris	24.98
33	Commiphora campestris	16.20
34	Commiphora confusa	11.24
35	Acacia tortilis	9.30

Plot T71

Tree Tag Number	Tree Species	Effective DBH
1	Lannea rivae	8.70
2	Commiphora confusa	14.36
3	Lannea rivae	5.70
4	Commiphora confusa	8.90
5	Lannea rivae	9.80
6	Boswellia neglecta	17.30
7	Lannea rivae	10.00
8	Lannea rivae	16.35
9	Commiphora confusa	6.90
10	Commiphora campestris	37.00
11	Acacia tortilis	11.40
12	Boswellia neglecta	34.09
13	Acacia nilotica	18.67
14	Commiphora campestris	34.60
15	Commiphora confusa	10.20
16	Commiphora confusa	22.50
17	Commiphora campestris	39.66
18	Commiphora confusa	13.00
19	Commiphora confusa	15.00
20	Commiphora campestris	41.11
21	Acacia tortilis	23.56
22	Commiphora confusa	12.00
23	Boswellia neglecta	24.92
24	Cassia abbreviata	7.10
25	Lannea rivae	5.80
26	Lannea rivae	7.90
27	Commiphora confusa	9.30
28	Commiphora confusa	13.12
29	Lannea rivae	7.10
30	Boswellia neglecta	36.06
31	Acacia tortilis	18.50
32	Acacia tortilis	14.50
33	Boscia coriacea	19.10
34		20.18

35	Boswellia neglecta	21.52
36	Commiphora campestris	16.80
37	Commiphora confusa	7.10
38	Commiphora campestris	26.30
39	Commiphora campestris	26.40
40	Commiphora campestris	21.30
41	Boswellia neglecta	23.69
42	Commiphora campestris	34.11
43	Boswellia neglecta	27.19
44	Boswellia neglecta	12.76
45	Commiphora campestris	44.19
46	Commiphora campestris	15.10
47	Commiphora confusa	5.50
48	Commiphora confusa	7.70
49	Commiphora confusa	6.70

Plot T73R

Tree Tag Number	Tree Species	Effective DBH
1	Acacia bussei	16.34
2	Acacia bussei	23.95
3	Acacia bussei	20.93
4	Acacia bussei	10.00
5	Acacia bussei	12.93
6	Acacia bussei	14.16
7	Acacia senegal	11.19
8	Acacia bussei	9.10
9	Acacia bussei	25.83
10	Acacia bussei	14.33
11	Acacia bussei	23.26
12	Acacia bussei	7.90
13	Acacia bussei	5.20
14	Acacia bussei	14.40
15	Boscia coriacea	10.00
16	Acacia bussei	28.71
17	Acacia bussei	5.00
18	Acacia bussei	31.87
19	Acacia bussei	12.46
20	Acacia bussei	20.79
21	Acacia bussei	21.08
22	Acacia bussei	28.36
23	Boscia coriacea	18.80

24	Cassia abbreviata	19.70
25	Commiphora campestris	29.13
26	Commiphora confusa	5.50
27	Commiphora confusa	5.60
28	Acacia senegal	7.38
29	Acacia senegal	5.10
30	Acacia bussei	26.54
31	Manilkara mochisia	21.45
32	Boscia coriacea	16.30
33	Acacia bussei	30.09
34	Boscia coriacea	11.20
35	Commiphora campestris	33.50
36	Acacia bussei	21.95
37	Acacia bussei	22.12
38	Acacia bussei	35.65
39	Acacia mellifera	14.50
40	Boscia coriacea	19.40
41	Acacia bussei	21.79
42	Acacia senegal	18.00
43	Acacia bussei	27.66
44	Acacia bussei	20.14
45	Boscia coriacea	12.50
46	Acacia bussei	23.67
47	Acacia bussei	22.00
48	Acacia bussei	12.16
49	Acacia bussei	20.03
50	Boscia coriacea	25.90
51	Acacia bussei	15.49
52	Sterculia africana	9.03
53	Boscia coriacea	10.83
54	Boscia coriacea	14.00
55	Boscia coriacea	4.70
56	Acacia bussei	16.10
57	Boscia coriacea	4.70
58	Boscia coriacea	17.75
59	Acacia bussei	15.22
60	Acacia bussei	20.88
61	Acacia bussei	18.90
62	Boscia coriacea	10.50
63	Acacia bussei	9.84
64	Boscia coriacea	15.00

65	Acacia bussei	8.60
66	Acacia bussei	23.99
67	Commiphora campestris	20.60
68	Acacia bussei	22.19
69	Boscia coriacea	14.18

Plot T82

Tree Tag Number	Tree Species	Effective DBH
1	Acacia bussei	14.87
2	Acacia bussei	18.44
3	Commiphora confusa	9.20
4	Commiphora confusa	12.73
5	Commiphora confusa	11.32
6	Commiphora confusa	8.68
7	Acacia nilotica	7.20
8	Commiphora campestris	44.33
9	Commiphora campestris	36.50
10	Acacia tortilis	6.50
11	Commiphora africana	13.78
12	Acacia mellifera	16.49
13	Acacia tortilis	34.40
14	Commiphora campestris	6.26
15	Acacia tortilis	17.34
16	Acacia bussei	44.92
17	Boscia coriacea	13.23
18	Boscia coriacea	6.20
19	Boscia coriacea	10.90
20	Boscia coriacea	6.50
21	Acacia bussei	28.81
22	Commiphora campestris	31.62
23	Boscia coriacea	13.20
24	Acacia bussei	31.64
25	Boscia coriacea	37.08
26	Acacia bussei	27.20
27	Boscia coriacea	12.10
28	Boscia coriacea	7.00
29	Acacia bussei	43.75
30	Acacia mellifera	15.10
31	Acacia etbaica	0.00
32	Acacia bussei	7.21
33	Acacia mellifera	6.40

34	Boscia coriacea	6.50
35	Acacia hockii	7.00

Plot T89

Tree Tag Number	Tree Species	Effective DBH
1	Terminalia prunoides	19.80
2	Commiphora campestris	7.30
3	Terminalia prunoides	21.70
4	Acacia tortilis	8.40
5	Acacia etbaica	15.15

Plot T109

Tree Tag Number	Tree Species	Effective DBH
1	Commiphora africana	20.80
2	Commiphora campestris	8.20
3	Commiphora africana	18.00
4	Commiphora africana	22.70
5	Commiphora campestris	20.08
6	Lannea rivae	9.10
7	Sterculia africana	15.00
8	Commiphora campestris	17.39

Plot T110

Tree Tag Number	Tree Species	Effective DBH
1	Lannea schweinfurthii	12.39
2	Commiphora baluensis	36.00
3	Haplocoelum foliolosum	29.51
4	Commiphora baluensis	29.80
5	Haplocoelum foliolosum	6.10

Plot T112

Tree Tag Number	Tree Species	Effective DBH
1	Euphorbia tirucalli	7.71
2	Euphorbia quinquecostata	31.54
3	Euphorbia tirucalli	14.24

5.5 Height of the ith tree in plot j in stratum k, $h_{i,j,k}$.

The table below lists the tree height for each tree within each plot monitored during this monitoring event (m_2).

Table of tree heights

Plot T05R

Tree Tag Number	Tree Species	Height Tree (m)
1	Commiphora confusa	2
2	Lannea rivae	3
3	Commiphora africana	3
4	Boscia coriacea	5
5	Acacia nilotica	5
6	Commiphora campestris	6
7	Commiphora confusa	2
8	Commiphora campestris	8.5
9	Boscia coriacea	5
10	Commiphora africana	4
11	Boscia coriacea	4
12	Commiphora africana	5
13	Commiphora africana	5
14	Commiphora africana	4
15	Boswellia neglecta	5
16	Sterculia africana	3
17	Commiphora africana	5.5
18	Commiphora confusa	6
19	Commiphora confusa	5
20	Commiphora campestris	5
21	Boscia coriacea	4
22	Commiphora africana	4
23	Commiphora campestris	4
24	Acacia bussei	5
25	Acacia nilotica	4.5
26	Acacia nilotica	4.5
27	Commiphora campestris	8
28	Acacia nilotica	4.5
29	Commiphora campestris	8
30	Acacia nilotica	8
31	Commiphora campestris	10

32	Commiphora campestris	8
33	Acacia nilotica	8
34	Lannea rivae	2
35	Commiphora africana	2
36	Commiphora confusa	3.5

Plot T13R

Tree Tag Number	Tree Species	Height Tree (m)
1	Commiphora confusa	5
2	Commiphora campestris	5.5
3	Commiphora campestris	8
4	Boscia coriacea	3.5
5	Commiphora campestris	7.5
6	Commiphora campestris	7.5
7	Commiphora campestris	8
8	Commiphora campestris	7.5
9	Commiphora campestris	7.5
10	Commiphora campestris	7.5
11	Commiphora campestris	7.5
12	Commiphora campestris	6.5
13	Commiphora campestris	6.5
14	Commiphora campestris	8
15	Commiphora campestris	7.5
16	Commiphora campestris	8
17	Commiphora campestris	7.6
18	Acacia hockii	2.5
19	Commiphora campestris	6.5
20	Commiphora confusa	2.5
21	Commiphora campestris	6
22	Acacia hockii	4
23	Commiphora campestris	5.5
24	Sterculia africana	2.5
25	Commiphora confusa	5
26	Commiphora campestris	7
27	Commiphora campestris	6.5
28	Commiphora campestris	8
29	Commiphora campestris	7.5
30	Boscia coriacea	3
31	Commiphora campestris	6
32	Commiphora campestris	6.5
33	Commiphora campestris	4.5

34	Commiphora campestris	7
35	Commiphora campestris	7
36	Commiphora campestris	5

Plot T19

Tree Tag Number	Tree Species	Height Tree (m)
1	Commiphora baluensis	2.5
2	Lannea alata	2.5
3	Commiphora confusa	3
4	Lannea alata	2.5
5	Commiphora confusa	3
6	Commiphora confusa	2
7	Commiphora confusa	6
8	Commiphora confusa	5
9	Platycelyphium voense	2.5
10	Boswellia neglecta	5
11	Lannea alata	2
12	Lannea alata	2
13	Lannea alata	3
14	Lannea alata	3
15	Lannea alata	2
16	Lannea alata	2
17	Lannea alata	2.5
18	Lannea alata	2
19	Commiphora baluensis	5
20	Platycelyphium voense	6.5
21	Boswellia neglecta	5
22	Boscia coriacea	5
23	Platycelyphium voense	5
24	Boswellia neglecta	5
25	Platycelyphium voense	4
26	Commiphora campestris	5.5
27	Platycelyphium voense	6
28	Commiphora confusa	4
29	Lannea schweinfurthii	4.5
30	Platycelyphium voense	6
31	Boscia coriacea	5
32	Platycelyphium voense	5
33	Boswellia neglecta	6
34	Lannea alata	3
35	Commiphora confusa	4.5

36	Boswellia neglecta	4
37	Commiphora confusa	4.5
38	Lannea alata	3
39	Commiphora confusa	3
40	Lannea alata	3
41	Platycelyphium voense	5.5
42	Commiphora confusa	3.5
43	Commiphora confusa	4
44	Lannea alata	3
45	Lannea alata	3.5
46	Lannea alata	3
47	Lannea alata	3
48	Lannea alata	3
49	Lannea alata	3
50	Lannea alata	3
51	Lannea alata	2
52	Lannea alata	2
53	Lannea alata	2
54	Lannea alata	3
55	Commiphora confusa	4
56	Lannea alata	2
57	Cassia abbreviata	7.5
58	Commiphora confusa	2
59	Lannea alata	3
60	Lannea alata	3
61	Lannea alata	3
62	Lannea alata	3
63	Commiphora confusa	4
64	Lannea alata	2
65	Boswellia neglecta	3

Plot T24R

Tree Tag Number	Tree Species	Height Tree (m)
1	Commiphora campestris	4
2	Commiphora confusa	4
3	Commiphora confusa	3
4	Commiphora confusa	4
5	Commiphora campestris	5
6	Sterculia africana	2
7	Commiphora campestris	5
8	Commiphora confusa	3

9	Commiphora campestris	7.5
10	Boscia coriacea	5
11	Commiphora campestris	8
12	Commiphora campestris	5
13	Commiphora campestris	<1
14	Boswellia neglecta	5
15	Commiphora campestris	7.5
16	Acacia hockii	7.5
17	Acacia nilotica	3
18	Acacia hockii	8
19	Lannea rivae	2.5
20	Acacia hockii	6.5
21	Commiphora campestris	10
22	Acacia hockii	7
23	Boswellia neglecta	6
24	Commiphora campestris	2.5
25	Acacia hockii	6
26	Acacia hockii	7.5
27	Acacia hockii	6.5
28	Acacia hockii	4.5
29	Acacia hockii	6
30	Acacia hockii	6
31	Acacia hockii	6
32	Acacia hockii	6
33	Boscia coriacea	6
34	Acacia hockii	5.5
35	Lannea rivae	3
36	Commiphora campestris	6
37	Acacia nilotica	2.5
38	Commiphora campestris	6
39	Lannea rivae	3
40	Acacia hockii	6.5
41	Commiphora confusa	3
42	Commiphora campestris	3
43	Commiphora confusa	5
44	Acacia nilotica	2
45	Commiphora campestris	5
46	Commiphora campestris	5
47	Commiphora confusa	4
48	Commiphora confusa	5
49	Commiphora confusa	3

50	Boscia coriacea	5
51	Platycelyphium voense	5
52	Commiphora confusa	4
53	Commiphora campestris	5
54	Acacia nilotica	3

Plot T30

Tree Tag Number	Tree Species	Height Tree (m)
1	Commiphora confusa	3.5
2	Commiphora confusa	4
3	Acacia bussei	5
4	Commiphora campestris	10
5	Boswellia neglecta	5
6	Acacia hockii	2.5
7	Acacia bussei	2
8	Cassia abbreviata	3
9	Commiphora confusa	3
10	Commiphora confusa	5
11	Acacia bussei	5.5

Plot T35

Tree Tag Number	Tree Species	Height Tree (m)
1	Acacia zanzibarica	2
2	Acacia hockii	4
3	Acacia tortilis	2.5
4	Acacia tortilis	4
5	Acacia hockii	3
6	Commiphora africana	2
7	Acacia zanzibarica	2.5
8	Acacia tortilis	3

Plot T37

Tree Tag Number	Tree Species	Height Tree (m)
1	Acacia tortilis	5
2	Lannea alata	2
3	Commiphora campestris	7
4	Lannea alata	4
5	Boscia coriacea	7
6	Lannea alata	3

7	Lannea alata	4
8	Lannea alata	4
9	Lannea alata	3.5
10	Lannea alata	3.5
11	Lannea alata	5
12	Commiphora confusa	5
13	Acacia nilotica	3
14	Boscia coriacea	3
15	Commiphora africana	7
16	Commiphora confusa	6
17	Commiphora campestris	6
18	Commiphora confusa	3
19	Lannea rivae	3
20	Commiphora confusa	1.5
21	Commiphora confusa	6
22	Lannea rivae	4
23	Lannea rivae	4
24	Lannea alata	4
25	Commiphora confusa	1.5
26	Acacia nilotica	5
27	Commiphora confusa	6
28	Acacia nilotica	2
29	Commiphora confusa	4
30	Acacia nilotica	7
31	Commiphora confusa	4
32	Lannea rivae	2
33	Acacia nilotica	4
34	Acacia tortilis	2
35	Commiphora confusa	4
36	Commiphora confusa	3
37	Commiphora confusa	2
38	Lannea alata	3.5
39	Commiphora confusa	5
40	Commiphora confusa	5
41	Acacia nilotica	2

Plot T43

Tree Tag Number	Tree Species	Height Tree (m)
1	Commiphora confusa	3
2	Commiphora campestris	7
3	Lannea alata	6

4	Commiphora confusa	6
5	Commiphora confusa	5
6	Commiphora campestris	6
7	Lannea alata	6
8	Boswellia neglecta	7.5
9	Commiphora confusa	7
10	Commiphora confusa	5
11	Acacia hockii	3
12	Acacia hockii	4
13	Acacia hockii	1
14	Commiphora confusa	3
15	Lannea alata	4
16	Boswellia neglecta	4.5
17	Commiphora confusa	4
18	Commiphora confusa	7
19	Boswellia neglecta	5
20	Boswellia neglecta	6
21	Commiphora confusa	6
22	Commiphora campestris	12
23	Commiphora campestris	8
24	Boswellia neglecta	6.5
25	Boswellia neglecta	8
26	Commiphora campestris	7
27	Commiphora campestris	7
28	Commiphora confusa	6.5
29	Commiphora campestris	7.5
30	Commiphora confusa	4.5
31	Commiphora campestris	7
32	Boscia coriacea	4
33	Boswellia neglecta	7
34	Commiphora confusa	
35	Commiphora campestris	5
36	Commiphora confusa	7
37	Commiphora campestris	9
38	Commiphora campestris	6.5
39	Boswellia neglecta	5
40	Boswellia neglecta	5
41	Maerua angolensis	2
42	Commiphora campestris	6.5
43	Boswellia neglecta	4.5
44	Commiphora confusa	7

45	Commiphora confusa	7
46	Boswellia neglecta	7.5
47	Boswellia neglecta	7.5

Plot T44

Tree Tag Number	Tree Species	Height Tree (m)
1	Commiphora campestris	5
2	Acacia hockii	4
3	Commiphora campestris	5
4	Boswellia neglecta	5
5	Commiphora confusa	5
6	Lannea alata	4
7	Boswellia neglecta	5
8	Lannea alata	4
9	Commiphora confusa	6
10	Commiphora confusa	6
11	Boswellia neglecta	4.5
12	Commiphora confusa	6
13	Boswellia neglecta	6
14	Commiphora confusa	6
15	Boswellia neglecta	6
16	Commiphora confusa	5
17	Boswellia neglecta	6
18	Boswellia neglecta	5
19	Acacia tortilis	4.5
20	Boswellia neglecta	5
21	Commiphora campestris	5
22	Boswellia neglecta	4
23	Lannea alata	3
24	Boswellia neglecta	7
25	Lannea alata	4
26	Commiphora campestris	4
27	Acacia nilotica	4
28	Lannea alata	3
29	Boswellia neglecta	5
30	Commiphora campestris	7
31	Commiphora confusa	4
32	Acacia senegal	4
33	Boswellia neglecta	7
34	Boswellia neglecta	6
35	Commiphora confusa	3.5

36	Commiphora confusa	4
37	Lannea alata	5
38	Lannea alata	3
39	Commiphora confusa	3
40	Boswellia neglecta	5
41	Lannea alata	4
42	Boswellia neglecta	5
43	Commiphora confusa	7
44	Acacia nilotica	6
45	Commiphora confusa	5
46	Commiphora confusa	3.5
47	Commiphora confusa	2.5
48	Commiphora campestris	6
49	Commiphora confusa	5
50	Commiphora confusa	4
51	Acacia tortilis	4

Plot T45

Tree Tag Number	Tree Species	Height Tree (m)
1	Commiphora confusa	2
2	Acacia hockii	3
3	Terminalia spinosa	3
4	Acacia hockii	3.5
5	Acacia zanzibarica	2
6	Balanites aegyptiaca	3
7	Balanites aegyptiaca	2
8	Acacia tortilis	2
9	Acacia nilotica	2
10	Acacia nilotica	2
11	Acacia nilotica	2.5

Plot T52

Tree Tag Number	Tree Species	Height Tree (m)
1	Commiphora campestris	8
2	Commiphora campestris	8
3	Commiphora campestris	7.5
4	Commiphora campestris	7.5
5	Commiphora confusa	5.6
6	Commiphora campestris	6
7	Acacia tortilis	8

8	Commiphora confusa	6.5
9	Commiphora campestris	7
10	Acacia tortilis	3.5
11	Acacia tortilis	7
12	Commiphora confusa	6
13	Lannea alata	7
14	Acacia nilotica	5
15	Commiphora campestris	7
16	Acacia tortilis	4
17	Acacia tortilis	7
18	Commiphora campestris	9
19	Lannea alata	4
20	Commiphora campestris	4
21	Acacia tortilis	7
22	Lannea rivae	4
23	Lannea rivae	4

Plot T55

Tree Tag Number	Tree Species	Height Tree (m)
1	Boscia coriacea	3.5
2	Commiphora campestris	3.5
3	Lannea rivae	3
4	Commiphora confusa	4.5
5	Lannea rivae	3
6	Acacia nilotica	5
7	Commiphora campestris	6
8	Boswellia neglecta	5
9	Acacia hockii	6
10	Commiphora campestris	3
11	Commiphora campestris	5
12	Commiphora campestris	5
13	Boscia coriacea	2.5
14	Lannea rivae	3
15	Boswellia neglecta	6
16	Commiphora confusa	4
17	Commiphora confusa	4
18	Boswellia neglecta	4
19	Boswellia neglecta	5
20	Commiphora campestris	5
21	Commiphora campestris	5
22	Boscia coriacea	3

23	Boswellia neglecta	4
24	Commiphora confusa	4
25	Commiphora campestris	5
26	Lannea rivae	3
27	Lannea rivae	2
28	Commiphora confusa	6
29	Commiphora confusa	5
30	Commiphora campestris	5.5
31	Commiphora campestris	6
32	Commiphora campestris	4
33	Commiphora confusa	4
34	Commiphora confusa	4
35	Commiphora confusa	6
36	Commiphora confusa	5.5
37	Commiphora campestris	5
38	Acacia hockii	6.5
39	Commiphora confusa	4
40	Commiphora confusa	3.5
41	Boswellia neglecta	5
42	Commiphora confusa	4
43	Commiphora confusa	3
44	Boswellia neglecta	5
45	Boscia coriacea	3
46	Commiphora campestris	5
47	Boscia coriacea	3.5
48	Commiphora campestris	5
49	Sterculia africana	3.5
50	Commiphora confusa	5
51	Commiphora confusa	3
52	Acacia nilotica	5.5
53	Sterculia africana	2
54	Sterculia africana	3
55	Commiphora confusa	3.5
56	Boswellia neglecta	5
57	Sterculia africana	2
58	Boscia coriacea	2.5
59	Commiphora campestris	5.5
60	Boscia coriacea	4

Plot T57

Tree Tag Number	Tree Species	Height Tree (m)

1	Commiphora campestris	5
2	Boswellia neglecta	5
3	Commiphora campestris	6
4	Lannea alata	3.5
5	Commiphora campestris	6
6	Boswellia neglecta	3.5
7	Commiphora confusa	3.5
8	Lannea alata	3
9	Lannea alata	3
10	Boswellia neglecta	5.5
11	Lannea alata	3
12	Lannea alata	3
13	Boscia coriacea	3
14	Acacia senegal	5
15	Lannea alata	3.5
16	Boswellia neglecta	5
17	Lannea alata	3
18	Lannea alata	3
19	Lannea alata	3
20	Lannea alata	3.5
21	Lannea alata	3
22	Lannea alata	3
23	Lannea alata	3
24	Commiphora confusa	4
25	Commiphora africana	5
26	Lannea alata	3
27	Commiphora confusa	5.5
28	Commiphora africana	3
29	Boswellia neglecta	5
30	Commiphora confusa	4
31	Lannea alata	3
32	Lannea alata	4
33	Lannea alata	3.5
34	Lannea alata	3
35	Lannea alata	3.5
36	Lannea alata	3
37	Lannea alata	3
38	Lannea alata	4
39	Lannea alata	2.5
40	Lannea alata	2.5
41	Lannea alata	4

42	Commiphora confusa	3.5
43	Lannea rivae	3
44	Commiphora confusa	3
45	Lannea rivae	4
46	Commiphora campestris	7
47	Commiphora confusa	6
48	Commiphora confusa	6
49	Lannea alata	3.5
50	Commiphora confusa	4
51	Commiphora confusa	3.5
52	Commiphora africana	3.5
53	Cassia abbreviata	10
54	Boscia coriacea	3.5
55	Commiphora campestris	7.5
56	Commiphora confusa	3
57	Commiphora confusa	3.5
58	Boscia coriacea	3
59	Commiphora africana	5.5
60	Commiphora africana	5
61	Commiphora campestris	5
62	Boswellia neglecta	4
63	Commiphora confusa	5
64	Commiphora confusa	2
65	Commiphora confusa	4
66	Lannea alata	4
67	Lannea alata	3
68	Commiphora campestris	4
69	Lannea rivae	3
70	Boswellia neglecta	5.5
71	Boswellia neglecta	6
72	Boswellia neglecta	5
73	Lannea alata	3
74	Boscia coriacea	5
75	Commiphora campestris	6
76	Sterculia africana	3
77	Lannea alata	4
78	Lannea alata	3.5
79	Lannea alata	3
80	Boscia coriacea	3
81	Commiphora confusa	6
82	Commiphora campestris	6

Plot T69

Tree Tag Number	Tree Species	Height Tree (m)
1	Commiphora campestris	5
2	Commiphora campestris	4
3	Commiphora confusa	3
4	Lannea alata	3.5
5	Boswellia neglecta	5
6	Commiphora campestris	4.5
7	Commiphora campestris	3.5
8	Acacia bussei	5.5
9	Boswellia neglecta	6
10	Acacia nilotica	6
11	Lannea alata	4
12	Lannea alata	3
13	Commiphora confusa	3
14	Acacia tortilis	6
15	Commiphora confusa	5
16	Cassia abbreviata	7
17	Commiphora confusa	3
18	Commiphora campestris	5
19	Lannea rivae	2
20	Boswellia neglecta	5
21	Commiphora confusa	3
22	Commiphora confusa	2
23	Commiphora confusa	4
24	Commiphora campestris	5
25	Acacia tortilis	4.5
26	Lannea rivae	2
27	Lannea rivae	2
28	Acacia bussei	1
29	Commiphora africana	4.5
30	Commiphora campestris	2
31	Acacia bussei	7
32	Commiphora campestris	4
33	Commiphora campestris	3.5
34	Commiphora confusa	4
35	Acacia tortilis	5

Plot T71

Tree Tag Number	Tree Species	Height Tree

		(m)
1	Lannea rivae	2
2	Commiphora confusa	5
3	Lannea rivae	3
4	Commiphora confusa	4
5	Lannea rivae	3
6	Boswellia neglecta	4
7	Lannea rivae	4
8	Lannea rivae	3.5
9	Commiphora confusa	3
10	Commiphora campestris	6
11	Acacia tortilis	5
12	Boswellia neglecta	6
13	Acacia nilotica	5
14	Commiphora campestris	7
15	Commiphora confusa	5
16	Commiphora confusa	6
17	Commiphora campestris	6.5
18	Commiphora confusa	4
19	Commiphora confusa	5
20	Commiphora campestris	6
21	Acacia tortilis	5
22	Commiphora confusa	3
23	Boswellia neglecta	5.5
24	Cassia abbreviata	2.5
25	Lannea rivae	2
26	Lannea rivae	4
27	Commiphora confusa	4
28	Commiphora confusa	5
29	Lannea rivae	4
30	Boswellia neglecta	5.5
31	Acacia tortilis	5
32	Acacia tortilis	5
33	Boscia coriacea	5
34		4.5
35	Boswellia neglecta	4
36	Commiphora campestris	4
37	Commiphora confusa	3.5
38	Commiphora campestris	6
39	Commiphora campestris	7.5

40	Commiphora campestris	5
41	Boswellia neglecta	5
42	Commiphora campestris	5.5
43	Boswellia neglecta	4
44	Boswellia neglecta	4
45	Commiphora campestris	5
46	Commiphora campestris	4
47	Commiphora confusa	2
48	Commiphora confusa	2
49	Commiphora confusa	4

Plot T73R

Tree Tag Number	Tree Species	Height Tree (m)
1	Acacia bussei	5.5
2	Acacia bussei	8
3	Acacia bussei	7
4	Acacia bussei	6
5	Acacia bussei	6
6	Acacia bussei	7
7	Acacia senegal	4
8	Acacia bussei	4
9	Acacia bussei	8
10	Acacia bussei	8
11	Acacia bussei	8
12	Acacia bussei	6
13	Acacia bussei	4
14	Acacia bussei	10
15	Boscia coriacea	4
16	Acacia bussei	10
17	Acacia bussei	4
18	Acacia bussei	10
19	Acacia bussei	7
20	Acacia bussei	6
21	Acacia bussei	7
22	Acacia bussei	7
23	Boscia coriacea	6
24	Cassia abbreviata	7
25	Commiphora campestris	4
26	Commiphora confusa	3
27	Commiphora confusa	2
28	Acacia senegal	3.5

29	Acacia senegal	3.5
30	Acacia bussei	8
31	Manilkara mochisia	4
32	Boscia coriacea	7
33	Acacia bussei	8
34	Boscia coriacea	4
35	Commiphora campestris	10
36	Acacia bussei	8
37	Acacia bussei	7
38	Acacia bussei	7
39	Acacia mellifera	7
40	Boscia coriacea	4
41	Acacia bussei	7
42	Acacia senegal	4
43	Acacia bussei	8
44	Acacia bussei	4
45	Boscia coriacea	4
46	Acacia bussei	8
47	Acacia bussei	8
48	Acacia bussei	7
49	Acacia bussei	7
50	Boscia coriacea	6
51	Acacia bussei	7
52	Sterculia africana	1
53	Boscia coriacea	3
54	Boscia coriacea	3
55	Boscia coriacea	2.5
56	Acacia bussei	5
57	Boscia coriacea	3
58	Boscia coriacea	4
59	Acacia bussei	6
60	Acacia bussei	6
61	Acacia bussei	6
62	Boscia coriacea	4
63	Acacia bussei	6
64	Boscia coriacea	6
65	Acacia bussei	4
66	Acacia bussei	7
67	Commiphora campestris	5
68	Acacia bussei	6
69	Boscia coriacea	4

Plot T82

Tree Tag Number	Tree Species	Height Tree (m)
1	Acacia bussei	5
2	Acacia bussei	4
3	Commiphora confusa	4
4	Commiphora confusa	4
5	Commiphora confusa	4
6	Commiphora confusa	3
7	Acacia nilotica	4
8	Commiphora campestris	8
9	Commiphora campestris	8
10	Acacia tortilis	2.5
11	Commiphora africana	4
12	Acacia mellifera	4.5
13	Acacia tortilis	8
14	Commiphora campestris	2
15	Acacia tortilis	4
16	Acacia bussei	8.5
17	Boscia coriacea	4.5
18	Boscia coriacea	3
19	Boscia coriacea	5
20	Boscia coriacea	3
21	Acacia bussei	7
22	Commiphora campestris	6
23	Boscia coriacea	5
24	Acacia bussei	6.5
25	Boscia coriacea	4
26	Acacia bussei	7
27	Boscia coriacea	5
28	Boscia coriacea	4
29	Acacia bussei	8
30	Acacia mellifera	5
31	Acacia etbaica	5
32	Acacia bussei	2
33	Acacia mellifera	2
34	Boscia coriacea	2
35	Acacia hockii	2.5

Plot T89

Tree Tag Number	Tree Species	Height Tree

		(m)
1	Terminalia prunoides	7
2	Commiphora campestris	4
3	Terminalia prunoides	8
4	Acacia tortilis	5
5	Acacia etbaica	5

Plot T109

Tree Tag Number	Tree Species	Height Tree (m)
1	Commiphora africana	2.5
2	Commiphora campestris	3
3	Commiphora africana	5
4	Commiphora africana	2
5	Commiphora campestris	6
6	Lannea rivae	4
7	Sterculia africana	5
8	Commiphora campestris	5

Plot T110

Tree Tag Number	Tree Species	Height Tree (m)
1	Lannea schweinfurthii	5
2	Commiphora baluensis	10
3	Haplocoelum foliolosum	5
4	Commiphora baluensis	12
5	Haplocoelum foliolosum	3

Plot T112

Tree Tag Number	Tree Species	Height Tree (m)
1	Euphorbia tirucalli	4
2	Euphorbia quinquecostata	6
3	Euphorbia tirucalli	7

5.6 Degradation proportion observation taken in each leakage plot i^{th} sample point at monitoring period m, $o_i^{[m]}$.

Plot	X Coord	Y Coord	Degradation % Nov, 2011 (m_2)	Factor 2011
L01	462291	9566407	61-80	0.8
L02	459731	9572807	81-100	1
L03	458451	9583047	61-80	0.8

L04	464851	9584327	41-60	0.6
L05	405971	9589447	61-80	0.8
L06	407251	9589447	81-100	1
L07	404691	9590727	0-20	0
L08	405971	9592007	41-60	0.6
L09	404691	9594567	61-80	0.8
L10	472531	9602247	0-20	0
L11	457171	9603527	81-100	1
L12	472531	9603527	0-20	0
L13	486860	9593066	0-20	0
L14	482454	9592770	21-40	0.4
L15	485034	9591787	0-20	0
L16	461011	9611207	81-100	1
L17	448211	9612487	81-100	1
L18	479345	9595139	61-80	0.8
L19	457171	9618887	41-60	0.6
L20	443091	9640647	41-60	0.6
L21	441811	9648327	0-20	0
L22	481307	9593867	21-40	0.4
L23	481599	9594813	41-60	0.6
L24	484345	9592969	0-20	0
L25	484232	9593634	0-20	0
L26	487580	9593522	0-20	0
L27	486771	9594065	0-20	0
L28	448402	9613947	81-100	1
L29	446810	9609307	81-100	1
L30	446012	9612380	61-80	0.8
L31	449457	9613888	61-80	0.8
L32	470359	9573125	81-100	1
L33	471131	9572882	innaccessible	n/a
L34	465491	9583962	21-40	0.4
L35	465407	9584618	21-40	0.4
L36	464822	9585007	41-60	0.6
L37	470990	9573694	81-100	1
L38	470381	9573910	61-80	0.8
Mean:				**0.5568**

This table represents the individual assessments of degradation for each leakage plot evaluated during this monitoring event (m_2). Additionally, the mean value for degradation, $\bar{o}^{[m]}$, is listed at the bottom of the table. Additional details concerning the leakage model can be found in the leakage model, 'Leakage_Model_Expanded_fixed_PhaseI.xls', which has been provided to the auditor.

5.7 Accompanying Files

Biomass Carbon Stock databases and Carbon Calculations:
Rukinga Carbon_M=2_Complete V2.13.xlsm

Calculation of NERs:
Rukinga Carbon_M=2_Complete V2.13.xlsm

Error Analysis:
Rukinga Carbon_M=2_Complete V2.13.xlsm

Cumulative Leakage Model:
Leakage_Model_Expanded_fixed_PhaseI.xls

Soil Carbon Sotck database, Carbon Calculations and Error Analysis:
Rukinga Deep 1m Soil Analysis - RA V2.1.xls

Standard Operating Procedures:
(Standard Operating Procedure - Biomass) Standard Operating Procedure - Forest Inventory Plots v2.4_2012-01-18.doc
(Standard Operating Procedure - Soils) Standard Operating Procedure Soils.doc
(Standard Operating Procedure – Leakage) Standard Operating Procedure Leakage.doc

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