CHYULU HILLS REDD+ PROJECT MONITORING & IMPLEMENTATION REPORT

Document Prepared By:

Project Title	Chyulu Hills REDD+ Project
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History of CCB Status	This Project was validated under the 2nd edition of the CCB Standard with the Validation Statement being issued 18 June 2015. This is the first verification for the Project.
CCB Benefits Summary	The CHRP aims to generate benefits in the areas of climate, community and biodiversity under both the Verified Carbon Standard (VCS) and Climate, Community and Biodiversity (CCB) standards. During the monitoring period covered by this report the Project prevented the emission of 2,033,002 t CO2e by stopping deforestation, forest degradation and grassland conversion. This was achieved largely by enhancing and strengthening landscape protection, employing forest rangers, bolstering employee motivation, creating alternative income sources, jobs and employment opportunities, and supporting stricter environmental law enforcement across the landscape. Community members and project stakeholders were consulted during this period to determine the Project's expected benefits, costs and risks to them, and to identify the indicators to be used to measure these impacts. Initial efforts were additionally made at assessing the biodiversity present within the Project Area, and to establish coordinated monitoring efforts across the entire Project Area. This is the first monitoring period for the Project and therefore many of the Project Activities that will provide community and biodiversity benefits are in their initial stages of implementation or still in the planning stages. Further detail on the community and biodiversity benefits generated by the Project to date can be found in sections 2.2 and 5.3.1 of this report.
Gold Level Criteria	The Chyulu Hills REDD+ Project qualifies for Gold Level certification because of the exceptional benefits it will provide to the Climate, Community and Biodiversity aspects of the Project Area and Project Zone. Climate benefits include project activities to improve and diversify agricultural practices, mitigating the effects of the prolonged and more intense droughts due to climate change. Additionally, local institutional capacity building and the protection of the natural ecosystem will provide resilience in the community and natural systems to adapt to the effects of

	climate change. As Kenya is classified as a low human development country by the UNDP, and experiences a high degree of poverty, inequality and population growth, the Project will provide community benefits in the form of revenue sharing, alternative livelihood development, jobs, sustainable infrastructure development, environmental awareness and support for the improvement of community social services, particularly health and education. The Project will utilize a revenue sharing mechanism that ensures that revenue sharing is done through an open and transparent process that engages broad community input with all groups being treated with equality, regardless of social or economic standing. Additionally, Project benefits are designed to fight the root sources of poverty, providing new opportunities to local communities. Biodiversity benefits include protection and conservation of the many IUCN Red listed species within the Project Zone, including the Eastern Black Rhino, which is listed as an IUCN critically endangered species. The Project has undertaken a number of measures to protect the habitats of these spectacular, yet endangered species and is committed to increasing their populations.

ACKNOWLEDGEMENTS

The Chyulu Hills REDD+ Project has been developed through a highly effective collaborative process between communities, landowners, public agencies, NGOs and private sector partners. The partner organizations bring their strong commitment to conserving the Chyulu Hills ecosystem together with an impressive range of skills and knowledge that are needed to develop and implement a successful and multi-faceted conservation project that integrates protection of an iconic ecosystem with supporting the economic and social well-being of local communities. It is therefore important to acknowledge the organizations and individuals for their distinct contributions.

Firstly, we acknowledge the group of landholders who are traditional and long-term stewards of the Chyulu ecosystem. These include the Maasai leaders and people of the communally-owned group ranches (Kuku, Kuku A, Rombo and Mbirikani) and the two community led non-profit organizations, Maasai Wilderness Conservation Trust (MWCT) and Big Life Foundation that support them in protecting their land and improving the lives of their communities. Kenya Wildlife Service (KWS) and Kenya Forest Service (KFS) hold and manage land in the Chyulu Hills landscape in trust for the benefit and enjoyment of the people of Kenya. We thank their respective Directors, headquarters staff, wardens, and field rangers. Finally, we thank the David Sheldrick Wildlife Trust (DSWT) for their support in managing the Kibwezi Forest Reserve on behalf of KFS.

During the last two years we would particularly like to acknowledge the following for their support and guidance for the Project. From KWS, Dr. Samuel Kasiki, Julius Kimani, Kenneth Ochieng, Rose Malenya, and Doreen Mutung'a. Within KFS, Alfred Gichu has strongly supported the work and its linkage to Kenya's National REDD+ program and Esther Keige has provided important legal counsel. From MWCT, the leadership and input from Samson Parashina, Luca Belpietro, Chris Tuite; Richard Bonham, Craig Millar, Daniel Ole Sambu, and Jeremy Goss from the Big Life Foundation; and Neville Sheldrick and James Mbuthia from the David Sheldrick Wildlife Trust (DSWT) have been essential to the success of the development of the Project

On the ground, CHRP would not have come about without the dedicated work of staff from the partner organizations who have supported the extensive community engagement process, dedicating many hours to community meetings and discussions with community members. Thank you to Rose Malenya and Alfred Masila (KWS), Daniel Ole Sambu and Anthony Kasanga (BLF), and Timothy Lenayain and Charity Lanoy (MWCT). A special thanks to Laurian Lenjo and Joseph Mwakima from Wildlife Works (WW) who provided guidance and assistance in the community and stakeholder engagement process across the entire landscape. Much praise is due to the teams who spent hundreds of hours in rugged field conditions to obtain soil samples. This includes Mwololo Muasa as plot sampling leader, Joshua Kitiro, Mattias Kakoi and Cyprian Mwawasi as team leaders and all of their respective team members hired from the communities throughout the Project Zone.

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A sincere thank you to Conservation International (CI) and their staff who provided a critical facilitative role, financial support and important technical guidance, particularly Christina Ender, Jaco Venter, Natasha Calderwood and Agustin Silvani. We would also like to thank the Critical Ecosystem Partnership Fund (CEPF) for a grant to support the achievement of verification. The Critical Ecosystem Partnership Fund is a joint initiative of l'Agence Française de Développement, Conservation International, the European Union, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank. A fundamental goal is to ensure civil society is engaged in biodiversity conservation.

Final acknowledgements go to Wildlife Works' managers and staff who have provided technical support and guidance to the Project and leadership to support the verification process. Simon Bird has led and coordinated the team, supported by Mike Korchinsky, Jeremy Freund, Cathy Zambrano, Sharifa Abdi, Mwangi Githiru, Yuni Nunokawa, Rob Dodson and Cara Braund.

ACRONYMS

ACoGS	Avoided Conversion of Grasslands and Shrublands
AFOLU	Agriculture, Forestry and Other Land Use
APD	Avoided Planned Deforestation
APC	Avoided Planned Conversion
AUC	Avoided Unplanned Conversion
AUDD	Avoided Unplanned Deforestation and/or Degradation
AWF	African Wildlife Foundation
BEM	Biomass Emission Model
CCB	Climate, Community and Biodiversity
CEPF	Critical Ecosystem Protection Fund
CHRP	Chyulu Hills REDD+ Project
CI	Conservation International
DNA	Designated National Authority
DSWT	David Sheldrick Wildlife Trust
ER	Emissions Reductions
FAO	Food and Agricultural Organization
FCPF	Forest Carbon Partnership Facility
FPIC	Free, Prior and Informed Consent
GHG	Greenhouse Gas
GIS	Geographic Information System
GOK	Government of Kenya
GR	Group Ranch
HCV	High Conservation Value
IBA	Important Bird Area
KARI	Kenya Agricultural Research Institute
KBA	Key Biodiversity Area
KFS	Kenya Forest Service

KWS	Kenya Wildlife Service
KWTA	Kenya Water Tower Agency
MRR	Monitoring Report Requirements of the VM0009 VCS methodology
MRV	Measuring, Reporting and Verification
MWCT	Maasai Wilderness Conservation Trust
NGO	Non-Governmental Organization
NPA	Natural Protected Area
NTFP	Non-Timber Forest Products
PAA	Project Accounting Area
PD	Verified Carbon Standard and Climate, Community and Biodiversity Project Description document
REDD	Reducing Emissions from Deforestation and forest Degradation
REDD+	Reducing Emissions from Deforestation and forest Degradation, plus Conservation, Sustainable management of forests, and enhancement of forest carbon stocks
R-PP	Readiness Preparation Proposal
SCE	Southern Chyulu Extension
TWNP	Tsavo West National Park
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
WWC	Wildlife Works Carbon

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1 GENERAL

1.1 Summary Description of the Project (G3.1.)

The Chyulu Hills REDD+ Project (CHRP) is a multi-partner initiative designed to promote climate change mitigation and adaptation, restore biodiversity and create alternative livelihoods under the United Nations scheme of Reducing Emissions from Deforestation and forest Degradation (REDD+). It is located in the Tsavo-Amboseli ecosystem in Southeastern Kenya and stretches over an area of 410,533.84 ha. Its main geographic feature is the volcanic Chyulu Hills mountain range, from which the project derives its name.

The Project Area comprises a great diversity of ecotopes, ranging from afro-montane cloud forests to grassland savannah. It is located between Tsavo (East and West national parks), Kenya's largest protected area, and Amboseli National Park, creating an important corridor within this Tsavo-Amboseli ecosystem. The area is rich in biodiversity, including Kenya's largest population of the increasingly threatened African Elephant (*Loxodonta africana*) and the critically endangered Black Rhino (*Diceros bicornis*).

The communities in the Chyulu Hills landscape are socially, economically and culturally diverse. The western side was traditionally inhabited by the Maasai, a pastoralist tribe with various groups or clans occupying a large area stretching along and adjacent to the Rift Valley throughout Kenya and northern Tanzania. The Maasai have a very strong sense of their tribal identity and traditional pastoralist way of life. Within the Project Area, many members of the Maasai community are still engaged in pastoralism though increasingly they are becoming more sedentary and engaging in a wider range of economic activities. The Maasai have traditionally lived in proximity to wildlife populations. On the eastern side of the Chyulu Hills the ethnic mix is much more complex and recent. Both the main road and the railway that links Mombasa and the capital city, Nairobi, are close to the eastern border of the project. The traditional tribe in the area is the Kamba but major influxes of people from all over Kenya have settled in the area. The road has resulted in the development of several towns, including Kibwezi in the north and Mtito Andei in the south, close to the border of the project, and the development of many shops and businesses serving the heavy traffic along the road. Outside the towns, the area is mainly comprised of small-scale subsistence agriculture with almost all the natural habitat having been cleared.

The Chyulu Hills also present a locally and regionally important water tower or catchment, which is a vital water source for much of the surrounding landscape, as well as supplying the coastal city of Mombasa.

The Chyulu Hills landscape and particularly the forest resources face a number of threats. Due to the rapid population growth in Kenya, with the national population having grown from about 15 million to 40 million people over the last 40 years, there is tremendous pressure on land. Much of this results in land-use change, and the conversion is due to unplanned agricultural expansion, settlement, and unsustainable extractive practices such as charcoal burning and the harvesting of trees for use as timber and for wood carvings. A major goal of the CHRP is therefore is to maintain the ecological health of this vitally important ecosystem by providing economically viable and sustainable alternatives to its destruction.

The CHRP aims to generate benefits in the areas of climate, community and biodiversity under both the Verified Carbon Standard (VCS) and the Climate, Community and Biodiversity (CCB) standards. Its specific climate related goals are to prevent the emission of 18,271,217 t CO_2e over the Project's 30-year crediting period by stopping deforestation, forest degradation and grassland conversion.

This will be achieved through a range of conservation activities that includes direct protection and law enforcement by the effective deployment of rangers, improved infrastructure (communications, vehicles, equipment), ecological research and monitoring, and livestock predator-loss compensation programs. The CHRP will also create and expand alternative income and employment opportunities for local communities. Furthermore, the Project aims to improve the management of livestock and restore degraded forest and grassland areas, which will increase the quantity of sequestered carbon from woody biomass and soil.

This report covers the first monitoring period for the CHRP. The monitoring period begins at the project start date of 19 September 2013 and ends at 31 December 2016. During this period the project prevented the emission of 2,033,002 t CO_2e by stopping deforestation and forest degradation in the Project Area. The CHRP initiated the implementation of the Project Activities, including the hiring of new forest rangers, new communications equipment and efforts to better coordinate forest ranger activities. The Project additionally implemented new programs to reduce over grazing and improve agricultural methods. Biodiversity monitoring activities have been planned to better coordinate across the Project Area, and to provide additional protection from poaching.

The Project has also generated substantial community and biodiversity co-benefits. New and sustainable livelihood opportunities, such as direct employment, alternative income generating activities (IGAs) and initiatives to stimulate investment in businesses will be designed to reduce pressure on the environment while significantly increasing community well-being. Additional programs will address food security, improve health and education facilities, as well as raise environmental awareness. Biodiversity co-benefits will be achieved through greater protection of the ecosystem predominantly by means of increased security, improved monitoring and bolstering wildlife-compensation schemes.

1.2 Project Location (G1.1-3. & G3.3.)

1.2.1 Project Area Location and Basic Physical and Social Parameters (G1.1. & G1.2.)

The CHRP is located in Southeastern Kenya. The Project Area extends over three counties: Makueni County in the north and the east, Taita Taveta County in the south and Kajiado County in the west. The total Project Area consists of seven land units covering 410,533.84 ha, while the Project Accounting Area covers a total of 374,677.64 ha. Its main geographical feature is the Chyulu Hills, a volcanic mountain range, about 150 km southeast of the Kenya Rift (Ritter & Kaspar, 1997), from which the Project's name is derived. The Project Area is located ~150 km south of the Kenyan capital city of Nairobi and can be easily accessed by road via the Nairobi-Mombasa Highway on the east as well as the Emali-Oloitokitok road on the west. Oloitokitok[1] (2.91° S, 37.52° E) on the west, Emali (2.09° S, 37.47° E) on the north and Mtito Andei (2.72° S, 38.20° E) on the east are the major towns directly adjacent to the Project Area.

[1] Oloitokitok is also referred to as Loitokitok.

Table 1. The land units in Project Area and their respective Kenyan counties.

County	Land unit
Kajiado	Mbirikani Group Ranch
	Kuku Group Ranch
	Kuku A Group Ranch
	Rombo Group Ranch
Makueni	Chyulu Hills National Park
	Kibwezi Forest
Taita-Taveta	Tsavo West National Park

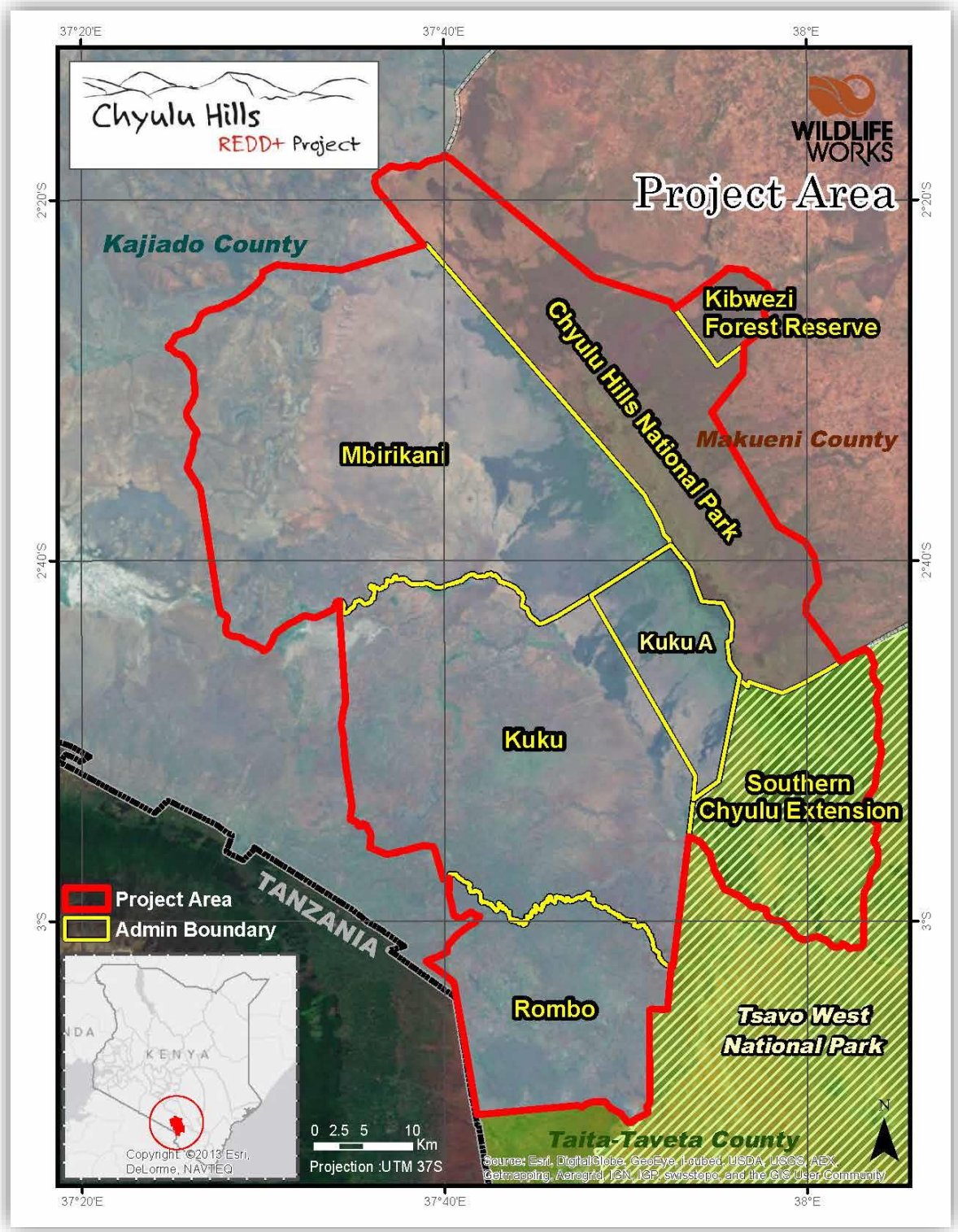


Figure 1: Chyulu Hills Project Area land units.

Maps containing the VM0009 methodology Monitoring Report requirements (MRR) listed below are provided in the following appendices to this document. Appendix A – Map of the Project Area, Appendix B – Map of Topography (DEM based), Appendix B – Map of Roads and Infrastructure, as well as major rivers and streams, and Appendix B – Map of Land use/Vegetation Cover.

The geographic or physical boundaries of the project area must be clearly delineated using, at minimum, the following:

- Name of the project area (compartment or allotment number, local name)
- Digital maps of the area, including geographic coordinates of vertices
- Total land area
- Details of ownership, including user rights and/or land tenure information
- Topography
- Roads
- Major rivers and perennial streams
- Land use/vegetation type classification

MRR.1 A digital (GIS-based) map of the project area with at least the above minimum requirements for delineation of the geographic boundaries.

MRR.6 A digital (GIS-based) map of the project accounting areas with at least the above minimum requirements for delineation of the geographic boundaries.

1.2.1.1 Physical parameters

For more detail on the physical parameters of the Project Area please refer to the Chyulu Hills REDD+ Project Design Document (CHRP PD) section 1.2.1.

Geology

The Chyulu Hills are a young Quaternary volcanic field, surrounded by the Mozambique belt (Novak *et al*., 1997). The hills lie about 150 km southeast of the Kenyan rift, close to the border of Tanzania, just 40 km northeast of Mt. Kilimanjaro (ibid.). They comprise a large number of free-standing and coalesced volcanoes, cinder cones and numerous lava flows (Späth *et al*., 2000, p.337).

Topography

The Project Area varies in altitude. Mbirikani GR in the northwest is a fairly flat expansive plain, while Kuku Group Ranch (Kuku A GR and Kuku GR) and Rombo GR feature a more hilly terrain. There are a number of denuded volcanic edifices and cinder cones on the western side of the hills. The surrounding plains rise from an elevation of less than 900 m above sea level (ASL) to a maximum elevation of 2175m ASL at the peak of the Chyulu Hills, which is also the highest elevation in the Project Area. The Chyulu Hills themselves are almost 100 km long and up to 30 km wide, covering an area of approximately 2,840 km^2 or 284,000 ha (Späth *et al*., 2000). Detailed maps of slope, aspect and elevation can be found in Appendix B.

Soil

The Project Area lies in the Southeastern region of Kenya, which is characterized by its marginally fertile and other saline soils, with patches of deep well-drained soils. In the Chyulu Hills area, the main soils are Lithosols on the lava flows, Andosols on coarse ash deposits and deep Luvisols on the flatter plains (Touber, 1983). Please refer to Appendix B for a map showing soil type and distribution.

Climate, precipitation and hydrology

The region's climate is semi-arid to arid, falling into the Agroclimatic Zones V and VI (Sombroek *et al*., 1982). The rainfall pattern tends towards a bimodal distribution, with two rainy seasons a year, though there is significant inter-year variation in the amount and timing. The "short rains" fall from November to December, while the "long rains" occur from March to May (Ntiati, 2002). Rainfall in the greater Project Zone averages approximately 500 mm per year, whereas the Chyulu Hills receive up to 700 mm per year. In the bush land area, rainfall ranges from 350 mm to 700 mm (Western *et al*., 2009). In the nearby Amboseli, temperatures range from annual highs in the mid-30s°C (86° - 104° F) in February to lows around 20°C (68° - 77° F) in July (Altmann *et al*., 2002). Droughts regularly occur in the region (Western *et al*., 2009), and during this century droughts have been recorded in 2001 and 2006-2007 (Ojwang *et al*., 2006). The most severe drought in recent history occurred in 2009.

Hydrology

High orographic rainfall and condensation (from mist in the cloud forest) make the Chyulu Hills a locally and regionally important water tower. Rainwater percolates into the ground due to the porous nature of the rock and emerges again at numerous springs. The Mzima Springs to the southeast of the Project Area is an important spring system and supplies water to many towns and communities in Southeastern Kenya and the coast region. These include Voi, Maungu, Taru and Kenya's second largest city of Mombasa, which receives approximately 30% of its water from the pipeline (Mombasa Water, 2014). Mzima Springs also supplies larger rivers and streams in the more arid parts of Southeastern and Eastern Kenya with water, in particular the Tsavo / Galana system. In addition to Mzima Springs, there are several other springs in the Project Zone, including Umani Springs, Kiboko Springs and Ol Pusare Springs.

There are also a number of seasonal rivers and streams in the Project Zone, which originate from rainfall. On Kuku GR, the Mokoine River, the Nolturesh River and several of its tributaries, such as Kikangorot, are the principal watercourses of the bush land area (Please see the map of rivers in Appendix B and below for a detailed picture of river location and density in the Project Zone). Rain and run-off from Mt. Kilimanjaro supplies the southwestern corner of the Project Zone with water, providing enough for rain-fed cultivation. The 24 inch-diameter Nolturesh water pipeline runs from the spring on Mt. Kilimanjaro, through Mbirikani GR on the western side of the Project Area up to the Nairobi-Mombasa highway at Sultan Hamud and beyond. It covers a distance of 200 km to supply water to the towns close to Nairobi, namely Machakos, Athi-River and Kajiado (Ntiati, 2002). Water off-take is found to be unsustainable (ibid.), leaving the actual Nolturesh stream with insufficient water to run the 150km to Tsavo West National Park (TWNP). The stream now dries up 33 km from the source, thereby compromising the water supply to pastoral people, livestock and wildlife downstream.

Wetlands are also present, but following unsustainable water off-take and increased agricultural activities, they have been drying up in recent years. The largest swamp used to be Leinkati Swamp, at the border between Mbirikani and Kuku GR, which is also a largely cultivated area. There are a few smaller swamps including Kimana Swamp on Mbirikani and Esoitpus and Olpusare Swamp on Kuku Group Ranch.

1.2.1.2 Types and Condition of Vegetation within the Project Area (G1.2.)

The Project Area is made up of a heterogeneous landscape that features a transition from lowland dry savannah grassland and Acacia-Commiphora forest, through a volcanic gradient, to an area dominated by a moist, dense cloud forest. To satisfy accounting criteria for the VCS methodology VM0009, the Project Area is separated into Project Accounting Areas (PAA), which separate the CHRP into homogenous areas of baseline scenario type (i.e. threat type and level, vegetation classification, potential agents of conversion, etc.). It should be noted that the PAAs represent strata that serve the sole purpose of rendering the calculation of emissions reductions (carbon accounting) more accurate. They do not represent physical boundaries within the Project Area and the PAAs will not be treated differently from one another throughout the Project Accounting Period. The CHRP has been separated into two Project Accounting Areas (PAAs), based on land cover sub-strata. The first is represented by native grassland and the second is all forested lands. Because of the diversity of natural land cover throughout the CHRP, the Project Area is an important ecological zone, containing a wide range of floral and faunal biodiversity.

A land cover classification of the Project Area is shown below in Figure 2. Land Cover data were provided by the African Wildlife Foundation (AWF), and are based on combined remote sensing and ground-based mapping. This classification defines 7 land strata, which are based on land cover types. Land cover classes include ‘Grassland’, ‘Acacia-Savannah Mosaic’, ‘Lava Forest’, ‘Lava Forest Sparse/Low’, ‘Cloud Forest’, ‘Woodland/Thicket’ and ‘Woodland – Sparse/Low’. The Grassland PAA contains only the Grassland land cover strata, with the balance of the land cover strata being present in both the protected and unprotected Forested PAA (see PAA map below). For a detailed vegetation map of the Project Area, see Figure 2 below and Appendix B. A detailed description of each important vegetation land cover is given below.

Grassland

The vegetation in the grassland land cover stratum is consistent with that of a typical lowland dry Kenyan savannah. This stratum represents the lowest elevation of the Project Area, receives relatively low rainfall and has few natural surface water sources. The grassland stratum is typified by large areas of native grasses with patches of low-density tree canopy cover. The grassland land cover stratum provides significant habitat for a typical African savannah community, including a diverse array of native ungulates, such as antelopes, common zebra, and Cape buffalo. These ungulates in turn support populations of the larger carnivores present in the Project Area.

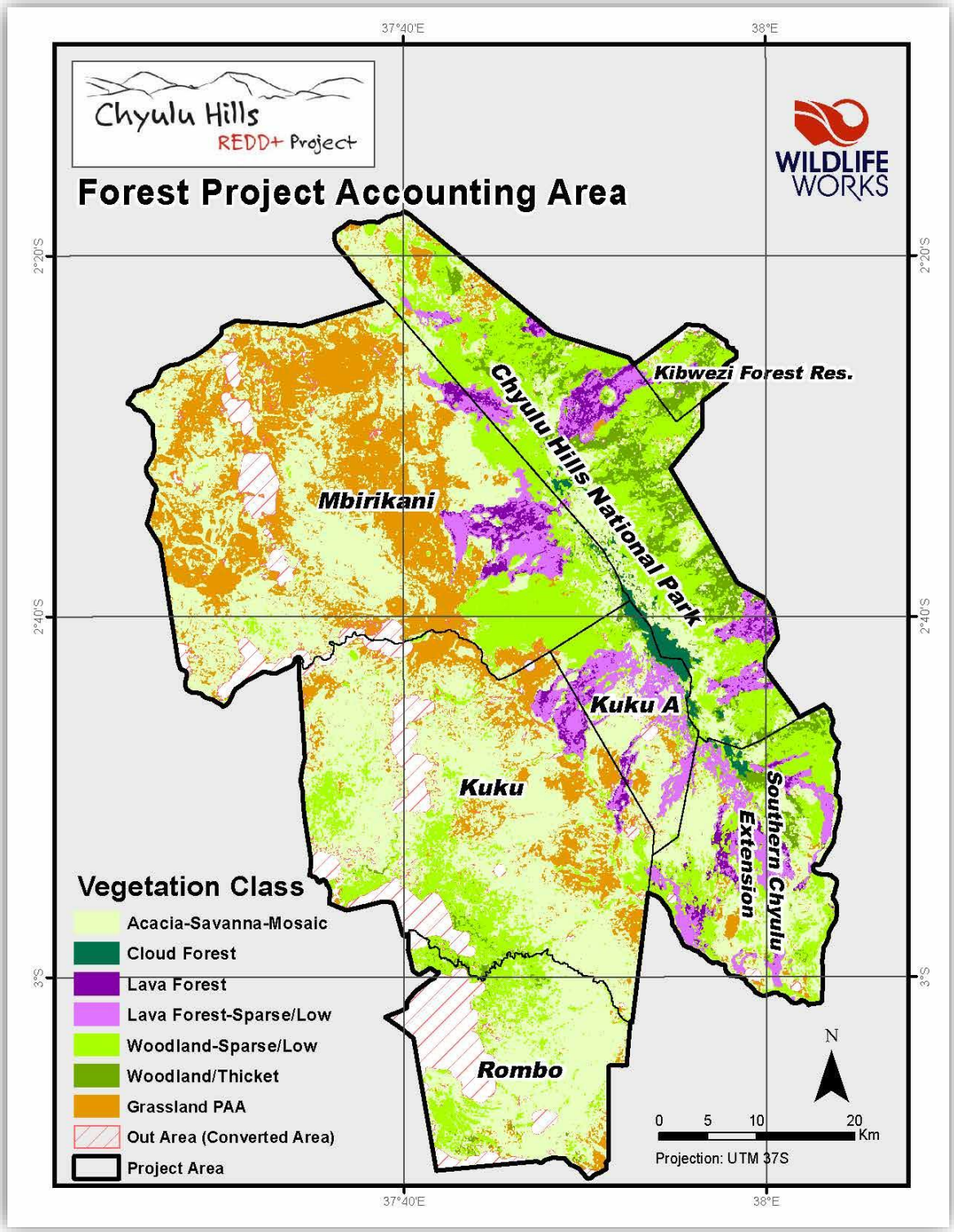


Figure 2: Project Area land cover

Acacia-Savannah Mosaic Forest

The Acacia-Savannah mosaic land cover stratum is an Acacia-Commiphora lowland dry forest. This forested stratum features a moderate tree canopy with an understory of grasses and shrubs. There are 38 tree species found in this stratum, with the dominant species being *Acacia mellifera, Commiphora africana*, various other *Commiphora species*, *Acacia hockii* and *Acacia tortilis*. The flora species present in this area are generally drought-tolerant, using several different strategies for preserving moisture in this semi-arid environment. These include dropping foliage or closing leaves during dry periods to reduce water loss from transpiration as well as photosynthesis through the bark of the trees (Weeks and Simpson, 2007). Commiphora species in particular have adapted to dry weather conditions by gaining chlorophyll cells beneath their thin, opaque bark, thereby enabling photosynthesis to continue through their bark during the leaf-off season. Their leaves are quite small to begin with, and generally cannot be seen from space. It is believed that the structure of this forest is influenced by the activity of the African elephants (Loxidonta africana), which cause significant damage to trees as they feed, killing the trees over time or in some cases knocking them over, causing sporadic patches of open canopy. This leads to significant areas of regeneration, as these patches allow grasses and woody shrubs to thrive.

Table 2. Tree metrics for the acacia-savannah mosaic, the most sparse project forest stratum compared to the Kenyan DNA forest definition.

Metric	Forest Stratum Metric	Kenyan Forest Definition Threshold
Average Tree Canopy Cover (%)	16.2 %	15 %
Average Tree Height (m)	3.7 m	2 m

Woodland/Thicket and Woodland-Sparse/Low Forest

The Woodland-Sparse/Low and Woodland/Thicket strata are very similar in species composition and forest structure, with the main contrasts being the relative frequency of each species. These forest strata are also of a dryland forest type, and contain drought tolerant species. The tree canopy is more dense and the mean carbon stock is therefore higher than the abovementioned Acacia-Savannah Mosaic stratum, with no patches of grassland interspersed.

Lava Forest and Lava Forest Sparse/Low

The Chyulu Hills are a volcanic range featuring a number of relatively recent lava flows. The hills contain rocky, shallow soils comprised largely of volcanic rock. Despite the presence of dense lava on or near the surface, tree and shrub cover is significant. These two strata are very similar in species composition and forest structure, and are primarily distinguished by the density of the forest canopy, with the Lava Forest Sparse/Low being a less dense forest type with a more open canopy. It is generally believed that this is due to the fact that the Lava Forest Sparse/Low stratum is growing on more recent lava flow, which has not degraded as much as the lava flows in the Lava Forest stratum. The forest type is a dry, upland forest with an open canopy mix of drought tolerant species and a low-density understory.

Cloud Forest

On the peaks of the Chyulu Hills, at elevations above 1,800 m, the cloud forest stratum is dominant. This land cover stratum is characterized as a montane type forest, with a dense tree canopy and understory comprised of moist species. This forest has a high incidence of low-level cloud cover, often at the tree canopy height, resulting in extremely humid conditions. This results in a lush appearance, with a high occurrence of mosses and thick understory vegetation. The dominant tree species observed in this stratum are *Croton macrostachyus, Ficus sycomorus, Vepris nobilis, Mystroxylon aethiopicum* and *Strombosia scheffleri*. The cloud forest's influence on the Project's ecology and biodiversity cannot be overstated. It is the primary water source for much of the surrounding area.

1.2.2 Description of Communities Located in Project Zone, Including Basic Socio-Economic and Cultural Information (G1.5.)

For further detail on the communities located in the Project Zone, please refer to the CHRP PD section 1.3.3.

Project Zone Communities

The Project Zone is socially, economically and culturally diverse. The surrounding communities can be most accurately and coherently understood by dividing the Project Zone into two; the western side (Kajiado County) and the eastern side (Makueni County). Most data are obtained from Government statistics, which are categorized according to pre-devolution districts, namely Loitokitok and Kibwezi. In addition, some independent studies have been carried out within the land units, providing further valuable insight. Figure 3 shows the major towns, villages and other place-names within the defined Project Zone, which encompasses the Project Area as well as the surrounding areas and communities affected by the Project (see description and map of the Project Zone in Section 1.2.3.2).

Demographic information

Western side, Kajiado County, Loitokitok District

According to the 2009 Kenya Population and Housing Census, there are 137,496 people living in the former Loitokitok District, which encompasses the Entonet, Mbirikani, Kimana, Central, Lenkism and Rombo divisions. The average population density is 21 people per km^2 (Seno and Tome, 2013). The Group Ranches within the Project Area have a combined population of 27,750 (Kenya Open Data, retrieved 20 November 2013).

Eastern side, Makueni County, Kibwezi District

According to the Kibwezi District Development Plan (KDDP) (2009), the population on the eastern side of the hills (Kibwezi District) was 296,768 people in 2012. The population between the Nairobi-Mombasa highway and the Project Area boundary is estimated at about 100,000 people. Density varies according to location, but averages at 73 people per km^2 (Muriuki *et al*., 2013). The largest town on the eastern side is Mtito Andei with an estimated population of approximately 100,000 people in 2012 (KDDP, 2009).

The population is predominantly young, with more than half of the population below the age of 18 (151,861 people). In 2008, young people made up 58.8% of the total population, which explains the high dependence ratio for the area (KDDP, 2009). Average individual household size is 7, and average life

expectancy is 39.6 and 46.1 years for males and females respectively. The sex ratio of males and females is 1: 1.1 (KDDP, 2009).

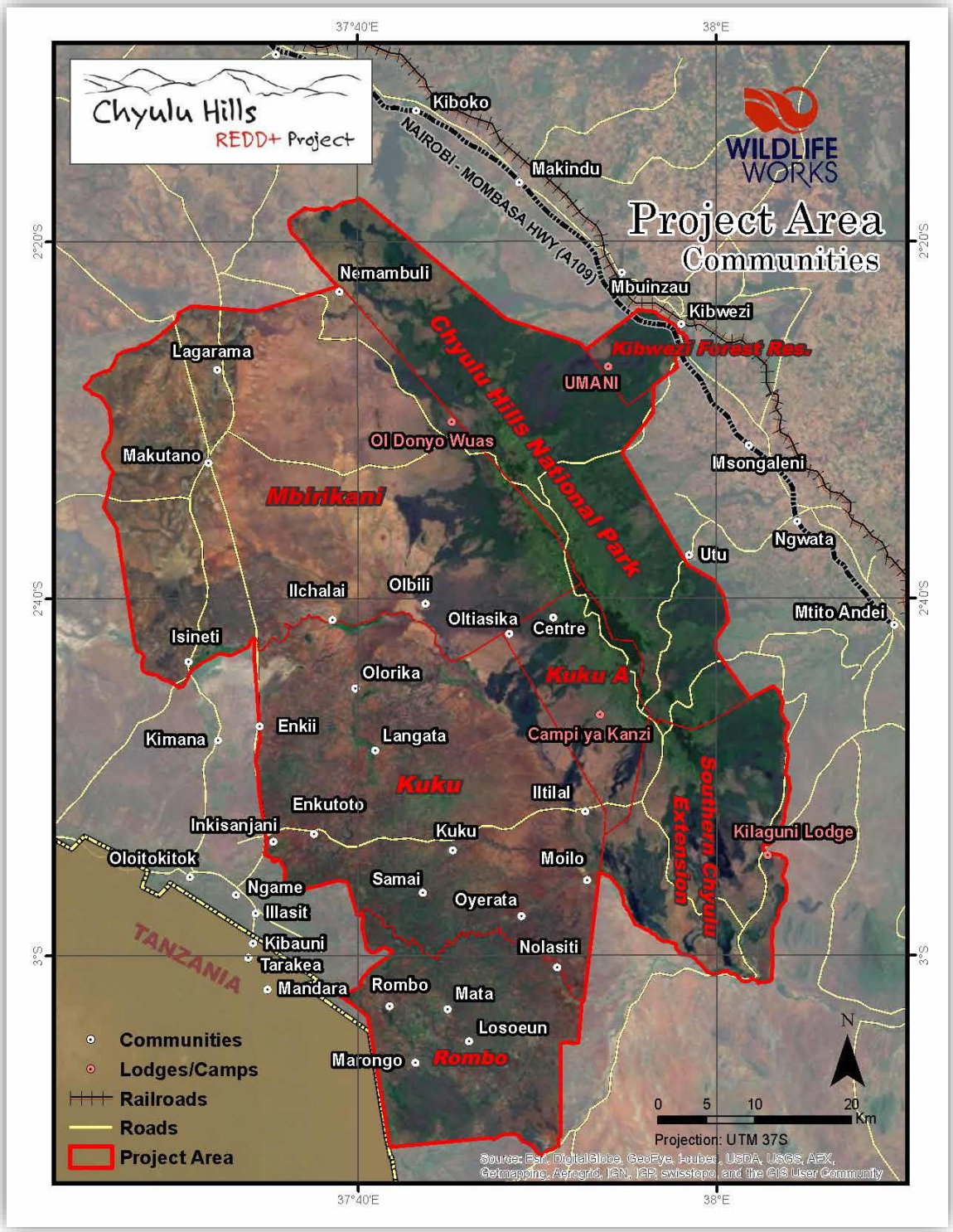


Figure 3: Major cities, village and towns in the Project Zone.

Land uses and economic activities

Western side, Kajiado County, Loitokitok District

Pastoralism is still the predominant livelihood activity in the west of the Project Area. According to a study undertaken by Best and Goss (unpublished, 2014), 100% of the 248 interviewed households on Mbirikani GR owned livestock, either for subsistence uses or for sale at nearby markets. Western *et al*., (2009) counted between 50-80,000 livestock on Mbirikani GR during an aerial survey, while in 2012, the estimated number of livestock on Kuku GR was 29,300 (Müller and van der Goes, unpublished, 2012). With a shift towards sedentism, many households have adopted agricultural lifestyles and are diversifying their livelihoods, which serves to reduce their dependence on livestock

Eco-tourism and conservation area management together provide probably the most significant employment opportunities for the Maasai on Kuku, Rombo and Mbirikani. There are high-end lodges on Kuku and Mbirikani, and MWCT and Big Life run significant conservation and community support programs. Combined, these ecotourism lodges and conservation programs are the largest employers on the Group Ranches, providing jobs for about 700 people, mainly local Maasai, in positions requiring a range of educational and technical qualifications and skills. TWNP and Amboseli National Park are also major ecotourism destinations with a number of lodges that cater to both the high-end and more mass tourism markets. A small percentage of local people own small businesses, mainly in the major market locations, or act as business middlemen (Best and Goss, 2014).

Eastern side, Makueni County, Kibwezi District

For the larger population on the eastern side, job opportunities are few, with only 15% of the population employed within the formal sector (Muriuki *et al.*, 2013). Agriculture is the most important economic activity on the eastern side of the Project Zone. Seventy (70) % of the population surrounding the CHRP are engaged in crop farming (KDDP, 2009). The average subsistence farm size is 2.1 ha, whilst the average commercial farm size is 20 ha. The main cultivated crops are maize, green grams, pigeon peas and beans (Muriuki *et al*., 2013). Many farms also raise livestock, which can be used as disposable capital and insurance against crop loss (Muriuki *et al*., 2013). Whilst cattle are also seen as an indicator of household wealth, the most abundant animals are goats, followed by chickens and cattle (ibid).

Trade and tourism are also key components of the economy of the eastern sector. In 2009 there were 98 trading centers in the district (KDDP, 2009), mainly scattered along the Nairobi-Mombasa highway. There are also registered retail and wholesale traders, yet the majority are informal micro businesses and hawkers. There are approximately several hundred small hotels catering to local travelers and truck drivers who transport goods along the highway. These small businesses, shops and stalls are expanding rapidly.

Charcoal burning and woodcarving are other economic activities, as is bee keeping. There are a total of 38,023 beehive apiaries, and in 2007 the annual honey production was 202,000 kg, with a value of KES 20,200,000 (US $234,884) (KDDP, 2009). These products are either sold directly along the highway or transported to Nairobi and Mombasa as in the case of charcoal.

Ethnic groups and migration

Western side, Kajiado County, Loitokitok District

A variety of ethnic groups live on the western side of the hills. The area was traditionally mainly inhabited by Maasai, but with a constant influx of immigrants there has been a subsequent decline in the proportion of Maasai in the region. In 1969, the Maasai ethnic group made up 78% of the population of the Loitokitok District, while according to the 1999 population census, the proportion had declined to 50% (Ntiati, 2002). Immigrants from other areas of Kenya make up the balance, with the majority being Kikuyu and Kamba, who have mainly settled in perceived high potential agricultural areas and urban centers (ibid). There are also some Taita, and Chagga, from Tanzania, living in the area.

Many Maasai continue to practice their traditional lifestyle. For generations their social roles, status and wealth have been closely connected to their livestock and even today livestock is an important component of everyday life. Traditional pastoralists strive to increase herd size as this is seen to improve their social standing. The productivity of such a production system, however, depends mainly on animal management techniques, water availability and distribution, and the quantity and quality of forage (Bekure *et al*, 1991). Therefore, with population increases, the resulting increases in livestock herd size can consequently result in over-grazing and over-stocking on the landscape, as is the case in the Project Area.

Inequality between men and women is pronounced, and historically women have been culturally and educationally marginalized (Ntiati, 2002). According to some Group Ranch regulations, women are unable to be registered as GR members. Ntiati (2002) found that Maasai women are very passive regarding land issues, and that this submissiveness presents an obstacle for access and land rights for female stakeholders. However, particularly in the last 5-10 years, the role and social and economic position of women has been undergoing rapid change with increasing school attendance and education for girls; expanding employment of women; development of income generating activities by women; the reduction in the incidence of traditional customs such as female genital mutilation (FGM); and access to electronic banking, money transfer, communications and internet through mobile phones.

Eastern side, Makueni County, Kibwezi District

Ethnically, the eastern side is dominated by the Kamba tribe. Other ethnic groups include the Kikuyu, Taita, Luyha and Maasai.

Gender inequality in this region is significant. As outlined above, small-scale farming and livestock rearing are the main livelihood activities. According to the KDDP (2009), 80% of these activities are carried out and managed by women. However, women are seen to hold a lower position in the family and in society at large, and therefore do not have control over production assets such as land and capital (ibid.). Furthermore, property is usually registered in the name of males. As with the Maasai, the role of women and their economic position is also evolving rapidly in line with Kenya's overall economic growth and development.

Poverty

Western side, Kajiado County, Loitokitok District

The proportion of the poor living in Loitokitok District is high. According to the Loitokitok District Development Plan (LDDP, 2009), poverty is perceived as the inability of an individual or household to

afford basic needs such as food, clothing, housing, health, education and security. The official figure of people living in absolute poverty in 2008 was 50%, where urban poverty was 52% and rural poverty 48% (LDDP, 2009). For this study, poverty line was defined as KES 1,562 (approximately USD $16) a month for rural communities and KES 2,913 (approximately USD $30) a month for urban communities.

Eastern side, Makueni County, Kibwezi District

The mean monthly income in Makueni County averages at KES 5,506 (USD $55) (Muriuki *et al.*, 2013), and compared to poverty levels of other Counties in Kenya, Makueni County falls towards the poorer end of the spectrum. The KDDP (2009) indicates that 64.2% (165,972 people) of the population is living in absolute poverty, which contributes 3.8% to the national poverty level.

Food security

Western side, Kajiado County, Loitokitok District

A comprehensive study undertaken by Thornton *et al*., (2006) concluded that in southern Kajiado County most of the households required some external calories and that only 30-46% of all calories were “home produced”, thus concluding that food shortage and poverty remain prevalent. Local stakeholders confirmed the occurrence of monthly food shortages.

Eastern side, Makueni County, Kibwezi District

Food security is a critical issue in Kibwezi district. Recent trends of unreliable rainfall and rising temperatures coupled with the historically poor soils have led to frequent crop failures. According to the KDDP (2009), food poverty is experienced by 57.2% of the total population. This is exacerbated in years of drought, such as the 1999 / 2000 drought in which 91% of households experienced between 3 and 5 months of food shortage (Speranza *et al*., 2008).

Public Health

Western side, Kajiado County, Loitokitok District

There are two health centers, 12 dispensaries and 7 private clinics in the former Loitokitok District, with a total bed capacity of 188 (LDDP, 2009). The doctor-patient ratio is 1:30,000 and the average distance to health facility is 30km. The HIV prevalence rate for this area is 5.7%, only 18.5% of women receive antenatal care, and the percentage of children vaccinated barely reaches 40% (ibid.).

Eastern side, Makueni County, Kibwezi District

Kibwezi has been recognized as a severely underserved area in Kenya in terms of health facilities. There are three hospitals in the district, four health centers and 18 dispensaries. The doctor-patient ratio is 1: 32,654. HIV prevalence is 9%, though Muriuki *et al*., (2013) indicated that it can be up to 30% close to the Nairobi-Mombasa highway. The most prevalent diseases have been identified as malaria, diarrhea and respiratory diseases.

Education

Western side, Kajiado County, Loitokitok District

The education standard in Loitokitok District is poor. According to the Ministry of Education (n.d.), the main challenges to education include low enrolment, low transition rates, poor primary school

performance and gender imbalance. According to the 2009 census, 35% of boys and 46% of girls in rural Loitokitok have never attended school (Kenya Open data, retrieved 25 February 2014). The percentages for not attending school are lower in urban Loitokitok however, with only 9% of boys and 11% of girls never having attended school.

With regards to gender imbalance, the percentage of girls attending school is lower than boys, and this disparity increases diversely with age. While 42% of rural girls attend primary school, only 6% proceed onto secondary school. Attendance for rural boys shows a similar discrepancy in terms of primary and secondary school attendance, at 49% and 8% respectively (Kenya Open Data, retrieved 25 February 2014).

Eastern side, Makueni County, Kibwezi District

According to the KDDP (2009), 92.3% of the male population aged 15 and above is able to read and write. The equivalent figure for the female population is 77.7%. As in the western side of the Chyulu Hills, transition rates are very poor. Muriuki *et al.*, (2013) found that two-thirds of the population has only attended primary school, while 14% (men) and 12% (women) proceeded to secondary school. A very small number completed tertiary education, totaling 2.5% of men and 1.7% of women (ibid).

Water availability

Western side, Kajiado County, Loitokitok District

Water is a scarce resource in this arid to semi-arid environment. Rivers and other water points have run dry due to unregulated off-take for irrigation and degradation of water catchments. Wetlands have also been negatively impacted, many of them drying up in the wake of increased sedentism and cultivation. Part of the community, located closer to developed infrastructure, has access to piped water. The other communities within the Project Zone depend on boreholes and wells. A significant number of people also tap the Nolturesh water pipeline illegally.

Eastern side, Makueni County, Kibwezi District

A total of 7,387 households (18.6%) have access to piped water, while 15,633 households (39.4%) have access to potable water (KDDP, 2009). In Kibwezi, a quarter of the households rely on springs, wells and boreholes to access their water, many of which are seasonal (Muriuki *et al,* 2013). The average walking distance to the nearest water point is 3.5 km. A number of households have also started to install rainwater harvesting, which has proven to be a relatively good drought mitigation measure (Muriuki *et al,* 2013).

1.2.3 Boundaries of the Project Area and the Project Zone (G1.3.)

1.2.3.1 Project Area boundaries (G1.3.)

As described previously, the Project Area is made up of seven different land units. The northern border of the Project is delineated by the northern edge of the Chyulu Hills National Park (CHNP), which sits directly adjacent to the KALRO research center (formerly known as KARI Kiboko). The eastern boundary roughly follows the CHNP boundary. However, it also includes the Kibwezi Forest Reserve, which is partially bisected by the Nairobi-Mombasa Highway and borders the railway line. The Southern Chyulu Extension (SCE) follows the Kilaguni – Mzima Springs Road in a southerly direction until reaching the Mzima Springs. The boundary then follows the Nolturesh River until reaching the boundary of TWNP and

adjacent Rombo GR. The most southerly project point is (3.12° *S*, 37.84° *E*) and follows a straight line westward to the Tanzanian border. The western boundary of Kuku GR follows the Nolturesh pipeline. Mbirikani GR is divided by the Kikangorot stream. The border is the Merrueshi River and joins CHNP in a northeastern direction. A detailed map of the Project Area is shown in Figures 2 and 3 above and in Appendix A.

Table 3: Chyulu Hills REDD+ Project Area boundaries.

Boundary	Location
Northern Boundary	Merrueshi Seasonal River
Northern Extent GPS Point	2.21° *S*, 37.70° *E*
Eastern Boundary	KARI Kiboko research Centre Community land
Eastern Extent GPS Point	2.84° *S*, 38.07° *E*
Southern Boundary	Mzima Springs, Tsavo West National Park
Southern Extent GPS Point	3.19° *S*, 37.84° *E*
Western Boundary	Tanzanian border Emali-Oloitoktok Highway Amboseli National Park
Western Extent GPS Point	2.47° *S*, 38.07° *E*

1.2.3.2 Project Zone (G1.3.)

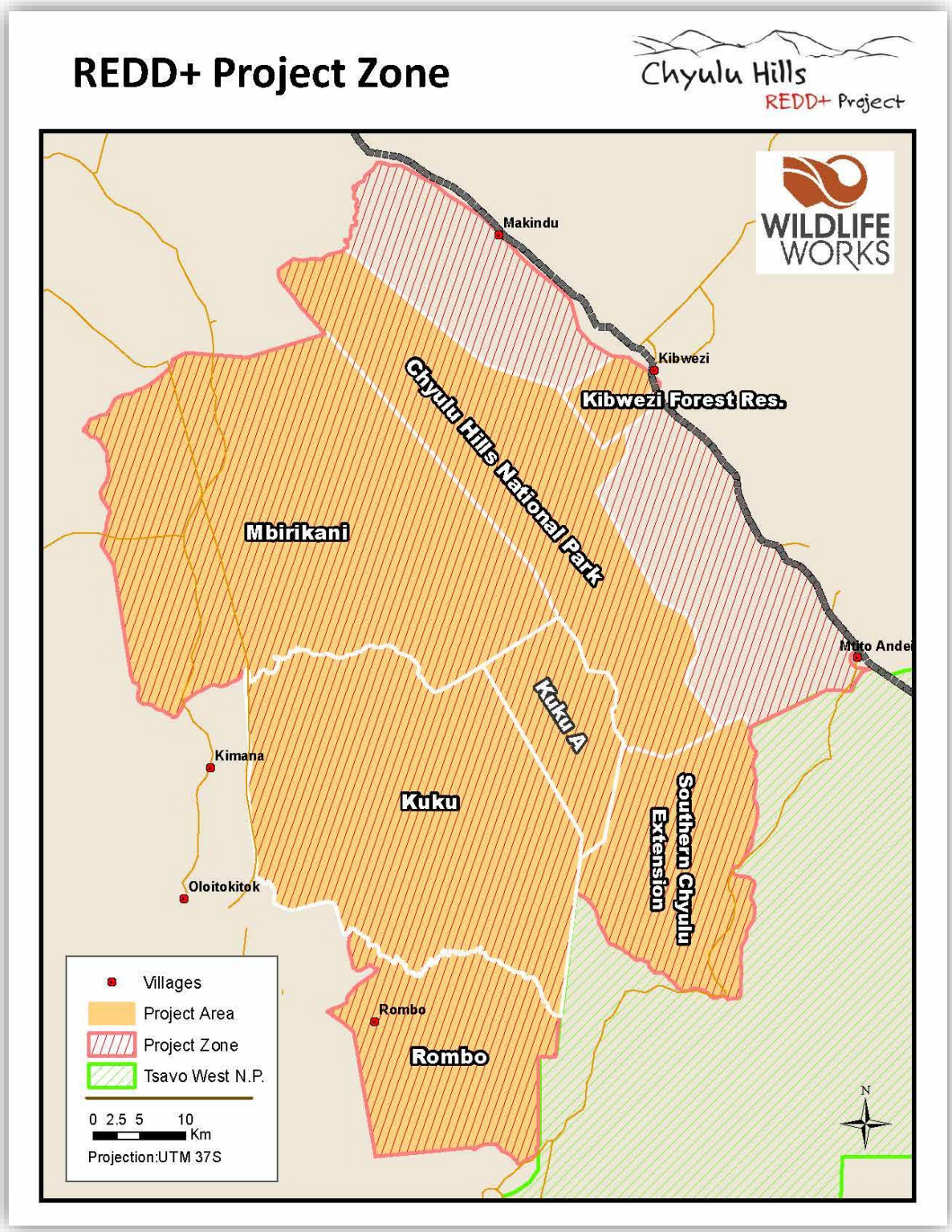


Figure 4: The Chyulu Hills REDD+ Zone

The Project Zone is defined as “the Project Area and the land within the boundaries of the adjacent communities potentially affected by the project”. The Project Zone is shown in Figure 4. On the eastern side of the Project Area this includes rural communities living in close proximity to, but outside the Project Area. However, it excludes the larger towns of Makindu, Kibwezi and Mtito Andei, as there is a wider array of alternative livelihood options in those locales, and they are insulated from the effects of the Project. Thus, the border of CHNP and KALRO demarcates the eastern border of the Project Zone. For the remaining boundaries, the borders of the Project Zone are the same as the borders of the Project Area. In this region the communities who will mainly be affected by the Project live inside the REDD+ Project Area. Additionally, the boundary of the Project Zone is the same as the Project Area in TWNP, as there are no communities residing in the national park who could be affected by the Project.

The primary reason for the difference in delineation of the Project Zone between the eastern and western sides of the Project Area is the difference in land ownership on each side and the effects that has on resource access. The Eastern side of the Project is a national park and national forest reserve, and as such the communities living outside the boundaries are more reliant on the resources inside the Project Area. The majority of the deforestation threat on the Project’s eastern side is from the communities pushing up against the Project’s boundaries, including along the national parks and forest reserve boundaries. It must also be noted that there are no communities residing inside the Project Area on the eastern side, they all travel into the Project Area for resources. Therefore, a buffer for the Project Zone was created on the eastern side. This threat is already visible, and the encroachment is spatially explicit in nature, pushing toward the project accounting area in a directional attack on the weakly protected areas.

On the western side of the Project Area where the land is held in communal ownership by the four Maasai Group Ranches, the communities are largely made up of indigenous Maasai with some influx from other tribal groups, generally involved in practicing agriculture. In general, the Group Ranch boundaries and access to land within the Group Ranches is strictly controlled and limited by the Maasai Group Ranch members and their elected leaders. For the Group Ranches the Project Zone and Project Area boundaries are the same, though some portions are excluded from the carbon accounting. Delineating the Project Zone boundaries by the Group Ranch Boundaries is supported because this area is the land on which these communities depend and from which they derive their livelihood, well-being and cultural values. Because the Group Ranches are effective at limiting access, groups from outside the Group Ranches have very limited dependence on the Project Area and cannot easily be defined. It would not be practical or justified to consider these groups as impacted by the CHRP or entitled to receive benefits from it.

The same applies to the charcoal burners living adjacent to the Project Area boundary on the Western side (Loitokitok etc.). According to expert knowledge, while these people do occasionally utilize the Project Area for charcoal production, they are not sedentary in the Project Area nor undertaking frequent incursions, but instead move in for a limited period of time before continuing to other places. As such, they have very limited dependence on the site, as they are not local and are able to move on as and when they desire. As they have very limited dependence on the Project Area, and their livelihoods are not dependent solely on the Project Area resources, they do not meet the definition of groups that should be included in the Project Zone.

For a more detailed discussion of the Project Zone please refer to the CHRP PD, section 1.2.2.

1.2.4 Current Land Use, Customary and Legal Property Rights, and any Ongoing or Unresolved Conflicts (G1.6.)

Land use

The predominant consumptive land uses in the Project Zone fall into four categories: agriculture, pastoralism, agro-pastoralism and extractive forest resource activities. Tourism represents the prevalent non-consumptive land use present in the Project Area. This land use is consistent across the Project Area, including in the areas that are officially protected conservation areas. In the group ranches, the majority of local communities practice pastoralism, with an increasing trend towards more sedentary subsistence-based agriculture.

For more detail on the current land use in the Project Zone, please refer to the CHRP PD, section 1.3.4.

Customary and Legal Property Rights

Within the Project Zone there are several land use and tenure systems, which are recognized in both statutory and customary rights regimes. The Group Ranches are recognized as part of the customary lands of the Il Kisongo group of the Maasai. The Group Ranch members have communal legal tenure under the Land (Group Representatives) Act of Kenya (2010), which includes rights to resource access and use.

Resource use, tenure and access to the CHNP and the SCE in the TWNP fall under the jurisdiction of the Kenya Wildlife Service as mandated in the Wildlife Conservation and Management Act (2013). The land within the boundaries of these two land units is held in trust by the national Government of Kenya for the people of Kenya. Thus, the National Parks are under the mandate of the Kenya Wildlife Service (KWS). The exception to this rule is water and water resources, which are governed by the Water Act (2016).

The Kibwezi Forest Reserve was established by the colonial government in 1936 and has been governed by the Forest Department and its descendent, the Kenya Forest Service (KFS) since its creation. The tenure and access rights are defined in the Forests Conservation and Management Act (2016) and the Government of Kenya holds the forest in trust for the people of Kenya. In 2011, KFS awarded a concession for the Kibwezi Forest Reserve to the David Sheldrick Wildlife Trust (DSWT), a Project Partner, for a period of 30 years, expressly for conservation management.

For more detail on the current land tenure and property rights in the Project Zone, please refer to the CHRP PD, section 1.3.4. Table 4 below lists the entities that either own or possess customary rights over each administrative unit within the CHRP Project Area.

Table 4. Land Ownership according to Project Area Administrative Unit

Land Owner / Custodian	Project Administrative Unit
Community Shareholders	Mbirikani Group Ranch
Community Shareholders	Kuku Group Ranch
Community Shareholders	Kuku A Group Ranch
Community Shareholders	Rombo Group Ranch
Kenya Wildlife Service (KWS)	Southern Chyulu Extension, Chyulu Hills NP
Kenya Forest Service (KFS)	Kibwezi Forest Reserve

Ongoing or unresolved conflicts

As reported in the validated CHRP PD, there has been one land dispute related to CHNP, which dates back to 1995. This concerns some land in the northern part of the CHNP, and a group of settlers who formed the Mukulolo Ranching and Directed Company. Ltd. The Machakos HCC case 475 was filed in 1995 by said company following the gazettement of the CHNP and consequent re-location of people residing within the National Park, which was ordered by the Office of the President. It concerns an area of 7,600 hectares of farming land. The case is filed against the Kenyan government, namely the District Commissioner of Makueni County, The Hon. Attorney General and KWS.

Prior to 2014, there was relatively little activity related to the case. However, in the last three years, and continuing up to October 2016, there have been a number of actions with respect to the legal process and within the disputed area on the ground.

On November 21, 2014, the plaintiff, Mukulolo Ranching and Directed Company Ltd., asked for a temporary injunction in the Machakos High Court to prevent KWS from initiating any action to relocate settlers who were claiming rights to the land through the Mukulolo Ranching Company. A letter dated 20th September 2016 from the Director General of KWS to Mukulolo Ranching Company noted a visit to the area in 2013 by the then District County Commissioner, who reported that the settlers in the park had occupied a small area of only 400 $m^{2,}$ and which contained no more than fifty structures. The following summarizes the chronology of events that have taken place since that date:

- 11 December 2014: the Court granted temporary orders (court injunction).
- 17 February 2015: the Court stated that the order given earlier to maintain the “status quo” was extended. There was confusion as to what the “status quo” was on the land. The Court ordered the parties to resolve the dispute through involvement of a surveyor and field visit.
- 14 March 2015: Surveyor and advocates met. The case was to be mentioned on 17 March 2015. The Court ordered that the surveying of the land and boundaries should take place within the next 45 days, beginning on the 17th of March, in collaboration with the County Land registrar, County Land surveyor, and the surveyors engaged by the parties (KWS and plaintiffs).
- 17 March 2015: Parties confirmed that the survey was conducted. Photographs were adduced in Court. The Makueni County, KWS and plaintiffs surveyors were to obtain all information and determine all beacons. The Court decided that the status quo was to remain in place until the matter was determined.

The Status quo is defined as follows:

- No further construction of structures
- Those in occupation can remain
- No felling of trees
- No new cultivation
- No killing of wildlife
- Cattle to remain and allowed to water

The Parties further agreed on the details for surveying of the area in question. KWS provided an independent person and the County provided a surveyor to serve as the lead surveyor. A report was produced by the lead surveyor, which was filed with the court. The plaintiffs covered the costs of the

survey. The Attorney General requested to liaise with the Land Registrar and Makueni Surveyor to collaborate. Furthermore, the Court ordered the surveyor to determine the boundaries of CHNP Land Reference 24362. KWS provided the Deed Plan, Survey Plan and Title Deed to the County Surveyor.

The exercise commenced on April 1, 2015. According to informal information provided by the KWS Surveyor, the plaintiffs have no survey plan that supports their claim and no land titles. The matter was to be mentioned in Court on May 26, 2015. The following list of events have incurred since then:

- The Survey of the settlement area was carried out by the District Surveyor and the KWS Surveyor.
- On December 7, 2015 the court file was transferred to the Environment and Land Court (ELC), Milimani Nairobi as there was no sitting Land Court in Nairobi.
- The matter was scheduled for directions on May 31, 2016 to establish how the matter would proceed for hearing.
- During 2016, in spite of the order of the court that the previous “status quo” should be maintained, including no new construction or areas of cultivation, it became evident to KWS that the plaintiffs, and additional new migrants, had continued to move into the park. Associated with this, there was significant new construction of dwellings and other structures, roads, expanded areas of cultivation, and an increase in the number of livestock.
- KWS sought legal advice with regards to their right of action, obtaining this advice on June 16, 2016.
- On June 17, 2016 lawyers representing KWS (Hamilton, Harrison and Mathews) wrote to the lawyers (J M Mutua and Company) representing the Mukulolo Ranching Company to inform them of the noted increase in settlement in contravention of the 17th March 2015 court order and gave 14 days notice that the new settlers should remove all new structures and relocate outside the park. KWS asserted their right to evict these settlers and demolish the structures if the settlers failed to relocate. On June 30, 2016, J M Mutua and Company responded, confirming receipt of the letter but claiming that their clients were not trespassers.
- On September 19, 2016, KWS carried out a survey of the settlements and mapped their locations with geo-coordinates. In a letter dated 20th September 2016 from Rose Malenya, the warden of CHNP, to the Secretary of the Mukulolo Ranching Company, it was reported that the survey had recorded a total of 255 homesteads.
- On September 29, 2016, KWS senior managers and commanders prepared an Operations Order to carry out a relocation of the illegal settlements, including removal of people, destruction of structures and removal of livestock. The operation was carried out on October 5 and 6, 2016. No arrests were made, there was no violence and the settlers were allowed to collect their belongings before leaving CHNP.
- The plaintiffs then proceeded to file an application for contempt of court and the same was to be heard on October 25, 2016 however the case was adjourned to November 2, 2016 to allow more time for KWS to prepare a defense of their action.

This has been a complex and long-running case and it is important to stress that the recent operation was not linked to the CHRP or its activities, but resulted from the outcome of over 20 years of historical dispute as evident by the information outlined above. Furthermore, cases of attempted settlement into national parks are not an uncommon occurrence faced by KWS. KWS is extremely aware of the sensitive nature of these situations and the socioeconomic and political drivers that influence them in a country with

a rapidly expanding population in which access to land is a highly-charged national issue. However, KWS also has a statutory and legal responsibility to protect the integrity of its legally created protected area estate. Failure to do so in any particular locality would potentially set a precedent that could lead to a significant threat to the integrity and long-term future of the entire national parks system.

In this particular case, rapid incursion by settlers, as occurred in 2015-16, poses a very high level of threat to the Chyulu Hills forests. The cloud forest is approximately 5,000 ha in size and the potential for rapid deforestation associated with a high rate of settlement incursion poses a very high risk to the maintenance of the forest. During the multi-year life of this land dispute KWS has shown significant restraint and sensitivity, and a willingness to settle the dispute, based on the involvement of a small number of people occupying a small area within the park boundary. The rapid growth in the number of people involved in the settlement, the building of many new structures and the grazing of large numbers of livestock were all contrary to the "status quo" condition imposed by the court in March 2015. Under these circumstances, KWS had to balance its broader national statutory responsibilities for protecting the National Parks and their flora and fauna against the potential impact on the settlers. KWS believed that if the rapid growth in the size of the incursion were left unchecked, the settlement would perhaps become irreversible. The area of the park involved is also an area of critical habitat, which still supports a remnant population of black rhino, one of Kenya's most endangered mammals.

It should be noted that in addition to trying to resolve the case through the courts, KWS carried out the removal of the illegal settlers with consideration for the rights and safety of the settlers. The operation was carried out in conjunction with the Kenya Police Service and Administrative Police Service from Kajiado and Makueni County. The Operations Order specifically stipulated that all civilians were to be treated humanely with respect for the law and their rights.

It is also important to be aware that the Mukulolo Ranching Company has produced no evidence to date that it has legal title to the land in question. Whereas, KWS in turn has full surveys and title deeds to the land, the validity of which have not been questioned.

1.2.5 Current Biodiversity in Project Zone (species and ecosystems), and Threats to that Biodiversity (G1.7)

The Project Zone features an extraordinary diversity of habitat types, ecotypes and species. The CHRP PD contains detailed information obtained through research of academic articles and specialist papers. Numerous site surveys and interviews with key informants possessing valuable expert knowledge also helped to compile the following biodiversity data. Please refer to section 1.3.5 of that document for further detail on this.

1.2.5.1 Wetlands

Springs: The importance of the Chyulu Hills as a dryland water tower has been described in previous sections of this document. Rainwater percolates through the rock and volcanic ash of the Chyulu Hills and emerges in numerous springs. The Mzima Spring is located in TWNP, approximately 55 km south of the Chyulu Hills. It is the largest and most important spring in the Project Zone, and for most of Southeastern Kenya. As a result of the natural filtration process the water from the spring is extremely pure. At the spring's source there are two large pools, surrounded by lush vegetation. Further downstream some of the water from the spring flows underground, with the rest of the outflow joining the Tsavo River via the Mzima River (Blackie, 1984). The spring is a major tourist attraction and presents a stark contrast to its semi-arid surroundings. It boasts numerous fruiting trees, including fig trees, dates and waterberries. It is also home to a small but diverse population of hippos and crocodiles, invertebrates, fish and birds. The

spring additionally is an important water point for migrating wildlife. The Mzima Spring area houses an important diversity of tree species. Smaller springs include Umani Springs, Kibwezi Springs and Kiboko Springs, among others, are located along the eastern side of the hills, and Olpusare springs which is located on the western side and has seen a reduction of water flow due to agricultural encroachment.

Rivers: The Mzima Springs feed the Tsavo and Galana Rivers with water. Tsavo River is the only perennial river in the Tsavo Conservation Area (TCA) and originates on Mt. Kilimanjaro, and merges downstream with the Athi River in Tsavo East National Park to form the Galana River. It is important to the survival of riverine forests, swamps and wetlands adjacent to the river.

The Nolturesh River, with its headwaters also from Mt. Kilimanjaro, is the main water source on the western side of the Project Area. As outlined in section 1.2.1., most of the water is being diverted via the water pipeline to areas close to Nairobi. Furthermore, its banks have become severely eroded and adjacent areas heavily overgrazed (Githaiga *et al*., 2003).

Swamps: There are a number of swamps in the Project Area. These include the Kimana Swamp on Mbirikani GR, the Leikati swamp between Mbirikani and Kuku GR, and Esoitpus Swamp and Olpusare Swamp on Kuku GR.

1.2.5.2 Grasslands

East Africa is a center of genetic diversity for grasses (Reid *et al*., 2005). The western side of the Project Area features large areas of grassland, mainly on Mbirikani Group Ranch. Please see section 1.2.1.2 above for more detail.

1.2.5.3 Forests

Four broad types of forest are found in the Project Area, with these divisions dictated largely by changes in elevation, moisture and soil type. Forest types include the lowland dry forests of Acacia-Savannah Mosaic, Woodlands, Lava Forests and Cloud Forests. The forested areas are centered on the Chyulu Hills, with the Cloud Forests on the top of the hills, and the other forest types found in a mosaic of patches along the elevation gradient of the Chyulu Hills. Please see section 1.2.1.2 above for more detail.

1.2.5.4 Animal diversity

Mammal diversity

The Project Area is home to a spectacular array of wildlife. Most famously, the area boasts the iconic ‘big five’, that is: the African elephant (*Loxodonta Africana*), Black rhinoceros (*Diceros bicornis*), African buffalo (*Syncerus caffer*), Leopard (*Panthera pardus*) and Lion (*Panthera leo*). In addition to these charismatic megafauna, there is a diverse mammal community, typical of these East African semi-arid ecosystems that includes a healthy diversity of top predators such as jackal (Canis *spp.),* wild dog (*Lycaon pictus*), cheetah (*Acinonyx jubatus*)*,* spotted and striped hyena (*Crocuta crocuta* and *Hyaena hyaena*), as well as large numbers of antelopes, including Thompson’s (*Eudorcas thomsonii*) and Grant’s gazelle (*Nanger granti*)*,* eland (*Taurotragus oryx*)*,* bushbuck (*Tragelaphus scriptus*), mountain reedbuck (*Redunca fulvorufula*), steinbok (*Rhapicerus campestris*), Coke's hartebeest (*Alcelaphus buselaphus cokii*), fringe-eared oryx (*Oryx beisa callotis*), gerenuk (*Litocranius walleri*), impala (*Aepyceros melampus*), lesser kudu (*Tragelaphus imberbis*), wildebeest (*Connochaetes taurinus*) and Kirk’s DikDik (*Madoqua kirkii*). Finally, there are also Burchell's zebra (*Equus burchelli*)*,* warthogs (*Phacochoerus africanus*), bushpigs (*Potamochoerus porcus*), and Maasai giraffes (*Giraffa camelopardalis tippelskirchi*)*.* Whilst this is a non-exhaustive list, it nonetheless usefully indicates the significant mammal species richness of the Project Area.

Bird diversity

Due to its topographic features and variety of vegetation types, the Project Area has a rich avifauna including both resident, Palearctic and intra-tropical migrant bird species. Both the CHNP and TWNP are classified by BirdLife International as Important Bird and Biodiversity Areas (IBA). The species listing for the nearby Tsavo East National Park includes in excess of 450 species and the species total for the Project Area can be expected to be of a similar order of magnitude (Lack, Leuthold and Smeenk, 1980)

Rarer and threatened species include the IUCN Red listed Abbott's Starling (*Cinnyricinclus femoralis*), that lives on a few montane forest patches in Kenya and Tanzania and is classified as vulnerable (VU). This bird uses the Chyulu Hills mainly as a stopping point between Mount Kilimanjaro and the central Kenyan highlands (Bennun and Njoroge, seen 12 February 2014). There are a number of endemic races of bird species described from the Chyulu Hills, including *Francolinus shelleyi* (macarthuri), *Pogonocichla stellata* (macarthuri) and *Zoothera gurneyi* (chyulu). Regionally threatened species include *Hieraaetus ayresii* (status unknown); *Stephanoaetus coronatus* (status unknown) and the vulnerable *Polemaetus bellicosus* (ibid).

Amphibians, reptiles, insects

The Chyulu Hills area is home to a diverse assemblage of butterfly species. Endemic species include *Pentila tropicalis chyulu, Acraea anacreon chyulu, Papilio desmondi desmondi* and the near-endemic *Amauris echeria chyuluensis.* Two amphibian taxa, *Afrixalus pygmaeus septentrionalis* and *Hyperolius sheldricki*, are also endemic. Reptile diversity is also significant and includes snakes, such as the black mamba (*Dendroaspis polylepis*), puff adder (*Bitis peringueyi*), rock python (*Python molurus*), as well as several different species of gecko, and lizard.

1.2.5.5 Threats to the biodiversity

1. Land conversion and unsustainable water off-take

Threats to aquatic habitat are severe due to rapidly expanding human demand. Waterways are threatened due to unregulated water off-take, agricultural expansion and degradation of water catchments. This is accompanied by siltation and eutrophication, with its long-term impacts upon the land, such as the drying wetlands.

2. Deforestation and forest fires

Forested areas are at major risk from deforestation and degradation.

As further described in section 4.5 (Additionality) there is evidence of significant encroachment into the Project Area already, including within the land units that are officially protected. Forested and/or native grassland areas are cleared with the deforestation and conversion generally accomplished by hand through an unplanned process to meet immediate familial nourishment requirements (subsistence farming). In the hills, there is ongoing gathering or harvesting of wood for the production of carvings. Illegal charcoal production in the Project Zone is a significant driver of deforestation, particularly on the eastern boundaries of the Project Area. Firewood is also collected on a large scale and anthropogenic fires are a common occurrence. There is significant evidence that the boundaries of even the protected portions of the project boundaries are not adequately enforced (see section 4.5), and that there is a level of uncontrolled access into protected areas that potentially leads to conversion.

3. Poaching and habitat loss

Subsistence and commercial poaching ("bushmeat" hunting) is still carried out in the area and is mainly a threat to smaller antelopes. Poaching for ivory and rhino horn is a major threat to elephant and black rhino populations and has increased significantly in the last few years across Africa as demand, market price, and the involvement of international criminal trafficking syndicates has grown.

4. Habitat fragmentation

Habitat loss due to agricultural expansion, settlements and fences may influence wildlife migration routes, causing habitat fragmentation.

5. Climate Change

Climate change in Southeastern Kenya will result in increasing average temperatures, produce more frequent and prolonged droughts (Downing *et al*., 2008), and reduce the productivity of the traditional subsistence crops grown by local farmers who already experience low variability and diversity of crops. High reliance on subsistence agriculture due to low skills and lack of knowledge concerning other income-generating activities can lead to severe vulnerability to climate change, which in turn poses a large risk to biodiversity. The 2009 drought, for example, had devastating effects on wildlife numbers (Worden *et al*., 2010). Increases in drought and decreased rainfall forces local smallholder farmers to rapidly expand in search of more fertile locations, leading to increased threat of encroachment into the Project Area, and, as a result, heavy threats to both flora (through deforestation) and fauna (from increased poaching activities).

1.2.6 High Conservation Values within the Project Zone (G1.8)

1.2.6.1 Globally, regionally or nationally significant concentrations of biodiversity values

Due to its diversity in landscapes, habitats and species, the Project Zone contains a range of biodiversity values that are significant on a global, regional and national level.

1.2.6.2 Protected Areas

The Project Zone contains three land units that are protected areas, namely the CHNP, SCE (TWNP), and Kibwezi Forest Reserve. Both of the national park areas fall into IUCN Protected Area Management Category II. In addition, these parks are part of the greater Tsavo Conservation Area (TCA), which is globally recognized for its large elephant population. TWNP and the Rhino Area in the CHNP have also been identified as being amongst Kenya's 80 Key Biodiversity Areas (KBAs) (UNEP-WCMC, seen 11 February 2014). Important Bird Areas (IBA) are an extension of Key Biodiversity Areas. Parts of the Chyulu Hills have been identified as an IBA (026) for Kenya, as has TWNP (027) (Bird Life International, seen 11 February 2014). The efficacy of the protection status of both of the aforementioned areas is under question, as both locations have seen moderate to severe pressure from encroachment, poaching and illegal charcoaling / wood extraction.

1.2.6.3 Threatened Species

There are a number of species in the Project Area that are classified as either near threatened, vulnerable, endangered or critically endangered. According to the IUCN Red List the threatened species found within the Project Area are as follows:

Near Threatened (T):

- Leopard (*Panthera pardus*)

- Gerenuk (*Litocranius walleri*)
- Lesser kudu (*Tragelaphus imberbis)*
- Thompson's gazelle (*Eudorcas thomsonii)*
- Rock python (*Python molurus*)

Vulnerable (VU):

- African Elephant (*Loxodonta Africana*)
- Cheetah (*Acinonyx jubatus*)
- Lion (*Panthera leo*)
- Abbott's Starling (*Cinnyricinclus femoralis*)
- Martial Eagle *(Polemaetus bellicosus)*
- African Stinkwood (Prunus Africana)

Endangered (EN):

- Wild dogs (*Lycaon pictus*)
- Basra reed warbler (*Acrocephalus griseldis*)
- East African Yellowwood *(Podocarpus usambarensis)*
- White-backed Vulture (*Gyps africanus*)

Critically endangered (CR):

- Black rhinos (*Diceros bicornis*): a small population of black rhinos lives in the Rhino sanctuary in the northern part of the Project Area. The rhino area remains severely threatened.

1.2.6.4 Species Endemic to the Chyulu Hills Ecosystem

There are a number of sub-species or races that are endemic to the Chyulu Hills ecosystem present in the Project Area, particularly in CHNP. This may reflect the relatively young age (in evolutionary terms) of these hills. More research needs to be undertaken to investigate further endemism in the area. The following species and/or subspecies are known to be endemic in the Project Area:

Table 5. Sub-Species endemic to the Chyulu Hills ecosystem found Within the Project Area

Fauna	Common Description	Linnean Taxonomy
Birds		
	Shelley's Francolin White-starred Robin Orange Ground Thrush	*Francolinus shelleyi* *Pogonocichla stellata* *Zoothera gurneyi Chyulu*
Butterflies		
		Pentila tropicalis chyulu *Acraea anacreon chyulu* *Papilio desmondi desmondi* *Amauris echeria chyuluensis*
Amphibians		
		Afrixalus pygmaeus septentrionalis *Hyperolius sheldricki*

1.2.6.5 Areas that support significant concentrations of a species during any time in their life cycle (e.g. migrations, feeding grounds, breeding areas).

Okello (2009) and Okello (2012) highlight the importance of both Kimana GR and Mbirikani GR respectively as critical dispersal areas for wildlife. Generally speaking, the Project Area acts as an important corridor for wildlife, particularly for elephants and lions. Blanc *et al*., (2003) identified that over 80% of the known elephant range lies outside of protected areas. A study conducted by Kioko & Seno (2011) investigated four migration corridors in the Tsavo-Amboseli-Kilimanjaro ecosystem and highlighted their importance in the face of increased human population, land conversion, sub-division and other threats. Together with elephants, Kioko & Seno (2011) identified over 17 other large mammal species that used the corridors as the only conduits to migrate back and forth to Kimana Sanctuary and the adjacent dispersal area. The Tsavo-Amboseli-Kilimanjaro ecosystem is also an important dispersal area for lions. According to Frank *et al*. (2006), the estimated number of lions living in the Tsavo ecosystem is the second largest in Kenya. However, lion populations face severe pressure as they are still killed in retaliation for livestock loss or for the traditional Maasai practices of *Olamaiyo* (young men proving their manhood).

1.2.6.6 Globally, regionally or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance

As highlighted above, the Project Area is part of the Tsavo Conservation Area and offers landscape-connectivity within Kenya as well as into Tanzania. In addition, the Project Area is located in the Somali-Maasai Biome, which expands from the Horn of Africa down to Northern Tanzania, and contains a suite of habitats and viable populations of species. 60 of the 92 species in the Somali-Maasai biome have been recorded in Tsavo, and thus the Project Area plays a vital role in maintaining these natural patterns of species distribution and abundance.

1.2.6.7 Threatened or Rare Ecosystems

The Chyulu Hills ecosystem has itself been identified as having incredible ecological value. In its submission to UNESCO for the inclusion of both Tsavo East and West National Parks and the Chyulu

Hills complex as a World Heritage Site, KWS noted, “The volcanic hills of Chyulu, ash cones and craters are outstanding examples of the major stages of the earth's history. Presence of numerous plant taxa, epiphytes, saprophytes and the beautiful montane forests also indicate on-going ecological and biological processes. The Chyulu Hills are an important corridor for Elephants that move from Tsavo to Amboseli game reserve” (KWS, 2010). The montane cloud forest is equally of great conservation concern due to its vital role as a water catchment, yet it is under substantial risk of severe deforestation, as previously outlined.

1.2.6.8 Areas that provide basic ecosystem services in critical situations (e.g. watershed protection, erosion control)

Critical ecosystem services are those services where their disruption of such would pose a threat of severe, catastrophic or cumulative negative impacts on welfare, health or survival of local communities (Brown *et al*., 2013, p. 37). In the CHRP it has been identified that High Conservation Values (HCV) exist in the areas of hydrological services and erosion control. These are described in more detail below.

1.2.6.9 Hydrological services

The Chyulu Hills mountain range has been identified as a HCV location due to its vital importance as a water catchment. According to the Kenya Water Tower Agency (KWTA), “Kenya is endowed with a number of smaller water towers, many of them located in arid and semi-arid areas where they play a critical role as sources of water for pastoral communities, as well as sources of piped water for urban settlements” (KWTA, seen 12 February 2014) of which the Chyulu Hills are one. The springs (including Kiboko, Umani and Mzima Springs) are critical for providing clean drinking water, water for cooking, washing and irrigation. The predominantly poor and rural population is highly dependent on the continued supply of clean water.

1.2.6.10 Erosion control

According to the HCV Network Toolkit, the grasslands within the Project Area are classified as being of HCV such that their loss would lead to serious soil erosion and desertification. This is particularly the case in arid and semi-aid areas of the Project Area, where soil fertility is low.

1.2.6.11 Areas that are fundamental to meeting the basic needs of local communities (e.g. for essential food, fuel, fodder, medicines or building materials without readily available alternatives)

Local communities rely on natural resources in the Project Zone and the surrounding areas to satisfy their basic needs. In particular, pastoralists depend on a number of provisioning services, which classify as being of HCV. Building materials such as poles and sticks are sought after, as they are required to build the traditional Maasai house, the boma. The Maasai pastoralist system is primarily dependent on the grasslands and woodland areas with a grass understory. Wood and charcoal are used extensively as the primary fuels for cooking, within and around the Project Zone.

1.3 Project Proponent (G4.1.)

The Project Proponent for the CHRP is the Chyulu Hills Conservation Trust (CHCT). To provide effective management of the CHRP the CHCT recognizes the importance of having a Project Office. At a meeting of the CHCT’s governing board on October 28, 2015, the board highlighted the need for a project office and it was agreed that the office of MWCT at the Chyulu Hills Research and Conservation Centre (CCRC) on Kuku Group Ranch would serve as the Trust Office and Project Office for the CHRP. The CCRC is located at the UTM coordinates zone 37M 379594 m E, 9684481 m S. A new physical office is currently

under construction for this purpose, with the project staff operating out of the adjacent MWCT office until it is complete. The office is open during regular business hours and is readily available for members of the community to receive information about the Project, to express any concerns or grievances and to interact with the Project Proponent in an open and transparent manner.

Organization name	Chyulu Hills Conservation Trust (CHCT)
Contact person	Mr. Iain Oliver
Title	REDD+ Project Manager
Address	CCRC, Maasai Wilderness Conservation Trust, Kuku Ranch
Telephone	070 4464 905
Email	ChyuluHillsConservationTrust@gmail.com

The role of the Project Office, approved by the board is:

Coordination and Project Management

- Manage overall coordination, communication and collaboration among all Project Partners.
- Coordinate communications and community outreach.
- Host and maintain repository of project information.
- Coordinate field work (patrolling and security, biodiversity/wildlife monitoring) between partners.
- Manage planning and coordination of activities required for ongoing verifications:
    - Integration of Project monitoring activities (social, biodiversity, soil and plot sampling).
    - Contracting and monitoring external consultant.
- Consolidate data and prepare for analysis.
- Draft project policies (with maximum integration with partners' existing policies).
- Serve as Project representative for community engagement and recipient of comments and grievances in relation to the Project (as further defined by the project Grievance and Redress Mechanism).
- Negotiate and manage contractual service providers.

Revenue Allocation and Grants Management

- Manage allocation of CHCT funds as agreed by Trustee Board representatives, adopting grant awards and management best practices.
- Manage the award of grant funds to Trustee organizations and external parties as directed by the board representatives:
    - Design and implement grant application process.
    - Request, review and short list applications from Trustee organizations.
    - Communicate budgeted grant amounts to Trustee partner organizations.
    - Review grant activities and reporting.
    - Manage payment of grant awards in accordance with grant agreements.

Trust Board Communication, Operations and Support

- Support all operations and logistics related to the Board and its meetings.
- Work with Chairman to schedule meetings and ensure formal notifications are sent out.
- Draft agendas, consult Board members and circulate agenda.
- Take minutes, draft and circulate.
- Assist Board representatives with logistical support for attending Board meetings.
- Undertake research and preparation of background information and documents for Board.
- Prepare financial reports for Board.
- Support Chairman, Secretary and Treasurer in activities related to Board agenda and actions.

Although the CHRP operations are coordinated though the Project Office, activities are carried out by the various Project Partners themselves. BLF, MWCT, KWS, KFS and DSWT still continue their independent activities in addition to the activities specific to the CHRP. The Project Partners' role is to assist in the implementation of the project activities and to act as a link between the communities' needs and the Project Office.

1.3.1 Project Partners (G4.1.)

The CHRP's uniqueness lies in its constituent partners, each of which contributes specific important resources and expertise. While some partners have long-standing, ground-based operations within the landscape, other partners offer more technical, political and governance expertise. The constituent partners include: Big Life Foundation, Maasai Wilderness Conservation Trust, Kenya Wildlife Service, Kenya Forest Service, David Sheldricck Wildlife Trust. Conservation International has provided significant technical and financial assistance. Wildlife Works has additionally provided significant technical assistance, REDD+ expertise and key personal for the Project's development and the Project's validation and verification stages. Together with the traditional Maasai landowners, this CHRP implementation team has proven to be an exceptionally strong partnership, which has ensured the successful execution of activities in line with the Project's objectives.

For more detailed information on the Project Partners please refer to section 1.4.1 of the CHRP PD.

Big Life Foundation

The Big Life Foundation (BLF) is a Kenyan–registered Trust based on Mbirikani GR. It was founded by photographer Nick Brandt and conservationist Richard Bonham in September 2010 with the aim of enhancing the protection of the Amboseli-Tsavo ecosystem through a holistic conservation model. Prior to this initiative, Richard Bonham had been running the Maasai Preservation Trust (MPT) for over 20 years. The entities merged in 2010. Currently, BLF uses many of MPT's strategies in a community collaborative approach to address the region's greatest wildlife threats, reduce the loss of wildlife to poaching, defeat the ivory trade, mitigate human-wildlife conflict, protect the great predators, and manage scarce and fragile natural resources. It recognizes that for the Maasai residents of Mbirikani Group Ranch and the Amboseli-Tsavo ecosystem as a whole, the cost of living with wildlife currently exceeds the benefits and therefore works to shift this dichotomy.

BLF's primary role in the Project is focused on anti-poaching and security measures, as they have long-term experience in this field as well as expert knowledge of the landscape. BLF is also instrumental in the running of the predator compensation scheme for their area of influence. Their local expertise has been instrumental for the determination of income generating activities to be implemented with the local communities.

Maasai Wilderness Conservation Trust

The Maasai Wilderness Conservation Trust (MWCT) is a Kenyan registered trust and was set up in 2000 by Luca Belpietro, Antonella Bonomi and Samson Parashina on Kuku GR. The goal of MWCT is to protect the wilderness, wildlife and cultural heritage across the Tsavo-Amboseli ecosystem by providing sustainable economic benefits to the local Maasai people. MWCT is a pioneering partnership between professional conservationists and dynamic young Maasai leaders. MWCT maintains its own staff, and also provides staffing and facilities to support the REDD+ Project Office.

MWCT manages an integrated program that includes conservation, community support focusing on health, education and livelihoods, and ecotourism. Conservation programs include wildlife and habitat protection with over 100 Rangers employed to combat poaching and illegal activities and provide community outreach and information-sharing; research and monitoring, wildlife monitoring and lion research led by a group of young Maasai warriors called Simba Scouts; a predator loss compensation program called Wildlife Pays; land conservancies, and an ecotourism partner, Campi ya Kanzi. MWCT also has emerging initiatives on grassland restoration and is developing an integrated approach to livestock grazing.

Kenya Wildlife Service

The Kenya Wildlife Service (KWS) is a Kenya state corporation established by an Act of Parliament and the Wildlife (Conservation and Management) Act No.16 of 1989 with the mandate to conserve and manage wildlife in Kenya, and to enforce related laws and regulations. Its mission is to “save the last great species and places on Earth for humanity”. KWS is the mandated authority for both the CHNP (with its headquarters near Kibwezi town) and the SCE in the TWNP (with headquarters at Kamboyo, near Mtito Andei). KWS manages the wildlife, wildlife habitat, security and tourism in the parks. In addition, KWS runs a number of community projects, aiming to raise environmental awareness through education and also it also deals with human-wildlife conflict mitigation.

KWS’s mandate is the continued management of the national parks, and thus they will mainly provide operational assistance and collaboration for the newly employed carbon rangers in close partnership with the Project Office. KWS will also be in charge of running the predator compensation scheme and human-wildlife mitigation initiatives on the eastern side of the Project Area as well as ensure continued community engagement through their outreaches.

Kenya Forest Service

Kenya Forest Service (KFS) is a State Corporation established in February 2007 under the Forest Act 2005 to conserve, develop and sustainably manage forest resources for Kenya's socio-economic development. Its vision is “to be the leading organization of excellence in sustainable forest management and conservation globally” (KFS website, retrieved 13 December 2013). KFS is the landowner of the Kibwezi Forest Reserve, which was gazetted in 1936. A concession agreement was granted to the David Sheldrick Wildlife Trust (DSWT) in 2009, which handed over the management rights to the DSWT for 30 years.

KFS is a department of the Ministry of Environment and Natural Resources, which is mandated to develop the National REDD+ Strategy and launch the National REDD+ Program, through its input into the National REDD+ Coordination Office. With KFS as a key stakeholder in the CHRP, it is anticipated that the implementation of the CHRP will influence policy and program design at the national level. With the broad scope and scale of the CHRP, it is also anticipated that KFS will play a key role in advocacy for the Project at a national level.

David Sheldrick Wildlife Trust

The David Sheldrick Wildlife Trust is a wildlife conservation charity registered in Kenya. Separate entities that represent the Trust are also registered in both the United Kingdom and the United States. The trust was established in 1977 by Dr. Dame Daphne Sheldrick, in the honor and memory of her late husband, the famous naturalist and founding warden of TWNP, David Leslie William Sheldrick. Today, it runs the world's most successful orphan-elephant rescue and rehabilitation program and is one of the pioneering conservation organizations for wildlife and habitat protection in East Africa (DSWT website, seen 13 December 2013). The DSWT has a 30-year concession with the KFS for the Kibwezi Forest, which writes over management rights to the trust.

DSWT's responsibility will be in partnering with rangers from KWS, MWCT, BLF and newly employed carbon rangers to coordinate anti-poaching and security activities. DSWT will continue to coordinate with the Project Office in community outreach, bursary schemes, community projects and capacity building.

1.4 Other Entities Involved in the Project (G4.2.)

Organization name	Conservation International
Role in the project	Conservation International (CI) is a non-profit environmental organization, set up in 1989, with headquarters in Arlington, Virginia. It is one of the largest conservation organizations headquartered in the US, with close to 1,000 employees worldwide. Its vision is to protect nature and its biodiversity, for the benefit of humanity. CI is one of the leading developers and implementers of forest carbon projects, including REDD+ and A/R, and has a diverse global portfolio of site-level initiatives, with projects already verified under the Verified Carbon Standard (VCS) and/or the Climate, Community and Biodiversity Standards (CCBS) in Peru, Fiji, the Philippines, Brazil, and Madagascar. CI's primary responsibility in the Project has been providing significant technical and strategic support for project development and implementation. CI has also been assigned the role of selling and marketing of carbon credits, once the Project is verified and credits have been issued. CI is an Advisory Member of the CHCT Board.
Contact person	Natasha Calderwood
Title	Projects Director, Carbon Fund
Address	2011 Crystal Drive, Suite 500 Arlington, VA 22202 USA
Telephone	703.341.2450
Email	ncalderwood@conservation.org

Organization name	Wildlife Works Carbon
Role in the project	Wildlife Works Carbon (WWC) is a community and conservation focused, for-profit organization established in 1998. It is the world's leading REDD+ project development and management company, with an effective approach to applying innovative market-based solutions to the conservation of forest and biodiversity. Its headquarters are in Mill Valley, California, but WWC's operations are focused in Africa And Asia. In 2011, WWC's Kasigau Corridor REDD+ Project became the world's first dual VCS / CCB validated and verified project. WWC followed this in 2012 with the validation and verification of the Lac Mai Ndombe REDD+ project in the Democratic Republic of Congo, another first of its kind. Wildlife Works has over a decade of experience in operating successful conservation projects in East and Central Africa. WWC have provided the technical expertise and coordination required to undertake the validation and first verification process. Their involvement will continue in the role of an advisory partner, if and when desired by the Board of Trustees and Project Office.
Contact person	Simon Bird
Title	Director of Forest Science
Address	242 Redwood Highway, Mill Valley, CA 94941 USA
Telephone	415.332.8081
Email	Simon@wildlifeworks.com

Organization name	The African Wildlife Foundation
Role in the project	The African Wildlife Foundation (AWF) is an international conservation organization founded in 1961, then called the African Wildlife Leadership Foundation. AWF is the largest conservation NGO working exclusively on African conservation issues. Its purpose is to develop sustainable systems within Africa's landscape, taking into account the needs of biodiversity and communities alike. It focuses on a landscape-level approach by identifying large, ecologically-important areas that typically span national boundaries. Since validation of the Project, AWF's involvement has been in an advisory capacity as an Advisory Member of the CHCT Board.

Contact person	Kathleen Fitzgerald
Title	Vice President of Land Protection, Nairobi, Kenya
Address	African Wildlife Foundation Ngong Road, Karen P.O. Box 310, 00502 Nairobi, Kenya
Telephone	+ 254 (0) 711 063 000
Email	kfitzgerald@awf.org

There are also several other organizations that have been critical to the authoring of this document and will continue to be essential to the success of the CHRP:

1. The University of California, Santa Barbara: Wildlife Works engaged several students in the Geography Department to collect and interpret imagery for the Biomass Emissions Model

   Contact: Dr. Greg Husak, Department of Geography. husak@geog.ucsb.edu.

2. The legal offices of Freshfields, Bruckhaus, Deringer LLP (Freshfields): Freshfields provided legal advice and support for development of legal agreements in relation to the REDD+ Project.

   Contact: Max Cairnduff, max.cainduff@freshfields.com.

3. The legal offices of Raffman, Dhanji, Elms and Virdee: Guy Elms provided pro-bono work for the Project Partners. His function is to assist Freshfields in interpreting Kenyan law for the Project.

   Contact: Guy Elms. elms@rev.co.ke.

4. The REDD+ Coordination Office within in the Ministry of Environment and Natural Resources: The REDD+ Coordination Office has the mandate to develop the national REDD+ Program for the country of Kenya.

   Contact: Alfred Gichu. alfredgichu@yahoo.com.

The CHRP is managed and operated by a pool of qualified staff, who each possess long-standing experience and a positive track-record in their respective fields. Please see the CHRP PD for more detail on the specific technical skills of the Project management.

1.5 Project Start Date (G3.4.)

MRR.2 The Project Start Date

The Project Start Date for the CHRP is the date on which the biomass sample plot sampling commenced: 19 September 2013. This is ultimately the date when carbon-related activities began in the landscape and therefore marks the Project Start Date.

1.6 Project Crediting Period (G3.4.)

MRR.3 The project crediting period start date, end date and length.

The Project Lifetime will be 30 years commencing from the Project Start Date of 19 September 2013 and ending 19 September 2043. The GHG accounting period will be the same 30 years as the lifetime of the Project.

Table 6: Project Implementation timeline including Project Activities and first and second monitoring milestones.

Date	Project Activity or Event
19 September 2013	Project start date and project crediting start date.
June 2014	MOU signed among Project partners establishing Project Proponent, project office agreement and project operating structure
July 2014	Project Description Document Public Comment Period
June 2015	Project Validation
2013-2016	Coordination between and enhancement of Project Partner ranger forces.
2013-2014	Establish tree nurseries
August 2016	SBIA Workshops
August/September 2016	Baseline Household Survey
November 2016	Monitoring Report / Project Implementation Report Public Comment Period
April 2017	First project verification event
June 2017	Project Office building compete
April 2019	Second project verification event
19 September 2043	Project end date and project crediting end date.

1.7 Sustainable Development

The CHRP provides many benefits that will help achieve Kenya's stated sustainable development goals. In 2015 Kenya joined the global community in adopting the Sustainable Development Goals (SDGs), a set of 17 universal goals covering the thematic areas of environmental, economic and social development. These 17 goals are structured to help drive the countries funding and policy decisions. Additionally, in 2016 Kenya implemented the Vision 2030 plan, a long-term development plan with the goal of transforming Kenya into a newly industrializing, middle-income country that provides a high quality of life to all its citizens by 2030 in a clean and secure environment. These two sustainable development plans are coordinated in their goals and thematic areas. The climate, community and biodiversity benefits provided the CHRP, and detailed in sections 6,7 and 8, all contribute to achieving the global and national sustainable development goals detailed in these two plans. These contributing benefits are monitored through the CHRP's climate, community and biodiversity monitoring plans. Some of Kenya's sustainable development goals that the CHRP will contribute to include: ending poverty, providing education to all,

sustainable water management, action to combat climate change and its impacts, and to sustainably manage forests, and reverse land degradation and halt biodiversity loss.

2 IMPLEMENTATION OF DESIGN

The CHRP has implemented a number of measures to monitor and manage leakage from the project area and non-permanence risk factors. Potential leakage from the Project is mitigated through project activities, which are designed to address the drivers of deforestation. Any leakage that does occur is monitored through the use of the leakage area. Please refer to section 6.3 for more detail on the mitigation and assessment of leakage. This document also documents the many methods that non-permanence risk factors are monitored and managed. Internal and external risks to the carbon stocks are managed through a combination of mitigation of the drivers of conversion and degradation and active protection of the Project Area. Please refer to section 2.3 for more detail on the Project Activities. Additionally, the expertise of the Project Proponent and management team enable the management of many of the risk factors. Natural risks are managed through the projection of the Project Area and its natural biodiversity. This provides the landscape with the greatest resilience to any natural risks to the Project's non-permanence. Additionally, the constant monitoring of the Project Area will inform the Project management of the presence of natural risks, such as fire or pest infestation, so that they can manage the risk. All non-permanence risk factors are monitored with the permanent sample plots and the Project's disturbance monitoring SOP, which will measure any conversion or degradation that has occurred.

2.1 Sectoral Scope and Project Type

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

2.2 Grouped Project

The CHRP is not a grouped project. This section is not applicable.

2.3 Description of the Project Activity (G3.2.)

The CHCT, working in collaboration with the Project Partners and other partners, has continued the conservation and community support programs that are essential for maintaining carbon stocks and delivering GHG emissions reductions. It has further expanded, enhanced and developed these programs and activities. As this is the first verification period, the project has not yet been in a position to deliver any additional revenues from carbon sales so that the continuation and expansion of initiatives has been funded, as before, largely through philanthropic sources and ecotourism. All the institutions have faced funding challenges and the future generation of carbon revenues as part of a broader strategy to diversify and expand revenue streams will be critical to support the project's long-term sustainability and continue to generate emissions reductions.

In the CHRP Project Document, a range of project activities to protect carbon stocks, conserve biodiversity, and engage and support local communities were proposed. During the crediting period further discussion and review have taken place to refine these activities and develop them in the context

of a more strategic vision. In 2015-16 a consultative process was initiated with project partners for aligning and coordinating the implementation and management of these activities across the landscape, and to provide a more coherent framework and further definition of the suite of exact project activities that would be undertaken under the broader themes, to identify the responsible parties, and develop a proposed initial timeline. The results of this process are summarized in a report entitled "Narrative of Project Management Plan for the Chyulu Hills REDD+ Project" and an accompanying Excel work plan.

Based on the CHRP Project Document, the more recent consultative process, and ongoing discussions, the following categories of Project Activity have been adopted: (1) Forest Protection, (2) Livestock and Range Management, (3) Reforestation and Improved Agriculture, (4) Community Engagement and Support, (5) Biodiversity Conservation and Research (6) CHCT Governance and Management. The description of project activities is based on this framework.

2.3.1 Forest Protection

2.3.1.1 Enhancement of habitat protection and training in conservation practices

2.3.1.1.1 Expand anti-poaching and security ranger teams:

KWS, MWCT, BL and DSWT have all continued to deploy significant ranger forces that are undertaking field patrols on a daily basis. The number of rangers deployed (existing and newly hired) by each organization is summarized in Table 7 below.

Table 7: Rangers operating in the Project Area and new rangers that have been hired by Project Partners of the Chyulu Hills REDD+ Project.

Organization	Number of Rangers (October 2016)	New Rangers Hired / Deployed	Notes
Big Life	222	60	222 comprises the total ranger force deployed in Kenya, of which 110 operate in the Project Area. Of these, 21 rangers are new hires. The rangers operating outside the Project Area are involved in the surrounding areas bordering the Project within the greater Chyulu-Amboseli landscape
MWCT	116	22	
KWS (Tsavo West)	N/A		
KWS (CHNP)	71 rangers 4 Officers		
DSWT	16	0	
Total	413	82	

In the case of BLF and MWCT the majority of the rangers are from the local Maasai communities.

Patrols are conducted on foot, motor-bike and vehicle and all rangers have been trained in bush craft either in house or by the KWS Manyani Law Enforcement Academy. These patrols protect against poaching of wildlife, illegal incursion into the forest and the felling of trees, provide communication and liaison with community members, and collect monitoring and research data. Rangers based in KWS

Rhino sanctuaries, and MWCT and BLF rangers all collect data by means of the Zoological Society of London (ZSL) Spatial Monitoring and Reporting Tool (SMART).

KWS, Big Life, DSWT and MWCT all have aircrafts that are engaged in regular patrolling and support for the rangers.

2.3.1.1.2 MWCT Simba Scout program

The Simba Scout Program forms part of the initiative to maintain a healthy population of lions in the landscape. MWCT has recruited an additional 6 simba scouts (captured above in the additional 22 rangers of MWCT), who have undergone in-house training on tracking, enforcement and in the use of Cybertracker and SMART procedures. This team totals a dedicated squad of 14 Maasai warriors (Morans), who continuously monitor GPS collared lions and other wildlife species and provide additional coverage to the ranger force. Data collected is used to record the movements of lions, monitor their population and provide real-time information on their location, which can be used to warn cattle-herders, to prevent and mitigate human-wildlife conflict with the local Maasai communities.

2.3.1.1.3 KWS training for new rangers

All rangers employed by KWS undergo the basic ranger training at the Manyani Law Enforcement Academy. Including anti-poaching techniques, bush craft, arrest and crime scene best practices and other appropriate topics.

2.3.1.1.4 Ranger refresher training

60 Community Rangers from MWCT have undergone training in arrest procedures, prosecuting and scene of crime management at the CCRC. The training was held on June 2, 2016 and was conducted jointly by KWS senior staff and the Kenyan Police Service, Mtito Andei.

2.3.1.1.5 Specialist training for security collaboration

Negotiations and planning have begun in collaboration with the TenBoma organization to improve law enforcement practices, and coordination of general anti-poaching activities between, BLF, MWCT, DSWT and KWS. In November 2016, an MOU was signed with IFAW and TenBoma, the umbrella organizations coordinating this collaboration.

2.3.1.1.6 Integration of Protection Operations

Linking the Trustee organizations through the REDD+ project and their involvement as Trustees of the CHCT has helped to catalyze increasing levels of collaboration and integration, especially in relation to the deployment of their ranger forces. Big Life and DSWT have provided vehicles and equipment to KWS and BL, DSWT, MWCT and KWS are increasing information-sharing, joint-planning, and mutual support to promote more effective operations. In November 2015, three MWCT staff were awarded Honorary Warden status by KWS and MWCT has also received a formal letter of Appreciation for their collaboration and support.

2.3.1.2 Fire response and management

Fire is a natural component of East African savannah and woodland systems. Fire has also been used traditionally by the Maasai to burn grassland in the dry season to promote the growth of more nutritious grass for livestock. However, fire does pose a potential threat to the cloud forest and excessively frequent fires also threaten the lower elevation grasslands, acacia woodland and lava forests. Reducing fires requires a combination of community outreach and improved firefighting capability. Both MWCT and BLF have engaged in discussions with the communities about purposeful burning and rangers visit all

seasonal bomas yearly to conduct awareness meetings and follow up on individuals suspected of setting illegal fires. MWCT has undertaken controlled burning in certain areas to create firebreaks and rangers have received initial training in basic fire response procedures and fire-fighting. KWS have created fire breaks in the rhino sanctuary.

The Project recognizes the need to develop a more comprehensive fire management strategy in the future. In the longer-term, controlling of purposeful burning will be a component of an overall livestock and rangeland management program.

2.3.1.3 Engagement with local law enforcement and political leaders to support awareness, protection and prosecution

All the partners recognize the importance of engaging with local and national political leadership to support the conservation and community engagement initiatives. Representatives from all the organizations have been in regular contact with the regional and county leaders to inform them about the project and discuss issues. Hon Katoo Ole Metito, Member of Parliament for Kajiado South constituency and Chief Whip for the government, meets regularly with representatives from all the CHCT trustee organizations and continues to be a strong supporter of the REDD+ project. As an example of his support, he made the following statement about the work of Big Life in May 2015:

"Big Life Foundation has become the benchmark of the good work any NGO can do in the communities of the Amboseli-Tsavo ecosystem. It has played a very critical role in bringing about the necessary mental shift, from where wildlife was viewed as an enemy to where wildlife is viewed as a resource that benefits the local community." (https://biglife.org/news-events/endorsement-of-big-life-foundation-by-honorable-katoo-ole-metito-mp)

CHNP management held a series of six meetings with Makueni County government to build awareness of conservation issues in the Chyulu Hills landscape.

In addition, all the organizations have been working closely with local law enforcement and the courts to improve understanding and enforcement of laws related to offences in situations where arrest and prosecution are required. To date, sixty MWCT rangers have undergone training by KWS and the Kenya Police in arrest procedures, prosecution, and scene of crime management. KWS conducted an awareness meeting with magistrates from the local Makindu courts to discuss law enforcement related to forests and wildlife.

2.3.1.4 Improved ranger equipment and infrastructure

The four Project Partners that manage ranger operations have all provided replacement or additional equipment and infrastructure to support these field staff. A summary is provided in Table 8.

Table 8: New infrastructure and equipment added by Project Partners to support ranger operations.

Organization	New Infrastructure and Equipment
Big Life	• 5 new ranger posts and 2 new "mini-huts" • 1 new vehicle (1 donated to KWS), 2 new motorbikes • 30+ new camera traps • 6 new firearms and 1 pepper gun • 1 thermal imagery camera • 8 night vision goggles

	• General ranger equipment including: GPS, digital cameras, binoculars, bed rolls, sleeping bags, mosquito nets, uniforms, backpacks, camelbacks, etc.
MWCT	• 25 additional radios • 11 GPS units • 7 tin huts for community rangers • 1 motorbike • 26 bed frames for community rangers • 4 cameras • Community rangers uniforms
KWS (Tsavo West)	• New ranger uniforms
KWS (CHNP)	• Camping tents • Mobile solar charging systems • GPS and binoculars • Water storage tanks
DSWT	• 2 vehicles (1 donated to KWS)

2.3.1.5 Creation and management of conservancies on group ranches

MWCT has entered into agreements with the Kuku Group Ranch officials and formalized and operationalized two protected conservancy areas. These are the Motikanju and Kanzi conservancies in the West and East of the Group Ranch respectively. Within these conservancies grazing is strictly controlled, no extractive resource use is allowed, and both areas have been prioritized from a law enforcement and anti-poaching perspective. These conservancies protect forest and grasslands and are critical for wildlife. The Conservancy concept will also be a component of a broader rangeland management strategy moving forward.

2.3.2 Livestock and rangeland management

The management of livestock grazing on the Group Ranches and its integration with wildlife and forest conservation is a key issue for the Project to address. Ownership of cattle is a central tenet of Maasai culture and provides some level of income to many families. However, livestock management is also linked to a variety of factors that impact the goals of the Project. It is clear that there are far too many livestock units for the carrying capacity of the rangeland. This results in severe overgrazing and degradation of the grasslands in certain areas, herders grazing livestock in protected areas (conservancies and the national parks), increased losses to predation, which increases the cost of compensation and can lead to lion and predator killing, and an increase in the incidence of fires. Even though there is a strong cultural tradition of cattle herding by the Maasai, the overall socioeconomic framework is undergoing tremendous and rapid change. Families are encouraged to, and increasingly desire to send their children to school rather than herd livestock. Also, keeping low quality livestock on an overgrazed range does not produce an adequate economic return as people transition into Kenya's rapidly growing cash economy. This combination of impacts and circumstances potentially provides an opportune time for developing a comprehensive strategy for livestock and rangeland management and rehabilitation.

All the Project Partners have recognized this issue, especially in the last 3 years, and undertaken small steps to address it. The most significant step will be to develop an integrated landscape-scale livestock and rangeland management plan. Between the partners several grant proposals to undertake this planning process have been submitted though, as yet, significant funds have not been raised. The CHCT Board has recognized this as a strategic priority and discussed the potential for using some carbon revenue to support it.

Additional initiatives that have been undertaken are discussed in the sections below.

2.3.2.1 Community outreach and engagement

Initial meetings and workshops to engage Maasai community leaders in discussions about cattle grazing, fires, and predator loss have been held. The Group ranches have also been working to form grazing committees.

2.3.2.2 Predator loss risk mitigation

MWCT and BLF make use of long term data acquired from their predator loss compensation programs to improve husbandry practices while herding and the effectiveness of bomas (stockades) used for protecting livestock at night. The data from the lion-tracking program are also used to better inform local Maasai communities about the presence of lions.

2.3.2.3 Rangeland monitoring and use planning

A pilot rangeland monitoring program is being developed by MWCT to provide data on grass quality, quantity, species, and grazing patterns. Monitoring is planned to take place twice a year, at the end of the wet season, and again at the end of the dry season. The program will allow for the assessment of the forage for both livestock and wildlife so that integrated livestock and wildlife management planning can occur. During this monitoring period MWCT developed holistic grazing plans for 3 pilot zones within Kuku Group Ranch and also built 3 Wetland Ecological Restoration Catchments (WERC) and 5 community cattle crushes for community grazing plan support.

2.3.2.4 Grass seed banks

MWCT has supported grass seed banks run by Maasai women at Kuku Group Ranch. These were developed to harvest grass for livestock fodder and habitat restoration. See Alternative Income Generating Activities for further details.

2.3.2.5 Grassland Restoration

The Naga foundation (affiliated with the better known "Just diggit" organization - https://justdiggit.org/east-africa), works to restore vegetation cover globally, with the ultimate goal to restore vegetation in the semi-arid areas of Kenya and other regions of sub-Saharan Africa. The concept of the Naga Foundation is that more vegetation increases evapotranspiration (ET), which leads to higher humidity and ultimately into local cloud formation and increased rainfall.

The Kuku Ranch “Justdiggit” initiative has served as a pilot project to demonstrate the feasibility of restoring degraded grassland in the Project Area. The program involves constructing stone contour lines and semi-circular bunds to slow down surface run-off and retain rainwater, enhance infiltration and recharge the ground water table. The retained water increases soil moisture and allows grasses to re-grow. MWCT has worked in partnership with the Naga foundation for approximately one year, and has to date undertaken a restoration pilot program covering an area of 20 km² (2,000ha). Grazing has also been excluded from these areas. The program has provided employment for about 100 women from the local community. The results have been quite remarkable with grass showing a strong recovery. The pilot

demonstrates that the approach could be used to restore large areas of degraded land if carried out as part of an overall rangeland management strategy.

2.3.2.6 Livestock value addition

Providing a local market and meat processing facility could potentially provide increased income for Maasai herders. This initiative is still in the conceptual development stage.

2.3.2.7 Reforestation and Improved Agriculture

On the eastern side of the Project Area, the communities in the Project Zone are extensively involved in small-scale agriculture. The Project would benefit by assisting these communities to improve their agricultural practices and develop tree planting to reduce incentives to harvest wood from the national park or forest reserve. On the western side, the opportunities for settled agriculture are more limited due to limited water access. The Project aims to support local farmers to develop agricultural practices that are more effective and sustainable in a water-limited environment that is also experiencing an increasing number of dry spells due to climate change.

2.3.2.8 Promotion of conservation agriculture and permaculture

Big Life has initiated a permaculture program for communities and hired a new staff memberto explore opportunities. A small permaculture plot is being developed at a local school and will be utilized to provide outreach to the community for disseminating sustainable farming practice concepts.

2.3.2.9 Tree nurseries and tree planting

On the western side of the Project the organizations have begun the planning of possible strategies to develop tree nurseries in towns such as Iltilal. On the Eastern side of the CHRP, DSWT has continued its tree nursery operations and planted more than 10,000 seedlings per year over the last three years. Primarily, the seedlings have been planted to restore degraded forest in the Project Area, but some are also being planted in community areas within the Project Zone. All the trees planted through this program are indigenous tree species naturally occurring in the Project Area.

2.3.2.10 Eco charcoal

No action has been taken with respect to eco-charcoal. At this time it is not clear whether such a program would be appropriate and feasible for the Project or could be developed to scale.

2.3.3 Community Engagement and Support

MWCT, Big Life, DSWT and KWS have continued to develop their community outreach and support programs. Once revenue from carbon sales begins, funding will also go directly to the Group Ranches to enable them to further develop these and other possible programs. The primary areas of support are education, health, the development of income generating opportunities, and ongoing outreach and information sharing.

2.3.3.1 Education

MWCT, Big Life, DSWT and KWS support a variety of school and education programs summarized in Table 9.

Table 9: Summary of Education Initiatives and Support of the CHRP.

Organization	Description

MWCT	• Support for 22 schools with over 7,900 pupils through the funding of salaries for 56 teachers and 13 support staff, 3 teaching positions have been added since the beginning of the Project • University bursaries over 40 students in both 2015 and 2016 • New library constructed at Iltilal School • Support for program "Removing Barriers to Education in Rural Kenya by Eliminating Female Genital Mutilation and Preventing Early Marriage"
Big Life	• New environmental education officer hired to develop program on environment and wildlife conservation • 1 tuk-tuk, 1 laptop, 1 projector, 1 generator, 1 speaker set purchased to provide mobile film/presentation equipment to visit local schools and teach students about wildlife, the ecosystem and conservation • 43 new student scholarships provided
DSWT	• Bursaries for 2 students to attend secondary boarding schools outside area • Funding for training 2 teachers in US. Both have now returned and are working for the community
KWS	• Ongoing support for school trips to Tsavo West National Park

2.3.3.2 Health

All the communities in the Project Area and Project Zone have inadequate health care and access to health facilities and programs. The Project Partners support a range of programs to assist the government health programs in the area and improve healthcare delivery. All of the programs could benefit from significant additional funding. Their linkage to the conservation programs helps build recognition of the important role that conservation can play in improving overall health and welfare.

Specific programs include the following. MWCT has a fairly extensive health program and funds 1 nurse, 1 public health officer, 1 laboratory technician, 1 clinical officer and 1 doctor. The public health officer position has been added since the beginning of the Project. Through the program there are continuous health outreaches and health information sessions at Kuku, Olorika, Langata, Moilo and Oltiasika. The primary focus is on childhood immunization, ante-natal clinics, general medical, lab services, and raising awareness on breast cancer and FGM. A total of 36 outreaches were conducted in 2015, with 883 persons tested, 41 Family Planning sessions and 122 Ante-natal Clinics held. MWCT additionally purchased an ambulance and a biochemistry analyser to provide improved diagnostic capabilities.

In 2015 DSWT provided free eye cataract surgeries, with 2,978 community members evaluated for cataracts, and 51 people diagnosed and treated.

2.3.3.3 Community Outreach and Income Generation

2.3.3.3.1 Community Outreach

Since the start of the Project there has been a significant increase in community outreach and information-sharing about the CHRP itself, the broader conservation initiatives and the community benefits that are associated with the integrated conservation program. Engagement with a wide variety of community groups is an ongoing process carried out by all the CHCT Trustee organizations.

Representative groups engaged include the Group Ranch leaders, local Chiefs, women's groups, youth organizations, and churches.

In preparation for the verification the Project has organized 2 Social Impact Assessments (SIA) and 1 Biodiversity Impact Assessment (BIA) workshops, a Stakeholder Engagement Officer refresher workshop, 6 Community Leaders Meetings, and 16 community barazas. The CHCT has also held 4 Board meetings since verification, involving the Board representatives from each of the Group Ranches and Trustee organizations. The predator loss compensation programs also hold regular meetings with community leaders and members.

2.3.3.3.2 Income Generating Activities

The Project aims to support new opportunities for members of the surrounding communities to engage in new income generating activities. These activities have the potential to improve the economic well-being of community members and reduce the dependence on activities that have an adverse environmental impact, such as cattle herding. Additionally, they will assist in the transition from a more subsistence level economy to activities that have the opportunity to grow and integrate into Kenya's rapidly developing market-based cash economy.

Eco-tourism Development and Expansion

Eco-tourism is already one of the largest sources of employment in the Project Area and is dependent on the continuing protection of the forest and wildlife resources.

Campi ya Kanzi on Kuku Group Ranch is currently in discussions for upgrades and improvements to the lodge and expansion of the tourism footprint. Strategic planning is underway for enhancement of tourism facilities and the restoration and the upgrade of the Motikanju camp in the Loosoitok Conservancy. Discussions have been started about the opportunity for a small-scale tourist facility inside CHNP.

DSWT has worked to enhance the Eco-Tourism potential around the Kibwezi Forest Reserve. A new road has been constructed and existing roads repaired to improve access from the Kibwezi Forest to the CHNP. The Trust has also built 2 viewing platforms on Umani Hill, a bird-viewing platform near Umani spring, new visitor footpaths and a campsite.

Beekeeping

MWCT has initiated a pilot program with test hives provided by the African Beekeepers in two locations. The hives have been successfully colonized and maintained and are demonstrating that they can produce significant honey yields. An external grant from the US was used to purchase equipment, including high-grade protection suits, a honey spinner, and various tools for processing honey and beeswax. A training session was held by a US beekeeper in hive management and honey processing in 2016.

In September 2016 a meeting was held to initiate planning for development of beekeeping as an economic enterprise. It is envisaged that it could provide a good opportunity for women.

Crafts and jewelry

MWCT supports a total of 13 local women's groups actively involved in traditional beading by linking them with local tourism operators including Campi ya Kanzi. These groups come from: Iltilal, Langata, Olorika, Enkii, Oltiasika, Kuku, Ilchalai and Enkutoto areas. Establishment of new groups and increasing engagement with the women will be explored moving forward.

Grass seed bank: implement additional projects

MWCT has provided 10 local women from the Moilo area with an alternative livelihood project, in the form of a Grass Seed Bank. The project area itself is 10 ha in size and has been fenced with a 1.5 m high electric fence. MWCT permanently employs an askari (security guard) to assist the women's group in protecting the area. To date, the first harvesting of the seeds has taken place and in total 410 kg of seeds were harvested. 27 bales of hay have also been harvested.

Grassland Restoration

The Kuku Ranch "Justdiggit" project with the goal to restore degraded grassland, which is discussed above in section 2.1.2.5, has provided employment for about 100 women and offers the potential for future expansion.

Temporary Jobs Related to Project

To assist with data collection under the Project's Climate Monitoring Plan, 8 manual workers were hired for 2 months as members of the soil sampling team. They were trained in the sampling methodology. Additionally, for data collection under the Project's Community Monitoring Plan 8 community members (3 women, 5 men) were hired across the Project Zone to undertake the household surveys. They were also trained and can potentially be re-hired for future surveys. The hiring was undertaken in accordance with the Project's policies of equal opportunity in hiring, and the temporary employees were hired from different communities throughout the Project Zone in an equitable, transparent and fair manner, ensuring equal representation.

2.3.4 Biodiversity Conservation and Research

The programs and activities described in the forest protection section are also central to the goal of conserving the biodiversity values of the Project Area.

2.3.4.1 Biodiversity Monitoring

KWS, BLF, MWCT and DSWT all have significant existing programs for the research and monitoring of wildlife in their respective areas. Integrating these programs has become a priority for the Project Office. In this context the partner organizations are moving towards adopting the Spatial Monitoring and Reporting Tool (SMART) developed by the Zoological Society of London (ZSL) and now being widely adopted by many wildlife conservation programs globally. MWCT began implementation of this tool about 3 years ago and more recently both KWS and Big Life have also begun using the system. In 2016, ZSL undertook a review of the MWCT implementation and concluded that it had been exceptionally effective. The Project Office will be working closely with MWCT, KWS and Big Life to coordinate the use and to integrate data collection and reporting through the SMART system.

In the last 3 years MWCT has also moved from use of tablets by field staff for data collection for the SMART system to smart phones using the Cyber Tracker Application. In 2016 ZSL donated an additional 12 smart phones for this purpose. The SMART system allows the ranger force managers to closely monitor patrolling coverage and to adapt deployments to cover areas of concern. The results also provide continuous data on species numbers and distribution in the landscape. All the organizations focus on collecting data on the most endangered species, including black rhino, elephant, lions, hyenas and wild dogs. All four organizations carry out annual aerial censuses of large mammals. MWCT has a program using camera traps to collect data on wildlife. Additionally, BLF, DSWT, MWCT and KWS all collect basic rainfall data at various locations across the landscape.

2.3.4.2 Predator Compensation Schemes

Both BLF and MWCT operate programs to compensate Maasai herders for livestock losses related to wildlife predation. These programs are extremely important for the significant reduction of incidences of lions and other predators being killed in retaliation for livestock losses. Without these programs it is likely that the lion population would be severely reduced or extirpated. These programs are very sophisticated and involve forensic examination of killed animals to assess cause of death, the type of predator involved, and factors of contributory negligence. MWCT has hired 11 new Zone Reporters for the program, all of which are women. These reporters, or "Zone Mammas," form the crucial first contact between the community and the MWCT base and Verification officers. Table 10 summarizes the numbers of lions killed in retaliation for livestock attacks for the last 3 years. Both programs maintain detailed records of all incidents.

Table 10: The number of lions killed in retaliation for livestock predation

Organization	2014	2015	2016
Kuku, Kuku A and Rombo (MWCT)	0	1	3
Mbirikani (BLF)	2	1	2
Total	2	2	5

2.3.4.3 Lion Research

MWCT has an ongoing lion research program. In October 2016 there were five lions with GPS collars on Kuku Group Ranch. The fourteen Simba Scouts actively track them and record data and observations in the SMART system as part of a lion research program. The research helps monitor the number of lions, the pride structure, ranging behavior and prey species taken. In addition, the data are used in real time to advise community members about the presence of lions so that they can adapt their grazing regime and herd management to reduce the risk of predation. Currently, MWCT fully funds the lion collaring research and pays the KWS team for their services.

2.3.4.4 Annual aerial surveys

MWCT conducts annual aerial surveys. Surveys follow the Aerial Total Count technique as outlined by Norton-Griffiths (1978) and is the same technique used by KWS in TWNP with the aim of standardizing the methods across sites and enabling site comparisons. This provides minimum counts of certain wildlife species including all the larger ungulates and livestock (goats, sheep, cows and donkeys). On MWCT, these surveys are carried out yearly and funded by MWCT as a critical monitoring exercise to allow conservation management to make informed decision based on up to date data.

2.3.4.5 Elephant Crop Damage Compensation Scheme

The Project plans to maintain a database of human wildlife conflict across the Project Area, and to analyze the incidents, compile reports and disseminate recommendations on conflict status. Currently, KWS maintains a human wildlife conflict database and provides analysis and reports incidents. BLF

additionally maintains a database, recording all human wildlife conflict incidences related to elephant crop damage and any human mortalities.

2.3.4.6 Fencing

Two Project Partners erected additional fences to reduce human-wildlife conflict and help secure portions of the Project Area boundary. KWS built a new line of fence on the southeastern section of the CHNP boundary. Additionally, on the north eastern CHNP boundaries 10 km of fence were completed by DSWT, with another 10 km stretch that is still under construction. The DSWT has now completed 50 km of fencing, with 10 km erected in 2015 at an average cost of USD $15-20 per meter.

Additional fencing goals are to restore the watering point at Mzima springs and to complete fencing on the eastern side of CHNP so as to prevent elephants coming into conflict with communities, as well as prevent poachers from entering the park. These fencing programs protect community land from wildlife and the resulting loss of crops and reduce the potential for injury. They also help to secure the protected area borders a reduce incursions for collecting firewood, poaching or tree felling.

2.3.4.7 Species Inventories

The CHNP in collaboration with National Museums of Kenya undertook a comprehensive inventory of all flora and fauna within the park. The entire park was sampled and a complete range of species was taken to be catalogued at the Nairobi Natural History Museum. CHNP scientists are currently analyzing this data and will compile a comprehensive species list from the data collected. MWCT also developed an inventory of plant species for the Kuku and Rombo areas.

2.3.4.8 Annual game counts across landscape

Strategic planning concerning a total game count across the entire Project Area has begun and project partners have entered into discussions regarding this activity. Possible strategies include combining the SMART system data and the sightings data together to allow for an up to date measure of species distributions across the landscape, and over different seasons.

2.3.4.9 Other

- DSWT has constructed a new stockade for orphan elephants at Umani that will assist its elephant release program.
- BLF has constructed a water hole in the CHNP rhino protection area, including a pipeline, pump, and holding tank, to provide water for black rhino.
- DSWT has worked on a project to remove the invasive Prosopis juliflora from the forest.

2.3.5 CHCT Good Governance

Significant time, effort and resources have gone into building CHCT governance over the period covered in this monitoring period. The CHCT was officially established in June 2015 as the Project Proponent of the CHRP. The Board of Trustees is comprised of one representative from each of the 9 Project Partners, who have equal voting power as per the Deed of Trust. Whilst each partner brings an important suite of skills and capacities to the Trust, it was seen as necessary to evaluate these attributes and understand how these will be integrated into one functioning entity. A Capacity Assessment was undertaken in 2016 to this effect, led by Conservation International. Utilizing various methods, including the Capacity Assessment Tracking Tool (CATT) and SWOT analyses, a comprehensive snapshot of the Trust's capacities was taken, displaying the Trust's characteristics in qualitative and quantitative ways. Data collection took place in March and June 2016, when CI met with all Trustees to capture their individual views. By thorough evaluation of these results, priority areas for improvement were identified. A concrete

Action Step Plan was proposed, highlighting high, medium and low priority actions. This was presented to the CHCT Board during the July and October 2016 Board Meeting. The document serves as a baseline of the Trust's capacity, against which progress can be measured.

As part of the Project Work Plan, the following 'Project Activities' have been identified as important to undertake. These are informed by the Capacity Assessment report.

2.3.5.1 Strategic Planning

CHCT has started the process of developing a strategic plan. This has built an initial framework for a work plan. At the Board meeting in October 2016, the Board recognized the need to develop this into a more formal strategic plan and proposed a workshop to take place in the first half of next year as a next step.

2.3.5.2 Operations Manual

Initial polices have been developed for the CHRP, including health and safety, sexual harassment, and equal opportunity. A financial policy for the CHCT is being drafted and will be completed in early 2017.

2.3.5.3 Revenue Allocation

One of the most significant functions of the CHCT will be to allocate future carbon revenues. This process has the potential to create significant tensions within the Project. The CHCT Board has therefore given high priority to proactively developing an agreed revenue allocation framework before any carbon sales take place. A Revenue Allocation Model (RAM) has been developed through a fully participatory and transparent process over the past year. Lead by CI as part of its advisory role and as a neutral facilitator, meetings with individual stakeholders were held in March, June and July of 2016 to gather their initial views on how revenue should be allocated. An initial model was presented at the July 2016 Board meeting, where Board representatives provided further input and proposed some changes. These were incorporated into a new evolving model, which was once again discussed with the Trustees individually before the report was circulated. Community meetings were held in which the model and potential revenues were transparently presented, and consensus sought by the communities. It was then formally presented at the October 2016 Board meeting, during which it was approved. The document has been described as 'extremely innovative' by the Kenyan National REDD+ Focal Point and the CHCT anticipates it can serve as a model RAM for other projects. The document ("Revenue Allocation Model for the Chyulu Hills REDD+ Project") and accompanying PowerPoint presentations can be made available to the auditor upon request.

2.3.5.4 Grant Management and Monitoring and Evaluation

The revenue allocation model proposes that a significant portion of the revenue will be allocated equally between the nine trustee organizations. However, these funds will be distributed as grants with each organization being required to submit proposals for projects that align with the Project's priorities to be approved by the Board. Under the proposed plan the Project Office would create a formal grant management process to oversee the use of these funds and create a fully transparent reporting and accounting process.

2.3.5.5 Project Office

The Project Office role is described in Section 1.3. A building to house the Project Office is currently under construction by MWCT to provide space to house staff required to support the Project. The office also provides a location where community members or other parties can communicate with the Project. Office equipment and administrative support for the office is being provided by MWCT. While the building is under construction, the adjacent MWCT office is hosting project staff and the project functions.

2.3.5.6 Board meetings

The CHCT has held four Board meetings to date. The meetings have been formally convened and documented in official minutes as set out by the Deed of Trust. The minutes are available for review by the auditor.

2.3.6 Financial Management

As mentioned above, an initial finance manual is being drafted. The Deed of Trust also contains significant guidance about the use of funds with the revenue allocation model providing an initial framework for budgeting. A bank account has been established by the Trust with Equity Bank, Loitokitok branch.

2.3.7 Staff

Mr. Iain Olivier was recruited by MWCT (Project Office) as the Conservation Program Coordinator and is allocating 50% of his time to the CHRP. Further recruitment of capable staff will take place once resources are available.

2.3.8 Capacity building and training

Although the Board has received a number of presentations about the Project and is continuously advised on its progress, the members have requested additional opportunities for training during the October 2016 Board meeting. The national REDD+ focal point, Mr. Alfred Gichu, offered to conduct a training workshop for the GR Trustees in Nairobi, once resources can be secured. This will address the following topics:

- Training on REDD+ and in National REDD+ process
- Training on VCS and CCB requirements

2.3.9 REDD+ Verification

The CHCT Board has been informed in preparation of the verification field visit and will participate in the verification audit meetings.

2.4 Management of Risks to Project Benefits (G3.5. & G3.7.)

2.4.1 Natural and Human-induced Risks to the Expected Climate, Community and Biodiversity Benefits, and Measures to Mitigate these Risks (G3.5.)

2.4.1.1 Human induced risks

1. Slash and Burn / Unsustainable Agriculture:

   As described in Section 1.2.1 and parts of Section 1.3, the Project Zone is considered semi-arid to arid, with frequent crop failures. It is an extremely difficult area to sustain subsistence, rain-fed agriculture, which nevertheless continues to be the primary form of survival throughout the area. As such, farmers often expand their growing areas in an attempt to find more fertile, moist soil, following a drought event. The prevailing practice, in the event of a failure, is to try to find a better area to grow crops. Unfortunately, these practices result in rapid expansion of degradation and deforestation. In this area, farmers typically degrade the land (extract hardwoods for fuel and charcoal), and those degraded areas are then entirely cleared for agricultural fields within a short period of time (often < 1 year). Therefore, slash and burn agriculture is a primary risk to the CHRP benefits and thus the Project's sustainability.

Mitigation for this risk is through the Project Activities, mainly in the form of agricultural intensification and/or conservation agricultural techniques as described above in Section 2.2. Additionally, alternative livelihoods such as employment in other sectors (rangers, plot sampling teams, IGAs like beekeeping and craft / woodcarving sales, etc.) are seen to be effective direct mitigation strategies. Local communities generally have a very difficult time as subsistence farmers in this area, and are therefore quite open to alternatives that offer them an easier way to make a living in subsistence agriculture, or to considering jobs in other areas that allow them to put food on the table.

2. Charcoal burning, wood carvings and firewood collection:

   Within the Project Area there are currently unregulated, extractive activities, including charcoal burning, firewood extraction and wood extraction for carvings. These are the main threats of deforestation and degradation in the CHNP area and pose a significant risk to the Project's climate benefits. Ranger teams patrol the area permanently and attempt to halt such activities early on. It has been recognized, however, that these law enforcement units lack resources and are consequently unable to effectively reduce the threat. The Project therefore provides support in terms of financial, political and human capacity. This is achieved through employing more rangers, increasing ranger motivation and providing rangers with more equipment, training and technology.

3. Poaching:

   Subsistence bush meat hunting and commercial poaching represent a substantial risk to this Project's biodiversity benefits. Subsistence hunters lay snares around the forest with the aim of catching small game. Poaching of rhinos and elephants is a more severe problem that has escalated in Africa in the recent years and has also affected the Project Area. In 2013, a total of 3 elephants were poached in the Project Area and two died following a human-wildlife conflict in the Project Area. As outlined in section 8.3, the Chyulu Hills also provide one of the last strongholds for the black rhino (*Diceros bicornis michaeli*). However, the 'Rhino Area', also known as Mukururo on Mbirikani/ CHNP, lost three black rhinos in 2013. KWS, BLF, DSWT and MWCT are putting all their efforts into maintaining high vigilance in the area and preventing further poaching incidents.

   The Project provides further support through ranger employment, increasing motivation and equipment, and providing IGAs. The Project undertakes educational activities, workshops and creates jobs in wildlife conservation that will serve to raise awareness and increase the tolerance for and perception of wildlife in the local communities.

4. Anthropogenic fires:

   Another human induced threat is frequent fires; these occur multiple times a year in the area. Whilst some are set intentionally by pastoralists with the goal of allowing fresh pasture to grow, others may start accidentally from cooking fires set by herders or poachers. Irrespective of their origin, KWS, BLF and MWCT have well thought-out fire management regimes in place and a close collaboration exists to address fire events.

   The Project will continue to support the partners in their fire management efforts. In addition, the Project Office aims to reduce illegal incursions of people into the Project Area, thus mitigating anthropogenic fire potential. Furthermore, the Project Proponent monitors fire events and other potential contributions to reversals as part of their annual monitoring efforts, and is required to report on and account for any major loss of carbon in the Project Area. Through collaboration with

the communities, awareness about carbon protection and forest stewardship will be enhance. It is the goal of the Project to work with communities to understand the value of the forest, thus decreasing their willingness to destroy their forest resources, as they begin to realize tangible carbon benefits.

2.4.1.2 Natural Risks

1. Droughts:

   Droughts are a regular occurrence in the area and this century 2001, 2006-2007 and 2009 have all been abnormally dry years. The 2009 drought has been described as the worst drought in living memory (African Conservation Centre, retrieved 18 December 2013) and had devastating effects on humans, wildlife and livestock alike. During this period, studies indicate that 75% of migratory wildlife and 81% of livestock numbers were lost on a national scale (KWS, 2010). In eastern Kajiado, deaths to wildlife were severe, with an estimated 92% of wildebeest, 86% of zebra, 66% of Grant's gazelle lost (Worden *et al*., 2010). A study conducted on Kuku GR found that livestock numbers also plummeted, and that pastoralists lost 84% of cattle, 77.8 % of goats and 72.8% of sheep (Wangai *et al*., 2013). These losses had severe economic impacts on food security and livelihood strategies, and similar events in the future pose a risk to the Project's envisaged community and biodiversity benefits.

   Droughts are naturally occurring phenomena and it is the Project's aim to mitigate the impacts of recurring droughts through promoting adaptive and drought-resistant livelihood strategies. Most of local flora and fauna are incredibly drought-resistant, yet crop failure due to extreme droughts poses a severe challenge to the human population. It is therefore the aim of the Project to concentrate on agricultural practices that increase yield, and in particular moisture retention, so as to minimize the devastating effects of drought on subsistence agriculture.

2. Fires:

   There is a possibility of natural fires occurring in the landscape. However, the frequency of these is very low and the majority of fires are caused by humans, either deliberately or accidental. The Project mitigates this risk via those strategies outlined above which refer to managing the risk of anthropogenic fires. Additionally, natural and anthropogenic fires alike are monitored and reported on. Any significant event that results in a loss of carbon will be included in the carbon accounting model.

2.4.1.3 Political Risks

1. Kenya's political stability:

   In its 50 years of independence, Kenya has maintained notable political stability, despite changes in its political system and conflicts in neighboring countries. A new constitution was passed in 2010, which included provisions for the establishment of devolved governance structures. Known as "devolution" many formerly central government roles are being transitioned to the newly established county governments, which will have a greater sphere of influence. With Kenya's previous and current stability however, the political risks to the CHRP are considered minimal. The CHRP aims to maintain open channels of communication and keep government entities informed of operations. There are two significant government organizations included as Project Partners (KWS and KFS). Their involvement in the Project will facilitate and augment country-level awareness and involvement in the Project, thus increasing the stability of not only this project, but also the national REDD+ strategy.

2. Legislative changes:

   There always exists a slight risk of changing legislation or the potential of new policies that could potentially affect natural resource management and/or land tenure. Previously, there have been cases in which the government has expropriated lands through compulsory purchase for development schemes. That said, the likelihood of such changes occurring is considered to be extremely small, especially given that half of the Project Area is currently under government ownership and a large proportion is technically under protective status (although in practice, much of the area is not physically protected).

   The Project will uphold open communication with the governmental entities and continue to be involved in political decisions that could potentially affect the Project Area, its natural resource management or tenure. The involvement of the aforementioned organizations will provide direct government agency support for the Project and for the national REDD+ strategy. Unlike many other REDD+ projects, the Project is not isolated from the national government. On the contrary, because the government possesses a stake in the Project (22% in terms of its governance), its success is in the Government of Kenya's best interests, and therefore this and other REDD+ projects are likely to be able to have input into any related changes in legislation.

2.4.1.4 Policy risks

1. Risk of reversal:

   Risk of project reversal due to community opposition is considered minimal, as the landowners and communities alike have been heavily involved in the design of the CHRP, and they have openly and widely been consulted through numerous outreach and information-sharing meetings. As a Project governance policy, all stakeholders are always able to seek further information or air grievances if desired. In addition, the Group Ranches themselves are invested in the project as Trustees of the CHCT, which is the Project Proponent, and have a significant governance role through their appointment of four out of nine Trustee Representatives on the CHCT board. The Project will continue to engage all the surrounding communities, provide employment and support for community social services, and improved livelihood opportunities.

   All these factors build and enhance community support for the project and make them authentic owners and stakeholders so reducing the risk of opposition to the project and its goals.

2. Insufficient Revenues:

   The vast majority of REDD+ credits are currently sold on the voluntary market, posing a risk to recurring, sustainable income flow. If credits are not sold, there will be no revenue, and thus no monetary support for the Project over its 30-year lifetime, save initial investment. Nevertheless, the project partners believe that the project is extremely well-placed to attract credit buyers. The project has an exceptionally appealing background story set in an iconic African landscape that includes the Chyulu Hills and its cloud forest, purportedly the inspiration for Ernest Hemingway's Green Hills of Africa, the backdrop of Mount Kilimanjaro, and a mosaic of savannah, woodlands, lava flows and volcanic cones. Within this landscape is written the history and culture of the proud Maasai living alongside Africa's best-known charismatic wildlife. The project also has important support from international celebrities. Finally, the internationally recognized Project Partners provide significant experience and capacity for supporting the marketing of the project's credits and the CHRP aims to be included in a jurisdictional REDD+ scheme, which could, in the future, allow for the sale of larger credit volumes, on a recurring, sustainable basis, to sovereign nations.

2.4.2 Measures Taken to Enhance CCB Benefits beyond the Project Lifetime (G3.7.)

The CHRP activities are all designed to enhance the CCB benefits beyond the Project's Lifetime. Implementing activities that address the drivers of deforestation, with a focus on education, poverty reduction and sustainable management of natural resources, will reduce the necessity of community members to cause deforestation and degradation. During the Project Lifetime, this will be achieved, for example, through training farmers in sustainable agriculture, facilitating better education, creating alternative income generating activities and raising awareness of the value of the habitat and its biodiversity. These activities are outlined in more detail in section 1.2 of this document.

2.5 Measures to Maintain High Conservation Values (G3.6.)

The following biodiversity and ecosystem related HCVs have been identified per the CCB indicators G1.8.1, 2 and 3 in section 1.2.6:

- G1.8.1 b) Five near threatened, six vulnerable, three endangered and one critically endangered species.
- G1.8.1 c) Nine endemic sub-species and races.
- G1.8.1 d) The Project Area is a wildlife corridor between the Tsavo and Amboseli ecosystem, thus supporting significant concentration of species during any time in their life cycle.
- G1.8.2 The Project Area is part of the Somali-Maasai biome and supports viable populations of plants and animals in their natural patterns of distribution and abundance.
- G1.8.3 Montane cloud forest that acts as a critical water catchment.

The CHRP is designed to ensure the maintenance and enhancement of HCVs by maintaining the species, landscapes and ecotopes of the Project Area intact and non-fragmented. Close cooperation with the landowners and communities as well as active protection in terms of a larger and more effective ranger force are key components of the project strategy. Several of the Project Activities are also oriented toward further ensuring that the conservation related goals of the CHRP are achieved, and HCVs maintained. These include increasing local awareness and capacity for conservation, generation of livelihood alternatives to reduce pressures on the land, and designing a zoning plan to allow for regeneration and sustainable, low-impact grazing.

The following community related HCVs have been identified per Section 1.2.6 (CCB indicators G1.8.4, 5 and 6):

- G1.8.4 Forests critical to water catchments, grasslands critical to the prevention of soil erosion.
- G1.8.5 Areas fundamental to meeting the basic needs of local communities, specifically food, medicines, fuel wood, and raw materials for building and crafts.
- G1.8.6 Areas critical for the traditional cultural identity of communities, specifically sacred sites, resources for artistic and traditional purposes, and importance to local worldview.

As with the measures outlined above for HCVs G1.8.1-1.8.3, active protection and alternative livelihood options are intended to reduce pressure on the land and thereby ensure the maintenance of forests critical to water catchments. Zoning and sustainable grazing regimes are designed to protect grassland areas and avoid soil erosion. This will also ensure that areas fundamental for food, medicines, fuel wood,

material for building and resources for artistic and traditional purposes are maintained. These values depend on the continued existence of an intact landscape and this is exactly what the CHRP provides.

2.6 Project Financing (G3.11. & G4.7.)

The Project Proponent for the CHRP is the CHCT, which is comprised of 9 Project Partners. These Project Partners are all relatively well-funded, sufficiently capitalized organizations that are also supported by a number of major international NGOs (CI, ZSL, and IFAW) and associated charitable entities based in the US and UK. The local Kenyan NGO partners all have significant histories of financial sustainability (MWCT, DSWT and BLF). The project partners also include the two governmental organizations (KWS and KFS) which have long histories, generate earmarked revenue and receive direct government support.

The international Project Partners, particularly CI and Wildlife Works have contributed both in-kind technical assistance and direct funding for the project development and continue to be closely engaged in supporting the Project. Between the local and international partners the development of the REDD+ project over a period of six years has been successfully funded and supported. The Project financial model that includes the current budgets for the various entities shows the capacity for the Project to continue until significant credit sales volume is achieved.

2.7 Employment Opportunities and Worker Safety (G4.3-4. & G4.6.)

2.7.1 Employee Orientation, Training and Capacity Building (G4.3.)

The CHRP considers local employment a priority and local sourcing is strongly encouraged at all levels of the Project, from casual workers up to management positions. The CHRP recognizes that local hiring is a major benefit to the implementation and operation of the Project due to the knowledge and familiarity local people possess about the landscape, its communities and its biodiversity. Their involvement will also ensure the sustainability and continuity of the Project throughout the Project's Lifetime and beyond. Currently, the majority of the Project Partners' employees come from the local area. The Project Office will continue employing and training local people in order to increase local participation in project design and implementation as well as build capacity, knowledge and a robust skills base.

Educating communities and employees in different areas related to the carbon activities will also be on-going. Capacity building includes skills development in relation to carbon measurement and accounting, climate change and carbon offsets, and this will continue to take place in the form of meetings, workshops or training days. So far, local plot samplers, both male and female, have been selected and trained in biomass measurement and forest inventory. Furthermore, in 2014 community officers received an intensive two-day training on REDD+ and climate change in an already established and successful REDD+ project, the Kasigau Corridor REDD+ Project, thus transferring knowledge from one location to another. In June 2016, a refresher training was held by CI and Wildlife Works at Kuku Group Ranch.

The Project is also undertaking important capacity building of the CHCT Board in project management, non-profit governance, grant management and sales and marketing.

2.7.2 Equal Opportunity for Employment (G4.4.)

Future CHRP job positions will be openly advertised through the Project Office and Project Partners. The selection of potential employees is undertaken through an open, and transparent process that provides equal opportunity to all applicants. The CHRP operates a strict non-discrimination policy such that women and vulnerable groups of people will receive equal chances regardless of the type of work. One example of this is that during validation the Project employed a female plot sampler, a job that is physically

demanding and typically only carried out by men. Additionally, for the administration of the household survey both women (3) and men (5) were hired as community officers through a process that was conducted on an equal opportunity basis.

Job applicants are selected for an interview based on their skills and experienced required for the advertised positions. Employment vacancies are publicly advertised through the same channels that other project news is publicized, such as through posters at the Project Office and on the Project notice boards located at various sites in the Project Area. Successful candidates are selected in a non-discriminatory manner through a fair and open process. Preference is given to applicants who live in the local communities. Unsuccessful candidates are provided with an explanation for why they were not selected in order to assist them to improve if there is another vacancy in the future.

2.7.3 Employee Safety (G4.6.)

The CHRP ensures that workers' health and safety are protected to the best of the Project's ability at all times and across all sites. Risks are identified, mitigation strategies produced and appropriate measures adopted in order to minimize any risks.

Given the nature of the Project and its geographical surroundings it is recognized that certain occupations inherently present a risk to the health and safety of workers, particularly occupations that require spending long periods in relatively remote and rugged areas. These include plot samplers, researchers and rangers, who may be faced with challenging terrain as well as the risk of encountering wild animals or people involved in illegal activities such as poaching, wood cutting or illicit cultivation who could pose a risk to their safety. In addition, forest fires may also pose a safety risk if they spread rapidly and unexpectedly. The Project has created a comprehensive Health and Safety Plan that ensures that all workers' health and safety is protected to the extent possible, and that all workers are fully informed about workplace risks and safe practices to mitigate those risks. These include training in safe working practices, first aid training for some staff members as well as the enforcement of requirements for safe handling of equipment and other materials. This Health and Safety Plan additionally provides a comprehensive list of the measures that will be taken to inform employees of their rights, to assign roles and responsibilities to supervisors and workers and provide a safe workplace culture. This document will be revisited regularly and revised as needed to ensure that it contains current information and includes all job categories and potential risks. A copy of the plan has been provided to the verifier and will be kept at the Project Office and be readily available for any consultation. In addition, the CHRP will ensure detailed orientation of newly recruited employee during their initial introduction at work and ensure that they are fully aware of their rights as well as responsibilities.

2.8 Stakeholders (G3.8-10)

2.8.1 Process to communicate Project costs, risks and benefits to Communities (G3.8.).

The CHRP has been designed through engagement of the communities and stakeholders, and has involved them in decision-making and implementation from the outset. Collaboration amongst the Project Partners with the goal of initiating a carbon-crediting scheme began in 2011. The role of the Project Partners is central to the CHRP, due to their close relationship with the communities. Through long-standing ties, these communities are already familiar with the Project Partners and open communication channels were already established prior to the start of the Project's design phase. The CHRP builds on these structures, which makes it possible to disseminate information to the communities in a quick and timely manner as well as to encourage their involvement in the Project. This structure also allows timely and efficient feedback, and questions and grievances are quickly forwarded to the Project Office.

A Project Office was established at MWCT's CCRC facility on Kuku A ranch in the summer of 2016, and a REDD+ office is currently under construction. This office will serve as the administrative headquarters of the CHRP. Currently project staff and management operate out of the adjacent MWCT office building, which is open to all community members and stakeholders to visit to gain information about the Project and/or place comments or grievances. The primary communication method to stakeholders and communities is through the Project Partner's existing channels to the respective communities in their area. Meetings are announced through a number of channels, including project notice boards, emails, mobile phone calls, text messages and word of mouth to inform leaders of a specific community group (women's groups, youth groups, etc.) in a timely fashion, who in turn communicate the information to the members of that group. Project Partners have been kept up to date with regular communication, dissemination of project documentation and through regular Board meetings. Upon completion of the Project Monitoring Report / Project Implementation Report (MR/PIR), each Project Partner will be provided with a hard and soft copy at their respective headquarters. Community members are encouraged to pay a visit to these headquarters in order to read and have full access to any such material, including an executive summary of the MR / PIR in Swahili and Maa, the local languages. Additionally, all of the documents have been disseminated to the Chief's offices, and the Local Administration offices. The Project Office constructed 15 sign-boards that were installed at strategic points around the Project Area and Project Zone for project information and notices to be posted on.

Initial community FPIC meetings took place from September 2013 to January 2014. For the FPIC process 47 community and stakeholder meetings were held. Significant time was given between the initial consultation and the time that any formal decision-making was expected. Details of all FPIC meetings including the dates, locations and number of attendants, are provided in the CHRP PD, section 2.7.1.

During this monitoring period an additional round of community and stakeholder meetings were held in the summer of 2016 to provide updates on the Project implementation and also to provide further information on the expected Project costs, risks and benefits to them. Before the community and stakeholder meetings, six leaders meetings were held to ensure that the political and community leaders in the region were fully aware of the Project and supportive to its mission.

2.8.1.1 Leaders Meetings

In 2016, a total of six Leaders' meetings were held on Eastern and Western sides of the Project Area, with 3 meetings conducted on each side. Leaders meetings were composed of political leaders, Chiefs and administrators, opinion leaders, religious leaders, youth group leaders, women group leaders, government officials and other stakeholders in the communities.

The main agenda of the meeting was to make sure the leaders and other stakeholders in the community are fully aware of the CHRP and to engage them with all processes before reaching the wider community. Awareness to the wider communities becomes easier once the leaders are fully informed.

Table 11: Locations where leaders' meetings were held.

Date	Region	Location of the meeting	Venue
13th July 2016	Western	Kuku (Iltilal)	CCRC Hall
14th July 2016	Western	Rombo	Tabernacle church
15th July 2016	Western	Mbirikani	Big life social hall

19th July 2016	Eastern	Makindu	Gorgeous hotel
20th July 2016	Eastern	Kibwezi	Dallas hotel
21st July 2016	Eastern	Mtito Andei	Migingo K5 hotel

The following lists the general agenda that was followed at each of the leaders' meetings:

I. Climate change and background of the CHRP.
II. Process and progress of CHRP.
III. Feedback/outcome of the Social and Biodiversity Impact Assessment (SBIA) workshops held in Oloitoktok and Kibwezi.
IV. Planning for community barazas to reach the wider community.

Other topics and discussions related to REDD+, climate change and conservation were also discussed in the meetings. Below are the common questions that were raised during the leaders' meetings:

Questions from the western side leaders:

- Will there be committees from the community that will be elected by the communities to manage the projects?
- Will the Project create job opportunities? If so how will the job advertisments be shared?
- Will there be notice boards and suggestion boxes in other public places if the chiefs' offices are far apart?
- Will the CHRP have its own independent employees apart from the Partners?
- What are the disadvantages of the Project?
- Will the Project benefit all members of the community?
- Why has the CHRP been delayed for so long without success?
- What will be the quick intervention to help those who are depending on charcoal burning and agriculture? Can they get other sources of income before the Project starts selling carbon credits?
- What are other alternatives of reducing carbon emissions apart from avoided deforestation?

Opinions and suggestions from western side leaders:

- We would like the Project Partners to employ staff for the Project as we wait to start selling the carbon credits.
- There is a need for more awareness in the sub-locational and village level. Again, communities should be informed on every new stage of the Project.
- There should be strict measures to protect the existing forest.
- Rangers should be employed specifically for the Project.
- REDD+ should support planting of more trees.
- There should be an immediate source of income to communities especially in Rombo and Njukini area to stop the ongoing charcoal burning.
- Other projects in the community should follow an example from CHRP as they are disseminating information on each and every stage.

Questions from Eastern side leaders:

- How is the Project going to address the problem of human wildlife conflict?

- What kind of quick measures will be in place to give to those people who rely on charcoal burning?
- What is the Project Office thinking of doing about neighboring areas that are not included in the project but that are experiencing a lot of deforestation?
- Should the communities form groups that will be trained on eco-charcoal production?
- What can we do to eradicate bhang (cannabis sativa) plantations in the Chyulu Hills?
- Can registered groups with large land areas with indigenous trees be included in the Project?
- Where will the money from carbon credits go?
- What is benefit sharing mechanism going to be like?

Opinions and suggestions from Eastern side leaders:

- Compensation for crop damage should be given priority when the Project starts.
- Youths to be more involved in awareness of CHRP.
- More awareness on the new Wildlife Act is required.
- Communities in the reference areas should be considered in benefits so that they don't encroach into the forest.
- More awareness is required at the village level.
- Wildlife Works team to train the communities on eco-charcoal production.
- Community benefits to be shared equally to both eastern and western side communities.
- Information to be provided through the Chiefs so that it can reach communities.
- Policies and enforcement should be implemented in the Project Area.
- Another Project Office to be on the Eastern side preferably in Kibwezi as the one in western side is far from us.

Figure 5: The leaders' meeting held on the eastern-side (top) and western-side (bottom) of the Chyulu Hills REDD+ Project

2.8.1.2 Community Barazas / community / stakeholder meetings in each location

A total of 16 community barazas were held to make sure the communities were involved in and aware of any decisions made with regards to the Project. A baraza is a Kenyan term for a large, official community meeting. Communities need to be involved in each of these steps, as they are the major stakeholders in the Project. Eight barazas were held on the western-side and seven in eastern-side of the Project Area.

During the baraza the community members and stakeholders were given the opportunity to freely ask questions in an open format until they were satisfied. Most of the questions asked were very similar to those asked during the leaders meetings.

Stakeholder engagement forms were used to record the meeting outline, questions raised, comments from the meeting participants and how the Project Partner is intending to follow up the issues raised.

These forms together with minutes will be filled at the Project Office. An example of the form is shown in Appendix C.

Some communities, such as Rombo and Njukini on the eastern side and Nzambani and Nthongoni on the western side, stated that they were dependent on charcoal production for their livelihoods, but they requested immediate alternative livelihood projects so that they can stop charcoal burning.

Table 12: Locations where community barazas / meetings were held.

Date	Region	Location	Venue	Time	Meeting lead	Officer in charge
August 2, 2016	Eastern	Nzambani	Utu gate/town	9:00 AM	KWS	Joseph Kisio & Laurian Lenjo
August 2, 2016	Eastern	Nthongoni	Nthongoni town	9:00 AM	KWS	Silvia Wangeci& Joseph Mwakima
August 3, 2016	Eastern	Utithi	Utithi Chiefs office	9:00 AM	KWS	Silvia Wangeci, Joseph Mwakima, Titus Mutuku & Laurian Lenjo
August 3, 2016	Eastern	Utithi	Thange	2:00 PM	KWS	Titus Mutuku, Joseph Mwakima & Laurian Lenjo
August 4, 2016	Eastern	Twaandu	Kavete town	11:30 AM	David Sheldrick	Titus Mutuku & Joseph Mwakima
August 4, 2016	Eastern	Makindu	Makindu Chiefs office	10:35 AM	KFS & David Sheldrick	James Kiema, Joseph Mwangi & Laurian Lenjo
August 5, 2016	Eastern	Nguumo	Mathayoni shopping center	11:30 AM	KFS, KWS & David Sheldrick	Joseph Mwangi, Joseph Kisio & James Kiema
August 9, 2016	Western	Rombo	Bomas	2:00 PM	MWCT	Timothy Lenaiya, Charity Lanoi, Laurian Lenjo & Joseph Mwakima
August 10, 2016	Western	Oltiasika	Ilchalai shopping center	12:21 PM	Big Life Foundation	Daniel Sambu, Antony Kasanga & Joseph Mwakima
August 10, 2016	Western	Njukini	Orgumaet village	12:00 PM	MWCT	Timoth Lenaiya, Charity Lenoi & Laurian Lenjo
August 11, 2016	Western	Isineti	Isineti KAG church	11:30 AM	Big Life Foundation	Daniel Sambu, Antony Kasanga & Joseph Mwakima
August 11, 2016	Western	Olorika	Langata	2:00 PM	MWCT	Timoth Lenaiya, Charity Lenoi & Laurian Lenjo
August 12, 2016	Western	Mbirikani	Nasipa ECD center	12:20 AM	Big Life Foundation	Daniel Sambu, Antony Kasanga & Joseph Mwakima
August 12, 2016	Western	Iltilal	Iltilal Catholic church	10:00 AM	MWCT	Timoth Lenaiya, Charity Lenoi & Laurian Lenjo
August 12, 2016	Western	Marlal	Marlal primary school	2:00 PM	MWCT	Timoth Lenaiya, Charity Lenoi & Laurian Lenjo

Figure 6: A community baraza on the western side (top) and on the eastern side (bottom).

2.8.1.3 Results of the community and stakeholder meetings

Successes

I. All planned and community stakeholder engagement meetings were completed as per the timeframe.
II. The leaders and communities appreciated the partners and their work on informing them about the process and progress of the CHRP.
III. The communities express their near-unanimous support for the Project, appreciating the fact that it is trying to safeguard their resources and heritage and giving the communities living around these forests a voice and alternatives to enable them to reduce their dependence on extraction, particularly charcoal.

Challenges

I. There were transportation challenges due to unreliable public transport.
II. Some communities could not get project information in time.
III. High expectations from the communities of the benefits that they will be receiving from the Project as a result of carbon revenue.
IV. Some communities who are currently directly dependent on charcoal production for their livelihoods were apprehensive and feared suffering adversely as a result of the Project if alternative sources of livelihood are not provided.

Recommendations from the meetings

I. To consider setting up another Project Office for the communities on the eastern side, preferably in the Kibwezi area.
II. Stakeholder engagement officers to extend awareness to the sub-locational and village level, taking advantage of regularly scheduled chief and sub-chief barazas.
III. Initiate alternative sources of income for the groups that currently directly depend on charcoal burning. i.e. micro-financing groups to start other income generating activities.
IV. To give out incentives to environmental groups which are growing seedlings. For example, the Project could purchase their seedlings and identify ideal locations where they should be planted.
V. Providing empowerment opportunities to community groups, for example entrepreneurship trainings, financial management trainings etc.
VI. Consider placing more notice boards and suggestion boxes in public places in locations where there are greater distances between chiefs' offices.
VII. Awareness and education about the CHRP should be carried out with all Project Partner staff i.e. MWCT, Big Life Foundation, KFS in Kibwezi, David Sheldrick Wildlfie Trust and KWS.

2.8.2 Community and Stakeholder Identification and Involvement in Project Design (G3.8.)

The process of Community and Stakeholder identification was conducted during the initial project development phase prior to the Project's validation through a series of key informant / expert interviews, workshop discussions, an analysis of rights and a literature review. Through these methods it was possible to obtain a well-informed and comprehensive understanding of all communities and community groups in the Project Area. The stakeholders identified during this process were involved in the initial development of the CHRP in 2014, and were again involved, with some updates, for further community and stakeholder engagement and involvement in project design during the first monitoring period covered by this report. Please refer to the CHRP PD for details on the stakeholder identification process. Table 13 lists the stakeholders described.

Figure 7: Community engagement officers from the Project Partners attending a training on leading community outreach meetings.

During the SBIA workshops held in July and August 2016 the participants further discussed stakeholder identification, by analyzing who will be impacted by the Project, either directly or indirectly, positively or negatively.

Table 13: The Stakeholders in the Chyulu Hills REDD+ Project.

Stakeholder or stakeholder sub-group	Current impact/ activities in landscape	Effect of project on their activities	Relationship with other stakeholders (partnership/conflict)
Pastoralists	Livestock herding, setting fire to allow fresh growth of pasture.	Reduced area of land for grazing and introduction of regulated grazing periods through zoning.	Potential conflict with farmers due to loss of grazing land and access to water. Conflict with ranger teams due to setting fires.
Agriculturalists	Land conversion, cultivation and irrigation.	No further land conversion allowed, loss of potential agricultural land.	Potential conflict with pastoralists due to livestock incursions.
Charcoal producers	Extraction of wood for charcoal making, often from protected areas.	Prohibition of charcoal making in the Project Area, loss of income generating activities, increased law enforcement and potential prosecution.	Conflict between charcoal burners and ranger teams if illegally trespassing
Firewood gatherers	Collection of firewood (sometimes illegally from protected areas).	Regulated collection of firewood. Prohibition of collection from protected areas.	No conflict besides that resulting from intrusion into National Park. KFS allows firewood collection in Kibwezi forest.
Wood carvers	Intrusion into protected areas to illegally obtain hardwoods for carvings.	Prohibition of extracting wood from protected areas, potential temporary loss of income.	Potential conflict between wood carvers and ranger teams.
Subsistence hunters	Intrusion into protected areas, killing of wildlife, igniting anthropogenic fires.	Greater law enforcement and abatement of hunting activities, persecution.	Potential conflict between hunters and ranger teams.
Commercial poachers	Poaching of elephants and rhinos.	Greater law enforcement to stop poaching.	Conflict between poachers and ranger forces. Potential threat within the communities.
Women	In charge of firewood collection, increasingly involved in charcoal production.	Regulation of firewood collection, stopping of charcoal production potentially leading to some loss of income.	Underrepresentation in decision-making, which could lead to conflicts.
Youth	Providing assistance for extractive activities, transportation of charcoal bags, khat (miraa) collection from protected area.	Stopping illegally produced charcoal therefore reducing demand for transportation, preventing intrusion into protected areas for khat collection.	Potential conflict between youth and ranger teams. Underrepresentation in decision-making due to seniority being main precedent for involvement.

Landless	Living on land without secure land titles, often practicing subsistence agriculture.	Cooperation to engage in agricultural training activities, though legal titles needed.	Potential conflict between landless and rightful landowners, such as KARI.

Table 14: Eastern Chyulu workshop Stakeholder analysis

Focal issue	Direct factor	Who benefits	How do they benefit	Who loses	How they lose
Poaching	Cultural beliefs and practices (inherited behavior on hunting)	Poachers	Indigenous knowledge, Economic benefit and source of food	Youth, Government and the general public	Unemployment due to collapse in tourism industry and lack of income to the government
	Poor law enforcement	Poacher Rangers	Low fines and short-term sentences and earning illegal income Getting bribes from poachers	General public Government	Death and injuries from wildlife Reduction in number of the target wildlife
	Poverty	Political leaders Business people	Easily influence or exploit the community Dictate the market prices and benefit from cheap labor	Community General public	Electing bad leaders hence lack of development Low income levels leading to poor living standards
Drought	Poor water harvesting infrastructure	Water vendors, tank retailers. Medical practitioners	Income from water sales. Treatment of water borne diseases	The poor. General community	Lack of water harvesting infrastructures, higher spending on water, poor health, increased health related expenses, poor health and poor health
	Reduced rainfall	Business people (food and animal feeds)	Increased market for their sales while cattle brokers get higher price margins	Farmers, government and biodiversity	Reduced yields, high cost of living, government's increased expenditure on feeding programs and

		Cattle brokers			lack of water and food for biodiversity
	Weather change	Food vendors	Increased market for their sales	Farmers	Reduced /lack of yields
Poverty	Diseases	Private medical practitioners, herbalists, witchdoctors and transport industry	Sale of medicines, herbs and service charge	The sick, their dependents and government	Financially, time lost when sick and government loses manpower
	Low income	Corrupt employers, and politicians	Exploitation through high interest rates and voter manipulation	General public	Low wages, bad health and choosing incompetent leaders
	Low production/ yields	Business people, middlemen and brokers	Buy cheaply but resale at higher prices	Farmers, general community and government	Monetary loss and government loses tax
	Human wildlife conflicts	Formal and informal health service providers and poachers	Sale of medicine, herbs, service charge and sale of game meat by poachers	Government, community and wildlife	Injuries, deaths, loss of source of sustenance (crops and livestock) and loss of time in guarding farms
Deforestation	Charcoal burning and wood carving	Charcoal makers, buyers, transporters, consumers and wood carvers and their customers	They earn income from selling charcoal and wood-based curios. Charcoal buyers gain energy while curio buyers gain aesthetic fulfilment	The community and wildlife	Environmental degradation, loss of habitat and law rainfall
	Unemployment	The rich and able in the society	Cheap casual labor	The unemployed	Low wage
	High levels of poverty	The rich and able in the society	Cheap labor	The poor and unemployed	Exploitation by the rich and low wages

	Low income	Investors, employers and the rich	Cheap labor	The poor and unemployed	Underpayment, difficulty in affording basic needs
	Lack of education	Employers	Availability of cheap labor	Uneducated and unskilled in the society	Offering labor at low cost
	Low farm productivity	Business people especially dealing with cereals	Selling food/cereals at low cost	Farmers	Selling their livestock at lower prices so as to buy cereals at higher prices
	High population	The rich and the community	Availability of cheap labor	The poor	High pressure on available resources and environmental pollution

Table 15: Western Chyulu workshop Stakeholder analysis

Focal issue	Direct factor	Who benefits	How do they benefit	Who loses	How they lose
Encroachment, agricultural expansion and land sub-division	Nomadism	Business people, Kenya Meat Commission and its shareholders Transport companies Veterinary service providers	Buy livestock at low prices but resale at very high prices High transport cost for hay and water for livestock Provision of veterinary services and drugs	Livestock owners	Selling their livestock at a loss especially during dry periods, High transport cost High cost of drugs and services
	Less land for settlement	Private investors (land and real estate) Farmers	Acquiring land at low prices Sale of farm produce to the nomad community	Land owners Land owners who lease out land to farmers	Selling land cheaply Buying food from farmers at high prices

Poverty	Lack of employment	The rich in the society	Low wages	The skilled and educated people in the society	Salaries that do not match their education (under-payment)
	Failure in agriculture	Business people, food venders and private health practitioners	Over-pricing and availability of more customers	General community	High expenditure on food and healthcare
	Land degradation	Charcoal makers Sand harvesters Herbalists Loggers	Profit from selling common resource	Wildlife (biodiversity), pastoralists, community and government	Drying up of water sources, reduced access to water and low food security
Environmental destruction and charcoal burning	Population increase	Business people Health service providers Education sector Government	Large markets for their products Health providers More job opportunities Increased taxes	Wildlife Parents and relatives	Conservation of wildlife habitat High cost of living
	Poverty	The rich NGOs	Exploitation through cheap labor Centralization of available resources Exploitation of resources	The poor Government	Poor wages Inequality in distribution of resources Increased expenditure on relief food Less tax collected
	Weak forest regulation	Poachers	Easy access of illegally acquired resources	Wildlife conservation (biodiversity)	Unabated destruction of forest

Education, awareness and women empowerment		Farmers and pastoralists	Cheap labor	Children, schools and community	Children lose education opportunity and illiteracy in community
	Child labor	Farmers, pastoralists and the rich	Cheap labor	The child, parents and community	Lose future prospects of prosperity and the child loses the right to education
	Inadequate teachers and equipment	Government and corrupt politicians	Withholding funds by government and embezzlement of funds by politicians	Marginalized communities, youth and children	Lack of education infrastructure, low standard of education and unemployment

2.8.3 Demonstration that all consultations and participatory processes have been undertaken directly with Communities or their representatives (CCB V3: G3.5.).

The Project has held a significant number of community meetings and workshops during the project development process. Section 2.7.1.2 lists the community meetings and barazas that were held in preparation for this monitoring period verification. Community workshops were also held in July 2016 and additional community meetings were held in advance of the validation in 2014, and are listed in the CHRP PD. A complete report of the SBIA workshops and community meetings, including pictures and meeting results have been provided to the verifier.

2.8.4 Steps to Communicate and Publicize the full Project Documentation, Project Validation and Verification Process, and CCB Public Comment Period (G3.9.).

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

- An executive summary of the monitoring report was made available in English, Swahili and Maa at all project partners' headquarters in the landscape, as well as the primary locational and sub-locational chief's offices by posting on the project bulletin boards.
- The project partners actively communicated to community members the start of the Public Comment Period at all their community outreach meetings and encourage them to file any comments. Community engagement officers will also make note of any verbal comment and ensure that these are registered.
- A computer was made available to any member of the public at the Project Office, located at the MWCT CCRC, Kuku Ranch, for making comments directly on the CCB website. All Public comments received in writing will be provided to the project verifier.

2.8.5 Process for Handling Unresolved Conflicts and Grievances (G3.10.).

The CHRP strives to minimize the possibility of conflicts and grievances by maintaining close linkages and working proactively with communities and stakeholders throughout the Project Area. The Project additionally has an open-door policy, encouraging community members, stakeholders and employees to visit the Project Office, which is located at the Community Conservation Research Centre (CCRC) at the Maasai Wilderness Conservation Trust (MWCT), on Kuku Group Ranch, and discuss any issues or feedback directly with project staff.

In the case that conflicts or grievances arise, the CHRP has a feedback and grievance redress policy and process, the purpose of which is to provide an efficient, fair and accessible mechanism for resolving complaints and conflicts, and ensure that the process is transparent and comprehensive. This grievance and conflict resolution procedure will additionally apply to any groups external to the CHCT that are involved in project benefit distribution or the operation of project activities. The CHRP feedback and grievance redress process has been publicized to communities and a copy provided to the project verifier.

This procedure applies to CHCT and activities under the CHRP. The individual Project Partners currently have their own respective feedback and grievance redress procedures in place. These vary from an open door and open dialogue policy, to formalized procedures. In the case of KWS, for example, written and verbal complaints are registered by the Community Warden and delivered to the TWNP Senior Warden.

The complaints are then verified and a report written. Every quarter, these reports are sent to the KWS headquarters to be kept on file. In addition, KWS has a 24-hour hotline that community members can call any time of the day or night.

Two types of issues accounted for in the grievance process include:

- Issues or conflict between the community or other project stakeholder and the CHCT, and
- Concerns regarding project employee rights, work practices, and employee safety raised by CHCT employees or contractors.

This grievance policy is outlined in the document "Chyulu Hills REDD+ Project Grievance Procedure." This grievance process was described in general at the community barazas, and the document has been provided to all of the Project Partners, and to the locational chiefs for reference. In addition, a summary of the grievance policy was translated to Swahili and Maa and posted on the Project information boards located at chief's huts throughout the Project Zone.

The full grievance policy has been submitted to the verifier, and is available to anyone upon request. In summary community members and project stakeholders are encouraged to submit grievances, comments or feedback to the Project Office through several channels, as listed below, with all communication methods receiving the same level of response. The primary method for communication will be through the Project Office located at the Maasai Wilderness Conservation Trust's office at the CCRC, Kuku Group Ranch. A secondary office location is being explored near Kibwezi town to increase access to those on the eastern side of the Project Area.

The Project Office maintains a mobile phone for the express purpose of grievance or comment submission by phone or text. The phone number for this phone has been widely communicated throughout the Project communities and stakeholders, and the phone is staffed during normal business hours by a Project Office employee, with an option to leave a message during non-business hours. A poster advertising the Project and containing photographs of the Project Manager and the 2 primary project staff members and the project contact phone number and email address was posted on all 15 of the sign boards and distributed in the Project Zone. When a community member or project stakeholder contacts the Project Office with a grievance, whether in-person or through other means, the Project Manager, or other project staff member appointed by the Project Manager, will record the grievance in the electronic log book. Another communications channel is through the location and sub-location chiefs. Location and sub-location chiefs have an information board located at their office, or in a central location in the village, where project information and communications will be posted. The board has a suggestion box where grievances or other feedback can be submitted, anonymously if desired. The location or sub-location chief will open the suggestion box at a minimum of once a week, and communicate all of the grievances or comments contained immediately to the Project Office either physically or through electronic means.

For project staff members and contract workers their first step to communicate any feedback or grievance is to go to their immediate supervisor or manager. If they do not feel comfortable going to their supervisor or manager, or the grievance is about their supervisor or manager, they should meet with the Project Manager or other senior project employee. Additionally, all of the other communication methods detailed above for community members and project stakeholders are available to project employees and contractors. All grievances or conflicts involving project employees or contractors will be resolved in a manner that meets all Kenyan labor laws.

For both community/stakeholder and project employee grievances there is a three-stage feedback and grievance redress procedure, with specified time limits and clear instructions at each stage. All communications and decisions in this procedure will be documented on the grievance recording template by the Project Office and be readily available for review by any parties upon request. All grievances or conflicts will start at stage 1, and only proceed to stages 2 or 3 if no amicable solution can be found.

When a grievance has been successfully resolved to the satisfaction of both the person who raised the grievance and the Project Manager the grievance and the resolution may be communicated to the CHRP stakeholders and community members or for employee grievances to the full project staff at the discretion of the Project Manager. If the grievance was of a personal or confidential manner, then no communications will be made beyond senior CHRP Management.

2.9 Deviations

2.9.1 Methodology Deviations

There are no deviations from the methodology, this section is not applicable.

2.9.2 Project Description Deviations

There are no deviations from the Project Description, this section is not applicable.

3 LEGAL STATUS

3.1 Compliance with Laws, Statues, Property Rights and Other Regulatory Frameworks (G4.5., G5.1.-2.)

3.1.1 Employee Safety (G4.5.).

The CHRP abides by all worker's rights laws and regulations. Workers will be informed about their rights at the point of their employment during the employee orientation. Additionally, as described in the Health and Safety plan, during the employee orientation workers will be informed about the potential safety risks of their job and of methods to mitigate the risks. A hard copy of the relevant laws will be kept at the Project Office and any worker is free to consult these any time during working hours. Below can be found a list of the relevant laws.

The Employment Act, 2007

Employment Act 2007 is an Act of Parliament that declares and defines the fundamental rights of employees, to provide basic conditions of employment of employees, to regulate employment of children, and to provide for matters connected with the foregoing.

The Labor Institution Act, 2007

The Labor Institution Act 2007 is an Act of Parliament to establish labor institutions, to provide for their functions, powers and duties and to provide for other matters connected thereto.

The Labor Relations Act, 2007

The Labor Relation Act 2007 is an Act of Parliament to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organizations or federations, to promote sound labor relations through the protection and promotion of freedom of association, the encouragement of effective collective bargaining

and promotion of orderly and expeditious dispute settlement, conducive to social justice and economic development and for connected purposes.

The Work Injury Benefits Act, 2007

The Work Injury Benefits Act 2007 is an Act of Parliament to provide for compensation to employees for work-related injuries and diseases contracted during their employment and for connected purposes.

The Retirement Benefits Act, 1997

The Retirement Benefits Act 1997 is an Act of Parliament to establish a Retirement Benefits Authority for the regulation, supervision and promotion of retirement benefits schemes, the development of the retirement benefits sector and for connected purposes.

The National Social Security Fund Act, 1989

The National Social Security Act (the 1989 was revised in 2012) is an Act of Parliament to establish a National Social Security Fund; to provide for contributions to and the payment of benefits out of the Fund; and for matters connected therewith and incidental thereto.

The Occupational Safety and Health Act, 2007

The Occupational Safety and Health Act 2007 is an Act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes.

3.1.2 Compliance with Relevant National and Local Laws, Regulations, and International Agreements (G5.1.).

The CHRP meets all local, national and international laws, which relate to this project. These laws include the aforementioned employment laws, as well as multiple laws outlined below:

The Land (Group Representatives Act), 2010

The Land (Group Representatives Act), 2010 is an Act of Parliament to provide for the incorporation of representatives of groups who have been recorded as owners of land under the Land Adjudication Act, and for purposes connected therewith and purposes incidental thereto.

The Forest and Conservation Management Act, 2016

An Act of Parliament to give effect to Article 69 of the Constitution with regard to forest resources; to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socio- economic development of the country and for connected purposes.

The Wildlife (Conservation and Management) Act (Cap. 376), revised 2009 and 2013

The Wildlife (Conservation and Management) Act 2013 is an Act of Parliament to provide for the protection, conservation, sustainable use and management of wildlife in Kenya and for connected purposes.

The Forest (Conservation and Management) Act, 2016

The Forest (Conservation and Management) Act 2016 is AN ACT of Parliament to give effect to Article 69 of the Constitution with regard to forest resources; to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socio- economic development of the country and for connected purposes

The Land Act (No. 6), 2012

The Land Act 2012 is an Act of Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land based resources, and for connected purposes.

The Environmental Management and Coordination Act, 1999

The Environmental Management and Coordination Act 1999 is an Act of Parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto.

The Water Act, 2002

The Water Act is an Act of Parliament to provide for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage services; to repeal the Water Act (Cap. 372) and certain provisions of the Local Government Act; and for related purposes.

The Water Act 2016

A new Water Act was passed in 2016 to replace the old act. The new Act is an Act of Parliament to provide for the regulation, management and development of water resources, water and sewerage services; and for other connected purposes.

The Agriculture, Fisheries and Food Authority Act, 2013

The Agriculture, Fisheries and Food Authority Act is an Act of Parliament to provide for the consolidation of the laws on the regulation and promotion of agriculture generally, to provide for the establishment of the Agriculture, Fisheries and Food Authority, to make provision for the respective roles of the national and county governments in agriculture excluding livestock and related matters in furtherance of the relevant provisions of the Fourth Schedule to the Constitution and for connected purposes.

The Constitution of Kenya, 2010

The Constitution of Kenya (2010) is the supreme law of Kenya. It establishes the structure of the Kenyan government, and also defines the relationship between the government and the citizens of Kenya.

The National Climate Change Response Strategy, 2010

The National Climate Change Response Strategy - Kenya has developed its first National Climate Change Response Strategy (NCCRS) in order to put in place robust and thorough adaptation and mitigation measures to minimize risks and maximize opportunities. The Strategy is designed to enhance Kenya's participation in the global climate change (COP) discussions.

Climate Change Act 2016

The Climate Change Act 2016 is an Act of Parliament to provide for a regulatory framework for enhanced response to climate change, to provide for mechanism and measures to achieve low carbon climate development, and for connected purposes.

International Treaties:

Kenya is a signatory to the following International Treaties.

Convention of Biological Diversity: Kenya ratified the convention on 26 July 1994, and signed its two related mandates, the **Cartagena and Nagoya Protocol** on 11 September 2003 and 2 of January 2012 respectively.

United Nation Framework Convention of Climate Change: Kenya signed this on 12 June 1992 and ratified the **Kyoto Protocol** on the 25 September 2005.

African Convention on Conservation of Nature and Natural Resources: Kenya signed on 15 September 1968.

Convention on International Trade in species of Wild Fauna and Flora (CITES): Kenya ratified on 13 December 1978.

3.1.3 Describe measures needed and taken to ensure that the Project is not complicit in any form of discrimination or sexual harassment (G3.7. (V3))

The CHRP is committed to fair treatment and equal opportunity for all. The Project, nor any agent of the Project, will discriminate against any person for any reason, including, but not limited to, gender, religion, nationality, tribe, or sexual identity. The Project has established an equal opportunity policy that ensures that the Project will not engage in or be complicit in any form of discrimination. The CHRP is committed to providing a workplace that is safe and free from all sexual harassment or unwelcome sexual advances. The Project has drafted a document outlining a sexual harassment policy, defining sexual harassment and describing the recourse that any employee who feels that they have suffered sexual harassment should take.

3.1.4 Approval from the Appropriate Authorities, Including Established Formal and/or Traditional Authorities Customarily Required by the Communities. (G5.2.)

The Project Proponent of the CHRP is the CHCT. The Trust was established in 2015 by all of the Project Partners. Together, the Project Partners hold legal land tenure over the entirety of the Project Area. The land tenure is described in section 1.2.4. Each Project Partner has assigned the carbon rights to the CHCT. A comprehensive FPIC process was undertaken during 2014 with Project stakeholders in advance of Project Validation. Please refer to the CHRP PD, section 2.7.1 for a detailed description of the FPIC process.

3.2 Evidence of Project Ownership (G5.3 & G5.6.)

Land tenure within the Project Area is divided between Kenya Wildlife Service, Kenya Forest Service and the four Maasai community owned Group Ranches. In addition, The David Sheldrick Wildlife Trust has a 30-year leasehold agreement for the management and protection of the Kibwezi Forest Reserve from KFS. Between them these partners hold title and/or control of all the land within the project area (Please refer to Figure 1).

Current Kenyan law makes no specific provisions for carbon rights or GHG emissions reductions. However, title to land includes a bundle of associated rights, such as to minerals and timber. In addition, precedent has been set with two VCS verified REDD projects (Kasigau Corridor REDD+ Project Phases I and II), located within about 70 miles of the CHRP, both of which have asserted Right of Use linked to land tenure in Kenya.

All these entities with Right of Use to the GHG emissions have assigned their respective Rights of Use to the Project Proponent (CHCT) through a duly executed Deed of Assignment filed with the Government of Kenya Lands Department Central Registry on July 29, 2015, providing enforceable and irrevocable

agreements with the holders of the statutory property rights in the land, vegetation, conservational or management process that generate GHG emission reductions which vests the right of use in the project proponent.

3.3 Emissions Trading Programs and Other Binding Limits (CL1.5.)

The CHRP is not subject to any additional emission trading programs or other binding limits. The CHRP is being developed under the VCS and CCB standards. The VCS standard requires that all carbon credits (VCUs) generated by the project are listed on a third-party registry and are tracked from the time of initial verification until their eventual retirement. Unique serial numbers will be generated for each tonne of CO2e that is generated under this protocol and issued as VCUs, so as to ensure that no credits can be sold more than once (double-counted). This project area will not be involved with any other projects developed under another voluntary or regulatory carbon offset protocol.

3.4 Participation under Other GHG Programs (CL1.5)

This is the first and only application for the CHRP to a GHG credit program.

3.5 Other Forms of Environmental Credit (CL1.5.)

The CHRP will also be validated under the Climate, Community, and Biodiversity (CCB) standards (Second Edition, Gold Level).

3.6 Projects Rejected by Other GHG Programs (CL1.5.)

The CHRP has neither applied nor been rejected by any other GHG program.

3.7 Respect for Rights and No Involuntary Relocation (G5.3-4.)

3.7.1 Encroachment on Private, Community or Government Property without Free Prior and Informed Consent from those Affected by the Project (G5.3.)

The Project will not encroach uninvited on private property, community property or government property. Tenure of the Project Area is outlined in section 1.2.4. Furthermore, the CHRP Document section 2.7.1. outlines the comprehensive procedure of FPIC activities which ensures that all stakeholders and communities are consulted.

3.7.2 Involuntary Relocation of People or Activities Important for Livelihood or Culture (G5.4.)

The Project does not require involuntary removal or relocation of communities or any activities important for their livelihood and culture. As discussed in section 1.2.4 KWS carried out a court ordered eviction of households that had illegally settled in the CHNP, within the Project Area. This was the result of a long running action that predated the formation of the CHRP, and was not carried out by the CHRP, the CHCT or on behalf of the Project.

3.8 Illegal Activities and Project Benefits (G5.5.)

There are some activities that, if carried out in a protected area, are illegal. These are currently being addressed by the Project Partners but efforts will need to be scaled up in intensity once carbon revenue is available in order to significantly reduce and eventually stop them. Activities that may impact the project's

climate objectives include charcoal burning, wood extraction for carvings and some logging. Project partners have on-going security operations and ranger teams that patrol the area with the aim of stopping any such activities, particularly in the National Parks and the Forest Reserve (KWS and KFS). Selective logging and removal of poles for fencing is currently allowed on the Group Ranches with approval by the Board of Directors, but during negotiations with the stakeholders it was made clear that such activities should be stopped.

Poaching is a serious problem, both in terms of bush meat and elephant/ rhino poaching for tusks and horn products, and may affect the Project's biodiversity impact. However, Project Partners, particularly BLF, MWCT and KWS, are dedicated to protecting these animals and have comprehensive security operations and vigilance in place in order to monitor any illegal activity. With the increasing demand of rhino horn and ivory, however, further security measures must be implemented in order to protect these species in the Project Area.

4 APPLICATION OF METHODOLOGY

The CHRP employs the VCS VM0009 Methodology for Avoided Ecosystem Conversion, version 3.0. This methodology quantifies greenhouse gas emission reductions generated from avoiding either planned or unplanned (or both) deforestation as well as protection from native grassland conversion as initiated by a variety of agents and drivers.

4.1 Title and Reference of Methodology

The methodology used for the CHRP was the VCS methodology VM0009 Methodology for Avoided Ecosystem Conversion, v3.0. Please see the CHRP Project Document section 4.2 for details on the applicability of this methodology to the Project.

4.2 Project Boundary (G1.1)

4.2.1 Gases

Carbon dioxide (CO_2) was determined to be the primary source of greenhouse gas emissions in the project, given the threat of deforestation and native grassland conversion from the drivers listed in the baseline scenario. Methane (CH_4) and nitrous oxide (N_2O) are conservatively excluded from the project.

Table 16: Baseline and Project Greenhouse Gases Considered

Source		Gas	Included?	Justification/Explanation
Baseline	Source 1	CO_2	Yes	Major pool considered in the baseline scenario
		CH_4	No	Conservatively excluded
		N_2O	No	Conservatively excluded.
		Other	No	No other GHG gases
Project	Source 1	CO_2	Yes	Major pool considered in the project scenario

		CH_4	No	Conservatively excluded
		N_2O	No	Conservatively excluded.
		Other	No	No other GHG gases

4.2.2 Selected Carbon Pools

Table 17: Selected carbon pools in the Forest Project Accounting Area (REDD+ baseline type).

Pool		Required	Included in Project	Justification
AGMT	Above-ground merchantable tree	Yes, if baseline scenario or project activity(ies) include the harvest of long-lived wood products. Otherwise, accounting for this carbon pool is not required	No	No commercial tree harvesting or production of long-lived wood products included in baseline
AGOT	Above-ground other (non-merchantable) tree	Yes	Yes	Major pool considered
AGNT	Above-ground non-tree	Yes, if the baseline scenario includes perennial tree crops. Otherwise, accounting for this carbon pool is optional.	Yes	Major pool considered
BGMT	Below-ground merchantable tree	Optional	No	No commercial tree harvesting or production of long-lived wood products included in baseline
BGOT	Below-ground other (non-merchantable) tree	Optional	Yes	Major pool considered
BGNT	Below-ground non-tree	Optional	Yes	Major pool considered
LTR	Litter	No	No	Conservatively excluded
DW	Dead wood	Yes, if AGMT is selected	No	Conservatively excluded
SD	Standing dead wood	Optional	Yes	Major pool considered
LD	Lying dead wood	Optional	No	Conservatively excluded
SOC	Soil organic carbon	Optional	Yes	Major pool considered
WP	Long-lived wood products	Yes, if AGMT is selected	No	Conservatively excluded

Table 18: Selected carbon pools in the Grassland Project Accounting Area (ACoGS baseline type).

Pool		Required	Included in Project	Justification
AGMT	Above-ground merchantable tree	Yes, if baseline scenario or project activity(ies) include the harvest of long-lived wood products. Otherwise, accounting for this carbon pool is not required	No	No commercial tree harvesting or production of long-lived wood products included in baseline
AGOT	Above-ground other (non-merchantable) tree	Yes	Yes	Major pool considered
AGNT	Above-ground non-tree	Yes, if the baseline scenario includes perennial tree crops. Otherwise, accounting for this carbon pool is optional.	Yes	Major pool considered
BGMT	Below-ground merchantable tree	Optional	No	No commercial tree harvesting or production of long-lived wood products included in baseline
BGOT	Below-ground other (non-merchantable) tree	Optional	Yes	Major pool considered
BGNT	Below-ground non-tree	Optional	Yes	Major pool considered
LTR	Litter	No	No	Conservatively excluded
DW	Dead wood	Yes, if AGMT is selected	No	Conservatively excluded
SD	Standing dead wood	Optional	Yes	Major pool considered
LD	Lying dead wood	Optional	No	Conservatively excluded
SOC	Soil organic carbon	Optional	Yes	Major pool considered
WP	Long-lived wood products	Yes, if AGMT is selected	No	Conservatively excluded

4.3 Baseline Scenario (G2.1., CM1.3. & B1.3.)

4.3.1 Most Likely Land Use Scenario in the Absence of the Project (G2.1.)

The baseline scenario that has been identified is that of conversion of native ecosystems from a natural land cover to a non-forest or agricultural state. The baseline scenario demonstrates that the lowland areas of the Project Area would be converted to subsistence agriculture, whereas the higher elevation areas of the Project Area would undergo complete deforestation through the unsustainable harvesting of trees for forest products. The VCS Additionality tool was used by the Project Proponent to demonstrate that this is the most likely baseline scenario for both the Forest Project Accounting Area and Grassland Project Accounting Area. Please refer to Section 4.6 for the VCS Additionality Tool.

4.3.2 How the 'Without Project' Scenario (baseline) would Affect Communities in the Project Zone (G2.4.)

The Without-Project land-use scenario would affect the communities in the Project Zone in myriad ways. In order to analyze these potential impacts systematically and pragmatically, we focused on several key issues, hereafter termed Focal Issues. Focal Issues are defined as the social and biodiversity factors or issues that are most important for the success of the REDD+ project (Richards & Panfil, 2011). These are issues or problems most associated with the deforestation and/or forest degradation process, which could prevent the Project from achieving its (carbon) objectives. They could also be issues or problems in the project area that the REDD+ project could have most influence on (Richards & Panfil, 2011). Selection of the most relevant social and biodiversity variables requires a strong understanding of local social and ecological processes, including, inter alia local social structures and governance mechanisms, and the likely response of target species to changes in forest cover. In order to select and prioritize potential social and biodiversity issues, we used a combination of the Project Partners' experience of the Project Area, the local community (environment) advisory committees they work with, information from the FPIC meetings, and literature.

For the community component of this Project, three focal issues were prioritized from a pool of potential issues as key to reducing deforestation, forest degradation and avoiding conversion of grasslands. These were: high levels of poverty and livelihood vulnerability; food insecurity; and poor education standards. (NB: water scarcity and poor health standards featured highly too, but were deemed cross-cutting and/or contributing factors and are thus already incorporated into these three main issues). A situational analysis of these three focal issues resulted in conceptual diagrams showing the root causes of the problems (also referred to as Problem Flow Diagrams by Richards and Panfil (2011)). From these diagrams, potential project entry points (or project strategies/activities) that would help address some key root causes were then identified. The results of this analysis are presented in Table 19. For a more detailed description of this analysis and for the conceptual diagrams used please refer to section 4.5.2 of the CHRP PD.

Table 19: Short-to-medium term Without-project projections for the major Direct Factors affecting the Social Focal Issues in the Chyulu Hills ecosystem

Direct threat	Condition expected in 5-10 years, improve, worsen, or remain unchanged?	What will drive the change?	Remarks
Little livelihood diversification	Worsen	Few alternative Income-generating activities (IGAs); Lack of technical capacity & poor education	Ecosystem deterioration in turn means lesser support for IGAs
Insufficient incomes (poverty)	Worsen	Limited external investment creating limited employment opportunities; Lack of capital for businesses	Includes poor health limiting ability to utilize opportunities;
Low farm productivity: livestock	Worsen	Loss of grazing areas from subdivision; Overgrazing and pasture deterioration; Increasing human-carnivore conflicts; Climate extremes (droughts)	
Low farm productivity: crops	Worsen	Sedentarization and unsustainable agriculture (poor SLM, excessive irrigation); Increasing human-wildlife conflicts; Climate extremes (drought/floods)	
Poor education infrastructure	Improve	Growing community awareness; Increased County provision for education	
Low enrolment	Unchanged	Growing community awareness; Growing girl-child drive; Insufficient income to support fees; Cultural priorities	
Poor teaching standards	Unchanged	Increased awareness and County provision for education; Still lagging cultural attitudes and hardship area failing to attract top teachers	
Poor storage of farm produce	Worsen	Poor yields and poor market access will reduce the incentive to build storage structures; Lack of income to invest in such structures	

4.3.3 How the 'Without Project' (Baseline) Scenario would Affect Biodiversity in the Project Zone (G2.5.)

The Without-Project land-use scenario would affect the biodiversity in the Project Zone in several ways. Similar to the analysis of effects to communities described in the section above (4.4.2), we focused once more on Focal Issues, which are defined in this context here as the biodiversity factors or issues that are most important for the success of the REDD+ project (Richards & Panfil, 2011). Biodiversity Focal Issues were also selected and prioritized based on Project Partners' experience in the Project Area, the local

advisory committees, information from the FPIC meetings, and literature. For the biodiversity component of this Project, the following two critical Focal Issues were prioritized from a pool of potential issues: Ecosystem degradation and Biodiversity declines. A situational analysis of these two Focal Issues resulted in conceptual diagrams showing the root causes of the problems (also referred to as Problem Flow Diagrams by Richards and Panfil (2011)). From these diagrams, potential project entry points (or project strategies/activities) that would help address some key root causes were then identified. The results of this analysis are presented in Table 20. For a more detailed description of this analysis and for the conceptual diagrams used please refer to section 4.5.3 of the CHRP Project Description document.

Table 20: Short-to-medium term Without-project projections for the major Direct Factors affecting the Biodiversity Focal Issues in the Chyulu Hills ecosystem

Direct threat	Condition expected in 5-10 years, improve, worsen, or remain unchanged?	What will drive the change?	Remarks
Unsustainable land use (overgrazing, poor SLM & excessive irrigation)	Worsen	Sedentarization and unsustainable agriculture intensification; Lack of technical knowledge or investment capacity for new agricultural methods e.g., agroforestry and livestock diversification	Individualization driven by population pressure and insecure tenure/rights
Deforestation, Encroachment, Settlement	Worsen	Poor security and enforcement; Lack of alternative livelihoods vs Increased community awareness precluding unregulated land issuance	
Unsustainable off-take (trees)	Worsen	Lack of alternative livelihoods will lead to greater dependence on extractive activities	
Fire	Worsen	Shrinking of grazing areas leading to elevated use of fire; Lack of technical knowledge on alternative techniques	Community stick to traditional techniques which will not work as well in this new landscape
Poaching	Worsen	Few economic opportunities; Lack of protein alternatives; Growing demand for game meat and other products; and Poor enforcement	Includes growing international markets for ivory
Wildlife persecution	Worsen	Inadequate enforcement; Increasing human-wildlife conflicts	Overstocking and farmland in the wildlife dispersal areas
Wildlife displacement from critical resources	Worsen	Habitat degradation from over-extraction and overstocking; Unsustainable agricultural intensification; and Encroachments	Also includes over-use of water for agriculture and catchment degradation

		and settlements	
Diminished migration and dispersal	Worsen	Smaller range from increasing encroachments and fenced settlements with escalation of human-wildlife conflicts	

4.3.4 Identifying the Agents and Drivers

The primary agents of deforestation and native grassland conversion in the Chyulu Hills are identical to those in the general reference area. The primary agents of conversion are local community members who are part of several tribes present in the region performing subsistence agriculture. There exists clear evidence that the agents and drivers are present and active throughout the reference area and Project Area. The documented deforestation and grassland conversion in the reference area demonstrates that this type of conversion is common practice in the area, and occurs across all boundaries and land ownerships. There has been significant agricultural conversion in the Project Area before the arrival of the Project Proponent. The land ownership in the reference area and the Project Area is a similar mix of privately owned group ranches and government owned land that has official protection against settlement. Therefore, the clear evidence of widespread conversion of the reference area provides strong evidence of the applicability of the identified baseline scenario and agents and drivers of conversion.

The drivers affecting both sets of agents include access to resources for livelihoods, proximity to major markets (allowing for access to healthcare, education, information and community), proximity to roads, and proximity to fresh water.

For a more detailed description of the agents and drivers of conversion please refer to section 4.5.4 of the CHRP Project Description document.

4.4 Additionality (G2.1. & G2.2.)

Step 1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity

Sub-step 1a. Identify credible alternative land use scenarios to the proposed VCS AFOLU project activity.

a) Identify realistic and credible alternative land-use scenarios to the proposed REDD+ project activity.

i. Continuation of the pre-project land use;

The most likely alternative land-use scenario to the CHRP is the continuation and proliferation of the historically observed unplanned deforestation, degradation and conversion of the Project Area. This ‘unplanned’ deforestation and conversion, as defined by the VCS methodology VM0009 v3, occurs across the Project Area both legally, with landowner permission in some land units, and illegally in other land units. This stems from lax enforcement of property tenure and resource planning, coupled with the communities’ economic need for resources and land. There are several different land ownership types existing within the Project Area. However, the general pattern of unplanned conversion, driven by the need for wood for building materials and charcoal production, and new agricultural land, is identical across all of the ownership types. The same mixture of drivers and agents of deforestation and conversion can be observed

across both the privately owned group ranches and publicly owned land that comprises the REDD+ Project Area. This scenario occurs despite the publically owned areas in the Project featuring official protection under Kenyan law.

End land-use in the greater Chyulu Hills ecosystem is generally observed as slash and burn agriculture. This is precipitated by several factors, the most prominent being immigration into the Project Area and the trend of traditional pastoralist cultures adopting more sedentary, agricultural-based livelihoods as described by Western *et al*., (2009). Small-scale subsistence agricultural offers a crucial livelihood to communities in the Project Area, where there is limited access to other economic activities and export markets. Additionally, as current agricultural practices are based on unsustainable and inefficient land uses, the soil fertility of converted land is quickly depleted, necessitating the continual conversion of new lands to maintain crop yields. Slash and burn agriculture is an especially important driver of conversion for the grassland areas, where few barriers exist to the rapid conversion of native grasslands into cultivated land.

For the majority of the prior ten years, the group ranches have experienced severe overgrazing which has led to ecological damage of the lowland dry forest areas. Cattle and shoat (goat and sheep) grazing results in deforestation through the clearing of forest by the herders to increase grazing lands and the cattle grazing down or trampling tree seedlings and saplings resulting in the suppression of the forests' natural regeneration. The areas managed by the group ranches are generally arid with little permanent water for sustainable cattle ranching. Traditionally, the cattle ranchers were nomadic pastoralists, moving across the landscape and limiting their ecological impact on any single location. However, due to cultural shifts, these communities have started settling (Western *et al*., 2009). This has led to increased ecological damage from overgrazing due to cattle sedentarization. Cattle grazing may occur in parts of the Project Area with the sanction of the landowner, though in many cases the herders do not have permission, or graze significantly more cattle than permitted by the landowner. Additionally, through efforts to diversify income, many pastoralists have turned to small-scale agriculture, either by leasing land to a third-party or farming themselves, resulting in the conversion of areas that were formerly grazing areas, into farms.

Illegal charcoal production in Kenya is a significant driver of deforestation nationally and the Project Area is no exception, particularly on the eastern boundaries of the Project Area. Charcoal is generally produced by local community members to supply urban demand, generally from Mombasa and Nairobi. The charcoal is produced either by targeted cutting of specific species across a larger area or clear-felling areas and burning the trees in earthen kilns built at the site of deforestation. This activity leads to significant forest degradation, and eventually can lead to deforestation.

Woodcarving is another significant driver of forest degradation and deforestation in the Project Area. Woodcarving is an important economic activity that is widely practiced by the communities and stakeholders of the CHRP, especially on the eastern side of the Chyulu Hills. Gathering or harvesting of wood for the production of carvings in CHNP and TWNP is illegal and rangers periodically make arrests of wood carvers found in the protected areas. However, woodcarvers continue to trespass into the protected areas of Project Area. Historically, desirable carving species such as *Dalbergia melanoxylon* and

Olea africana occurred widely across the area. However, due to over-extraction, woodcarvers now venture deep into the national parks and the forest reserve as these are the only remaining sources of the desired wood species remaining in the area. Often the carvers reside in CHNP and the SCE (TWNP) for weeks on end, where they perform the wood carving activity in-situ. The products are sold along the Nairobi-Mombasa highway to traders and to passing tourists. Though the activity is widespread and well-known throughout the CHNP and SCE, park rangers have had little overall impact on the curbing this activity.

In the absence of a REDD+ Project, the deforestation, degradation and conversion patterns described above, coupled with inadequate financial resources across the landscape, will continue unabated. It is clear that on both the communally owned group ranches and the state lands, that in the absence of funding from the sale of emission reductions, the Project Proponent will be unable fund project activities at a level significant enough to protect the Project Area from ecosystem conversion.

ii. Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project;

Conservation is a common practice in Kenya, with many conservation activities run by non-governmental organizations. However, many of these conservation projects are smaller in scale than the CHRP, and funded by government or donor funds, not by a financial return from Project Activities. There have been limited conservation activities over large portions of the privately owned group ranches in the Project Area prior to the initiation of the CHRP. Three of the project partners, MWCT, BLF and the DSWT are conservation focused NGOs that have operated in portions of the Project Area prior to the onset of the Project. Existing activities include land patrolling by staff, collection of biological data and community education. There are also eco-tourism activities on sections of both Kuku A and Mbirikani group ranches. Visitors pay a conservation fee that is in turn used to fund some protection and conservation activities over very limited areas of the current Project Area resulting in only a proportion of the landscape being protected by the CHRP. The lack of a consistent source of significant funding has limited the scope of these project activities and their effectiveness at reducing the widespread degradation and ecosystem conversion that has been occurring across the area. Furthermore, donor funding has been unsustainable and inconsistent over the long term, which has limited the ability of the Project Proponent to expand the project activities to the scale needed to stop the ecosystem degradation and conversion from occurring. The funds from the sale of emissions reductions provided through the REDD+ Project will be instrumental in the development of an independent, and long-term sustainable revenue stream to support these project activities and expand their reach across the Project Area to additional communities.

iii. Activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate from legal requirements;

The state-owned land in the Project Area includes land gazetted as National Parks (CHNP and the SCE) through the Wildlife Act Cap. 376 and under the jurisdiction of Kenya Wildlife Service, and land gazetted as a Forest Reserve (Kibwezi Forest Reserve), through the Forest Act (2005), which falls under Kenya Forest Service (KFS) jurisdiction. On these land parcels, there is a legal requirement to perform activities similar to the

proposed project activities, such as conserve the forest and enforce the boundaries of the areas against deforestation and conversion activities. While this land is managed for conservation purposes and is protected under several articles of national legislation, it has undergone significant degradation, deforestation and conversion over the last 10 years. This is largely due to a lack of funding at the aforementioned agencies, limiting their ability to enforce the national park and forest boundary rules / laws and patrol the areas to stop the activities that lead to conversation and deforestation. The primary source of revenue for the protection of national parks in Kenya is revenue generated through gate fees. This revenue is then remitted at the national level for re-allocation across a wide range of activities. Lesser-visited parks such as the CHNP face significant shortfalls in funding, compared to the well-known parks such as Tsavo East National Park and Amboseli National Park, due to their lower profile. Therefore, while some Kenyan National Parks do not face significant deforestation and conversion threat, the CHNP and SCE area of TWNP have continued to suffer from insufficient levels of protection and therefore experience drastically higher levels of forest degradation, deforestation and conversion than these other parks. Deforestation activities inside of the national parks and forested areas in the Project Area include widespread “slash and burn” or swidden agriculture across these areas. Additionally, trees are harvested for woodcarvings, charcoal production and firewood and grasslands are subject to burning.

Sub-step 1b. Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations

The majority of the alternative land use scenarios listed in sub-step 1a represent illegal land uses, with the major exception of swidden agriculture. The obvious exception to this are the project land units that are nationally gazetted protected area such as the National Parks and the Forest Reserve, where all of the alternative land uses listed are illegal. However, local expert knowledge documents that all of these alternative scenarios have been commonly occurring in the project protected areas, despite being illegal. Much of the conversion to agriculture on the privately owned group ranches is done with the consent of the owners of the land. This conversion is primarily carried out by members of the communities that own the group ranches and who are shifting from traditional pastoralist livelihoods to more sedentary, agriculturally based existences. Despite the legal status of these activities, evidence of forest degradation, deforestation and conversion is present around the Project Zone as well as within the Project Area itself. It currently occurs in all project land units, irrespective of land ownership or management.

Forest degradation, grassland conversion and deforestation are major threats to all land units in the Project Area despite the presence of official legal protection. In addition to slash and burn agriculture, tree harvesting for charcoal production, firewood and woodcarving from the state owned protected areas is also clearly illegal under Kenyan Law. There is significant evidence that the boundaries of many Kenyan protected areas are not enforced adequately, and that there is a substantial amount of uncontrolled access into protected areas that leads to their conversion. This gap in enforcement is largely caused by a lack of funding, limiting the ability of Kenyan Wildlife Service and Kenya Forest Service to patrol CHNP, the SCE and Kibwezi Forest Reserve with enough frequency and efficacy to deter conversion activities, as detailed in the above section Sub-Step 1a. An analysis of the land cover / land use in the 5 counties (Kajiado, Kilifi, Kwale, Makueni, and Taita Taveta) in which the Project Area is located showed that greater than 30% of the land area has been converted to agriculture. This shows that conversion to Agriculture is a common and prevalent scenario in this area, and that laws and regulations on land use are

systematically not enforced. The evidence of this analysis was provided to the validator. Additional clear evidence in support of the land cover conversion assertions above is the Ngai Ndethya National Reserve, a Kenyan protected area adjacent to the Project Area. Despite this area being officially gazetted as a protected area, an analysis of recent satellite imagery (present day) demonstrates that a substantial amount of its area has undergone complete deforestation and conversion to agriculture (Figure 8). The Ngai Ndethya National Reserve exhibits extremely similar conditions to the protected areas within the CHRP, including presence of, and ease of access by, the same agents of deforestation and conversion as well as the same drivers of deforestation and degradation.

Sub-step 1c. Selection of the baseline scenario:

VM0009, 'Methodology for Avoided Ecosystem Conversion' v3 provides a step-wise approach for selecting the most plausible baseline scenario. For the CHRP, the most plausible scenario was determined to be the continuation of pre-project land-use activity: namely, conversion to agriculture, as described in Step 1a above. There is evidence of significant encroachment into the Project Area already, including within the land units that are officially protected. Those areas that have already been converted to agriculture were excised from the Project Area according to VCS and VM0009 regulations. The surrounding areas, including other protected areas, have all seen significant levels of ecosystem conversion from forest or native grassland to agriculture, demonstrating that slash and burn agriculture is the primary driver of ecosystem conversion in this region, and it is also the most obvious scenario that would occur in the absence of a REDD+ project.

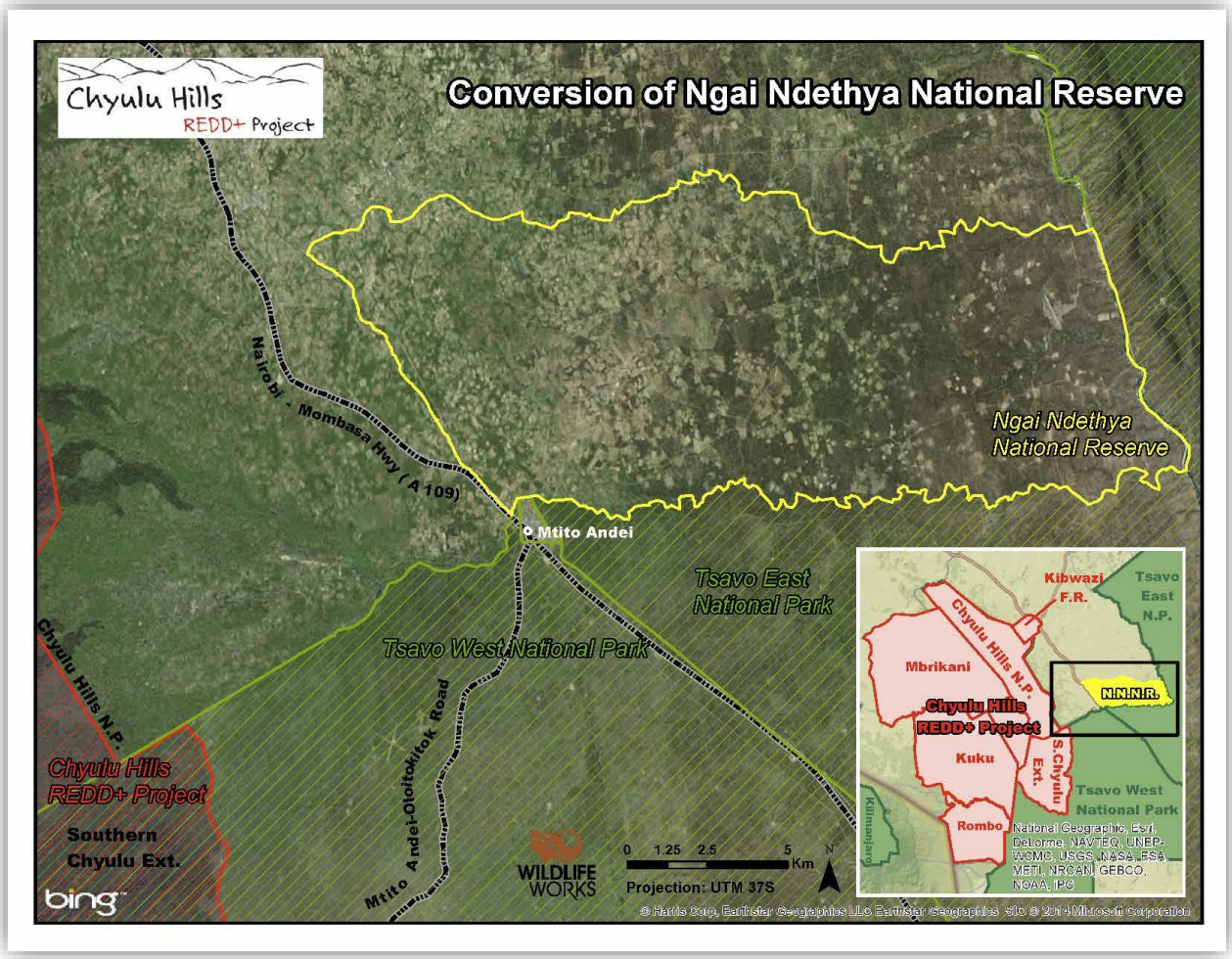


Figure 8: The Ngai Ndethya National Reserve is shown in relation to the Project Area. The Ngai Ndethya National Reserve has been mostly converted to agriculture despite being gazetted as a protected area.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method

The VCS AFOLU project generates no financial or economic benefits other than VCS-related income derived from the sale of carbon credits. Therefore, simple cost analysis applies.

Sub-step 2b. Apply simple cost analysis

The proposed project activities are non-revenue generating (other than VCS-related carbon income) and the physical protection of the Project Area, and provision of deforestation mitigation activities are projected to cost the Project Proponent over $4,500,000 USD per annum. There exists no significant income from other Project Activities or other sources from the land to offset these costs. In the absence of active protection, both physical, and that created by partnering with the communities to create new economic alternatives, it is clear the land in the Project Area would be cleared aggressively for subsistence agricultural purposes, as has already been

observed in the Project Area currently. Slash and burn agriculture faces no economic barriers, and is therefore clearly identified as the most likely land use in the baseline (without-project) scenario.

Step 4. Common Practice Analysis

While several of the Project Activities in the CHRP have already been attempted or in some cases implemented by some of the Project Partners on portions of the Project Area, they were all funded with charitable donations and/or grants. They have therefore been limited in scope across the Project landscape and subject to significant fluctuation and uncertainty. Most of these activities occurred independently, on isolated portions of the Project Area, thereby limiting their effectiveness in reducing overall threat from drivers of conversion that operate across the borders of the land units that comprise the Project Area. The CHRP aims to utilize the revenue from emission reduction sales to significantly increase the number and size of Project activities and the geographic area on which they are implemented. The Project will additionally unite the individual land units into a single operating entity that will be better suited to coordinate efforts, engage communities and address the agents and drivers of deforestation and conversion across this incredibly important landscape. It is common practice to protect wilderness in Africa, and to provide sustainable development support for rural Kenyan communities, but that common practice is typically funded by governments or donor agencies, and not by financial return from Project activities. It is NOT common practice for a coalition of public entities, non-profits, and private companies, such as the Project Proponent, to unite in a large-scale effort to protect forested and native grassland wilderness in Africa for financial return, in the absence of carbon revenue. The CHRP will provide new, ecologically sustainable, economic alternatives for local communities, dramatically reducing their unsustainable reliance on the natural resources within the Project Area.

The Project Proponent has demonstrated that the Project complies with the applicability conditions of the methodology (see Section 4.2). Further, the Project Proponent has demonstrated that the Project complies with all applicable local and National laws (see Section 3). Finally, the method for determining the baseline scenario (described in section 4.5) is consistent with that prescribed in VM0009 methodology version 3.0. Thus, the Project Proponent has fully complied with the minimum requirements of the VCS Additionality tool.

5 MONITORING DATA AND PARAMETERS

5.1 Description of the Monitoring Plan (CL3, CM3 & B3)

5.1.1 Development of Climate Monitoring Plan (CL3.1.)

The objective of the monitoring plan is to ensure accurate estimates of carbon stocks and carbon emission reductions from the REDD+ project over the crediting period of the project. The Climate Monitoring Plan includes three primary monitoring activities that will be performed throughout the lifetime of the CHRP. These activities, and their frequency are shown in Table 21.

Table 21: The three primary monitoring activities, the frequency that they will be performed and the method to be used.

Activity	Frequency	Method
Forest Patrols and Perimeter Observation	Annually	Patrol team inspects perimeter of project area
Plot Measurements	Bi-Annually	Sampling teams visit a portion of plots in project and proxy areas
Identification of significant disturbance	Once every 2-3 years or after major disturbance event	Periodic inspection of aerial imagery or videography, with ground inspection when necessary

Descriptions of these monitoring activities are provided in Annex 5 – Climate Monitoring Plan. In addition to these three primary project monitoring activities several additional monitoring activities will happen at varying frequencies during the Project Partners' general operations. This includes regular forest ranger patrols through the Project Area, regular flights over the Project Area (either for transport or for other monitoring activities), and outreach to the communities. These additional monitoring activities will serve to identify many instances of encroachment or tree harvesting that may occur in the Project Area. The monitoring plan is meant as a guide to maintain consistency during monitoring, and also includes training and internal audit procedures for quality control. It is meant as a working document to be revised as needed during the lifetime of the Project. When revisions are necessary they should be noted as monitoring deviations in the subsequent monitoring report prepared for a VCS and CCB verification event.

MRR.88 Documentation of training for field crews.

The CHRP considers local employment a priority, and local sourcing is strongly encouraged at all levels of the Project, from casual workers up to management positions. The CHRP recognizes that local hiring is a major benefit to the implementation and operation of the Project due to the knowledge and familiarity local people possess of the landscape, its communities and its biodiversity. Their involvement will also ensure the sustainability and continuity of the project throughout the Project's lifetime and beyond. Currently, the majority of the Project Partners' employees come from the local area. The Project Office will continue employing and training local people in order to increase local participation in project design and implementation as well as to build capacity, knowledge and a robust skills base.

Specifically, the plot team samplers received an initial carbon inventory training in September of 2013 from WWC's Director of Carbon Development, Gordon Smith, and WWC Operations Manager Jamie Hendriksen. Additional training on the measurement of soil carbon was provided in June of 2016 by Associate of Carbon Development, Simon Bird from WWC. Muasa Mwololo, WWC lead of the plot sample team, provided additional training on forest inventory methods and provided oversight of the biomass and soil carbon plot sampling.

MRR.90 Documentation of data quality assessment such as a check cruise and plots of the data such as diameter distributions by strata or plot.

Please refer to 'Annex 14 – Quality Control Procedure' for the quality control standard operating procedure that the Project uses to assess data measurement quality and thoroughness. The Carbon Development team, in accordance with the QC SOP, randomly selected 5% of the biomass inventory plots. These QC plots were re-measured by a different plot sample team than originally measured the plot

as close in time to the original plots as possible to avoid any errors due to natural regeneration/growth, although it is widely understood that some natural variation will occur between these two measurement events. The team that re-measures the plot does not have access to the data sheet from the initial plot measurement, nor should have discussed any element of the plot with the team that performed the initial measurement. The plots cover all strata present in the Project Area.

Table 22: The QA/QC assessment for this monitoring (M_1) period.

Paired T-Test	QC Basis	Inventory Basis
1% of Estimated Mean (tCO2e)	0.4197	0.4990
Estimated Mean of Paired Differences (tCO2e)	-7.9236	-7.9236
Standard Error of Paired Differences (tCO2e)	4.9764	4.9764
Difference between 1% and Paired Difference (tCO2e)	-8.3433	-8.4225
t Statistic	-1.6766	-1.6925
Degrees of Freedom	19	19
p Value (1 - alpha)	0.9450	0.9466
H0: No difference between 1% and Paired Difference at 90% Level	TRUE	TRUE
H1: Difference greater than or equal to 1% and Paired Difference at 90% Level	FALSE	FALSE

MRR.91 Maps of a stratification (if any) and references to plot allocation.

Please refer to Appendix B for maps of the Project Area stratification, the biomass sample plot locations and the soil plot locations.

MRR.92 List of plot GPS coordinates.

Please refer to Annex 5 the Climate Monitoring Plan for a comprehensive list of all sample plots and their GPS coordinates.

MRR. 93 Description of plot sizes and layout (such as the use of nests and their sizes) for each carbon pool.

A permanent circular nested plot design was used for the biomass sample plots. The tree plot radius for this project is 17.84 meters, which is a 0.1 ha plot area, except for plots that are located in the Cloud Forest and Lava Forest, where the tree plot radius is 10 meters. The minimum diameter for considering an individual plant as a tree for the project is 5 cm diameter at 1.4 m above the ground (DBH). All smaller woody plants are considered shrubs. The shrub plot radius for the project is 5 meters.

Table 23: The radii used for the Chyulu Hills REDD+ Project tree and shrub plots

Area	Plot Radius
Tree Plots	
Cloud Forest and Lava Forest	10 meters
All other Strata	17.84 meters
Shrub Plots	
All Plots	5 meters

For soil carbon analysis, a square plot of 1 m x 1 m to a depth of 30 cm was used.

MRR.94 If applicable, a detailed description of the process used to develop allometric equations, to include:

a. **Sample size**
b. **Distribution (e.g. diameter) of the sample**
c. **Model fitting procedure**
d. **Model selection**

Please refer to Annex 7 – Development of Allometry – Chyulu Hills REDD+ Project

MRR. 95 The estimated carbon stock, standard error of the total for each stock, and the sample size for each stratum in the area selected.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

MRR. 97 Deviations from the measurement methods set out in Appendix B or the monitoring plan, per current VCS requirement.

There were no deviations from the Methodology Appendix B or from the Project Climate Monitoring Plan in Annex 5.

MRR.98 The frequency of monitoring for each plot for all plots – all plots should be measured for the first verification. All leakage plots should be measured every verification, and all proxy and project accounting area plots at least every five years, or after a significant event that changes stocks.

All Project biomass, soil carbon, Proxy Area and Leakage Area sample plots were measured for this monitoring period. For the frequency of monitoring for all of these plots please refer to the Climate Monitoring Plan in Annex 5.

5.1.2 Dissemination of Climate Monitoring Plan and monitoring results (CL3.2.)

The Climate Monitoring Plan has been established and accepted by the Project Proponent. The Plan has been made available for public review at the Project Office, and at the office of each of the Project Partners. The full results of the climate monitoring are included in this project monitoring report, which is being made publicly available in the Project Area by having a hard copy available for review at the Project Office, and at the office of each of the Project Partners. Additionally, a monitoring report summary has

been written and provided to communities throughout the Project Area in English, Swahili and Maa. The monitoring report has additionally been posted to the website of the CCB for public review and comment.

5.1.3 Development of Community Monitoring Plan (CM3.1.)

The various Project Partners have been working in the Project Area for decades; thus, the starting conditions of the communities were familiar to all. Based on this, the next step in the development of a Community Monitoring Plan was to engage the community further in thinking about how conditions would have been without the Project, to project how they may be with the Project and identify any potential risks and negative impacts they may face as a result of the Project. We used insights from the SIA community workshop to enrich our original social theories of change as presented in the CHRP Project Document for the three overarching Focal Issues – 1) high levels of poverty and livelihood vulnerability; 2) Food insecurity; and 3) Poor education standards. Based on the insights gained from the SIA workshops new key activities, strategies, risks, negative impacts or assumptions were added to the analysis.

The selection of appropriate indicators is at the heart of impact assessment. An indicator is “a quantitative or qualitative factor or variable that provides a simple and reliable means to measure how well a desired outcome is being achieved or fulfilled”. They measure progress in achieving the desired social outcomes and objectives, besides furnishing a means of monitoring negative impacts and risks. The first requirement for identifying indicators is clarity of the desired objectives. These can be short-, medium- or long-term results (outputs, outcomes, and impacts), written in a SMART manner (Specific, Measurable, Achievable, Relevant and Time-bound).

For the CHRP, three Focal Issues were identified with nine corresponding Direct Results. From these, a suite of 41 indicators was crafted to measure progress towards achieving the Project’s social objectives. Please see Annex 1 in the Chyulu Hills Community and Biodiversity Monitoring Plan for these indicators.

Once the indicators (what to measure) had been determined, the next task was deciding how to measure them. This depends on a range of factors including intended users of the monitoring results, required level of accuracy and precision, transparency and simplicity of the method, and cost. A monitoring plan is designed to collect information about how a project is being implemented and about the outcomes and impacts that it produces. The plan includes the following key aspects: SMART objectives, Indicator(s) and Indicator type (output, outcome, or impact indicator), Data collection method, Existing data for the indicator, Person or organization responsible for measuring the indicator, Timing or frequency of the measurement of the indicator, and Location where the indicator will be measured.

For the Project, after identification of the critical issues and the appropriate indicators to measure progress in achieving the desired social outcomes and objectives, we elected to use two major avenues for obtaining requisite data for these indicators: In-house reporting systems and external interviews. Community workshops will also be used as needed to validate findings and obtain any further information, whilst Government departments will be visited for secondary data about the general community.

The primary method utilized for measuring the indicator outcomes is the household survey. 300 households were targeted across the Project Zone, 150 each on the Eastern side and 50 on the Western. The households cover all seven Locations on the eastern side (Mang’elete / Nthongoni, Nzambani / Muthingiini, Utithi / Thange, Nguumo / Kaunguni, Makindu / Manyatta, and Kiboko / Kalii), and the three Locations/ranches on the western side (Imbirikani, Kuku and Rombo). Household selection followed a random process where each location was first overlaid with a 1-km grid and each grid intersection numbered. While 300 households were targeted, this survey aimed to interview slightly more households to cater for a less-than 100% return rate in the future. Number of households per Location were

determined proportionately based on the number of households recorded in the location during the 2009 National Census. In the end, the following was the household number and distribution:

- East: Mang'elete / Nthongoni 50, Nzambani / Muthingiini 35, Utithi / Thange 50, Nguumo / Kaunguni 20, Makindu / Manyatta 30, and Kiboko / Kalii 15.
- West: Imbirikani 65, Kuku 60 and Rombo 75

Based on the allocation of households for each Location, the designated number of grid intersections corresponding to number of households was randomly selected. The household nearest to each grid intersection was interviewed; when there was no household in the near vicinity (1 km on any side) of a grid intersection in a certain section of the location, the team moved to the next point. Data was collected from 310 households (150 in the East and 160 in the West) from a cross-section of about 122 villages in the East and 96 villages in the West (Figure 9). All interviews were conducted by the designated teams in each area as follows:

- East 1 – Kiboko to Utithi: Evans Mwangangi & Caroline Ngina
- East 2 – Utithi to Mang'elete: Victor Musyoki & Reginah Kithia
- West 1 – Imbirikani to Kuku: George Mungesia & Godfrey Mukaine
- West 2 – Kuku to Rombo: John Moilo & Evalyne Lenku

Please refer to 'Annex 6 – Chyulu Hills Community and Biodiversity Monitoring Plan' for more details on the development of the Community Monitoring Plan and its implementation.

5.1.4 Development of Community HCV Monitoring Plan (CM3.2.)

The Chyulu Hills Community and Biodiversity Monitoring Plan, as described in section 5.1.3 is utilized to monitor and assess the effectiveness of maintaining and enhancing community HCVs. The Project contains several important community HCVs, as documented in the CHRP Project Document section 1.3.6. Through protection of the Project Area from ecosystem conversion, and the wildlife from poaching activities these community HCVs can be maintained. With the increased conservation-focused activities, education and other Project Activities the HCVs will be enhanced. The same methods as described above in section 5.1.3 will enable the Project Proponent to assess the effectiveness of the Project's efforts to maintain and enhance the community HCVs.

5.1.5 Dissemination of the Community Monitoring Plan and monitoring results (CM3.3.)

The Community Monitoring Plan has been established and accepted by the Project Proponent. The Plan has been made available for public review at the Project Office, and at the office of each of the Project Partners. The full results of the community monitoring are included in this Project Monitoring Report, which is being made publicly available in the Project Area by having a hard copy available for review at the Project Office, and at the office of each of the Project Partners. Additionally, a monitoring report summary has been written and provided to communities throughout the Project Area in English, Swahili and Maa. The monitoring report has additionally been posted to the website of the CCB for public review and comment.

5.1.6 Development of Biodiversity Monitoring Plan: Variables to be Monitored, and Monitoring Frequency (B3.1.)

The CHRP ecosystem encompasses montane cloud lava forest at higher elevations, transitions through dryland forest at mid elevation levels and grassland-dominated savannah at the lowest elevations, with an

impressive array of large mammals and birds. Several High Conservation Value species are present in the Project Area, including: African elephant, Lion, Leopard, Cheetah, African hunting dog and Rhino. The Project Area is also an important dispersal area and corridor for large mammals. To enrich the monitoring plan outlined in the CHRP PD, an expert workshop was held involving eight representatives of the Project Partners involved with biodiversity conservation in this region. From this, two biodiversity Focal Issues for biodiversity were identified: Poaching and Poor land-use planning.

Working as a single group, the participants then formulated problem flow diagrams (PFD) for these focal issues, and forecast what would happen with the major direct threats in the short-to-medium term in the absence of the Project. They also did a stakeholders analysis. Next, each group undertook a with-project analysis in which they sought the solutions to the problems identified in the problem flow models above, producing a chain of desirable results (result chains [RCs]) using a cause-and-effect logic, and incorporating possible risks and negative impacts. This exercise was used to update the PFDs and RCs in the CHRP PD, as well as review and revise the indicators and compile a final Biodiversity Monitoring Plan.

Two main strategies will be used to obtain the data for these indicators: In-house reporting, mostly for response and pressure indicators as indicated in the SIA section above, and Fieldwork for most state indicators. There will be three main aspects of state indicators to measure, each with a distinct set of monitoring protocols:

- Wildlife: wildlife surveys and monitoring for all species but especially focusing on the HCVs will be done using several methods, including road transects, ranger patrols, camera traps, aerial surveys, anecdotal sightings and species-specific research projects.
- Vegetation: this will mainly be monitored using the permanent biomass plots. A total of 415 plots selected using a stratified random approach were included in the Project Area for carbon monitoring, including assessing disturbance and regeneration.
- Land use: monitoring major land-use changes (e.g., fire effects, encroachment) is done using remote sensing (based on LANSAT imagery) and GIS techniques.

Data collection from both strategies (in-house reporting and fieldwork) is underway. Specific databases have been or are in the process of being created to hold these data and analysis will start immediately after all data entry protocols have been finalized.

Please refer to ‘Annex 6 – Chyulu Hills Community and Biodiversity Monitoring Plan’ for more details on the development of the Biodiversity Monitoring Plan and its implementation.

5.1.7 Development of a plan for assessing the effectiveness of measures to maintain or enhance biodiversity HCVs (B3.2.).

The Chyulu Hills Community and Biodiversity Monitoring Plan, as described in section 5.1.6 is utilized to monitor and assess the effectiveness of maintaining and enhancing biodiversity HCVs. The Project contains many significant biodiversity HCVs, as documented in the CHRP PD, section 1.3.6. Through protection of the Project Area from ecosystem conversion, and the wildlife from poaching activities these biodiversity HCVs can be maintained. With the increased conservation-focused activities, education and other Project Activities the HCVs will be enhanced. The same methods as described above in section 5.1.6 will enable the Project Proponent to assess the effectiveness of the Project’s efforts to maintain and enhance the biodiversity HCVs.

5.1.8 Dissemination of the Biodiversity Monitoring Plan and monitoring results (B3.3.)

The Biodiversity Monitoring Plan has been established and accepted by the Project Proponent. The Plan has been made available for public review at the Project Office, and at the office of each of the Project Partners. The full results of the biodiversity monitoring are included in this Project Monitoring Report, which is being made publically available in the Project Area by having a hard copy available for review at the Project Office, and at the office of each of the Project Partners. Additionally, a project summary has been written and provided to communities throughout the Project Area in English, Swahili and Maa. The monitoring report has additionally been posted to the website of the CCB for public review and comment.

5.2 Data and Parameters Available at Validation (CL3.1, CM3.1 & B3.1)

Data Unit / Parameter:	α
Data unit:	Unitless
Description:	Combined effects of β and θ at the start of the historic reference period for the Forest Project Accounting Area
Source of data:	Reference area and historic reference period
Value applied:	-0.56731
Justification of choice of data or description of measurement methods and procedures applied:	Time and place in which the logistic model is fit
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	α
Data unit:	Unitless
Description:	Combined effects of β and θ at the start of the historic reference period for the Grassland Project Accounting Area
Source of data:	Reference area and historic reference period
Value applied:	-1.13912
Justification of choice of data or description of measurement methods and procedures applied:	Time and place in which the logistic model is fit
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	β
Data unit:	nitless
Description:	Effect of time on the cumulative proportion of conversion over time for Forest Project Accounting Area
Source of data:	Reference area and historic reference period

Value applied:	0.000103
Justification of choice of data or description of measurement methods and procedures applied:	Time and place in which the logistic model is fit
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	$\boldsymbol{\beta}$
Data unit:	unitless
Description:	Effect of time on the cumulative proportion of conversion over time for Grassland Project Accounting Area
Source of data:	Reference area and historic reference period
Value applied:	0.000578
Justification of choice of data or description of measurement methods and procedures applied:	Time and place in which the logistic model is fit
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	$\boldsymbol{\gamma}$
Data unit:	days
Description:	Time shift from beginning of historic reference period to Project Start Date
Source of data:	Historic reference period
Value applied:	10,725
Justification of choice of data or description of measurement methods and procedures applied:	Time in which the logistic model is fit. The start of the historic reference period is 9 May, 1984 and the Project Start Date is 19 September, 2013.
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	$\boldsymbol{\theta}$
Data unit:	unitless
Description:	Effect of certain covariates on the cumulative proportion of conversion over time
Source of data:	Reference area and historic reference period
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	Time and place in which the logistic model is fit

Purpose of Data:	Determination of baseline scenario
Any comment:	Parameter not used

Data Unit / Parameter:	λ_{SOC}
Data unit:	proportion (unitless)
Description:	Exponential soil carbon decay parameter
Source of data:	Value from the literature. Davidson, E., and Ackerman, I. 1993. Changes in soil carbon inventories following cultivation of previously untilled soils. Biogeochemistry, 20(3), 161-193.
Value applied:	0.2
Justification of choice of data or description of measurement methods and procedures applied:	Default value from VCS methodology VM0009
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{EM}$
Data unit:	standard deviation (unitless)
Description:	The estimated standard deviation of the state observations used to fit the logistic function for the Forest Project Accounting Area BEM
Source of data:	Remote sensing image interpretation
Value applied:	0.43027
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	$\hat{\sigma}_{EM}$
Data unit:	standard deviation (unitless)
Description:	The estimated standard deviation of the state observations used to fit the logistic function for the Grassland Project Accounting Area BEM
Source of data:	Remote sensing image interpretation
Value applied:	0.21912
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	$\mathcal{B}$
Data unit:	set
Description:	The set of all selected carbon pools in biomass. Is a subset of $\mathcal{C}$
Source of data:	PD
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

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

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

Data Unit / Parameter:	$\mathcal{M}$
Data unit:	set

Description:	The set of all monitoring periods
Source of data:	Monitoring records
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	$\mathcal{T}$
Data unit:	ha
Description:	The set of all species/categories of livestock
Source of data:	Monitoring records
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline emissions
Any comment:	Parameter not used

Data Unit / Parameter:	A_{PAA}
Data unit:	ha
Description:	Area of Forest Project Accounting Area
Source of data:	GIS analysis prior to sampling
Value applied:	265,547.07
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	A_{PAA}
Data unit:	ha
Description:	Area of Grassland Project Accounting Area
Source of data:	GIS analysis prior to sampling
Value applied:	109,130.57
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	A_{PX}
Data unit:	ha
Description:	Area of proxy area for the Forest Project Accounting Area
Source of data:	GIS analysis prior to sampling
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	A_{PX}
Data unit:	ha
Description:	Area of proxy area for the Grassland Project Accounting Area
Source of data:	GIS analysis prior to sampling
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline emissions
Any comment:	

Data Unit / Parameter:	$c_{L\,p}$
Data unit:	tCO_2e/ha
Description:	Carbon stocks in project leakage area
Source of data:	Leakage area sampling
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	Direct measurement
Purpose of Data:	Determination of baseline emissions
Any comment:	Parameter not used

Data Unit / Parameter:	$f_{LS\,i}$
Data unit:	kg CH4 $head^{-1}$ yr^{-1}
Description:	Emission factor for the defined livestock population, i

Source of data:	IPCC default values
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	Obtained directly from IPCC default values
Purpose of Data:	Determination of baseline emissions
Any comment:	Parameter not used

Data Unit / Parameter:	m
Data unit:	tCO_2e/ha
Description:	Average carbon in merchantable trees cut each year as a result of legally-sanctioned commercial logging
Source of data:	Timber harvest plans or measurement of carbon stocks in merchantable trees in the Project Accounting Area.
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	Should use the most accurate of the two data sources if both are available
Purpose of Data:	Determination of baseline emissions
Any comment:	Parameter not used

Data Unit / Parameter:	n_d
Data unit:	unitless
Description:	Number of spatial points in the Forest Project Accounting Area reference area
Source of data:	Remote sensing image interpretation
Value applied:	10,285
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	n_d
Data unit:	unitless
Description:	Number of spatial points in the Grassland Project Accounting Area reference area
Source of data:	Remote sensing image interpretation
Value applied:	1,508
Justification of choice of data or description	N/A

of measurement methods and procedures applied:	
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	o_i
Data unit:	unitless
Description:	State observation for the ith sample point in the Forest Project Accounting Area reference area
Source of data:	Remote sensing image interpretation
Value applied:	See Annex 14 – BEM Export Grid Forest PAA
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	o_i
Data unit:	unitless
Description:	State observation for the ith sample point in the Grassland Project Accounting Area reference area
Source of data:	Remote sensing image interpretation
Value applied:	See Annex 14 – BEM Export Grid Grassland PAA
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	$p_{L\,ME}$
Data unit:	unitless
Description:	Portion of leakage related to market
Source of data:	VCS methodology VM0009 Section 8.3.3
Value applied:	0
Justification of choice of data or description of measurement methods and procedures applied:	No market leakage from Project
Purpose of Data:	Calculation of leakage
Any comment:	Parameter not used

Data Unit / Parameter:	q
Data unit:	days
Description:	Lag between start of degradation and conversion
Source of data:	Expert knowledge, results from the PRA or reports from peer-reviewed literature
Value applied:	0
Justification of choice of data or description of measurement methods and procedures applied:	Commonly accepted methods in the social sciences, choice determined and justified by Project Proponent
Purpose of Data:	Determination of baseline scenario
Any comment:	Parameter not used

Data Unit / Parameter:	$r_{CF\ b}$
Data unit:	unitless
Description:	Carbon fraction of biomass for burned wood or herbaceous material b
Source of data:	Literature estimates or direct measurement
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	No burning of wood or herbaceous material in Project
Purpose of Data:	Determination of baseline emissions
Any comment:	Parameter not used

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

Data Unit / Parameter:	r_U
Data unit:	unitless

Description:	Onset proportion of conversion immediately adjacent to Project Area
Source of data:	GIS analysis and image interpretation
Value applied:	0.3965
Justification of choice of data or description of measurement methods and procedures applied:	Measured using GIS
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	t
Data unit:	days
Description:	Time since Project Start Date
Source of data:	Monitoring records
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	t_i
Data unit:	days
Description:	The point in time of the observation made at point i
Source of data:	Remote sensing image interpretation
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	t_{PA}
Data unit:	days
Description:	Time prior to the Project Start Date when the primary agent began commercial logging in the Project Accounting Area.
Source of data:	Harvest plans prepared for the Project Accounting Area, or by public record
Value applied:	N/A
Justification of choice of data or description	N/A

of measurement methods and procedures applied:	
Purpose of Data:	Determination of baseline scenario
Any comment:	Parameter not used

Data Unit / Parameter:	t_m
Data unit:	days
Description:	Length of project or logging in baseline scenario
Source of data:	PD
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Any comment:	Parameter not used

Data Unit / Parameter:	t_{PL}
Data unit:	days
Description:	Length of project crediting period
Source of data:	PD
Value applied:	10,957
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	t_{PAI}
Data unit:	days
Description:	Number of days after the Project Start Date for the start of a Project Activity instance in a grouped project
Source of data:	PD
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	w_i

Data unit:	unitless
Description:	weight applied to the ith sample point in the Forest Project Accounting Area reference area
Source of data:	Remote sensing image interpretation
Value applied:	See Annex 14 – BEM Export Grid Forest PAA
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	$\boldsymbol{w_i}$
Data unit:	unitless
Description:	weight applied to the ith sample point in the Grassland Project Accounting Area reference area
Source of data:	Remote sensing image interpretation
Value applied:	See Annex 14 – BEM Export Grid Grassland PAA
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data:	Determination of baseline scenario
Any comment:	

Data Unit / Parameter:	$\boldsymbol{x}$
Data unit:	unitless
Description:	Covariate values
Source of data:	Participatory Rural Appraisal, analysis of public records, and/or expert interpretation of inventory data or remotely sensed imagery
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	Should use the most accurate of the data sources if both are available
Purpose of Data:	Determination of baseline scenario
Any comment:	Parameter not used

Data Unit / Parameter:	$\boldsymbol{x_i}$
Data unit:	geographic coordinates
Description:	Latitude of the ith sample point
Source of data:	Remote sensing image interpretation

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

Data Unit / Parameter:	x_o
Data unit:	unitless
Description:	Covariate values as of the Project Start Date
Source of data:	Participatory Rural Appraisal, analysis of public records, and/or expert interpretation of inventory data or remotely sensed imagery
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	Should use the most accurate of the data sources if both are available
Purpose of Data:	Determination of baseline scenario
Any comment:	Parameter not used

Data Unit / Parameter:	x_{SA}
Data unit:	unitless
Description:	Covariate values as of the arrival of the secondary agents
Source of data:	Participatory Rural Appraisal, analysis of public records, and/or expert interpretation of inventory data or remotely sensed imagery
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	Should use the most accurate of the data sources if both are available
Purpose of Data:	Determination of baseline scenario
Any comment:	Parameter not used

Data Unit / Parameter:	y_i
Data unit:	geographic coordinates
Description:	Longitude of the ith sample point
Source of data:	Remote sensing image interpretation
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	N/A

Purpose of Data:	Determination of baseline scenario
Any comment:	

5.3 Data and Parameters Monitored (CL4.1, CM4.1 & B4.1)

MRR.85 List of parameters from Appendix H, their values and the time last measured.

MRR.86 Quality assurance and quality control measures employed for each.

MRR.87 Description of the accuracy of each.

Data Unit / Parameter:	$w^{[m]}$
Data unit:	set
Description:	The set of all burned wood or herbaceous material
Source of data:	Monitoring records
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	N/A
Any comment:	Parameter not used

Data Unit / Parameter:	$A_{B\,\Delta\,PAA}^{[m]}$
Data unit:	ha
Description:	Area of avoided conversion
Source of data:	Generated from equation
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3.3.4
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.52]
Any comment:	Parameter not used

Data Unit / Parameter:	$A_{P\,1}^{[m=0]}$

Data unit:	ha
Description:	Area of Forest Project Accounting Area stratum 1 prior to first verification event – Cloud Forest
Source of data:	GIS analysis prior to sampling
Description of measurement methods and procedures to be applied:	GIS analysis of best available data
Frequency of monitoring/recording:	First monitoring period
Value applied:	4,823
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Cross-check of GIS analysis
Purpose of data:	Calculation of baseline emissions
Calculation method:	GIS analysis
Any comment:	

Data Unit / Parameter:	$A_{P\,2}^{[m=0]}$
Data unit:	ha
Description:	Area of Forest Project Accounting Area stratum 2 prior to first verification event – Woodland/Thicket
Source of data:	GIS analysis prior to sampling
Description of measurement methods and procedures to be applied:	GIS analysis of best available data
Frequency of monitoring/recording:	First monitoring period
Value applied:	24,874
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Cross-check of GIS analysis
Purpose of data:	Calculation of baseline emissions
Calculation method:	GIS analysis
Any comment:	

Data Unit / Parameter:	$A_{P\,3}^{[m=0]}$
Data unit:	ha
Description:	Area of Forest Project Accounting Area stratum 3 prior to first verification event – Woodland-Sparse/Low
Source of data:	GIS analysis prior to sampling
Description of measurement methods and procedures to be applied:	GIS analysis of best available data
Frequency of monitoring/recording:	First monitoring period
Value applied:	53,075
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Cross-check of GIS analysis

Purpose of data:	Calculation of baseline emissions
Calculation method:	GIS analysis
Any comment:	

Data Unit / Parameter:	$A_{P\,4}^{[m=0]}$
Data unit:	ha
Description:	Area of Forest Project Accounting Area stratum 4 prior to first verification event – Lava Forest
Source of data:	GIS analysis prior to sampling
Description of measurement methods and procedures to be applied:	GIS analysis of best available data
Frequency of monitoring/recording:	First monitoring period
Value applied:	16,718
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Cross-check of GIS analysis
Purpose of data:	Calculation of baseline emissions
Calculation method:	GIS analysis
Any comment:	

Data Unit / Parameter:	$A_{P\,5}^{[m=0]}$
Data unit:	ha
Description:	Area of Forest Project Accounting Area stratum 5 prior to first verification event – Lava Forest-Sparse/Low
Source of data:	GIS analysis prior to sampling
Description of measurement methods and procedures to be applied:	GIS analysis of best available data
Frequency of monitoring/recording:	First monitoring period
Value applied:	14,558
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Cross-check of GIS analysis
Purpose of data:	Calculation of baseline emissions
Calculation method:	GIS analysis
Any comment:	

Data Unit / Parameter:	$A_{P\,6}^{[m=0]}$
Data unit:	ha
Description:	Area of Forest Project Accounting Area stratum 6 prior to first verification event – Acacia-Savannah-Mosaic

Source of data:	GIS analysis prior to sampling
Description of measurement methods and procedures to be applied:	GIS analysis of best available data
Frequency of monitoring/recording:	First monitoring period
Value applied:	151,499
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Cross-check of GIS analysis
Purpose of data:	Calculation of baseline emissions
Calculation method:	GIS analysis
Any comment:	

Data Unit / Parameter:	$A_{P\,1}^{[m=0]}$
Data unit:	ha
Description:	Area of Grassland Project Accounting Area stratum 1 prior to first verification event – Grassland
Source of data:	GIS analysis prior to sampling
Description of measurement methods and procedures to be applied:	GIS analysis of best available data
Frequency of monitoring/recording:	First monitoring period
Value applied:	109,130.57
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Cross-check of GIS analysis
Purpose of data:	Calculation of baseline emissions
Calculation method:	GIS analysis
Any comment:	

Data Unit / Parameter:	$B_b^{[m]}$
Data unit:	tonnes
Description:	Biomass in burned wood or herbaceous material b
Source of data:	Measurements of biomass
Description of measurement methods and procedures to be applied:	Scale
Frequency of monitoring/recording:	Every monitoring period
Value applied:	
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Summation
Any comment:	Parameter not Used

Data Unit / Parameter:	$c_B^{[m]}$
Data unit:	tCO_2e/ha
Description:	Baseline carbon stocks at the end of the current monitoring period for the Forest Project Accounting Area
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Section 6.4 and Appendix B.4
Frequency of monitoring/recording:	Every monitoring period
Value applied:	5
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [B.33]
Any comment:	

Data Unit / Parameter:	$c_B^{[m]}$
Data unit:	tCO_2e/ha
Description:	Baseline carbon stocks at the end of the current monitoring period for the Grassland Project Accounting Area
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Section 6.4 and Appendix B.4
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [B.33]
Any comment:	

Data Unit / Parameter:	$C_{B\ BGB}^{[m]}$
Data unit:	tCO_2e
Description:	Carbon not decayed in BGB at the end of the current monitoring period
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Section 8.1.7
Frequency of monitoring/recording:	Every monitoring period

Value applied:	1,370,348
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.32]
Any comment:	

Data Unit / Parameter:	$C_{B\,DW}^{[m]}$
Data unit:	tCO_2e
Description:	Carbon not decayed in DW at the end of the current monitoring period
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Section 8.1.6
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.36]
Any comment:	

Data Unit / Parameter:	$C_{B\,SOC}^{[m]}$
Data unit:	tCO_2e
Description:	Carbon not decayed in SOC at the end of the current monitoring period
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.5
Frequency of monitoring/recording:	Every monitoring period
Value applied:	2,943,268
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Subtraction
Any comment:	

Data Unit / Parameter:	$C_{B\,WP}^{[m]}$
Data unit:	tCO_2e

Description:	Carbon not decayed in WP at the end of the current monitoring period
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix C
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [C.1]
Any comment:	

Data Unit / Parameter:	$C_{B\ AGMT}^{[m]}$
Data unit:	tCO_2e/ha
Description:	Baseline carbon stocks in above-ground merchantable trees at the end of the current monitoring period
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Appendix B.2.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Weighted per ha average
Any comment:	

Data Unit / Parameter:	$C_{B\ BGMT}^{[m]}$
Data unit:	tCO_2e/ha
Description:	Baseline carbon stocks in below-ground merchantable trees at the end of the current monitoring period
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Appendix B.2.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records

Purpose of data:	Calculation of baseline emissions
Calculation method:	Weighted per ha average
Any comment:	

Data Unit / Parameter:	$C_{P\ AGMT}^{[m=0]}$
Data unit:	tCO_2e
Description:	Project carbon stocks in above-ground merchantable trees at Project Start
Source of data:	Project accounting area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Appendix B.2.1
Frequency of monitoring/recording:	At Project Start
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Summation across plots
Any comment:	

Data Unit / Parameter:	$C_{P\ BGMT}^{[m=0]}$
Data unit:	tCO_2e
Description:	Project carbon stocks in below-ground merchantable trees at Project Start
Source of data:	Project accounting area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Appendix B.2.3
Frequency of monitoring/recording:	At Project Start
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Summation across plots
Any comment:	

Data Unit / Parameter:	$c_{B\ b}^{[m]}$
Data unit:	tCO_2e/ha
Description:	Baseline scenario average carbon stock in selected carbon pools
Source of data:	Proxy area sampling
Description of measurement methods and	VCS Methodology VM0009 v3 Appendix B.1.5

procedures to be applied:	
Frequency of monitoring/recording:	Every monitoring period
Value applied:	See Annex 17 – Proxy Area Carbon Model
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Weighted per ha average
Any comment:	

Data Unit / Parameter:	$c_{B\,BM}^{[m]}$
Data unit:	tCO_2e/ha
Description:	Baseline carbon stocks in biomass at the end of the current monitoring period for the Forest Project Accounting Area
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Appendix B.2
Frequency of monitoring/recording:	Every monitoring period
Value applied:	5
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.18]
Any comment:	

Data Unit / Parameter:	$c_{B\,BM}^{[m]}$
Data unit:	tCO_2e/ha
Description:	Baseline carbon stocks in biomass at the end of the current monitoring period for the Grassland Project Accounting Area
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Appendix B.2
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.18]
Any comment:	

Data Unit / Parameter:	$c_{B\,SOC}^{[m]}$
Data unit:	tCO_2e/ha
Description:	Baseline soil carbon stocks at the end of the current monitoring period for the Forest Project Accounting Area
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Appendix B.2.6
Frequency of monitoring/recording:	Every monitoring period
Value applied:	206.33
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.32]
Any comment:	

Data Unit / Parameter:	$c_{B\,SOC}^{[m]}$
Data unit:	tCO_2e/ha
Description:	Baseline soil carbon stocks at the end of the current monitoring period for the Grassland Project Accounting Area
Source of data:	Proxy area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 v3 Appendix B.2.6
Frequency of monitoring/recording:	Every monitoring period
Value applied:	206.33
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.32]
Any comment:	

Data Unit / Parameter:	$c_{P}^{[m]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks at the end of the current monitoring period for the Forest Project Accounting Area
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Every monitoring period

Value applied:	66.86
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Equation [B.31]
Any comment:	

Data Unit / Parameter:	$c_P^{[m]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks at the end of the current monitoring period for the Grassland Project Accounting Area
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Every monitoring period
Value applied:	17.93
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Equation [B.31]
Any comment:	

Data Unit / Parameter:	$c_P^{[m-1]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks at the beginning of the current monitoring period
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Already reviewed
Purpose of data:	Calculation of project emissions
Calculation method:	Equation [B.31]
Any comment:	

Data Unit / Parameter:	$c_P^{[m=0]}$

Data unit:	tCO_2e/ha
Description:	Project carbon stocks prior to first verification event for the Forest Project Accounting Area
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior monitoring period
Value applied:	66.86
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Already reviewed
Purpose of data:	Calculation of project emissions
Calculation method:	Equation [B.31]
Any comment:	

Data Unit / Parameter:	$c_P^{[m=0]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks prior to first verification event for the Grassland Project Accounting Area
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior monitoring period
Value applied:	17.93
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Already reviewed
Purpose of data:	Calculation of project emissions
Calculation method:	Equation [B.31]
Any comment:	

Data Unit / Parameter:	$c_{P\,1\,BM}^{[m=0]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks in biomass in Forest Project Accounting Area stratum 1 at project start – Cloud Forest
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	1,157.39
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records

Purpose of data:	Calculation of project emissions
Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$c_{P\,2\,BM}^{[m=0]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks in biomass in Forest Project Accounting Area stratum 2 at project start – Woodland/Thicket
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	116.00
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$c_{P\,3\,BM}^{[m=0]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks in biomass in Forest Project Accounting Area stratum 3 at project start – Woodland-Sparse/Low
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	77.31
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$c_{P\,4\,BM}^{[m=0]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks in biomass in Forest Project Accounting Area stratum 4 at project start

	– Lava Forest
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	79.38
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$c_{P\,5\,BM}^{[m=0]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks in biomass in Forest Project Accounting Area stratum 5 at project start – Lava Forest-Sparse/Low
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	57.65
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$c_{P\,6\,BM}^{[m=0]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks in biomass in Forest Project Accounting Area stratum 6 at project start – Acacia-Savanna-Mosaic
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	19.91
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions

Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$c_{P\,1\,BM}^{[m=0]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks in biomass in Grassland Project Accounting Area stratum 1 at project start – Grassland
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	17.93
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$c_{P\,AGMT}^{[m=0]}$
Data unit:	tCO_2e/ha
Description:	Project carbon stocks in above-ground merchantable trees prior to first verification event
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$c_{P\,BM}^{[m=0]}$
Data unit:	tCO_2e
Description:	Project carbon stocks in biomass prior to first verification event
Source of data:	Project Accounting Area sampling
Description of measurement methods and	VCS Methodology VM0009 Appendix B.2

procedures to be applied:	
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	19,710,032.19
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Equation [F.17]
Any comment:	

Data Unit / Parameter:	$c_{P\,b}^{[m]}$
Data unit:	tCO_2e/ha
Description:	Average carbon in biomass in the Forest Project Accounting Area
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	66.86
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$c_{P\,b}^{[m]}$
Data unit:	tCO_2e/ha
Description:	Average carbon in biomass in the Grassland Project Accounting Area
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2
Frequency of monitoring/recording:	Prior to first monitoring event
Value applied:	17.93
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$c_{P\,SOC}^{[m=0]}$

Data unit:	tCO_2e/ha
Description:	Project soil carbon stocks prior to first verification event in the Forest Project Accounting Area
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2.6
Frequency of monitoring/recording:	At Project Start
Value applied:	371.01
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$c_{P\,SOC}^{[m=0]}$
Data unit:	tCO_2e/ha
Description:	Project soil carbon stocks prior to first verification event in the Grassland Project Accounting Area
Source of data:	Project accounting area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2.6
Frequency of monitoring/recording:	At Project Start
Value applied:	232.22
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Average of plot measurements in a given stratum
Any comment:	

Data Unit / Parameter:	$C_{P\,\Delta\,WP}^{[m]}$
Data unit:	tCO_2e
Description:	Project carbon stocks in wood products at the end of the current monitoring period
Source of data:	Project Accounting Area sampling
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix C
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions

Calculation method:	Equation [C.2]
Any comment:	

Data Unit / Parameter:	$E_{\Delta\,GER}^{[m]}$
Data unit:	tCO_2e
Description:	GERs for the current monitoring period
Source of data:	Area measurements
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.4.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	2,281,980
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of GER calculations
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation F.53
Any comment:	

Data Unit / Parameter:	$E_{\Delta\,GER}^{[i]}$
Data unit:	tCO_2e
Description:	GERs for monitoring period i
Source of data:	Area measurements
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.4.1
Frequency of monitoring/recording:	Prior monitoring period
Value applied:	2,281,980
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of GER calculations
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.53]
Any comment:	

Data Unit / Parameter:	$E_{\Delta\,NER}^{[i]}$
Data unit:	tCO_2e
Description:	NERs for monitoring period i
Source of data:	Area measurements
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.4.3
Frequency of monitoring/recording:	prior monitoring period

Value applied:	2,033,002
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of GER calculations
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.55]
Any comment:	

Data Unit / Parameter:	$E_B^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative baseline emissions at the end of the current monitoring period
Source of data:	Proxy area measurements
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	6,907,179
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.16]
Any comment:	

Data Unit / Parameter:	$E_B^{[m-1]}$
Data unit:	tCO_2e
Description:	Cumulative baseline emissions at the beginning of the current monitoring period
Source of data:	Proxy area measurements
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1
Frequency of monitoring/recording:	Prior monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.16]
Any comment:	

Data Unit / Parameter:	$E_{B\,\Delta}^{[m]}$
Data unit:	tCO_2e

Description:	Change in baseline emissions
Source of data:	Proxy area measurements
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	7,184,272
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.15]
Any comment:	

Data Unit / Parameter:	$E_{B\,\Delta\,BGB}^{[i]}$
Data unit:	tCO_2e
Description:	Change in baseline emissions from below-ground biomass during monitoring period i
Source of data:	Monitoring the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2.3
Frequency of monitoring/recording:	Already Monitored
Value applied:	2,040,705
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.30]
Any comment:	

Data Unit / Parameter:	$E_{B\,\Delta\,DW}^{[i]}$
Data unit:	tCO_2e
Description:	Baseline emissions from dead wood in monitoring period i
Source of data:	Measurements in the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.2.4 and B.2.5
Frequency of monitoring/recording:	Already Monitored
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.34]

Any comment:	

Data Unit / Parameter:	$E_{B\,\Delta\,SOC}^{[m]}$
Data unit:	tCO_2e
Description:	Baseline change in emissions from soil carbon
Source of data:	Measurements in the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.2.1, 8.1.2.2, 8.1.2.3 and Appendix B.2.6
Frequency of monitoring/recording:	Every monitoring period
Value applied:	4,015,226
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.26]
Any comment:	

Data Unit / Parameter:	$E_{B\,\Delta\,SOC}^{[i]}$
Data unit:	tCO_2e
Description:	Baseline emissions from soil carbon in monitoring period i
Source of data:	Measurements in the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.2.1, 8.1.2.2, 8.1.2.3 and Appendix B.2.6
Frequency of monitoring/recording:	Every monitoring period
Value applied:	4,015,226
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.26]
Any comment:	

Data Unit / Parameter:	$E_{B\,AGMT}^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative baseline emissions from above-ground commercial trees at the end of the current monitoring period
Source of data:	Measurements in the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.6.1, 8.1.6.2, 8.1.6.3
Frequency of monitoring/recording:	Every monitoring period

Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.37]
Any comment:	Parameter not used

Data Unit / Parameter:	$E_{B\ BGB}^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative baseline emissions from below-ground biomass at the end of the current monitoring period
Source of data:	Measurements in the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.4
Frequency of monitoring/recording:	Every monitoring period
Value applied:	1,370,348
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.30]
Any comment:	

Data Unit / Parameter:	$E_{B\ BGB}^{[m-1]}$
Data unit:	tCO_2e
Description:	Cumulative baseline emissions from below-ground biomass at the beginning of the current monitoring period
Source of data:	Measurements in the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.4
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.30]
Any comment:	

Data Unit / Parameter:	$E_{B\ BM}^{[m]}$

Data unit:	tCO_2e
Description:	Cumulative baseline emissions from biomass at the end of the current monitoring period
Source of data:	Measurements in the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.1, 8.1.1.5.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	7,184,272
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.22]
Any comment:	

Data Unit / Parameter:	$E_{B\,DW}^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative baseline emissions from dead wood at the end of the current monitoring period
Source of data:	Measurements in the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.3
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.34]
Any comment:	

Data Unit / Parameter:	$E_{B\,DW}^{[m-1]}$
Data unit:	tCO_2e
Description:	Cumulative baseline emissions from dead wood at the beginning of the current monitoring period
Source of data:	Measurements in the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.3
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions

Calculation method:	Equation [F.34]
Any comment:	

Data Unit / Parameter:	$E_{B\ SOC}^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative baseline emissions from soil carbon at the end of the current monitoring period
Source of data:	Measurements in the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.2.1, 8.1.2.2, 8.1.2.3
Frequency of monitoring/recording:	Every monitoring period
Value applied:	4,015,226
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.27]
Any comment:	

Data Unit / Parameter:	$E_{B\ SOC}^{[m-1]}$
Data unit:	tCO_2e
Description:	Cumulative baseline emissions from soil carbon at the beginning of the current monitoring period
Source of data:	Measurements in the proxy area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.2.1, 8.1.2.2, 8.1.2.3
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.27]
Any comment:	

Data Unit / Parameter:	$E_{BA}^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative emissions allocated to the buffer account at the end of the current monitoring period
Source of data:	N/A
Description of measurement methods and	VCS Methodology VM0009 Section 8.4.4

procedures to be applied:	
Frequency of monitoring/recording:	Every monitoring period
Value applied:	228,198
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Multiplication
Any comment:	

Data Unit / Parameter:	$E_L^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative emissions from leakage at the end of the current monitoring period
Source of data:	Measurements in the leakage area(s)
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of leakage
Calculation method:	Equation [F.45]
Any comment:	

Data Unit / Parameter:	$E_L^{[m-1]}$
Data unit:	tCO_2e
Description:	Cumulative emissions from leakage at the beginning of the current monitoring period
Source of data:	Measurements in the leakage area(s)
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3
Frequency of monitoring/recording:	Already monitored
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of leakage
Calculation method:	Equation [F.45]
Any comment:	

Data Unit / Parameter:	$E_{L\Delta}^{[m]}$

Data unit:	tCO_2e
Description:	Change in emissions due to leakage
Source of data:	N/A
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of leakage
Calculation method:	Equation [F.44]
Any comment:	

Data Unit / Parameter:	$E_{L\,AS\,F}^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative emissions from activity-shifting leakage in forested strata at the end of the current monitoring period
Source of data:	Measurements in the activity-shifting leakage area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of leakage
Calculation method:	Equation [F.46]
Any comment:	

Data Unit / Parameter:	$E_{L\,ASG}^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative emissions from activity-shifting leakage in native grassland strata at the end of the current monitoring period
Source of data:	Measurements in the activity-shifting leakage area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3.3.4
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11

QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of leakage
Calculation method:	Equation [F.47]
Any comment:	

Data Unit / Parameter:	$E_{L\,ME}^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative emissions from market leakage at the end of the current monitoring period
Source of data:	Measurements in the market leakage area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of leakage
Calculation method:	Equation [F.51]
Any comment:	

Data Unit / Parameter:	$E_{P\,\Delta}^{[m]}$
Data unit:	tCO_2e
Description:	Change in project emissions
Source of data:	Monitoring records for Forest Fire, Burning, logging, wood products, and natural disturbance events
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.2
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Equation [F.41]
Any comment:	

Data Unit / Parameter:	$E_{P\,\Delta BRN}^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative project emissions due to burning at the end of the current monitoring period

Source of data:	Monitoring plots in the project
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.2.2
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Equation [F.42]
Any comment:	

Data Unit / Parameter:	$E_{P\,\Delta\,LS}^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative project emissions due to livestock grazing within the Project Area.
Source of data:	Monitoring in the Project Area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.2.4
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	Equation [F.43]
Any comment:	

Data Unit / Parameter:	$E_{P\,\Delta\,SF}^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative project emissions due to the use of synthetic fertilizers within the project area.
Source of data:	Monitoring in the Project Area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.2.5
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of project emissions
Calculation method:	CDM A/R methodological tool *Estimation of direct and indirect (e.g. leaching and runoff) nitrous oxide emission from nitrogen fertilization*

Any comment:	

Data Unit / Parameter:	$E_U^{[m]}$
Data unit:	tCO_2e
Description:	Cumulative confidence deduction at the end of the current monitoring period
Source of data:	N/A
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.4.1.1
Frequency of monitoring/recording:	Every monitoring period
Value applied:	20,780
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.57]
Any comment:	

Data Unit / Parameter:	$n_{LS\,i}$
Data unit:	count
Description:	The number of head of livestock species/ category i in the Project Area
Source of data:	Monitoring in the Project Area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.2.4
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of leakage
Calculation method:	Use of literature or expert knowledge
Any comment:	

Data Unit / Parameter:	$p_{L\,DEG}^{[m]}$
Data unit:	proportion (unitless)
Description:	Portion of leakage due to degradation in forest at the end of the current monitoring period
Source of data:	Monitoring in the leakage area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3.2.3
Frequency of monitoring/recording:	Every monitoring period

Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of leakage
Calculation method:	Summation across leakage plots
Any comment:	

Data Unit / Parameter:	$p_{L\,DEG}^{[m=0]}$
Data unit:	tCO_2e
Description:	proportion (unitless)
Source of data:	Portion of leakage due to degradation prior to first verification event
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3.2.3
Frequency of monitoring/recording:	At Project Start
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Project verification
Purpose of data:	Calculation of leakage
Calculation method:	Summation across leakage plots
Any comment:	

Data Unit / Parameter:	$p_{L\,CON\,G}^{[m]}$
Data unit:	proportion (unitless)
Description:	Portion of leakage due to native grasslands conversion at the beginning of the current monitoring period
Source of data:	Monitoring in the leakage area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3.2.4
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of leakage
Calculation method:	Summation across leakage plots
Any comment:	

Data Unit / Parameter:	$p_{L\,CON\,G}^{[m=0]}$
Data unit:	proportion (unitless)

Description:	Portion of leakage due to native grasslands prior to the first verification event
Source of data:	Monitoring in the leakage area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3.2.4
Frequency of monitoring/recording:	At Project Start
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Project verification
Purpose of data:	Calculation of leakage
Calculation method:	Summation across leakage plots
Any comment:	

Data Unit / Parameter:	$p_{L\,CON\,G}^{[m-1]}$
Data unit:	proportion (unitless)
Description:	Portion of leakage due to native grasslands conversion at the end of the current monitoring period
Source of data:	Monitoring in the leakage area
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.3.2.4
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	Equipment list in Annex 11
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of leakage
Calculation method:	Summation across leakage plots
Any comment:	

Data Unit / Parameter:	$p_{SL}^{[m]}$
Data unit:	proportion (unitless)
Description:	Proportion of AGMT that is not merchantable and goes into slash estimated from inventory
Source of data:	Estimated from inventory
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 8.1.6.3
Frequency of monitoring/recording:	Every monitoring period
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions

Calculation method:	Conservatively used volume of a cone
Any comment:	Parameter not used

Data Unit / Parameter:	$t^{[i-1]}$
Data unit:	days
Description:	Time from Project Start Date to beginning of monitoring period i
Source of data:	Monitoring records
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value applied:	0
Monitoring equipment:	*N/A*
QA/QC procedures to be applied:	*N/A*
Purpose of data:	Calculation of baseline emissions
Calculation method:	Subtraction
Any comment:	Parameter not used

Data Unit / Parameter:	$t^{[m]}$
Data unit:	days
Description:	Time from project start date to end of current monitoring period
Source of data:	Monitoring records
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Every monitoring period
Value applied:	1,199
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Subtraction
Any comment:	

Data Unit / Parameter:	$t^{[m-1]}$
Data unit:	days
Description:	Time from Project Start Date to beginning of current monitoring period
Source of data:	Monitoring records
Description of measurement methods and procedures to be applied:	N/A

Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Subtraction
Any comment:	

Data Unit / Parameter:	$U_B^{[m]}$
Data unit:	tCO_2e
Description:	Total uncertainty in Proxy Area carbon stock estimate
Source of data:	N/A
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.1.5
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [B.34]
Any comment:	

Data Unit / Parameter:	$U_{EM}^{[M]}$
Data unit:	tCO_2e/ha
Description:	Total uncertainty in Baseline Emissions Models for the Forest Project Accounting Area
Source of data:	N/A
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6.8.10
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0.262
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.14]
Any comment:	

Data Unit / Parameter:	$U_{EM}^{[M]}$

Data unit:	tCO_2e
Description:	Total uncertainty in Baseline Emissions Models for the Grassland Project Accounting Area
Source of data:	N/A
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Section 6.8.10
Frequency of monitoring/recording:	Every monitoring period
Value applied:	0.101
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [F.14]
Any comment:	

Data Unit / Parameter:	$U_P^{[m]}$
Data unit:	tCO_2e/ha
Description:	Total uncertainty in the Forest Project Accounting Area carbon stock estimate
Source of data:	N/A
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.1.5
Frequency of monitoring/recording:	Every monitoring period
Value applied:	24.89
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	Equation [B.34]
Any comment:	

Data Unit / Parameter:	$U_P^{[m]}$
Data unit:	tCO_2e/ha
Description:	Total uncertainty in Grassland Project Accounting Area carbon stock estimate
Source of data:	N/A
Description of measurement methods and procedures to be applied:	VCS Methodology VM0009 Appendix B.1.5
Frequency of monitoring/recording:	Every monitoring period
Value applied:	28.19
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions

Calculation method:	Equation [B.34]
Any comment:	

Data Unit / Parameter:	$wc_{Pi}^{[m=o]}$
Data unit:	tCO_2e
Description:	Weighted average carbon stocks for biomass or SOC in the Project for the set of selected strata
Source of data:	Biomass inventory
Description of measurement methods and procedures to be applied:	Inventory or GIS
Frequency of monitoring/recording:	Every monitoring period
Value applied:	See Annex 26 – Soil Carbon Model
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Review of monitoring records
Purpose of data:	Calculation of baseline emissions
Calculation method:	N/A
Any comment:	

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

5.3.1 Community and Biodiversity Metrics (CL3.1 & B3.1)

5.3.1.1 Social Impact Assessment

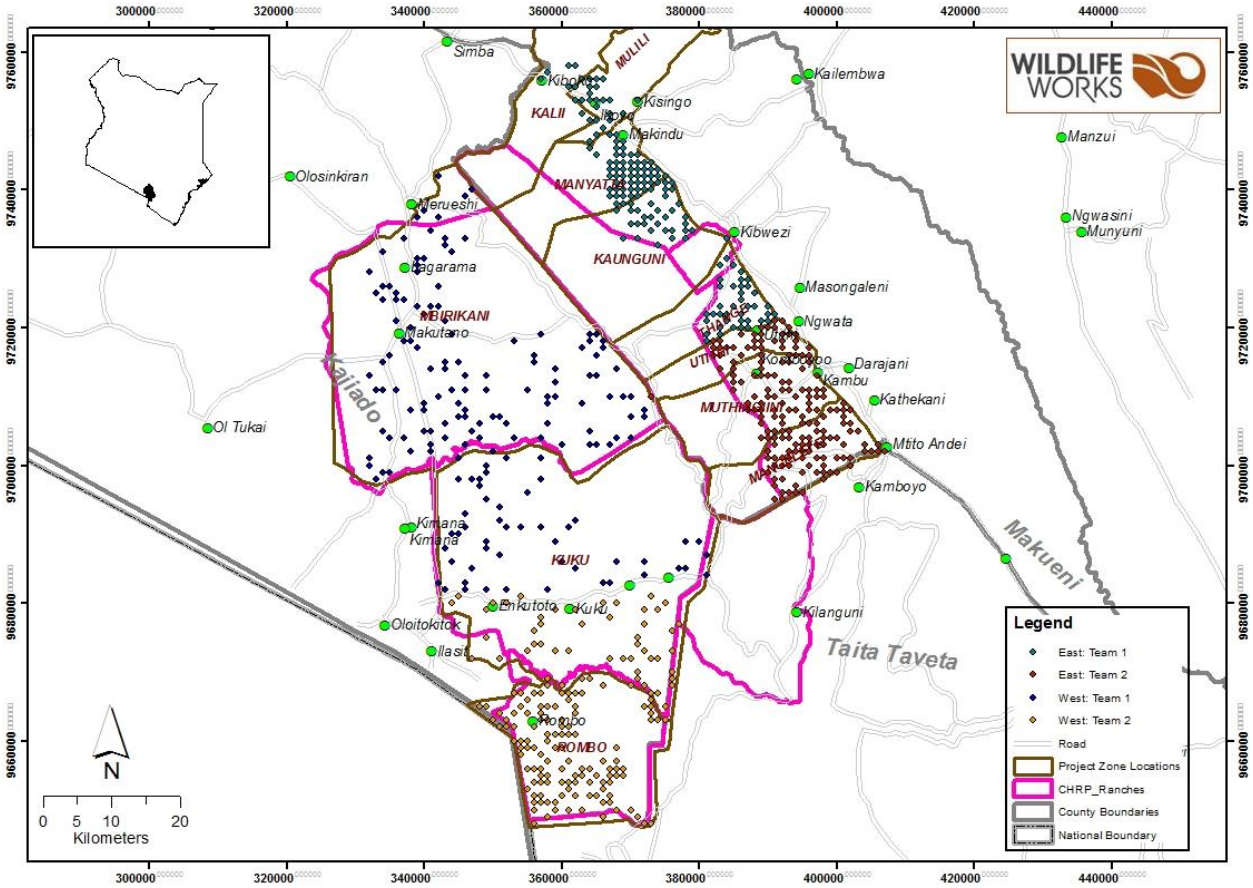


Figure 9: Map of all households surveyed in the baseline Social Impact Assessment in Aug-Sept 2016 in the Chyulu Hills REDD+ Project Zone

5.3.1.1.1 Household type and basic demography

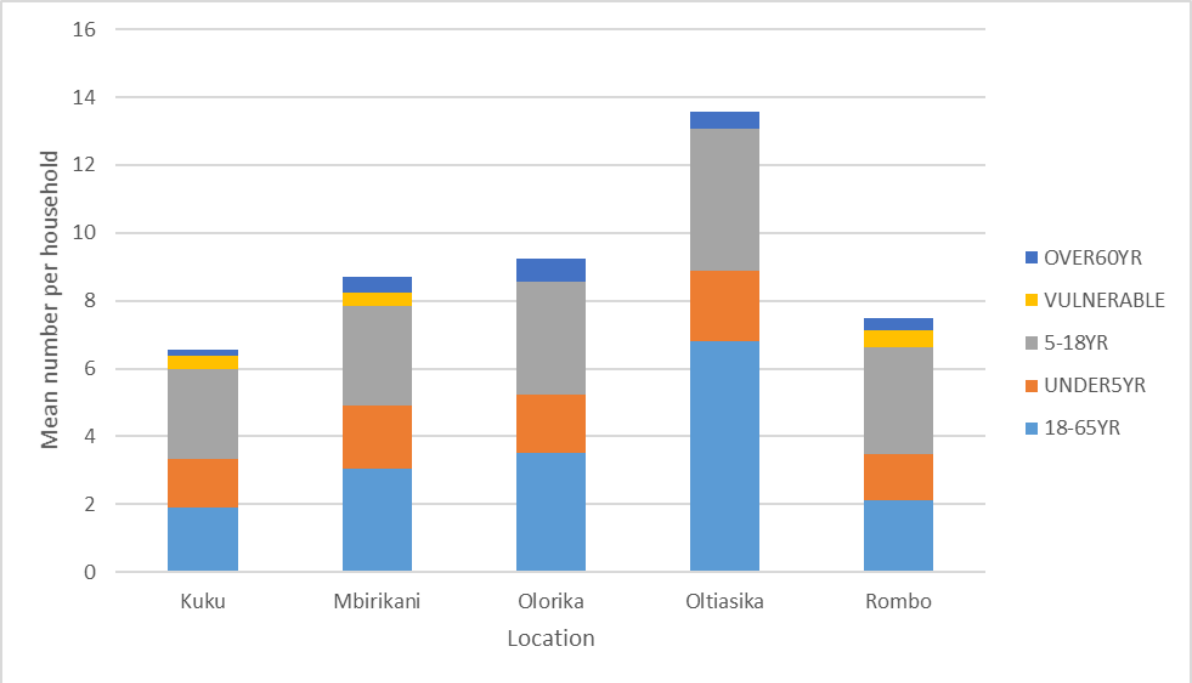
On the western side est of the Project Area, data was collected from five Locations Kuku, Mbirikani, Olorika, Oltiasika and Rombo, spanning 18 sub-locations and 96 villages. The vast majority of respondents across all the Locations were Maasai (92.5%); other ethnic groups represented included: Kamba 1.25%; Kikuyu 3.75%; Taita 0.63%; Taveta 0.63%; and Others 1.25%. Most of the households surveyed were male-headed with a wife (92.4%); most of the rest were female-headed ones without a husband (4.4%) while female headed ones where husband was around but wife decides were less common (1.3%), as were male headed without a wife (0.63%).

Number of people per household varied from 2 to 50 with an overall mean of about 8±5; more than half (56%) of the households had 5-8 members. This did not vary much across locations including in age structure, with most households being comprised mostly of school-going age group (5-18 yrs) and working class (18-60yrs bracket) (Figure 10). Overall, the highest level of education in 44% of the households was primary school; 5% of the households did not have anyone with formal education, 32% had secondary-level members and 19% had a member of their household attain tertiary education (Figure 11). Oltiasika seemed to have more members who have attained tertiary education compared to the rest.

On the eastern side, data was collected from six Locations Kiboko, Makindu, Nguumo, Nthongoni, Nzambani and Utithi, spanning 24 sub-locations and 122 villages. The vast majority of respondents across all the Locations were Kamba (98%); other ethnic groups represented included: Maasai 1.3%; and Taveta 0.7%. Most of the households surveyed were male-headed with a wife (82%); most of the rest were female-headed ones without a husband (12%) or male headed without a wife (6%).

Number of people per household varied from 1 to 15 with an overall mean of about 6; more than half (53%) of the households had 4-6 members. This did not vary much across locations including in age structure, with most households being comprised mostly of school-going age group (5-18 yrs) and working class (18-60 yrs bracket) (Figure 10). Overall, the highest level of education in 28% of the households was primary school; 44% had secondary-level members and another 28% had a member of their household that had attained tertiary education (Figure 11). Kiboko and Nzambani seemed to have more members who have attained tertiary education compared to the rest.

Please refer to Appendix D for a complete list of Locations, Sub-locations and Villages sampled, and the number of households sampled in each.



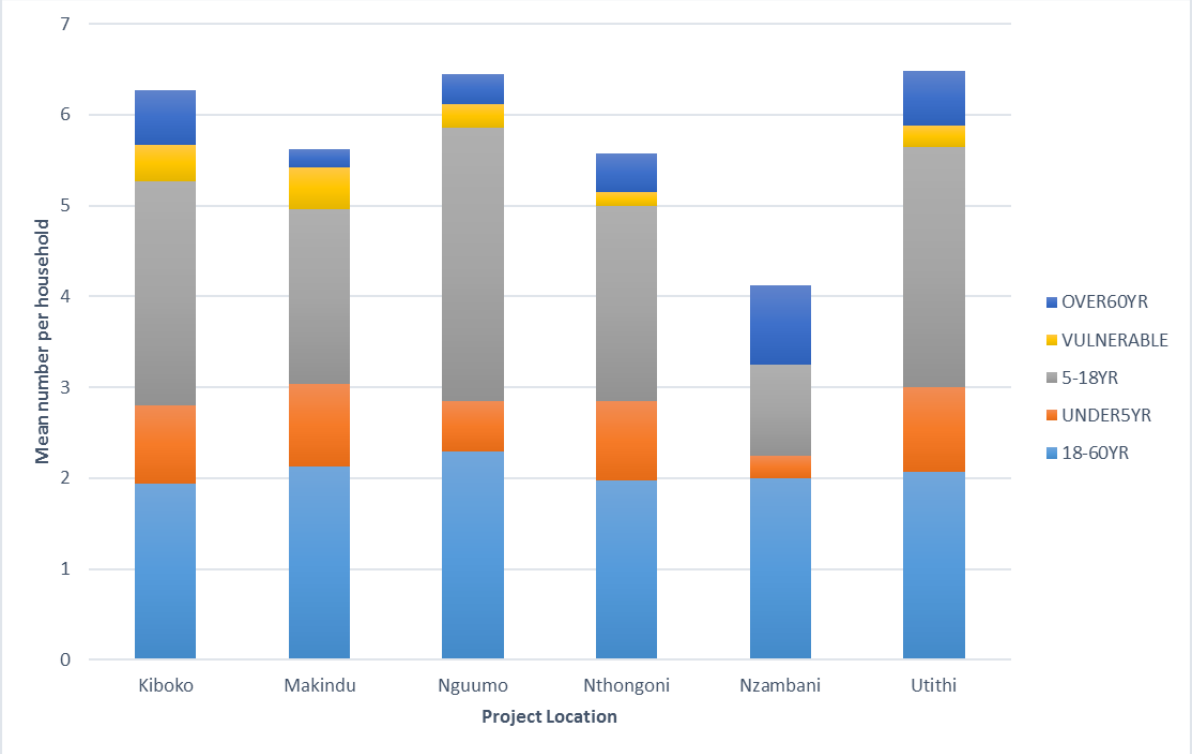


Figure 10: Mean number of household members in the different age categories and number that are vulnerable. Vulnerable refers to households interviewed that were either orphans or disabled, irrespective of their age range. (Top: Western side, Bottom: Eastern Side)

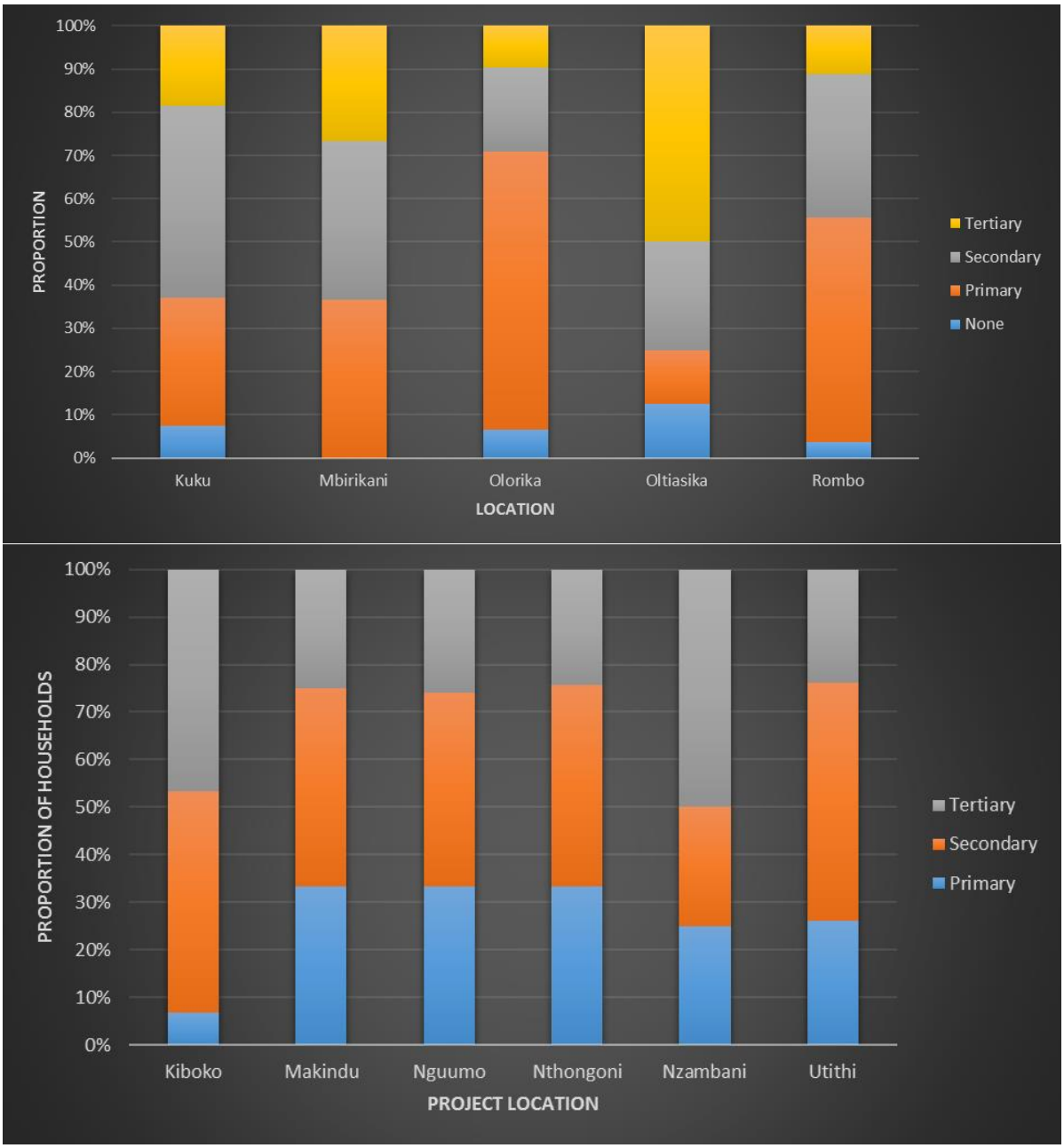


Figure 11: Highest level of education attained by a member of the household (Top: Western side, Bottom: Eastern Side).

5.3.1.1.2 Sources of Livelihood Security

On-farm Income

On the western side of the Chyulu Hills, all households obtained some livelihood-supporting products from their own farms, with 80% of the 160 respondents saying they produced 3-7 of these products from their farms. For all households, at least one of the products produced on-farm was consumed by the

household or used on farm; 18% did not sell any of their on-farm produce. The livelihood-supporting products commonly produced on-farm included small (e.g., chicken and shoats) and large livestock (cattle, donkey), various food types including vegetables, and fuelwood (Figure 12).

On the eastern side of the Chyulu Hills, all 148 respondents obtained some livelihood-supporting products from their own farms, with a mean of about 7 products per household (range 1-12). For all households, at least one of the products produced on-farm was consumed by the household or used on farm; about 41% of on-farm produce was also sold. The livelihood-supporting products commonly produced on-farm included various food crops, small (e.g., chicken and shoats), manure (compost), large livestock (cattle, donkey) and fuelwood (Figure 12).

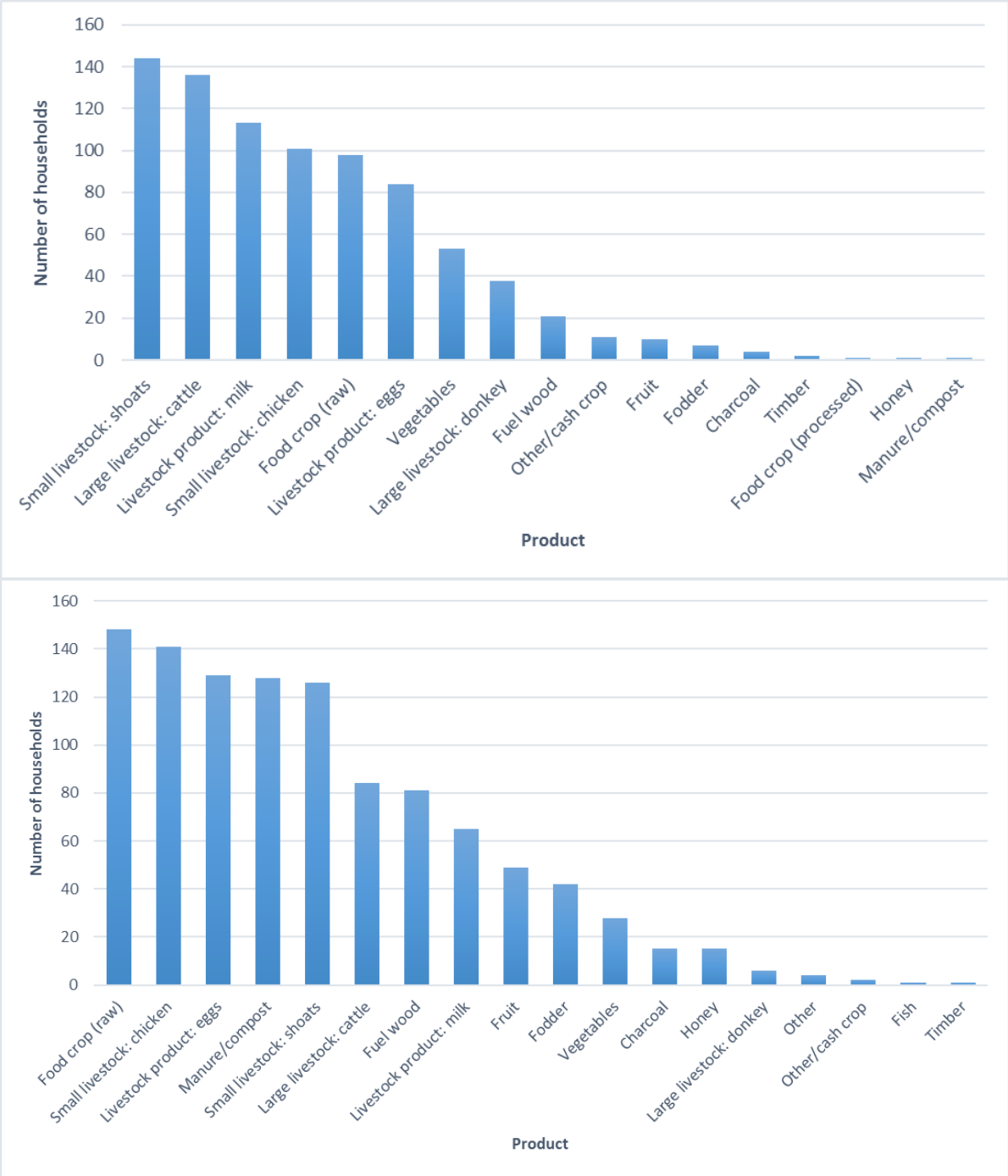


Figure 12: Various products produced on-farm across all the households in the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

Off-farm Income

On the western side of the Chyulu hills 31 of the 160 (13%) respondents said they did not obtain any livelihood-supporting products outside their farms. Of the rest, 96% obtained 1-3 products from outside their farms. Fuelwood comprised 62% of the off-farm products, while food crops and vegetables

comprised 22%; charcoal and honey comprised 5.5 and 4% respectively. Most of them obtained these products from communal areas (47%), with the rest obtaining them from private lands (27%) and CHRP ranches (23%).

On the eastern side of the Chyulu Hills 54% of the respondents did not obtain any livelihood-supporting products outside their farms. Of the rest, 93% obtained only 1-2 products from outside their farms. Food crops comprised 38% of the off-farm products, while fuel-wood comprised 25%; fodder and charcoal 12 and 7% respectively. Most of them obtained these products from other private lands (88%), with the rest obtaining them from a mix of communal lands, ranches and National Park.

5.3.1.1.3 Crop, Farm Animals/Fish, Tree and Soil & Land Management Changes

Important crops and changes in the past year

On the western side of the Chyulu Hills the most important crops over the past year and currently are maize (53%) and tomatoes (38%); beans make up for most of the rest (6%) with kale and melons also mentioned. Only 44 respondents mentioned making any changes in the crops they were planting in the past year. A majority of them either introduced (41%) or are testing (24%) a new crop; 21% either completely or seasonally stopped growing a crop, while 8% introduced or are testing a new crop variety. Most of the changes made involved either starting to grow or testing new varieties of tomatoes (51%) and beans (15%), while farmers also moderately experimented with maize and melon (each 7%).

On the eastern side the most important crops over the past year and currently are maize, mentioned by 96% of the respondents, 85% of the time as first choice; other important crops were green grams (72%), and cow peas and leafy vegetables both mentioned by 46% of respondents. 69% of the respondents mentioned making some changes in the crops they were planting in the past year. A majority of them (60%) had either completely or seasonally stopped growing a crop, while 37% either introduced or are testing a new crop. Most of the changes made involved stopping growing beans and sorghum, and starting to grow green grams and testing new varieties of sorghum.

Important animals and changes in the past year

On the western side of the Chyulu Hills the most important animals over the past year and currently was cattle (75%) and shoats (20%); sheep were considered more important than goats. Respondents said they had made five key changes to their livestock production including: introducing cut and carry (57%), introducing new breeds (52%), improving pastures (45%), reducing herd sizes (43%) and also increasing in herd sizes (25%) (Figure 13). The main reasons proffered for these changes were better prices (33%) more frequent droughts (27%) and improved productivity (22%); predation by wildlife also featured at 8%, alongside new markets (4%) and insufficient labor 2%.

On the eastern side the farm animals mentioned as most important over the past year and currently was chicken, mentioned by 92% of the respondents, 32% of the times as the first choice. Goats were mentioned 66% of the time, cattle 54% and sheep 39%. Respondents said they had made 12 changes to their livestock production including: reducing herd sizes (89%), fodder storage (75%), introducing fencing (64%), and introducing cut and carry (31%) (Figure 13). The main reasons proffered for these changes were more frequent droughts (33%), predation by wildlife 17% and insufficient labor 12%; others were increased productivity 10% and better prices 7%.

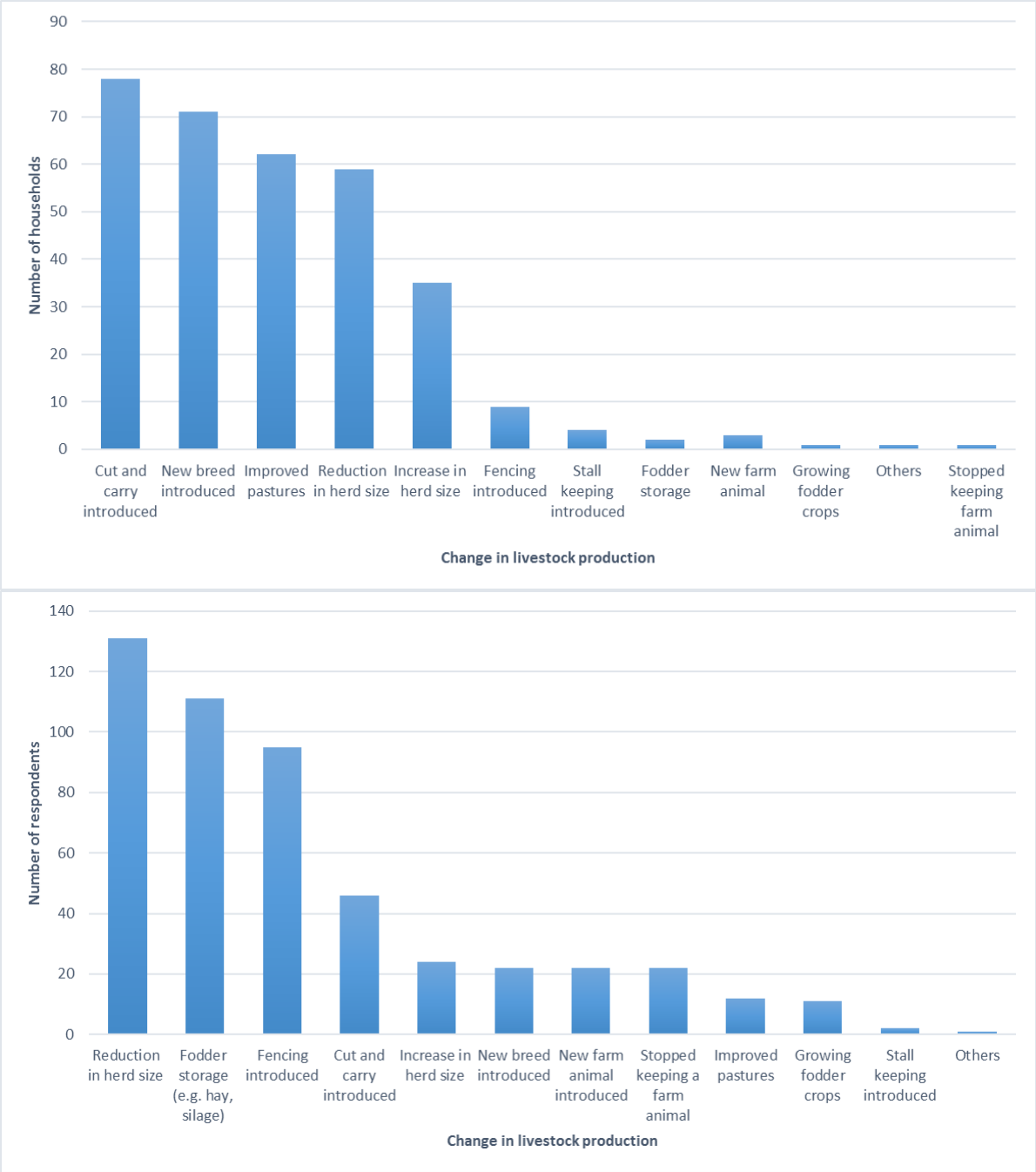


Figure 13: Changes to livestock husbandry over the past year for the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

Soil, Land & Water management

On the western side of the Chyulu Hills 110 of the 160 respondents (69%) had altered the ways they conducted their soil, land and water (SLW) management on their farms over the past year. Of the ones that had made changes, a majority had either started using chemical fertilizers (76%) or pesticides/herbicides (74%); other commonly stated changes included introduction of crop rotation and intercropping, expansion or reduction of area, and starting to use irrigation (Figure 14). The five

commonest reasons proffered for these changes included better yields (86%), greater resistance to pests/diseases (58%), better prices (54%), advent of new pests/diseases (47%) and wildlife/elephant damage (29%) (Figure 15).

On the eastern side, with the exception of five respondents, all of the other 150 respondents (97%) had altered something about how they conducted their soil, land and water (SLW) management on their farms over the past year. A majority had started using pesticides/herbicides (72%) or introduced intercropping (61%); other commonly stated changes included earlier land preparation, earlier planting, had started using manure/compost and the introduction of terraces (Figure 14).

The five most common reasons proffered for these changes included reduced rainfall (72%), new pests/diseases (70%), decreasing land productivity (62%), an earlier start to the rains (44%) and frequent droughts (36%) (Figure 15).

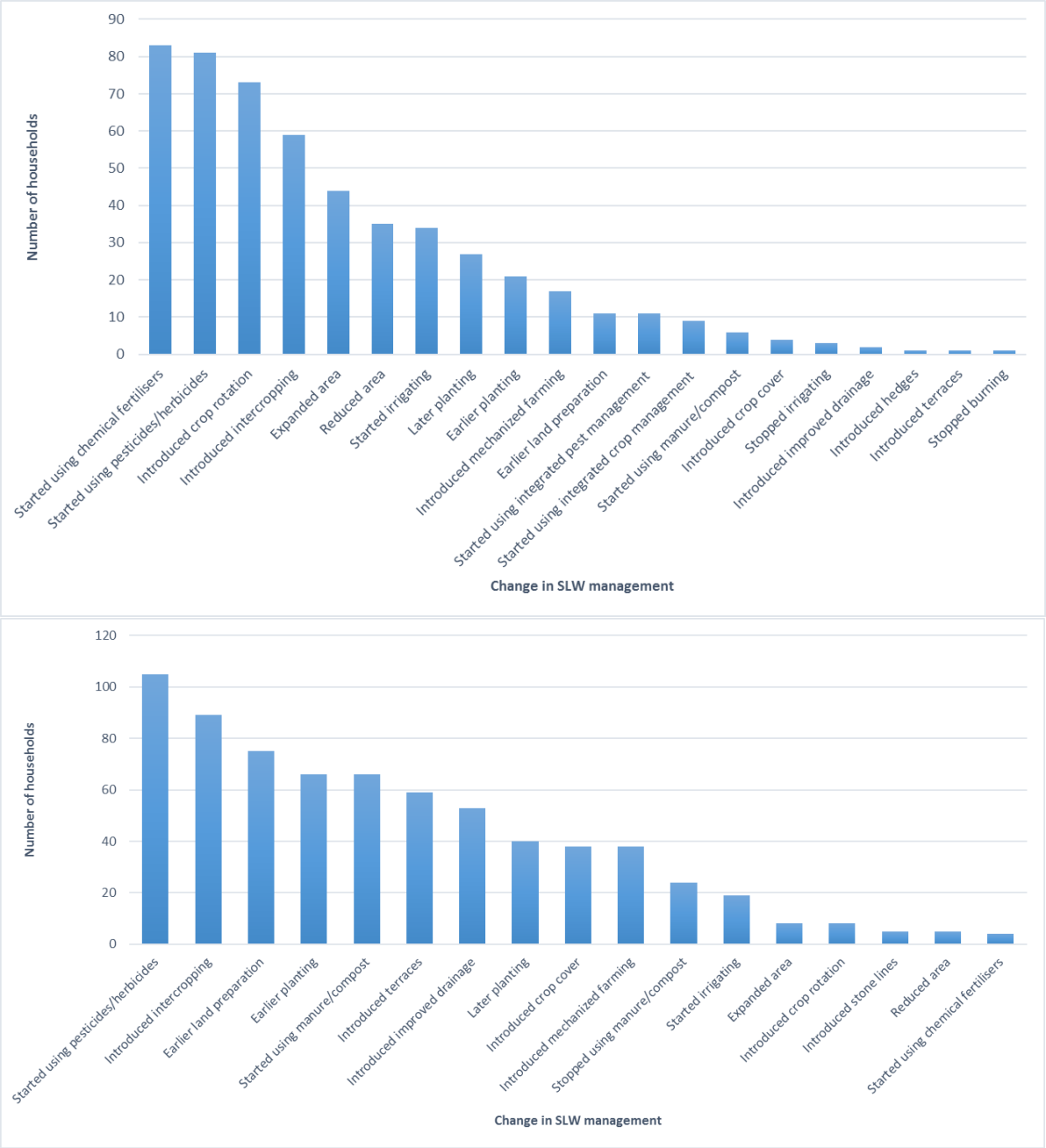


Figure 14: The most important changes to Soil, Land and Water (SLW) management on farms in the past year in the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

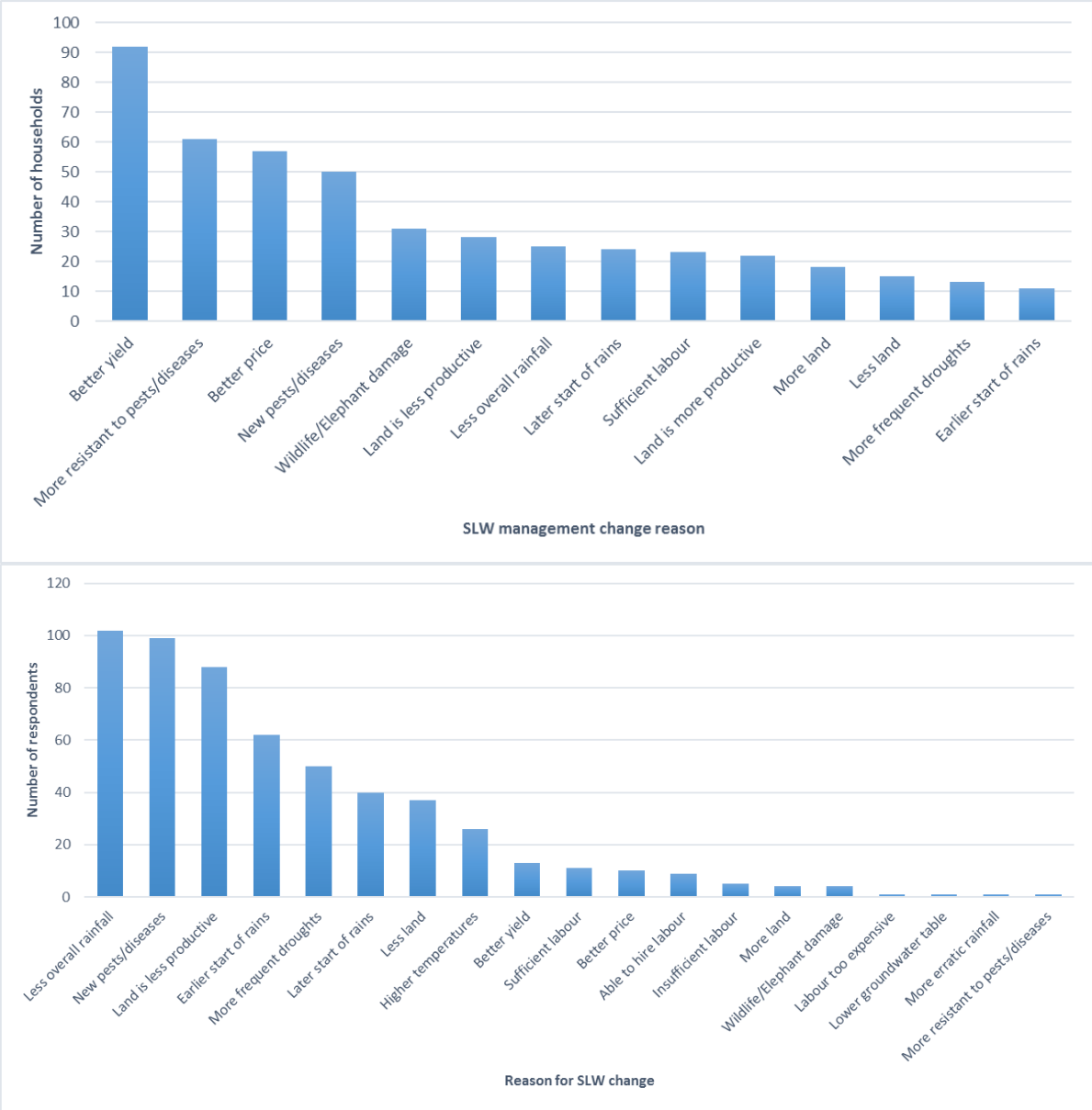


Figure 15: The most common reasons given for implementing Soil, Land and Water (SLW) management on farms in the past year for the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

5.3.1.1.4 Food Security

On the western side of Chyulu Hills, while there was a consistent pattern in terms of communities generally being the most food secure between December and June, it was telling that nearly 10% of the respondents said they suffered from food shortage year-round, but about 15% reported not having a food shortage at any time of year (Figure 16). Unexpectedly, it seems that food insecurity was mostly tied to their ability to purchase food off-farm, rather than to production on their own farms (Figure 17).

On the eastern side, the most food secure time is in the first half of the year (January to June), however it was telling that about 15% of the respondents said they suffered from food shortage year-round, but 10%

did not have food shortage at any time of year (Figure 16). Perhaps unsurprisingly, it seems that food security was mostly tied to their ability to produce food on their own farms, with most shortage felt when there was little own-farm food supply (Figure 17).

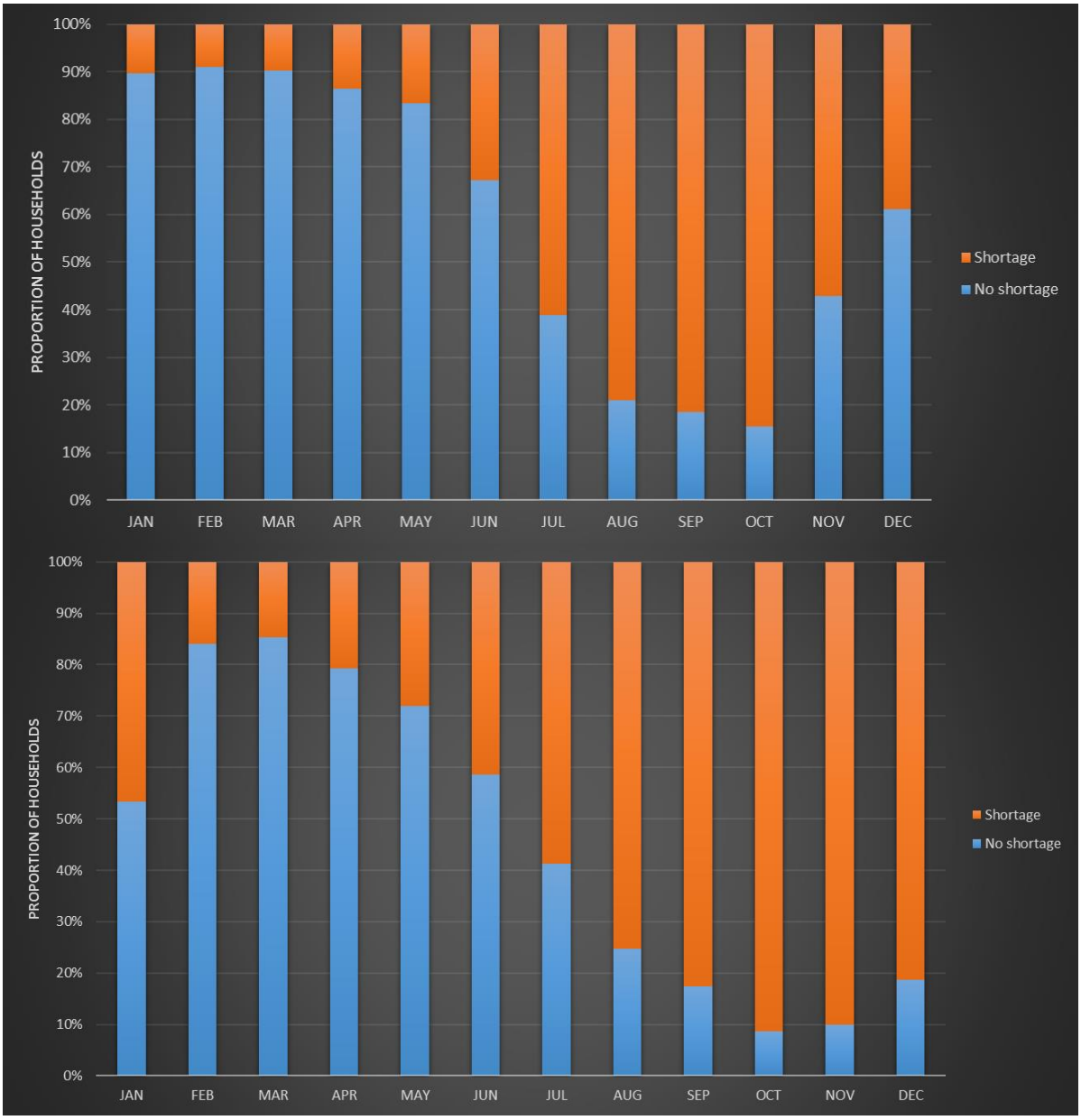


Figure 16: The pattern of food shortage across the year for the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

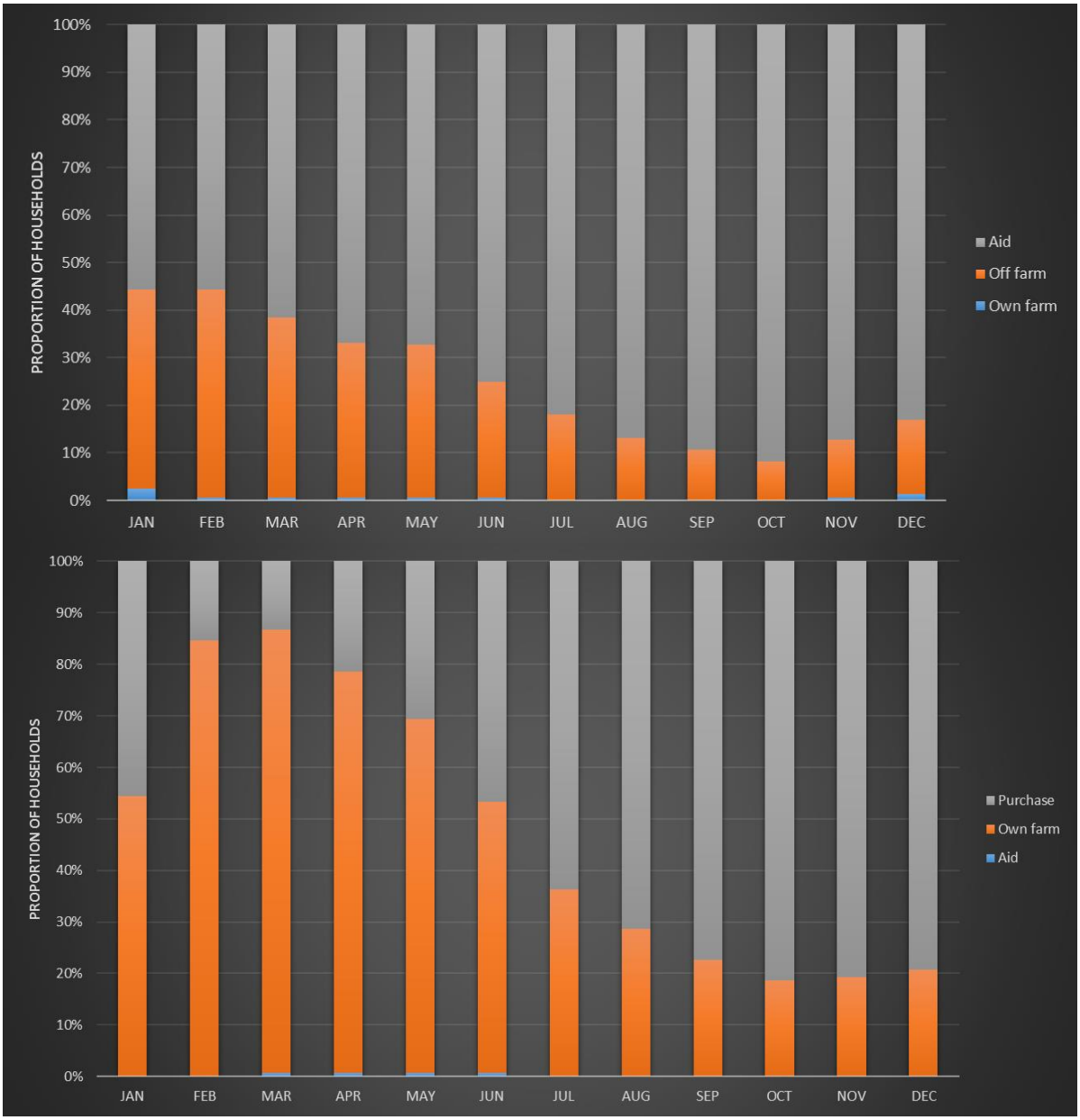


Figure 17: Major sources of food for the households throughout the year across the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

5.3.1.1.5 Water use: Household and Agricultural

On the western side of the Chyulu Hills more than half of the respondents (64%) had access to a communal or other tap, while 45% said they relied on rainwater for household use; rivers and streams were used by 41%, while boreholes and dams served another 30% of the population. Out of 97 responses on water use for agriculture, 90% said they used some form of irrigation, with 80 respondents depending on inlets from the rivers and streams, 12% on boreholes, and 9% on storage tanks from rainwater.

On the eastern side the vast majority of the respondents (95%) said they relied on rainwater for household use; 77% also had access to a communal tap, while boreholes served another 65% of the population. Only 27% (40 respondents) said they used different sources of water for agriculture apart from rainwater. 78% said they used some form of irrigation, mostly depending on boreholes (33%), water pumps (28%) and inlets from the rivers and streams (25%).

5.3.1.1.6 Access to land

On the western side of the Chyulu Hills 18% of the respondents said they did not have access to own land for household use. All farms were under 30 acres, and with an overall mean farm size of 3.6±4 acres, and a range of 0.25 to 22 acres. Overall, about three-quarters of the farmers have between 1 and 10 acres of land. Additionally, 20% of the respondents said they had rented some land for their own use, including 30% of those who said they did not have their own land. Rented land ranged from 1-14 acres, with a mean of 2.8 acres. A vast majority (75%) of these farmers had food crops on their land while about a quarter (26%) also used their land for grazing. 19% said they had portions of their farms they left fallow for various reasons, whilst 56% said they had some trees on their farms.

On the eastern side, all of the respondents apart from three said they had some access to own land for household use. The overall mean farm size was 6±8 acres (n = 147), with a range of 0.25 to 62.25 acres. Overall, about 25% of the households had less than 2 acres, 63% had 2.5-10 acres of land; only four farms were 20 or more acres. Additionally, 37% of the respondents said they had rented some land for their own use, ranging from 0.5-10 acres, with a mean of about 2 acres. All respondents said they had some food crops on their land, while about 60% also used their land for grazing. 10% said they had some trees on their farms, and 7% said they had portions of their farms they left fallow for various reasons.

Current in-farm land-use

On the western side of the Chyulu Hills 72% of the 158 respondents who responded to this question said they did not plant or protect any trees on their farms in the 12 months preceding the study. Most of those who did (16%) planted or protected less than 10 trees with another 9% planting 11-50 trees; only 2% planted more than 50 trees. Only 6% of the respondents used animal-drawn ploughs, but close to 70% said they used tractors; and also about 70% hired extra labor for working on their farms. Finally, 81% of the respondents said they grazed their livestock outside their own farms.

On the eastern side 23% of the respondents said they did not plant or protect any trees on their farms in the 12 months preceding the study. Most of those who did planted or protected less than 10 trees (35%) with another 35% planting 11-50 trees; 6% said they planted more than 50 trees. Farming was generally mechanized, with 57% of the respondents saying they used animal-drawn ploughs, while 53% said they used tractors; ⅔ of the respondents did not hire extra labor for working on their farms. Finally, about half of the respondents said they grazed their livestock outside of their own farms.

5.3.1.1.7 Assets & Utilities

Ownership of assets

Overall, on the western side of the Chyulu Hills households across the six locations had an average of 3-4 of the 23 asset items listed, ranging from 1 to 14. Asset-wise, a mobile phone was the commonest with almost 85% of the 138 respondents who answered this question owning one; other commonly-owned assets included motorcycle (44%), radio (61%), bank account (29%) and solar panel (24%) (Figure 18

On the eastern side households across the six locations had an average of 6 of the 23 asset items listed, ranging from 1 to 15. Asset-wise, a mobile phone was the most common with almost 99% of the 149

respondents owning one; other commonly-owned assets included radio (82%), bicycle (79%), improved jiko (stove) (71%), mill (53%) and animal plough (48%) (Figure 18).

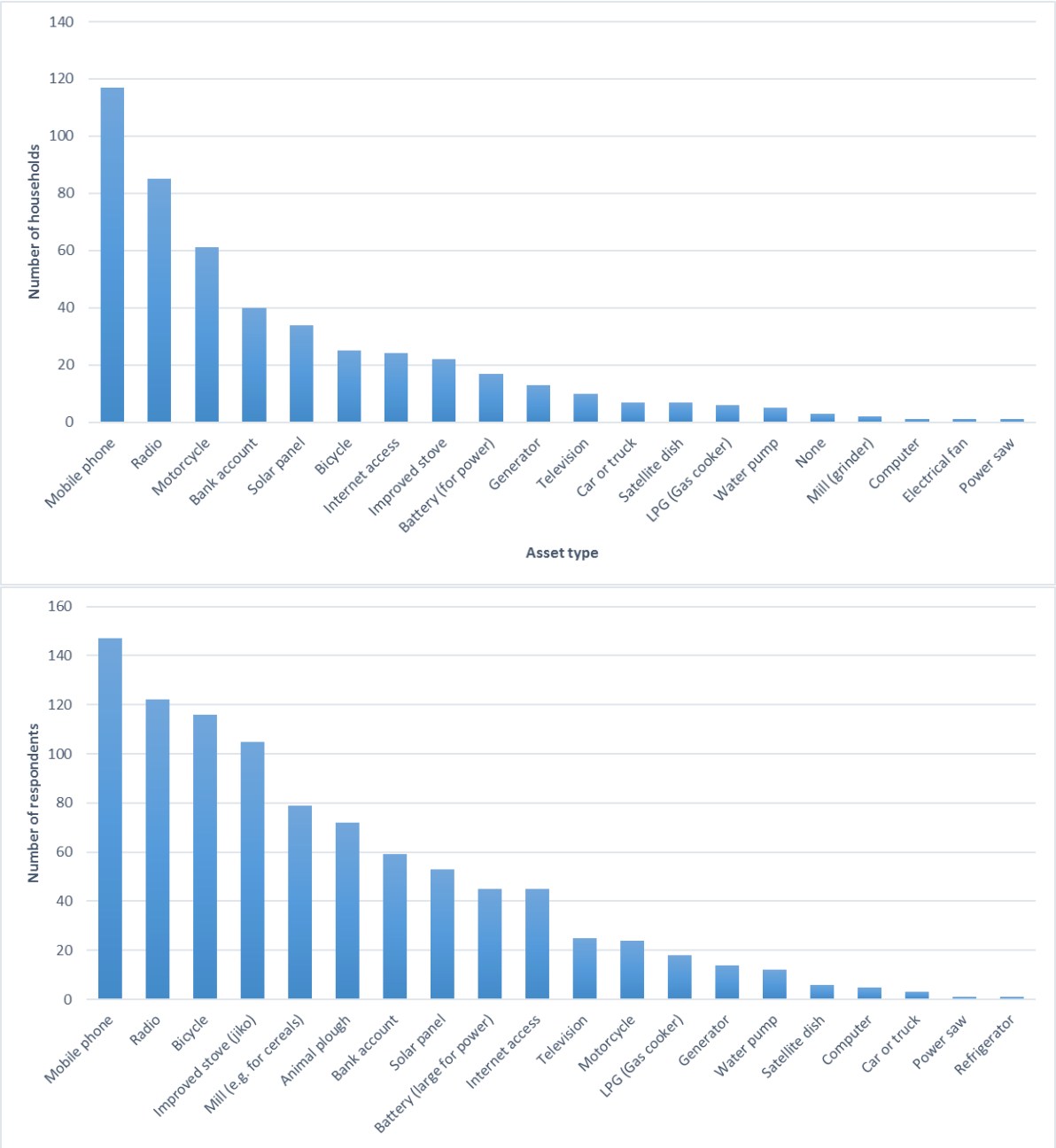


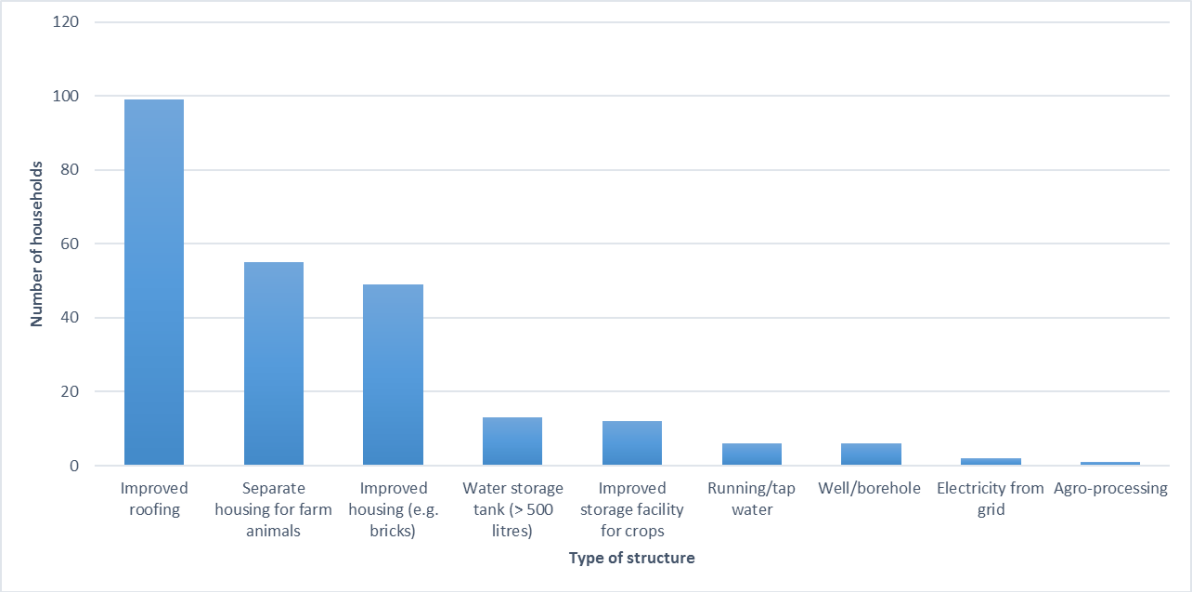
Figure 18: Number of households owning various asset items in the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

Structures and utilities

On the western side of the Chyulu Hills, out of a list of 9 structures and utilities, the average household across the six locations had 2 structures, with the total ranging between 0 and 6 structures. Most

households had 1-3 structures while 30% (48 of 160) did not own any structure. The most common structures were improved house roofing (e.g., tin, tiles) with 62% of the 160 households, and separate housing for farm animals (34%). Other commonly owned structures were improved housing (e.g. concrete, bricks, etc.), water storage tanks, and improved storage facility for crops (food or feed) (Figure 19).

Out of a list of 9 structures and utilities, the average household on the eastern side had 3-4 structures, and ranged between 1-7 structures; 50% of the households had 1-3 structures. The most common structures were improved house roofing (e.g., tin, tiles) with 97% of the 148 households, improved housing (89%) and separate housing for farm animals (81%) (Figure 19).



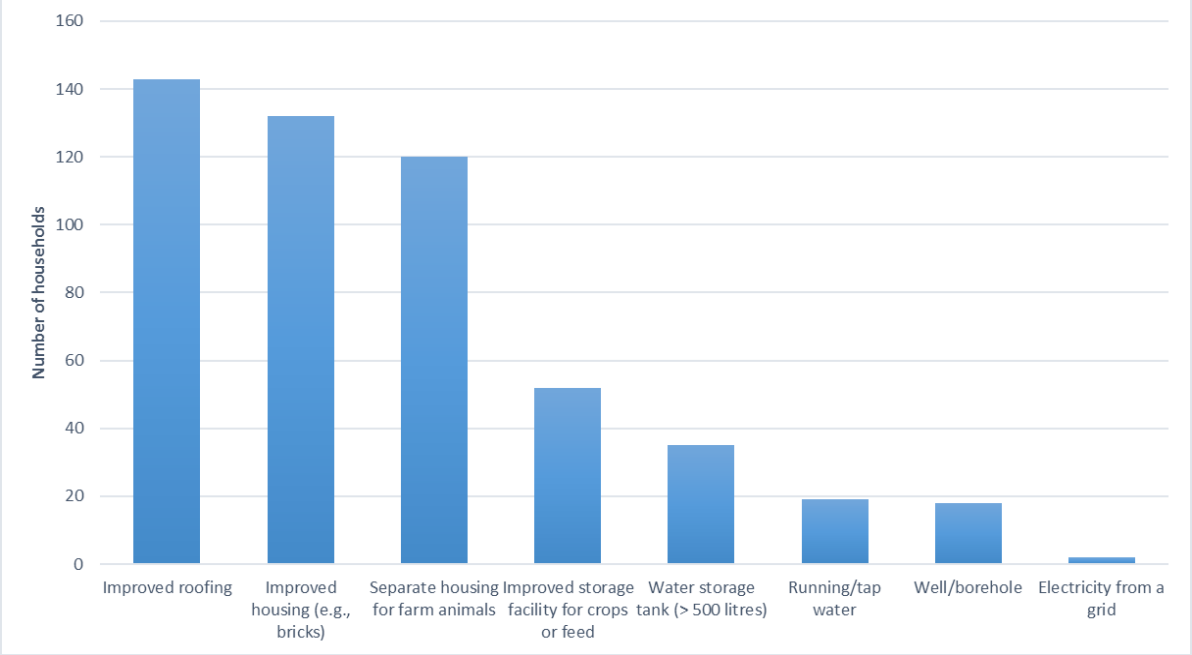


Figure 19: The most common types of structures and utilities in households across the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

5.3.1.1.8 Infrastructure and Services

On the western side of the Chyulu Hills, by the respondents own estimation, the mean distances the household members had to cover in order to access key services was: 1.9 km to a primary school, 6.4 km to a secondary school, 4.5 km to a health facility (community health center, clinic, dispensary or hospital), 15.8 km to a shopping center or market, and 4.9 km to their usual water point. Health-wise, 67% of the respondents attend a dispensary/clinic type of establishment, while about 20% access community health centers; 14% had usual access to hospitals. Albeit subjective, only a few respondents considered it easy to access any of these services, most feeling it was moderately to very difficult to access them (Figure 20).

Whereas on the eastern side, the respondents estimated the mean distances the household members had to cover in order to access key services were: 1.5 km to a primary school, 2.8 km to a secondary school, 4 km to a health facility (community health center, clinic, dispensary or hospital), 4.4 km to a shopping center or market, and 1 km to their usual water point. Health-wise, about 50% of the respondents attend a dispensary/clinic type and another 50% said they had usual access to a hospital. Albeit subjective, most respondents considered it more difficult to access health services and markets, compared to water and educational facilities (Figure 20).

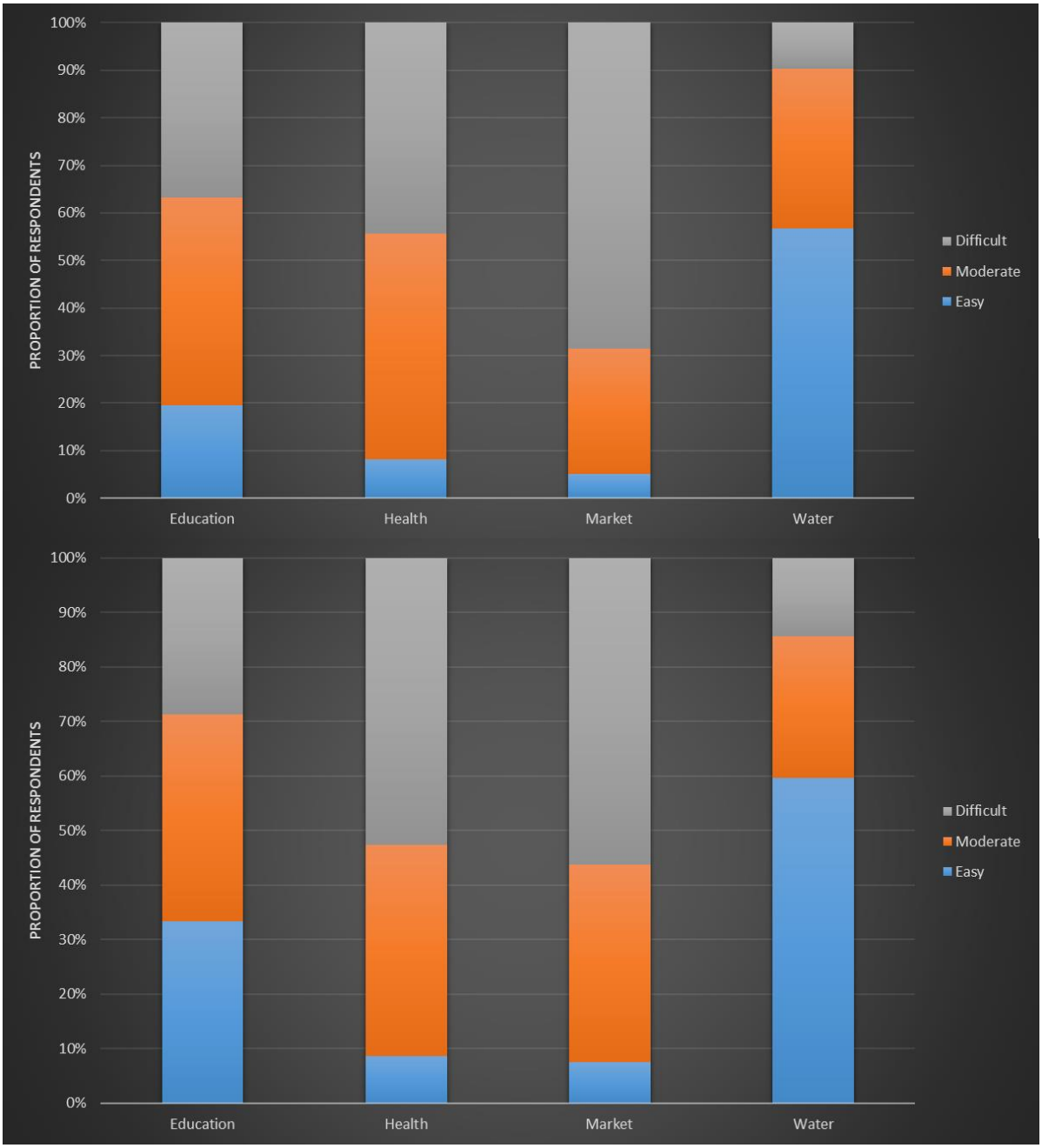


Figure 20: The perception of respondents to the ease of accessing the various key services across the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

School fees and sources

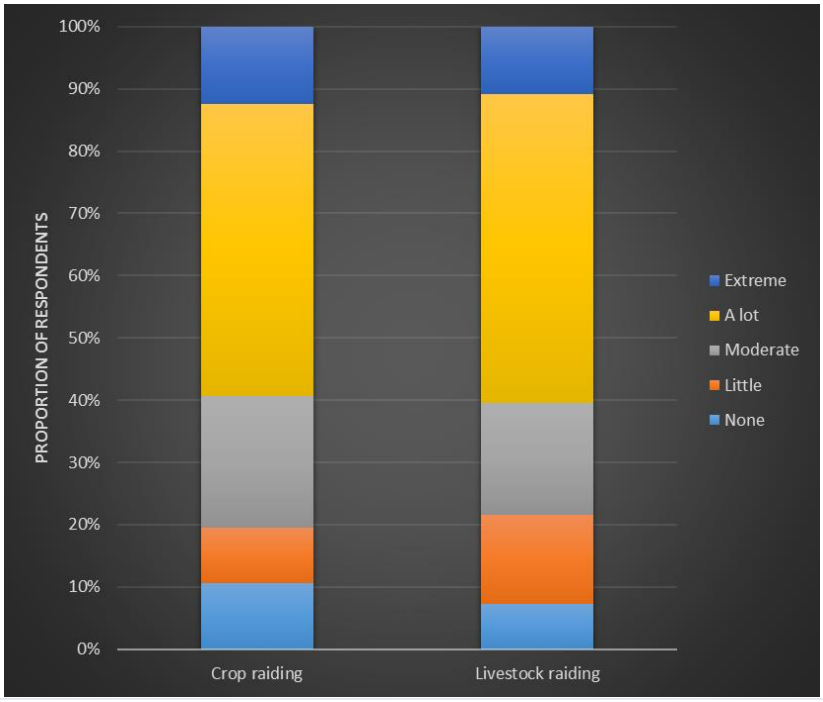
Overall, 132 of 160 respondents had school-going children: 80% in primary school level, 36% in secondary school and 15% tertiary-level. Of these, 14% were not in school due to fees at primary level, 19% at secondary level, and 13% at tertiary level. Except for the Government-funded free primary education, fees are overwhelmingly footed by the households themselves. Other government agencies (e.g., CDF) contributed to school fees in 20% of the households interviewed, while politicians (12%), family and friends (11%) and NGOs (11%) also contributed.

5.3.1.1.9 Human-wildlife conflicts

Crop & livestock raiding perceptions

When residents of the western side of the Chyulu Hills were asked how troubled they perceived their households to be by crop raiding and livestock, about 45% of the 160 respondents felt they were troubled a lot (Figure 21). Farmers said they lost between 1 and 100% of their crops to wildlife, with the biggest losses (>90%) being to maize, beans, tomatoes and melons. The top three most raided crops included maize (mentioned by 50% of the respondents), tomatoes (41%) and beans (28%); watermelon was mentioned by 6% of the respondents. The respondents said they lost between 1 and 100 farm animals to wildlife in the preceding 12 months, with the greatest losses (20 to 100 animals) being sheep, chicken and cattle.

Whereas when residents of the eastern side were asked about the risk they perceived their households to be at from crop raiding and livestock, about 26% of the 149 respondents felt they were not troubled at all, while 29% felt extremely troubled; crop raiding was perceived as a slightly bigger problem than livestock raiding (Figure 21). On average, the respondents lost 18% of their crop to wildlife, ranging between 0-98%. The biggest losses (>75%) were to sugar cane, cassava and tomatoes; other crops with significant losses (>50%) were papaya, kale, sweet potato, leafy vegetables, mango, banana, maize and watermelon. The respondents said the greatest farm animal losses to wildlife in the preceding 12 months were chicken (>90% of total reared), sheep (16% of total) and cattle (6%).



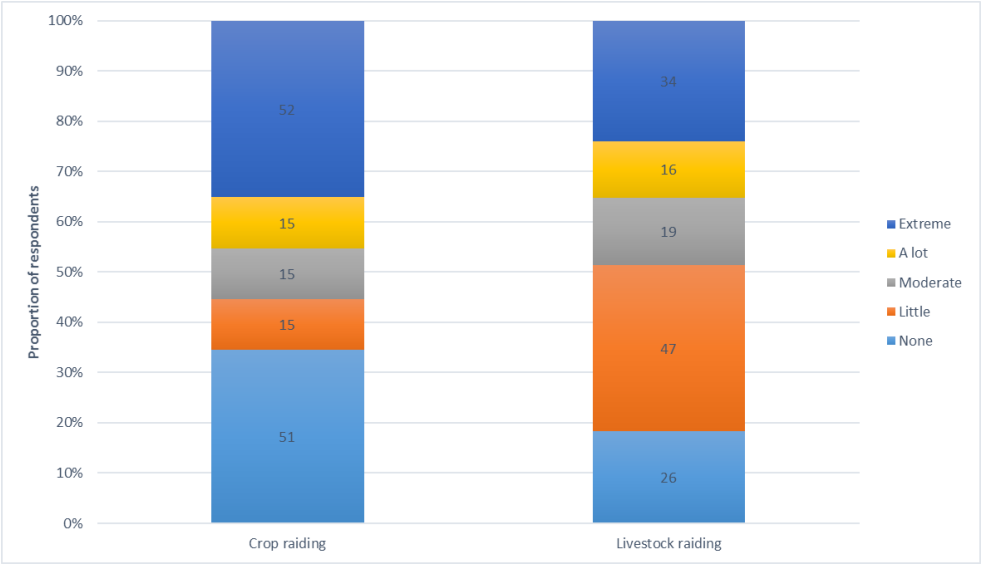


Figure 21: Respondents' perception of how troubled they felt from crop and livestock raiding in the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

Crop-raiding species

On the western side of the Chyulu Hills, 117 (75%) respondents said they suffered wildlife related crop losses in the last 12 months. Of these, when asked to rank crop-raiding wildlife species by frequency of raids and damage caused, 105 (90%) mentioned elephants, with 87% of them ranking it as the most problematic species they faced (Figure 22).

Of the respondents on the eastern side, 97 (66%) said they suffered wildlife related crop losses in the last 12 months. Of these, when asked to rank crop-raiding wildlife species by frequency of raids and damage

caused, about 55% mentioned bush squirrel and elephants, but 90% of them ranked elephants as the most problematic species they faced, compared to less than 50% for the squirrel (Figure 22).

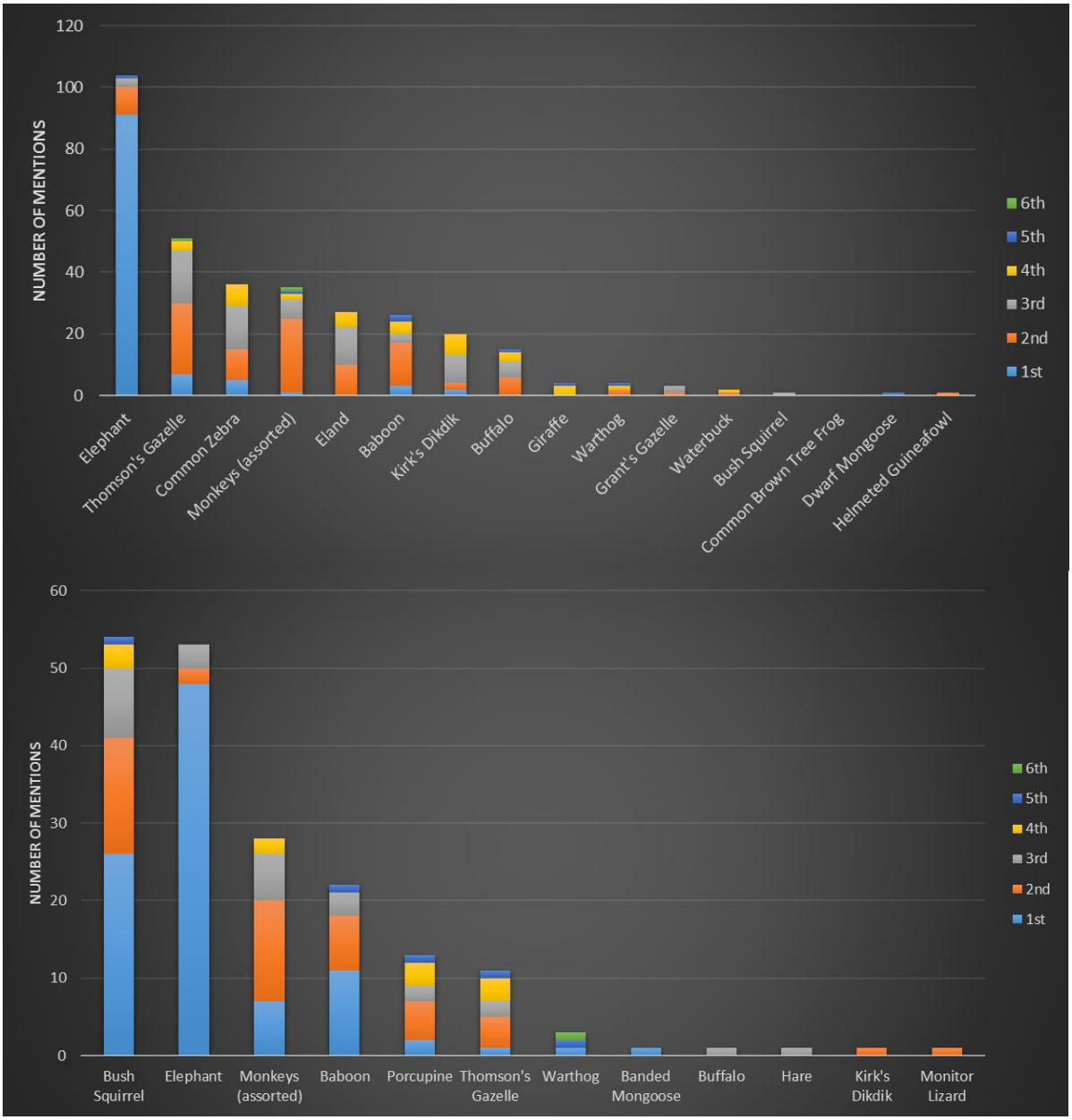


Figure 22: Respondents' ranking of wildlife species based on frequency of crop incursion and crop damage done across the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

Wildlife species involved in livestock-raiding

Overall, on the western side of the Chyulu Hills 142 (90%) respondents said they suffered wildlife-related livestock losses in the last 12 months. Of these, when asked to rank livestock-raiding wildlife species by frequency of raids and damage caused, 121 (85%) mentioned spotted hyena, with 70% of them ranking it as the most problematic species they faced (Figure 23).

Similarly, on the eastern side 115 (80%) respondents said they suffered wildlife-related livestock losses in the last 12 months. Of these, when asked to rank livestock-raiding wildlife species by frequency of raids and damage caused, 112 (97%) mentioned the banded mongoose, with more than 60% of them ranking it as the most problematic species they faced; other important predators were birds of prey (43%), honey badgers (37%) and spotted hyena (13%) (Figure 23).

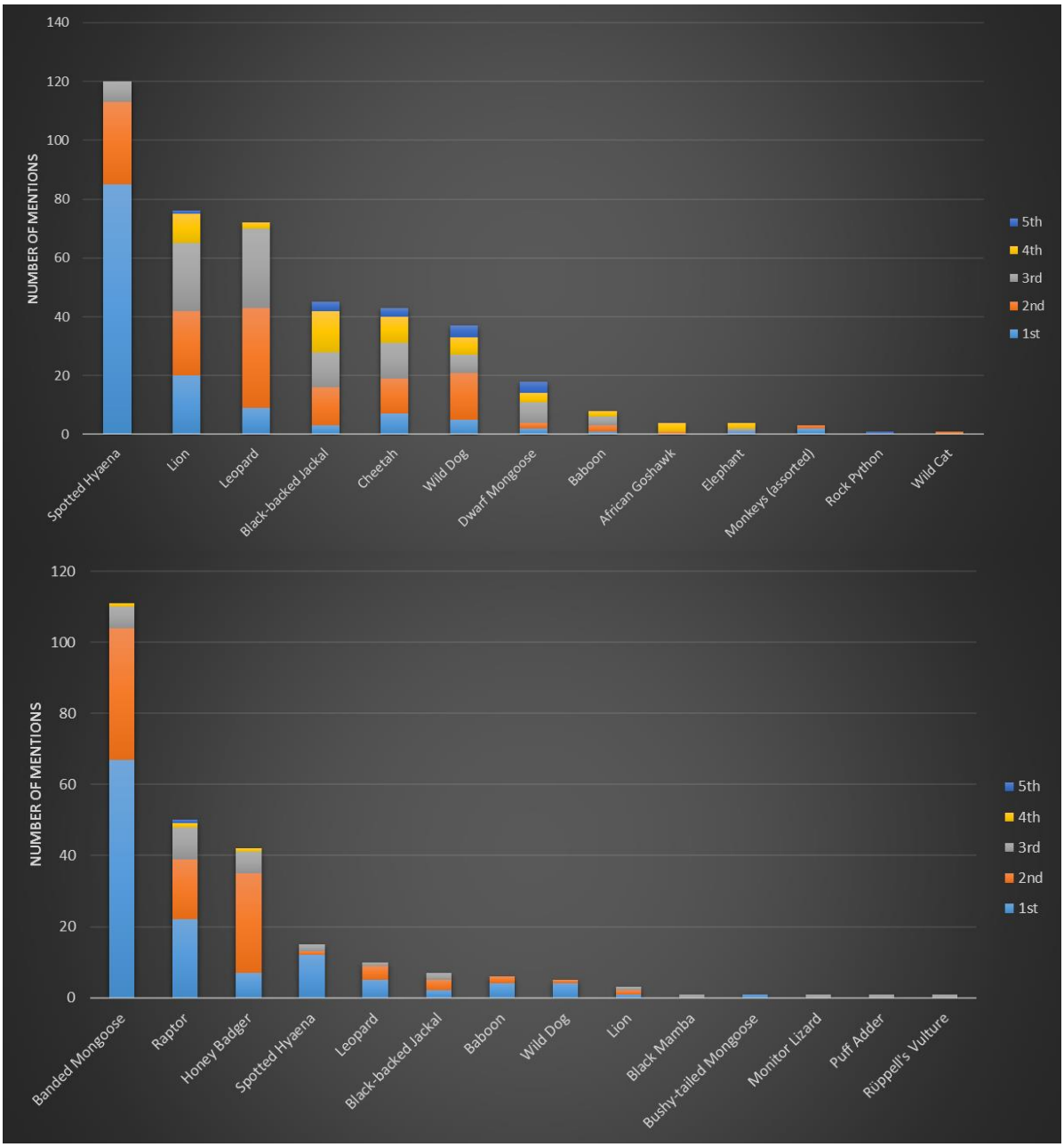


Figure 23: Respondents' ranking of wildlife species based on frequency of livestock raids in the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

Seasonal distribution of crop and livestock raiding

Although the crop-raiding problem was present across the entire year, it seems there is a lull between Jan and May when about ⅔ to ¾ of the respondents of the western side of the Chyulu Hills stated that the problem was absent or low-level, but increased between Jun and Dec where the majority considered the problem moderate to high (Figure 24).

On the eastern side of the Chyulu Hills, the respondents also stated that although the crop-raiding problem was present across the entire year there appeared to be a lull at times. However, on the eastern side they reported the least problematic period to be between May and October when about 66 to 80% of the respondents said the problem was absent or low-level (Figure 24).

Figure 24: Respondents' report of the incidence of crop-raiding across the year in the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

On the western side of the Chyulu Hills a similar pattern to the crop-raiding emerged for livestock-raiding, except for the fact that there seemed to be higher level of livestock raiding in the 'quiet' months of Jan to May when compared to crop-raiding (Figure 25).

However, on the eastern side, besides showing less variation across the year compared to crop raiding, a different pattern emerged for livestock-raiding, with June to October being in this case the most problematic months (Figure 25).

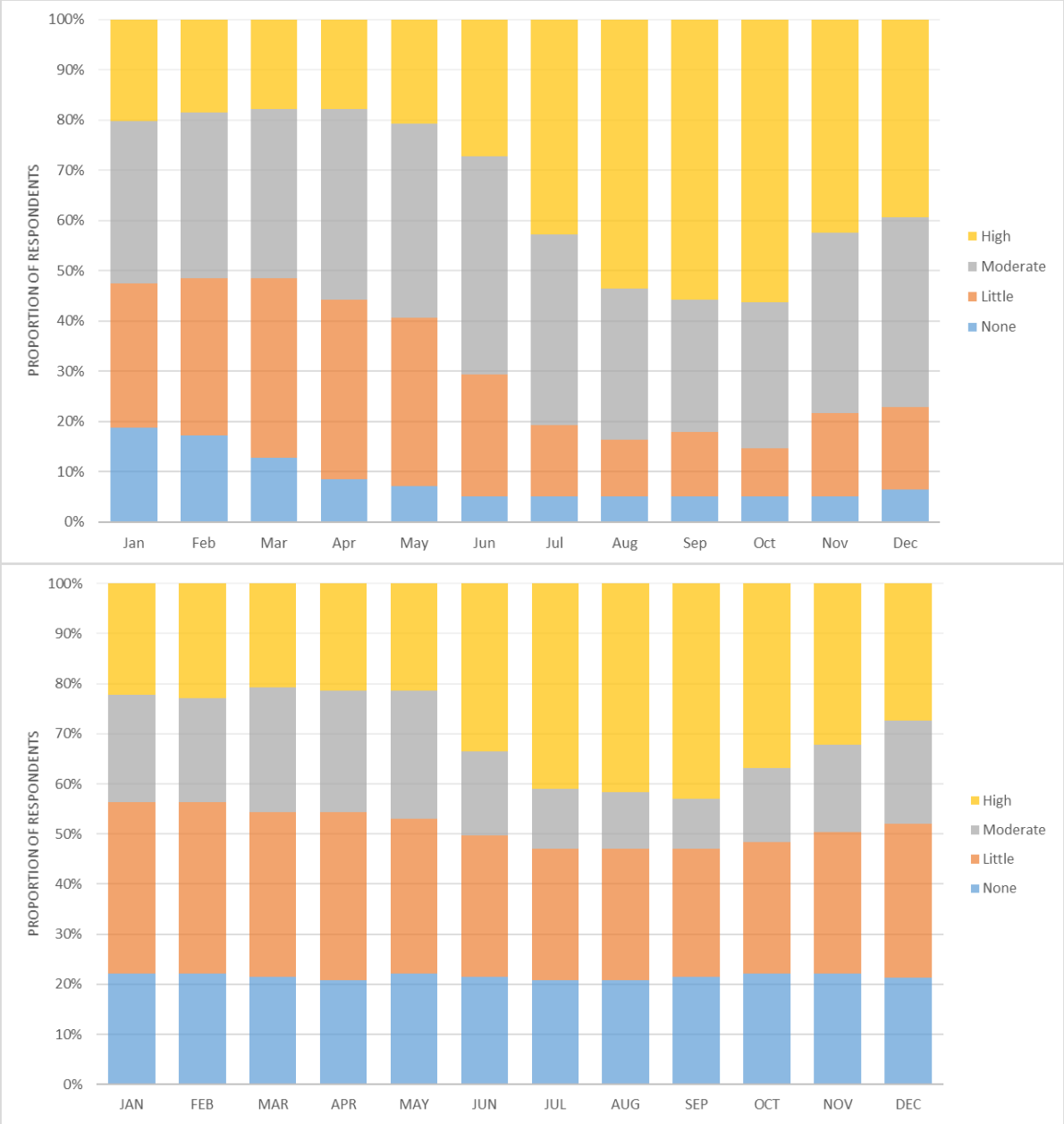


Figure 25: Respondents' indication of incidence of livestock-raiding across the year in the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

Crop and/or livestock raiding defenses

On the western side of the CHRP a total of 12 different crop and/or livestock-raiding deterrents were mentioned by the respondents. Overall, the top five mentions were: spotlight (88%), human guarding (69%), fire (61%), dogs (49%) and scare-shooting by KWS (36%) (Figure 26). Interestingly, none dominated as the most effective method (by being mentioned 1st or 2nd consistently); different people considered different deterrents most effective for them.

On the eastern side, 11 different crop and/or livestock-raiding deterrents were mentioned by the respondents. Overall, the top five mentions were: human guarding (90%), dogs (46%), spotlight (34%), drums (32%) and scare-shooting by KWS (32%) (Figure 26). Although different people considered different deterrents as effective for them, human guarding was overall the most highly ranked deterrent.

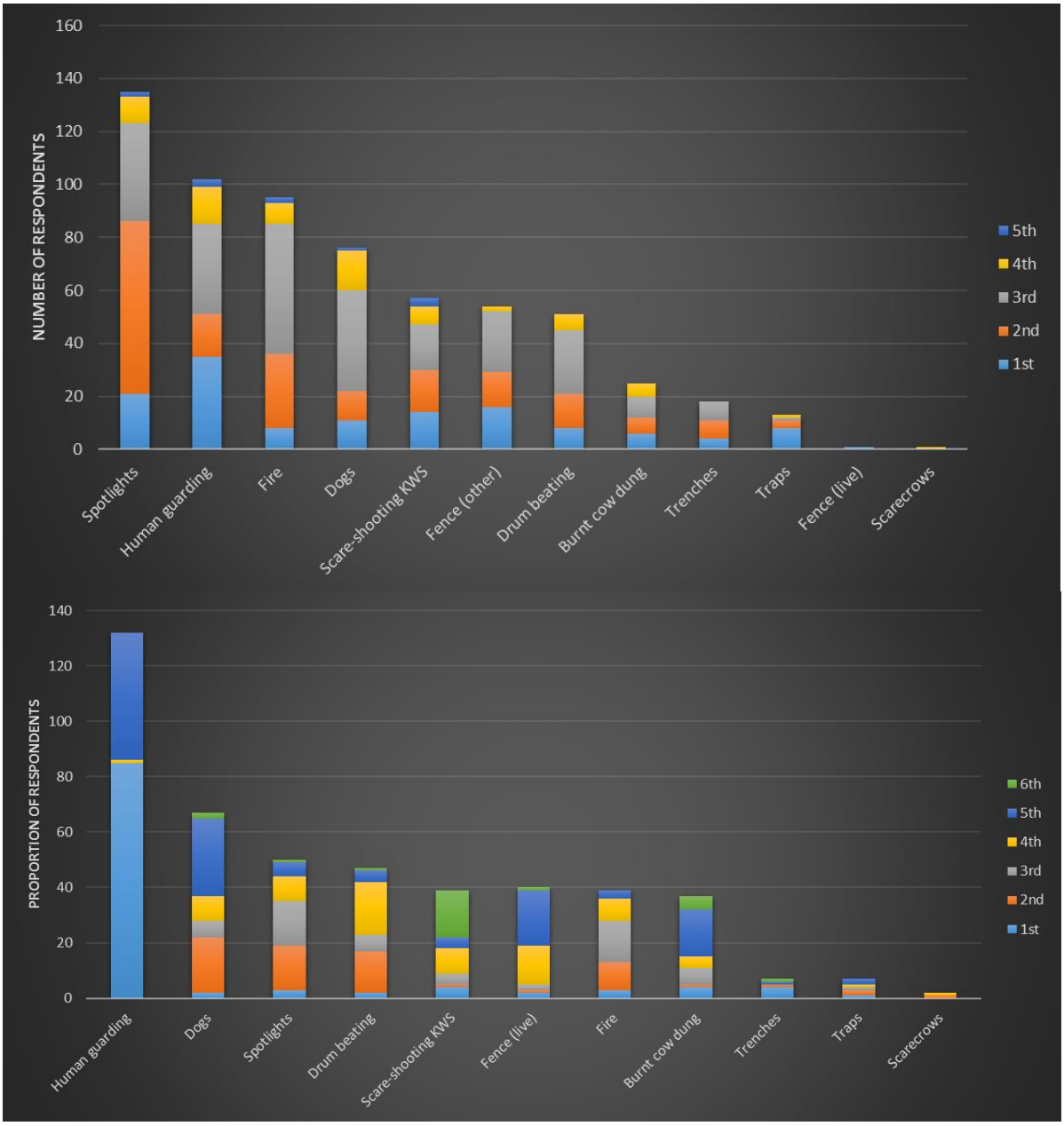


Figure 26: Respondents' opinions on the degree of effectiveness of various crop or/and livestock-raiding deterrents across the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

5.3.1.1.10 Income and Expenditure

Overall, 156 (98%) respondents on the western side of the Chyulu Hills provided an estimate of their monthly incomes. In good (normal) years, 56% of the respondents said they earn more than KES 20,000 (USD $190) per month; 37% said they made less than KES 10,000 (Figure 27). Crucially, in bad years, half of the households earn less than KES 10,000 (US $95), with only 14% earning more than KES 20,000 (Figure 27). Only 13% of the respondents mentioned that a household member had an important

non-farm income, with most earnings coming from formal employment (5%), business (4%), and service provision (e.g., transport) (2%).

On the eastern side 148 (99%) respondents provided an estimate of their monthly incomes. In good (normal) years, 10% of the respondents said they earn more than KES 20,000 (US $190) per month; 70% said they made less than KES 10,000 (Figure 27). Significantly, respondents stated that in bad years, 87% of the households earn less than KES 10,000 (US $95), with only 3.5% earning more than KES 20,000 (Figure 27). 43% of the respondents mentioned that a household member had an important non-farm income, with most earnings coming from service provision industry (including transport) (85%); construction (8%) and business (5%) also featured.

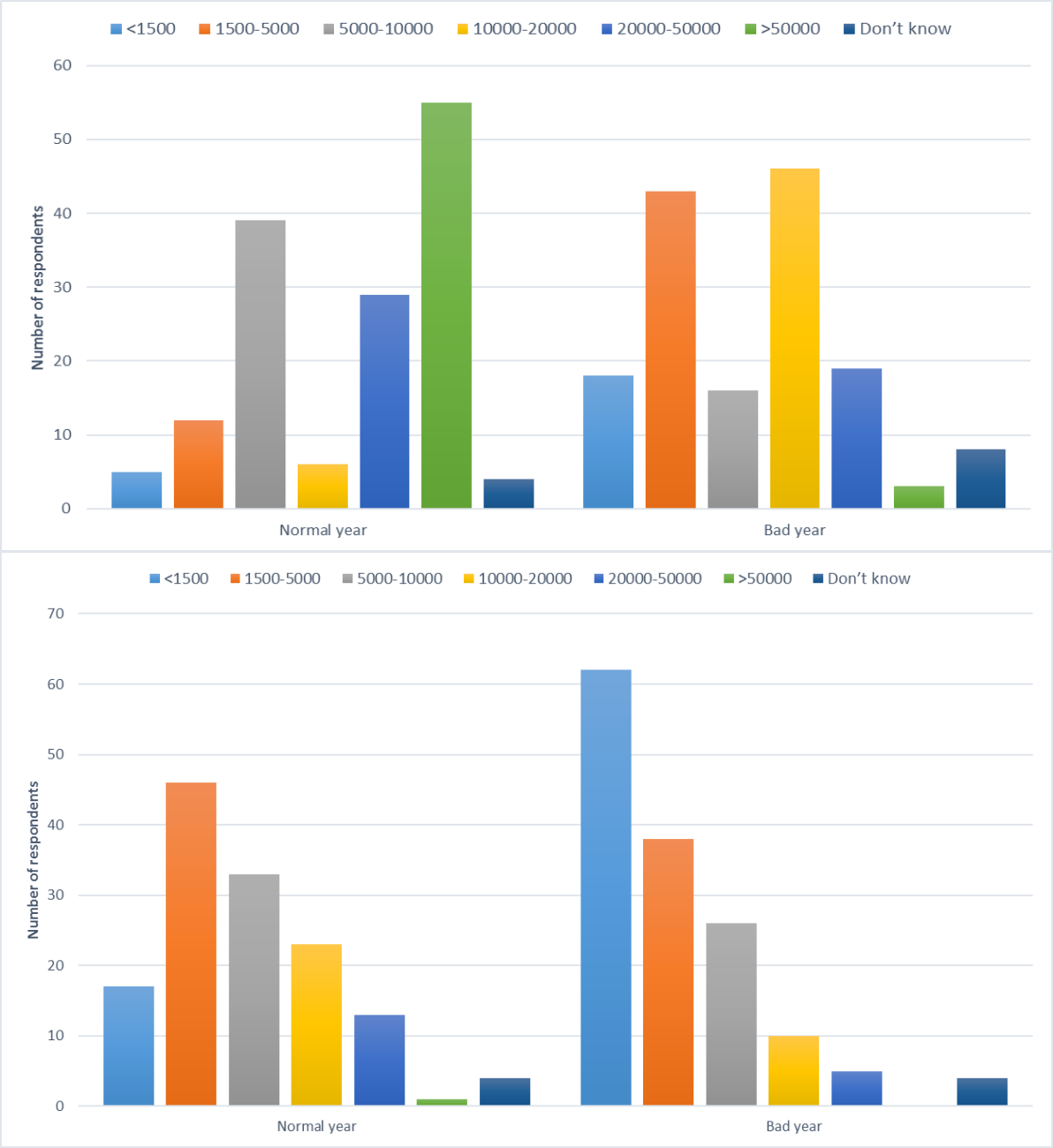


Figure 27: Number of households in the various income brackets across the Chyulu Hills REDD+ Project Zone (Top: Western side, Bottom: Eastern Side).

In both the rainy and dry seasons, on the western side of the Chyulu Hills about 90% of all household income was derived from a combination of crop (35%) and livestock (57%) production; agricultural and non-agricultural wages and non-farm enterprises made up most of the rest (Figure 28).

Expectedly, on the eastern side in the wet season, most household income was derived from a combination of crop (25%) and livestock (17%) production and agricultural wages (19%). In the dry season, livestock production (33%), non-agricultural wage (35%) and non-farm enterprises (21%) gained greater prominence as sources of income (Figure 28).

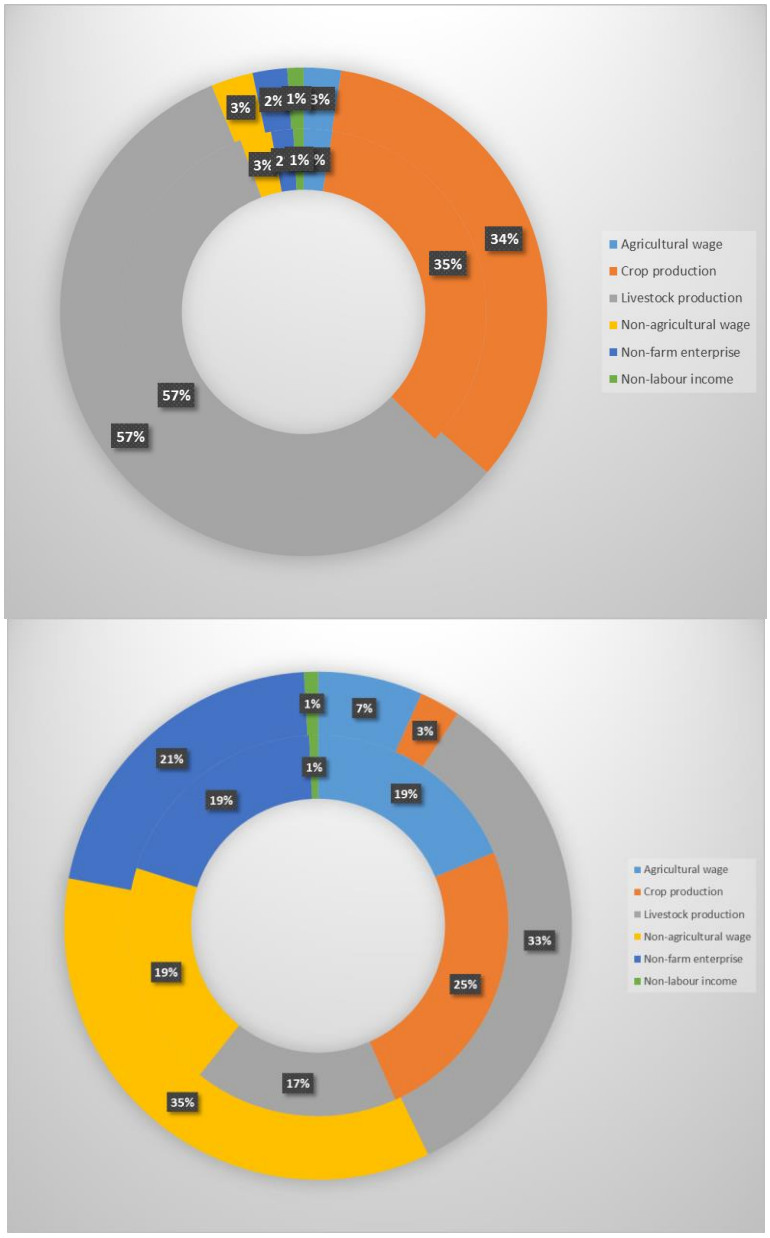


Figure 28: Proportion of all household income in the Chyulu Hills REDD+ Project Zone obtained from seven designated sources during the wet (outer ring) and dry (inner ring) seasons (Top: Western side, Bottom: Eastern Side).

On the western side of the Chyulu Hills the respondents estimated spending on average about KES 8,200 and 12,500 per month on food during the wet and dry seasons, respectively (n = 152), KES 1,260 and 1,370 per month on water during the wet season and dry seasons, respectively (n = 117), KES 54,000 per year on education matters (n = 151) and KES 7,600 per year on health matters (n = 137) (Figure 29).

Whereas on the eastern side the respondents estimated spending on average about KES 3,080 and 6,330 per month on food during the wet and dry seasons, respectively (n = 148), KES 575 and 1,115 per

month on water during the wet season and dry seasons, respectively (n = 148), KES 32,400 per year on education matters (n = 147) and KES 9,100 per year on health matters (n = 146) (Figure 29).

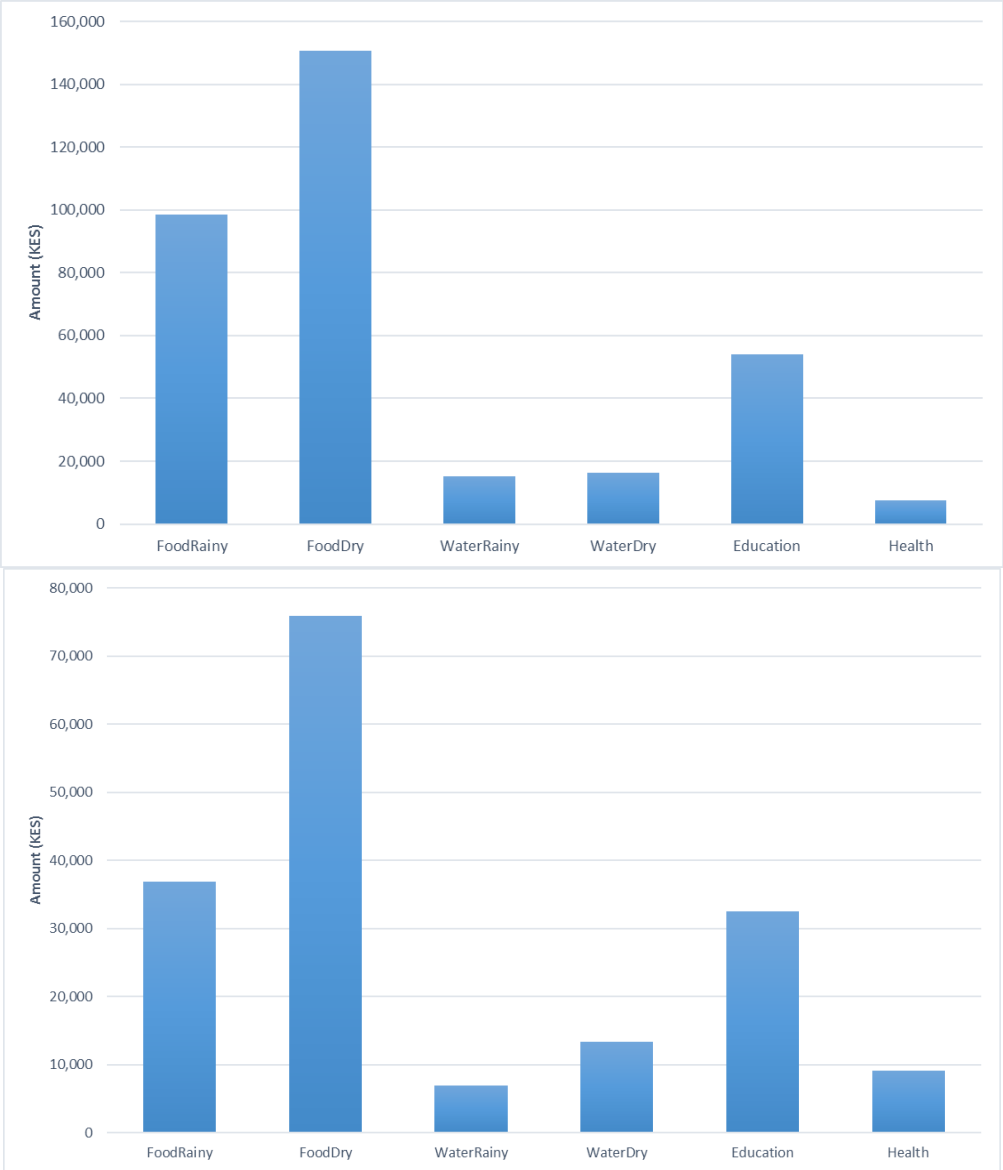


Figure 29: Estimate of the amount of money an average household in the Chyulu Hills REDD+ Project Zone spends annually on these four key livelihood needs (Top: Western side, Bottom: Eastern Side).

5.3.1.1.11 General knowledge about Environment and REDD+

When asked whether they supported wildlife and environmental conservation, 88% of the respondents on the western side of the Chyulu Hills stated that they did, citing clean environment (trees and water), employment and education bursaries as key benefits associated with conservation. Respondents that stated not supporting wildlife and environmental conservation predominantly mentioned human-wildlife conflicts as the culprit. When asked whether they had been in touch with CHRP over the past 12 months,

40% of the 160 respondents said they had. When asked whether the CHRP had affected their households in any way, the majority (66%) said it had had no direct effect to their households yet.

This is in comparison to the eastern side, where 99% of the respondents said they did support wildlife and environmental conservation, citing clean environment (trees and water) and the fact that they did not have conflicts with wildlife. Those that did not support wildlife and environmental conservation predominantly mentioned human-wildlife conflicts as the culprit. When asked whether they had been in touch with CHRP over the past 12 months, 15% of the 150 respondents said they had. When asked whether the Project had affected their households in any way, the majority (95%) said it had had no direct effect to their households.

5.3.1.2 Biodiversity Impact Assessment

As discussed in section 5.1.6, during this monitoring period a Biodiversity Monitoring Plan was developed that for the first time will unify the collection of biodiversity metrics across the Chyulu Hills landscape. The biodiversity data is to be collected by the individual Project Partners, with the CHRP working to ensure data collection quality and compatibility. As this is the first monitoring period of the Project there continued to be some inconsistencies in the collection of data, and the collection of data on some metrics has not yet been implemented. Table 24 shows the biodiversity indicators that were collected during this monitoring period. Please refer to section 5.1.6 or Annex 6 'Chyulu Hills Community and Biodiversity Monitoring Plan' for more detail on the Biodiversity Monitoring Plan.

Table 24: The biodiversity impact assessment indicators for the Chyulu Hills REDD+ Project.

Indicator	2014-2016	Grand Total
Number of Log Heaps / firewood piles	15*	15
Wood-harvesting / logging incidents	128*	128
Poles / wood posts	12*	12
Kilns recorded	45*	45
Arrests of loggers and charcoal burners	169*	169
Charcoal bags	69*	69
Number of illegal livestock confiscated / driven out of the National Park	131,163	131,163
Illegal grazing incidents	28	28
Arrests of illegal grazers	250	250
Number of rangers employed	219	219
Number of active outposts /	26	26

observation posts		
Number of ranger patrols	1,907*	1,907
Distance covered of ranger patrols (km)	72,989*	72,989
Number of snares recovered	868*	868
Number of bushmeat poachers arrested	127	127
Number of animals injured or killed for bushmeat	136*	136
Commercial poachers arrested	3	3
Human-Wildlife conflict incidents (human injury/fatality)	8	8
Human-Wildlife conflict incidents (crops, livestock, property)	2,768	2,768
Amount of compensation paid out for wildlife related losses	15,884,835	15,884,835

*Data is incomplete or not collected consistently across all Project Partners.

6 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS (CLIMATE).

6.1 Baseline Emissions (G2.3.)

The Baseline Emission Model (BEM) and the Soil Emissions Model (SEM) were used to calculate the emissions that would occur under the baseline scenario in the absence of the Project. The BEM predicts the cumulative emissions from biomass as a result of ecosystem conversion and forest degradation. A separate BEM for the Forest Project Accounting Area and Grassland Project Accounting Area was evaluated. The BEM is parameterized using observations of historic imagery from the reference area. The SEM is based on a logistic model of ecosystem conversion and assumes that soil organic carbon (SOC) begins to decay in the Project Accounting Area at the point in time the patch of land is cleared to a converted state. This approach dramatically simplifies baseline accounting. Complete documentation is provided in sections 6.5-6.19 and 8.1 of the methodology VM0009, v3.0. Baseline emissions accounting for the Project is provided for monitoring event documentation, in the monitoring plan and monitoring report(s) associated with project verification.

Table 25: Baseline carbon emissions and reductions from the Chyulu Hills REDD+ Project.

Component	First monitoring period (m_1)	Total to date
Gross NERs (t CO_2e)	2,281,980	2,281,980
10% buffer tonnes to VCS (t CO_2e)	-228,198	-228,198
Net NERs (t CO_2e)	2,033,002	2,033,002

MRR.10 Calculations of current baseline emissions $E_{B\,\Delta}^{[m]}$ as of the current monitoring period.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

MRR.11 Calculations of baseline emissions $E_{B\,\Delta}^{[m-1]}$ from prior monitoring periods.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

MRR.12 Calculations of cumulative baseline emissions for each selected pool ($E_{BM}^{[m]}$ and $EB_{SOC}^{[m]}$) and undecayed carbon ($CB_{BGB}^{[m]}$, $CB_{DW}^{[m]}$, $CB_{SOC}^{[m]}$ and $CB_{WP}^{[m]}$), as of the current monitoring period.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

6.1.1 Calculating Baseline Emissions from Biomass

Cumulative baseline emissions from biomass $E_{B\,BM}^{[m]}$ are estimated for both the Forest PAA and Grassland PAA using equation [F.22] of the VCS methodology VM0009 v3:

$$E_{B\,BM}^{[m]} = BEM_{U1}\left(c_{P\,BM}^{[m=0]}, c_{B\,BM}^{[m]}, t^{[m]}, x^{[m]}\right)$$

This estimate employs a Biomass Emissions Model (BEM) for baseline type F-U1 and G-U1 using equation [F.5] of the VCS Methodology VM0009 v3:

$$BEM_{U1}(c_P, c_B, t, x) = \frac{A_{PAA}(c_P - c_B)}{1 + e^{-\beta(t+0.5q-t_{PAI})-\boldsymbol{\theta}(\boldsymbol{x}-\boldsymbol{x_{PAI}})^T-\alpha}}$$

MRR.13 Calculations of cumulative baseline emissions from biomass EB $E_{B\,BM}^{[m]}$ for the current monitoring period.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

MRR.14 Calculations of cumulative baseline emissions from biomass EB $E_{B\,BM}^{[m]}$ for all prior monitoring periods.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

6.1.2 Calculating Baseline Emissions from SOC for Baseline Types F-U1 and G-U1

Cumulative baseline emissions from SOC $E_{B\,SOC}^{[m]}$ for baseline types F-U1 and G-U1 are estimated using equation [F.28] of the VCS Methodology VM0009 v3:

$$E_{B\ SOC}^{[m]} = SEM_{U1}\left(c_{P\ SOC}^{[m=0]} c_{B\ SOC}^{[m]}, t^{[m]}, x^{[m]}\right)$$

The estimate employs the Soil Emissions Model (SEM) for baseline type F-U1 and G-U1 using equation [F.8] of the VCS Methodology VM0009 v3:

$$SEM_{U1}(c_P, c_B, t, x) = \frac{A_{PAA}(c_P - c_B)}{1 + e^{-\beta(t-t_{PAI})-\boldsymbol{\theta}(\boldsymbol{x}-\boldsymbol{x}_{PAI})^T-\alpha}}\left[1 + \frac{1}{1 + e^{-\alpha-\boldsymbol{\theta}(\boldsymbol{x}_0-\boldsymbol{x}_{PAI})^T-\beta t_{PAI}}}\right] - \frac{A_{PAA}(c_P - c_B)}{1 + e^{-\alpha-\boldsymbol{\theta}(\boldsymbol{x}_0-\boldsymbol{x}_{PAI})^T-\beta t_{PAI}}}$$

Please refer to Annex X – NER Worksheet.

6.1.3 Calculating Carbon Not Decayed in DW

The CHRP does not include planned forest harvesting in the baseline scenario. Therefore, the deadwood carbon pool has been conservatively excluded from project carbon accounting.

6.1.4 Calculating Carbon Not Decayed in BGB

Carbon that has not yet decayed in the below ground biomass (BGB) carbon pool is estimated using equation [F.10] of the VCS Methodology VM0009 v3:

$$DEM_{DW,BGB}\left(E_{B\ \Delta}^{[m]}, t, t^{[m-1]}\right) = \frac{E_{B\ \Delta}^{[m]}}{1 + e^{t-t^{[m-1]}-3650}}\left[1 - \frac{t - t^{[m-1]}}{3650}\right]$$

The Decay Emissions Model (DEM) for carbon in the BGB and deadwood carbon pools is based on the default VCS decay models for those pools.

MRR.26 An estimate of carbon stored in non-decayed BGB $C_{B\ BGB}^{[m]}$ for the current monitoring period.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

MRR.27 An estimate of cumulative baseline emissions from BGB $E_{B\ BGB}^{[m]}$ for the current monitoring period.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

MRR.28 Calculations of cumulative baseline emissions from BGB $E_{B\ BGB}^{[m]}$ for all prior monitoring periods.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

6.1.5 Calculating Carbon Not Decayed in SOC

Carbon that has not yet decayed in the SOC carbon pool is estimated using equation [F.33] of the VCS Methodology VM0009 v3:

$$C_{B\ SOC}^{[m]} = \sum_{i \in \mathcal{M}} DEM_{SOC}\left(E_{B\ \Delta\ SOC}^{[i]}, t^{[m]}, t^{[i-1]}\right)$$

This estimate employs the Decay Emissions Model (DEM) for carbon in the SOC for baseline type F-U1 and G-U1 using equation [F.9] of the VCS Methodology VM0009 v3:

$$\boldsymbol{DEM_{SOC}\left(E_{B\ \Delta}^{[m]}, t, t^{[m-1]}\right) = E_{B\ \Delta}^{[m]} - \frac{365 E_{B\ \Delta}^{[m]}}{\lambda_{SOC}(t - t^{[m-1]})}\left[\frac{\lambda_{SOC}(t - t^{[m-1]})}{365} + e^{-\frac{-\lambda_{SOC}(t-t^{[m-1]})}{365}} - 1\right]}$$

MRR.29 An estimate of carbon stored in non-decayed SOC $C_{B\,SOC}^{[m]}$ for the current monitoring period.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

6.2 Project Emissions

6.2.1 Calculating Emissions from Changes in Project Stocks (G1.4)

Carbon stocks have been estimated using the Verified Carbon Standard (VCS) methodology VM0009 'Methodology for Avoided Ecosystem Conversion' v3.0. This methodology was originally validated with VCS in January 2011, with version 2 validated in 2012. A third major revision was conducted to include the AFOLU (Agriculture, Forestry and Other Land Uses) category Avoided Conversion of Grasslands and Shrublands (ACoGS). Version 3.0 of VM0009 was successfully validated in June 2014 under the VCS double approval process.

Biomass plots must be re-measured at a minimum every five years. 50% of the biomass plots will be re-measured biennially, achieving 100% sample plot coverage within every five years. Soil sample plots must also be re-measured at a minimum every five years. Due to the reduced amount of temporal variation in soil carbon, 100% of these plots will be re-measured every five years. Biomass plot locations are depicted below in Figure 30, and soil sample plots in Figure 31. Changes in project carbon stocks are calculated as the difference in project stocks in each stratum for each PAA between the current and prior monitoring periods, as determined from in-situ measurement of biomass plots:

$$A_{PAA}\left(c_P^{[m-1]} - c_P^{[m]}\right)$$

Carbon stocks that are lost to burning, wood products, and leakage are accounted for using the procedures and equations listed below.

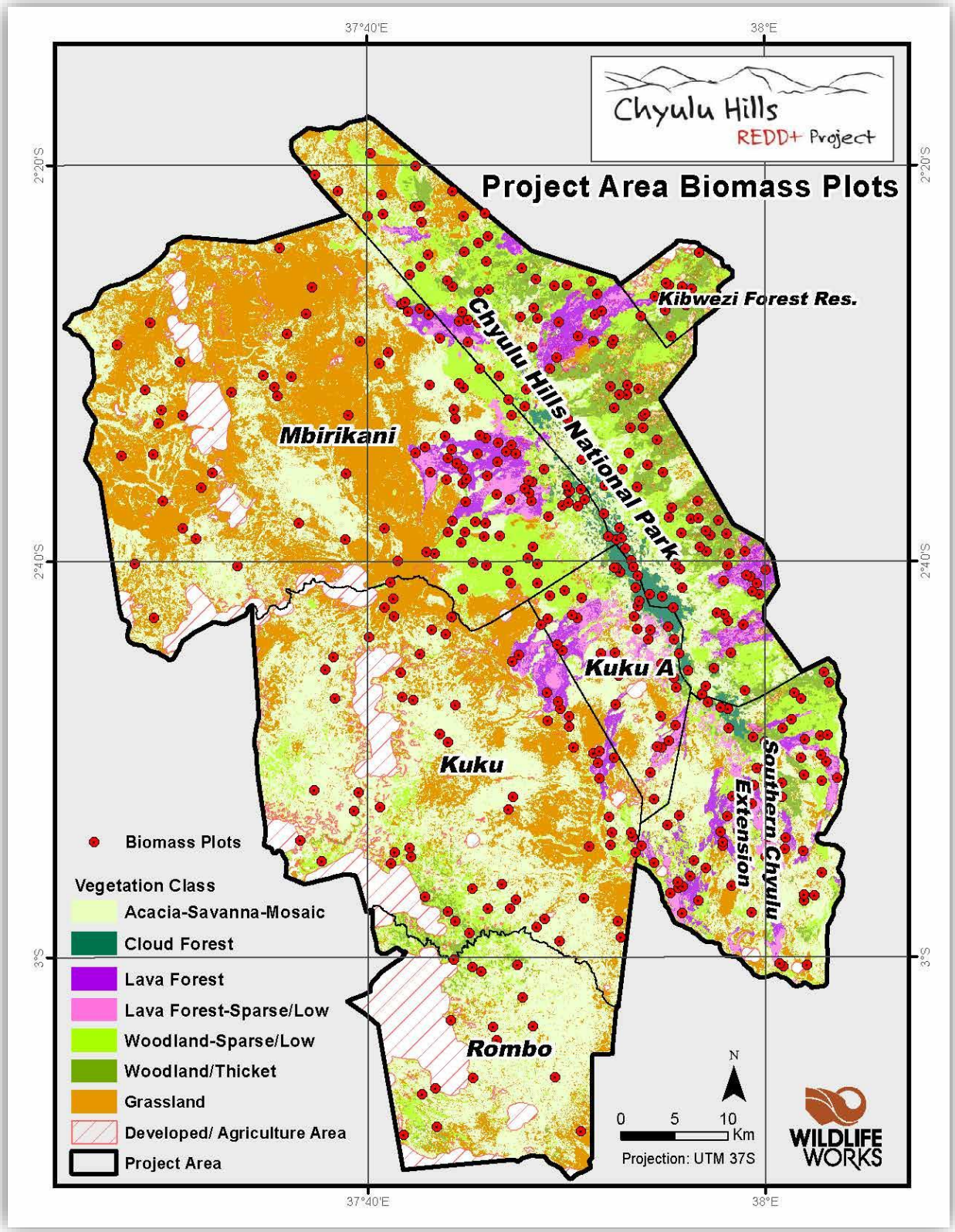


Figure 30: Biomass sample plot locations in the Chyulu Hills REDD+ Project

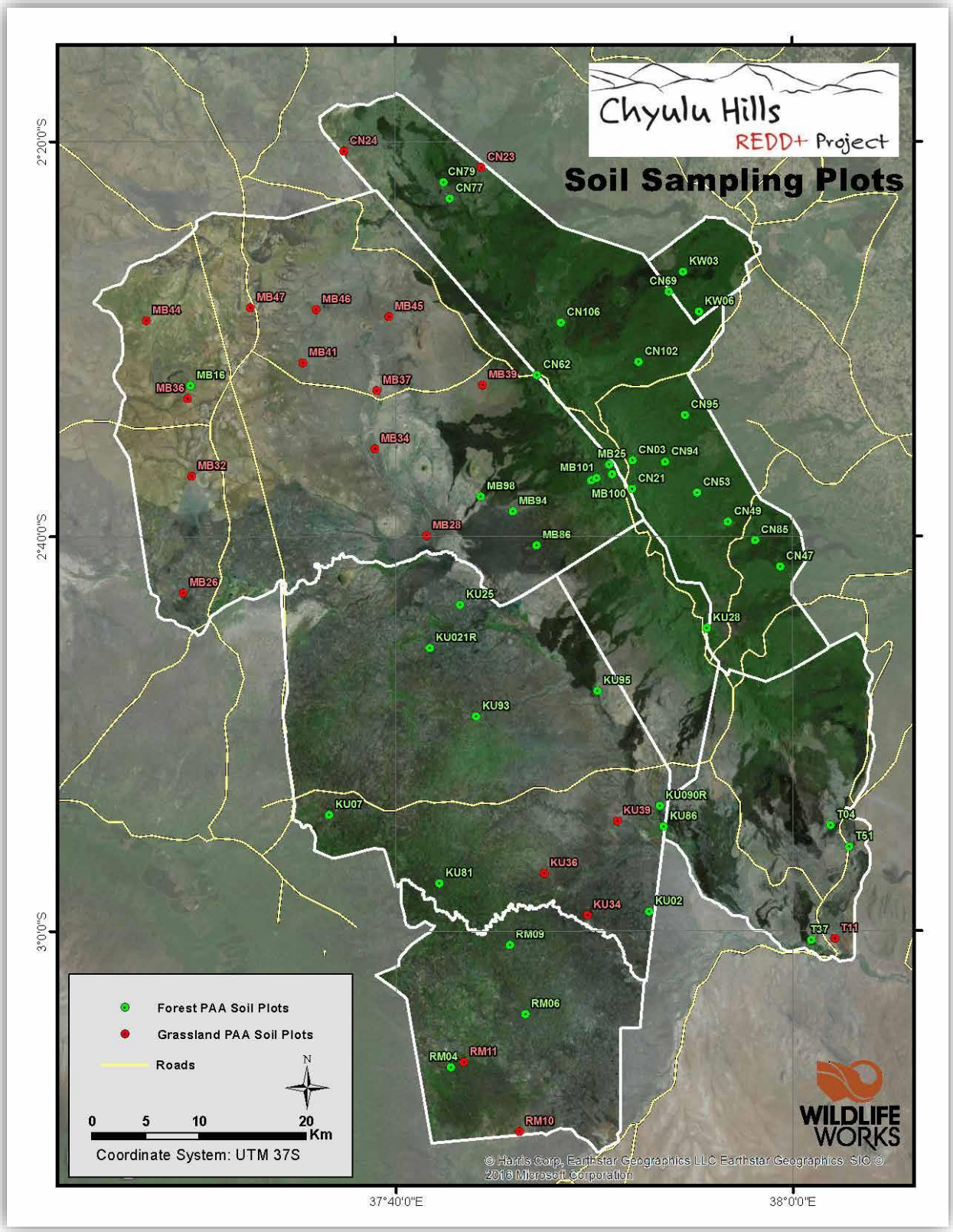


Figure 31: Soil sample plot locations in the Chyulu Hills REDD+ Project

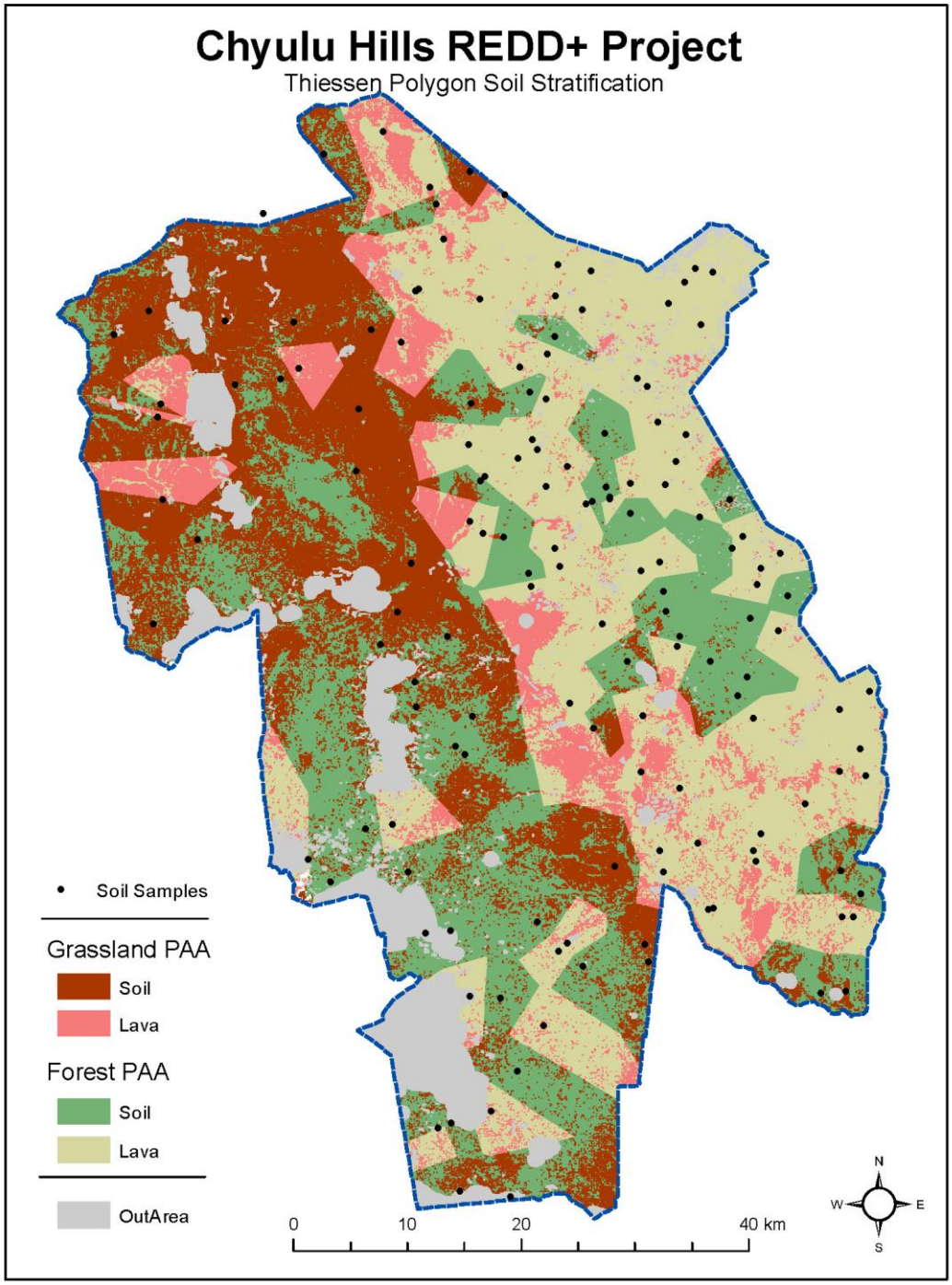


Figure 32: Stratification used for soil carbon accounting. Soil samples shown here were used solely for the delineation of the lava zones.

Table 26 depicts current measured above- and below-ground biomass carbon stocks by land cover stratum and Table 27 the soil carbon stocks by PAA within the Project Area, as further defined in section 1.3.1. Values below have been calculated using the methods of carbon accounting detailed in the VCS Methodology VM0009 and this VCS / CCB validated PD. The area of the soil carbon accounting area for each PAA is different than that of the PAA as a result of significant presence of lava flows across the Chyulu Hills. Figure 32 shows the soil carbon stratification that was developed using the Thiessen Polygon method. For this method approximately 180 points across the Project Area were sampled for the presence of lava. This data was then complied and a GIS program was used to analyze it and create the stratification.

Table 26. A summary of current carbon stocks within the Project Accounting Area

Stratum	Area (ha)	Mean carbon stock (t CO_2e / ha)	Standard error (t CO_2e /ha)	Mean dbh (cm)	Average height (m)
Grassland	109,131	17.97	4.55	10.15	3.7
Acacia-Savannah Mosaic	151,499	20.07	2.43	10.50	3.9
Cloud Forest	4,823	1110.55	270.63	24.42	11.0
Lava Forest	16,718	79.45	9.91	11.32	5.3
Lava Forest Sparse/Low	14,558	57.82	11.95	11.85	5.7
Woodland / Thicket	24,874	110.00	17.35	12.05	6.1
Woodland – Sparse/Low	53,075	78.50	8.98	12.30	5.3

Table 27. A summary of current soil carbon stocks within the Project Accounting Area

PAA	Soil accounting area (ha)	Mean carbon stock (t CO2e / ha)	Standard error (t CO_2e /ha)
Forest PAA	125,710	371.01	23.84
Grassland PAA	79,451	232.22	27.64

6.2.2 Calculating Emissions from Burning

Currently, no planned Project Activities involve the burning of biomass burning in any manner. As such, emissions from burning are included in carbon accounting. However, if future Project Activities should include this emission type, project emissions from burning of biomass shall be calculated using equation [F.42] of the VM0009 methodology v3.0.

6.2.3 Calculating Emissions From Disturbances

There were no disturbances within the Project Area that met the criteria of “significant disturbance” as described in the document Disturbance Monitoring – SOP.

6.3 Leakage (CL2)

6.3.1 Leakage Mitigation Strategies (CL2.2.)

MRR.44 A description of project activities that have been implemented since the project start date and the estimated effects of these activities on leakage mitigation

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

6.3.2 Activity-Shifting Leakage (CL2.1.)

6.3.2.1 Change to the Activity-Shifting Leakage Area

There were no changes or revisions to the activity-shifting leakage area as described in the PD.

6.3.2.2 Estimating emissions from the activity-shifting leakage area.

MRR.48 Calculated cumulative emissions from activity-shifting leakage for the current monitoring period $E_{L\,AS}^{[m]}$ and supporting calculations.

Not applicable. The Project is in the first monitoring period.

MRR.49 Calculated cumulative emissions from activity-shifting leakage for the prior monitoring periods $E_{L\,AS}^{[m]}$.

Not applicable. The Project is in the first monitoring period.

6.3.3 The Leakage Emissions Model

Activity shifting leakage is estimated by empirical, in-situ observation of sample points in the activity shifting leakage areas for evidence of conversion and forest degradation. These observations are used to estimate the cumulative emissions from activity shifting leakage for each monitoring period according to equations [F.46] and [F.47] (from the methodology VM0009) using the leakage emissions model. The leakage emissions model is parameterized using equations [F.48] and [F.49] in the VCS methodology VM0009 v3.

6.3.3.1 Sampling Conversion and Forest Degradation to Build the Leakage Model

Conversion and forest degradation is sampled in the activity shifting leakage area by empirical, in-situ observation of sample plots. The sample design utilized is a simple random sample of 35 forest leakage area plots and 35 grassland leakage area plots within the Forest and Grassland activity shifting leakage areas. Please see Figure 21 and 22 in section 5.5.1.3 of the CHRP PD for a delineation of the leakage areas and the locations of the plots. The procedures used for locating and sampling the activity shifting leakage Areas are found in the document 'Standard Operating Procedure Activity-Shifting Leakage Area'. Plot teams visited each leakage plot a priori to confirm that each plot begins in a non-converted state and that its location is appropriate with respect to the agents and drivers in the Project baseline scenario.

6.3.3.1 Fitting the Leakage Model

The Leakage Emissions Model is dictated by the VCS methodology VM0009 v3 equation [F.48] for the Forest PAA and equation [F.49] for the Grassland PAA. These models estimate cumulative carbon

emissions from activity shifting leakage based on the conversion parameters α, and β and field measurements in the leakage areas.

Where equation [F.48] is:

$$LEM_F(c_P, c_B, p_{L\,DEG}, t, x) = p_{L\,DEG}^{[m]} A_{AS}(c_P - c_B) - \frac{A_{AS}(c_P - c_B)}{1 + e^{\ln\left(\frac{1}{p_{L\,DEG}^{[m=0]}} - 1\right) - \beta t - \boldsymbol{\theta}(\boldsymbol{x}_0 - \boldsymbol{x})^T}}$$

And, equation [F.49] is:

$$LEM_G(c_P, c_B, p_{L\,DEG}, t, x) = p_{L\,CON\,G}^{[m]} A_{AS}(c_P - c_B) - \frac{A_{AS}(c_P - c_B)}{1 + e^{\ln\left(\frac{1}{p_{L\,CON\,G}^{[m=0]}} - 1\right) - \beta t - \boldsymbol{\theta}(\boldsymbol{x}_0 - \boldsymbol{x})^T}}$$

The parameter $p_{L\,DEG}^{[m]}$ is estimated at least once every five years from measurements taken in-situ within the Forest PAA Leakage area. The parameter $p_{L\,CON\,G}^{[m]}$ is estimated at least once every five years from measurements taken in the Grassland PAA Leakage area. The Standard Operating Procedure (SOP) used for estimating these parameters is given in Annex 12- SOP – 'Chyulu Hills - Forest Leakage 04-15-2014.pdf' and Annex 13 'SOP - Chyulu Hills - Grassland Leakage 04-15-2014.pdf'.

MRR.56 The estimated value $p_{L\,DEG}^{[m]}$ for the current monitoring period and supporting calculations.

Please refer to Annex 21 – Forest PAA Leakage model and Annex 22 Grassland PAA Leakage Model.

MRR.57 The calculated value $p_{L\,DEG}^{[m=0]}$ calculated for the first monitoring period.

Please refer to Annex 21 – Forest PAA Leakage model and Annex 22 Grassland PAA Leakage Model.

MRR.58 The estimated value $p_{L\,CON\,G}^{[m]}$ for the current monitoring period and supporting calculations.

Please refer to Annex 21 – Forest PAA Leakage model and Annex 22 Grassland PAA Leakage Model.

MRR.59 The calculated value $p_{L\,CON\,G}^{[m=0]}$ calculated for the first monitoring period.

Please refer to Annex 21 – Forest PAA Leakage model and Annex 22 Grassland PAA Leakage Model.

6.3.4 Market Leakage (CL3.1.)

Market leakage can occur if a project reduces the supply of market goods, such as timber, relative to the baseline. Market leakage is assessed independently for the Forest Project Accounting Area and for the Grassland Project Accounting Area. As described in Section 4.5.1, the most likely baseline scenario is conversion of forest and native grassland to agriculture. This agriculture is primarily subsistence, with little production remaining beyond household consumption. Food security is a serious issue, as discussed in Section 4.5.2, in the Project Zone. Without the Project there would be increasing demand for land and continued low productivity of agricultural production, crop failures from droughts, and few alternatives for income generating activities available to local communities. Given that the agents and drivers practice subsistence farming, and a key Project Activity is to work with local farmers to increase yields on land that is currently farmed, no net reduction in agricultural production due to the Project is anticipated.

6.4 Net GHG Emission Reductions and Removals (CL1 & CL2)

6.4.1 Determining Reversals

MRR.72 A description of the reversal including which pools contributed to the reversal and reasons for its occurrence.

There have been no reversals in the CHRP.

6.4.2 Determining Reversals as a Result of Baseline Re-evaluation

MRR.73 A description of the reversal including a summary of new data obtained in the reference area.

There have been no reversals in the CHRP and the next baseline re-evaluation period will be in 2024.

6.4.3 Quantifying Net Emission Reductions for a PAA

6.4.3.1 Determining Deductions for Uncertainty

MRR.68 The confidence deduction $E_U^{\{m\}}$ and estimated standard errors used to determine the confidence deduction.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

MRR.69 Reference to calculations used to determine the confidence deduction.

Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 – Grassland PAA NER Worksheet.

6.4.3.2 Determining Buffer Account Allocation

MRR.77 Reference to the VCS requirements used to determine the buffer account allocation.

The buffer account allocation for the first monitoring period of the Project was calculated according to the VCS requirements as stated in the VCS Standard Version 3.4, VCS Registration and Issuance Process Version 3.4, and the VCS Non-Permanence Risk Tool Version 3.2. Please refer to Annex 23 – Non-Permanence Risk Tool for the determination of the buffer allocation amount. Please refer to Annex 17 – Forest PAA NER Worksheet and Annex 18 Grassland PAA NER Worksheet to see the calculation of the total number of credits to be allocated to the VCS buffer pool.

MRR.78 Reference to calculations used to determine the buffer account allocation.

Please refer to Annex 18 – Forest PAA NER Worksheet and Annex 19 – Grassland PAA NER Worksheet.

6.4.3.3 Net Emission Reductions for a PAA

MRR.74 Quantified NERs for the current monitoring period including references to calculations.

Please refer to Annex 18 – Forest PAA NER Worksheet and Annex 19 – Grassland PAA NER Worksheet.

MRR.75 Quantified NERs for the prior monitoring period.

Please refer to Annex 18 – Forest PAA NER Worksheet and Annex 19 – Grassland PAA NER Worksheet.

MRR. 76 A graph of NERs by monitoring period for all monitoring periods to date.

Please refer to Annex 18 – Forest PAA NER Worksheet and Annex 19 – Grassland PAA NER Worksheet.

6.4.4 Quantifying Net Emission Reductions Across PAAs (CL1.1)

MRR.79 Quantified NERs for the current monitoring period including references to calculations.

Please refer to Annex 18 – Forest PAA NER Worksheet, Annex 19 – Grassland PAA NER Worksheet and Annex – 19 NERs Project Area Summary.

MRR.80 Quantified NERs for the prior monitoring period.

Please refer to Annex 18 – Forest PAA NER Worksheet, Annex 19 – Grassland PAA NER Worksheet and Annex – 19 NERs Project Area Summary.

MRR.81 A graph of NERs by monitoring period for all monitoring periods to date.

Please refer to Annex 18 – Forest PAA NER Worksheet, Annex 19 – Grassland PAA NER Worksheet and Annex 20 – NERs Project Area Summary.

6.4.5 *Ex-Ante* Estimation of NERs (CL1.2 & 1.4)

MRR.82 Quantified NERs by vintage year for the current monitoring period including references to calculations.

Table 28: The GHG reductions, Project Emissions, Leakage Emissions and Net Emission Reductions (NERs) for the monitoring period, specified by vintage.

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2013	198,102	0	0	176,488
2014	695,261	0	0	619,404
2015	695,261	0	0	619,404
2016	693,356	0	0	617,707
Total	2,281,980	0	0	2,033,002

The non-permanence risk rating for the CHRP is 10% (see annex 23). The total number of buffer credits to be deposited in the VCS AFOLU pooled buffer account this monitoring period is 228,198 t CO_2e.

6.4.6 Evaluating Project Performance

MRR.83 Comparison of NERs presented for verification relative to NERs from ex-ante estimates.

The NERs presented in this monitoring report are significantly lower than the ex-ante estimates that were displayed in the CHRP PD. For the ex-ante estimates of project NERs the soil carbon was estimated by using the results of soil carbon sampling from the Kasigau Corridor REDD+ Project. This project is very close to the CHRP, and contains very similar soil types and ecosystems. However, for this verification soil sampling of the Project Area was completed, and the results showed a significantly smaller soil carbon pool than what was estimated.

MRR.84 Description of the cause and effect of deviations from ex-ante estimates.

The cause of this deviation is described above. The effect is that the number of carbon credits produced by this Project will be significantly lower than what had been estimated and planned for. This will not affect the viability of the Project, but will result in reduced revenues.

6.5 Climate Change Adaptation Benefits (GL1)

6.5.1 Demonstrate that current or anticipated climate changes are having or are likely to have an impact on the well-being of communities *and/or* biodiversity in the project zone (GL1.3.)

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

6.5.2 Describe measures needed and taken to assist Communities and/or biodiversity to adapt to the probable impacts of climate change based on the causal model that explains how the project activities will achieve the project's predicted adaptation benefits (GL1.4, V3: GL1.3.).

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

Table 29: Project climate change adaptation Benefits

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

7 COMMUNITY

7.1 Net Positive Community Impacts (CM2)

7.1.1 Estimated Impacts on Communities from Project Activities (CM1-2)

7.1.1.1 Result Chain Diagrams (CM1.1)

Please refer to the section below, 7.1.1.2 for Table 30 displaying the result chains produced by the SBIA Working Groups. Additionally, please refer to CHRP PD section 6.1.1.1 for detailed result chains utilizing the Theory of Change procedure.

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

The SBIA Working Groups were tasked to outline any possible unexpected side effect(s) that might arise because of the Project successfully realizing the desired result. Additionally, they were also required to gauge the likelihood and magnitude of these unintentional side effects then propose possible mitigation (Table 30). (NB: the western workshop ran out of time and could not complete this assignment before closure.

Table 30: Negative impact assessments for key results in the respective Result Chains as developed by the SBIA workshop on the eastern side of the Chyulu Hills

Focal issue	Result	Activities	Potential negative	Stakeholders	Likeli-hood	Magnitude	Mitigation	Explanation
Poaching	Increased Income	Improved skills and better education standards	Uncontrolled population increase	General community and government	Medium	Medium	Minimize	Equality in resource distribution and availability of adequate facilities
	A knowledgeable society	Increased awareness, sensitization and education programs	Low jobs opportunities	The general community	Medium	Medium	Minimize	Create more programs that and engaging training of trainers
	Better farming methods	Practicing contour farming and digging of terraces and Zai pits		Farmers	Low	Low	Do nothing	
Drought and lack of water	More plant cover in landscape	Afforestation, reforestation, programs and agroforestry	Displacement of people settling in targeted land	Squatters and people living in water catchment areas.	High	Medium	Compensate and minimize	Resettle people and provide alternative sources of livelihoods
			Loss of agricultural land	Farmers				Planting tree which add fertility to soil
	More water harvesting techniques	Sinking boreholes, earth dams and provision of water harvesting infrastructures	Wildlife and human through increased human wildlife conflict	Wildlife, farmers and the general community	Medium to Low	Medium	Minimize	Fencing water catchments and earth dams/water pans
			Transmission of disease from wildlife to livestock					
	Better farming methods	Practicing contour farming and digging of terraces and zai		Farmers	Low	Low	Do nothing	

		pits						
Poverty	Reduced poverty	Dig shallow wells, harvesting surface run-off water and digging water pans	Drowning, dams providing conducive environment for mosquitos to breed and land revocation to provide land for reservoirs	General community, Government and NGOs	Low to medium	Low	Minimize and compensate (land)	Fencing off water reservoirs and creating awareness
	Improved living standards	Building and maintaining attraction sites, employment of more tour guides and boosting security	Pollution, cessation of land ownership, erosion of local culture and possible conflict between security agents and the community	Members of community, Government, tourists and security agents	Low	Low	Minimize	Creating awareness, sense of ownership and fencing off tourist attraction sites
Deforestation		Fencing catchment areas, creation or introduction of income generating activities	Loose grazing areas and revenue for those subsisting on charcoaling	Livestock keepers, wood carvers, charcoal makers, firewood collectors	Low	Low	Minimize	Training and creating awareness on zero grazing, allow controlled access to protected areas by farmers to cut and carry fodder for their livestock and encourage farmers to reduce their livestock herds and start alternative businesses
		Provide scholarships and bursaries, conducting seminars/ trainings for life skills	Social and economic inequality, Mistrust if bursaries are not distributed fairly and Conflict among bursary distribution committee	Members of community and as well as students	Low	Low	Minimize	Awareness creation to the youth on the need to acquire vital life skills, Advocacy on the need for education for all

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

Each group was assigned one of the focal issues to work with throughout the remaining part of the workshop. First, they were asked to consider the issue they were handling as a problem, then formulate a focal issue problem statement and its vision statement (envision how things will be when the problem is solved) (Table 31).

Table 31: Focal issues problem and vision statements formulated in the two workshops

Eastern workshop focal issues
Poverty
Problem statement: as a result of semi-arid location where rains are unreliable, and poor understanding of the current climatic changes by the community so as to adjust accordingly leading to low income per capita at household level.
Vision statement: To have a well-informed community that is self-reliant with minimal dependency hence enhancing its livelihoods.
Deforestation
Problem statement: A community which is ignorant and lacks knowledge on the myriad direct and indirect benefits of trees to humans other than the only source of fuel, construction material and income.
Vision statement: To sensitize our community on importance of trees and the available alternative sources of fuel, construction materials and income such as use of gas, for energy and metal, bricks and stones for construction.
Drought
Problem statement: Drought as a result of lack of awareness and sensitization on the impacts of anthropogenic factors on deforestation
Vision statement: Sensitization on the positive impact of afforestation limited human activities as a way of curbing drought.
Poaching
Problem statement: Illegal hunting of wildlife for both subsistence and commercial purposes do to poverty, unemployment and ignorance.
Vision statement: To fight poaching through creating employment opportunities to improve living standards and boost local economic development.

Western workshop focal issues
Agriculture, land sub-division and encroachment
Problem statement: High rate of population growth, poor farming techniques due to few agricultural extension officers has contributed encroachment to wildlife habitats.
Vision statement: To improve agricultural techniques and come up with different sources of income in order to have a self-reliant community.
Poverty
Problem statement: Due to lack of employment, poor levels of education and climate change has contributed to high levels of poverty in our society
Vision statement: To create more job opportunities, promote high levels of education and tackle issues of climate change so at to reduce levels of poverty in our society.
Charcoaling and environmental destruction
Problem statement: High population increase and lack of information on the environmental resources and lack of alternative sources of income in our community leads to charcoal burning and poaching as the only source of income.
Vision statement: A Naramati* with better sources of income, controlled population increase and an informed society with diverse sources of livelihoods will reduce charcoal burning and poaching hence minimal or no environmental destruction.
Education, awareness and women empowerment.
Problem statement: Lack of educated as contributed by poor infrastructure, cultural perception (socially and economically) and gender inequality.
Vision statement: To improve infrastructure and to sensitize the community on proper cultural practices that will improve their livelihoods and promote gender equity

*Naramati is a Maa word meaning something that needs care and nurture, used in this case in reference to the ranch or the Project Area in general.

7.1.3 Describe measures needed and taken to mitigate any negative well-being impacts on Community Groups and for maintenance or enhancement of the high conservation value attributes (CCB V3: CM2.2.)

In Section 7.1.1.2 the potential risks and negative impacts identified by the SBIA Work Groups are listed. In Table 31 the potential mitigations for each potential risk and negative impact is listed.

7.1.4 Demonstrate that the net well-being impacts of the project are positive for all identified Community Groups compared with their anticipated well-being conditions under the without- project land use scenario (CCB V3: CM2.3.)

As outlined in the CHRP PD section 6.2.1, the CHRP does not expect any net negative impacts on other Stakeholder Groups. The comprehensive Community Monitoring Plan will monitor for any impacts on

community groups. Once the plan has been implemented and data gathered, more concrete conclusions can be drawn.

7.1.5 Demonstrate that no High Conservation Values are negatively affected by the project (CM1.2).

The Project will not negatively affect HCVs. Please refer to the CHRP PD, section 6.1.2 for a detailed description of the expected impacts.

7.2 Negative Offsite Stakeholder impacts (CM3)

7.2.1 Describe Measures needed and taken to Mitigate Negative Impacts on Other Stakeholders (CM2.2)

Human-wildlife conflict occurs quite regularly in the Project Area and subsequently affects offsite stakeholders as wildlife disperses. Mitigating any net negative impacts is achieved though conservation landscaping, where dams or water points may be scooped out at strategic places as to divert wildlife from populated areas. Furthermore, there are comprehensive compensation schemes in place that reimburse any losses caused by wildlife in monetary terms. Finally, by encouraging offsite stakeholders to closely collaborate with the Project Office and its partners, particularly ranger teams, any negative result from wildlife intrusion may be stopped before leading to conflict.

7.2.2 Demonstrate no Net Negative Impacts on Other Stakeholder Groups (CM3.3)

As outlined in the Chyulu Hills REDD+ Project Description Document section 6.2.1, the CHRP does not expect any net negative impacts on other Stakeholder Groups. The monitoring plan described in section 5.1.3 will monitor for any negative impacts on community groups.

7.3 Exceptional Community Benefits (GL2)

7.3.1 Project Zone is in a Low Human Development Country (GL2.1).

The Project Zone is located across three counties in Southeastern Kenya, which is characterized by a high poverty level. Kenya itself is a low human development country (LHDV), which ranks at the 145th position worldwide (UNDP Human Development Report, 2015). Despite Kenya's promising economic potential, nearly half of the population (43.4%) lives below the poverty line (UN data, retrieved 27 September 2016). Moreover, more than three quarters of the population lives in rural areas, and rural households rely on agriculture for most of their income. The rural economy, in turn, depends mainly on smallholder farming, which produces the majority of Kenya's agricultural output (IFAD, retrieved 14 February 2014). As outlined in the CHRP PD section 1.3.3, poverty levels are higher in the Project Zone than Kenya's national average, with 67% in Loitokitok and 64.2% in Kibwezi County respectively. Kenya also has one of the world's highest rates of population growth. The population has tripled in the past 35 years, increasing pressure on the country's resources, leading to environmental degradation and leaving young people particularly vulnerable to poverty.

7.3.2 Demonstrate that at least 50% of the households within the lowest category of well-being of community are likely to benefit from the projects (GL2.2).

The CHRP has designed the Project Activities to provide alternative income generating opportunities and economic benefits to marginalized and lower socio-economic households. The locations of where the Project Activities will be implemented are determined by need as identified by the communities. The

school bursary program will provide funds to students that are identified as otherwise not being able to afford school fees or having access to other bursary or scholarship options. Additionally, the Project Activities focused on the provision of healthcare and public health education are also focused on households with no other access to healthcare due to their socio-economic positions. Other activities, such as water projects and agricultural intensification projects will be prioritized in communities that have the greatest need for such developments. The alternative income generating activities, such as craft and jewelry groups, will target marginalized groups, especially women, who have few other income generating activities available. Lastly, the Project will provide benefits for those with the least access to education and resources through capacity building that will happen throughout the Project Zone and be open to community members. For example, this may include workshops on land tenure, land rights, natural resource governance and community building activities.

7.3.3 Barriers or risks preventing benefits to go to poorer households (GL2.3).

Potential barriers or risks that prevent benefits from reaching the poorer households include elite capture, fewer chances of formal employment and no representation in decision-making processes. The CHRP is taking measures to ensure these barriers and risks are mitigated and benefits reach poorer households. The benefit-sharing mechanism has been designed in a transparent and inclusive way and all finances are dispersed through the project partners. This prevents potential corruption in the communities. Furthermore, the Project operates under a strict non-discrimination policy and offers the same chances for employment to all applicants. Finally, the advisory committees include representatives of all social groups, who represent the needs of their respective social class. The CHRP will ensure that poorer households have a voice in decision-making regarding the allocation of benefit sharing.

7.3.4 Measures to identify poorer and more vulnerable households and individuals whose well-being may be negatively affected by the project, and that the project design includes measures to avoid any such impacts (GL2.4).

Women

As highlighted previously, women are a marginalized group across the entire Project Zone, regardless of their ethnicity. They are considered vulnerable, as they do not have equal access to social and economic assets (IFAD, seen 14 February 2014, http://www.ruralpovertyportal.org/country/home/tags/kenya). Kipuri and Ridgewell (2008) outline the considerable inequality amongst pastoralist women in East Africa. They identify a lack of political participation leading to further marginalization, which is very much apparent in the Maasai communities in the Project Zone. As outlined in section CHRP PD, section 6.1.1., women, with the exception of widows, are not able to become a legal shareholder of the Group Ranches. There is also a discrepancy in school attendance between boys and girls though this is rapidly declining. Furthermore, the Kajiado District Development Plan (2008-2012) states that farmland is usually registered under the husband's name. On a more cultural note, Maasai women are still brought up to respect and submit to male leadership and still undergo female genital mutilation (Kipuri and Ridgewell, 2008).

Poor households

There is also a discrepancy of wealth across the households in the Project Zone. As outlined by Thornton *et al* (2006), poorer pastoralist households are more susceptible to adverse impacts of land use change and food insecurity. With fewer resources and less ability to diversify their income, poor households must spend more money in absolute terms in order to satisfy their calorie requirements (ibid.). Political marginalization also exists. As Ntiati (2002) points out, it is the richer members of the community who are able, for example, to support the process of sub-division of Group Ranches and in return obtain first

choice on the land. With most favorable land being located close to waterways often leaves the poorer households with less desirable land.

Many of the Project Activities of the CHRP are focused at these two groups. This includes new income generating activities, such as micro finance and craft groups, healthcare and school fee bursaries, to name a few. Additionally, the Project will increase community organization to ensure that these groups have a strong voice and an established communication channel to the project management.

Demonstration of net-positive benefits to these groups, an analysis of barriers or risks that may prevent benefits reaching these groups as well as identifying marginalized/vulnerable groups whose well-being may be negatively affected will be carried out during the Project lifetime.

7.3.5 Community Impact Monitoring will be able to identify positive and negative impacts on poorer and more vulnerable groups (GL2.5).

The CHRP places great emphasis on the empowerment of women. Women have been involved in project design through their representation in various advisory committees, as outlined in the CHRP PD, section 2.7.1. It is also anticipated to encourage girls' enrollment in schools through the allocation of an equal number of school bursaries to boys as to girls. Finally, the CHRP has developed Project Activities to engage with women groups and help promote financial independence as well as decision-making amongst these women. Please refer to section 5.1.3 for details on how the indicators identified in the project social monitoring will capture positive and negative impacts on these groups.

8 BIODIVERSITY

8.1 Net Positive Biodiversity Impacts (B1)

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

8.1.1.1 Result Chain Diagrams

Based on the extensive experience of the Project Partners (both Government and NGOs) on the biodiversity of this landscape and conservation issues, and from information obtained from the FPIC workshops and literature, we applied the theory of change approach to justify our project rationale and produce indicators for the Biodiversity Monitoring Plan. The theory of change is a hypothesis about how a project intends to achieve its intended objectives, or a roadmap of how it plans to get from Project Activities to project impacts (Richards & Panfil, 2011). We developed a theory of change for each of the two key issues (hereafter referred to as Focal Issues) that we intend to address in the biodiversity component of this project so as to achieve the ultimate goal of reducing deforestation, forest degradation and avoid conversion of grasslands. The Focal Issues are: Ecosystem degradation and Biodiversity declines. The assumptions we make about the cause-and-effect relationships are made explicit in the Result Chain diagrams below, from which the theories of change statements that follow are based. Indicators were developed for key results and assumptions; including assumptions will enable us monitor them in our causal chain analysis, which will help us identify points of deviation early enough. In sum, the indicators outlined in the Biodiversity Monitoring Plan will enable measuring progress towards achieving the desired Project outcomes and impacts from Project Activities and strategies.

Chyulu Hills REDD+ Project's Biodiversity Focal Issues: Result Chain Diagram

Ecosystem enhancement

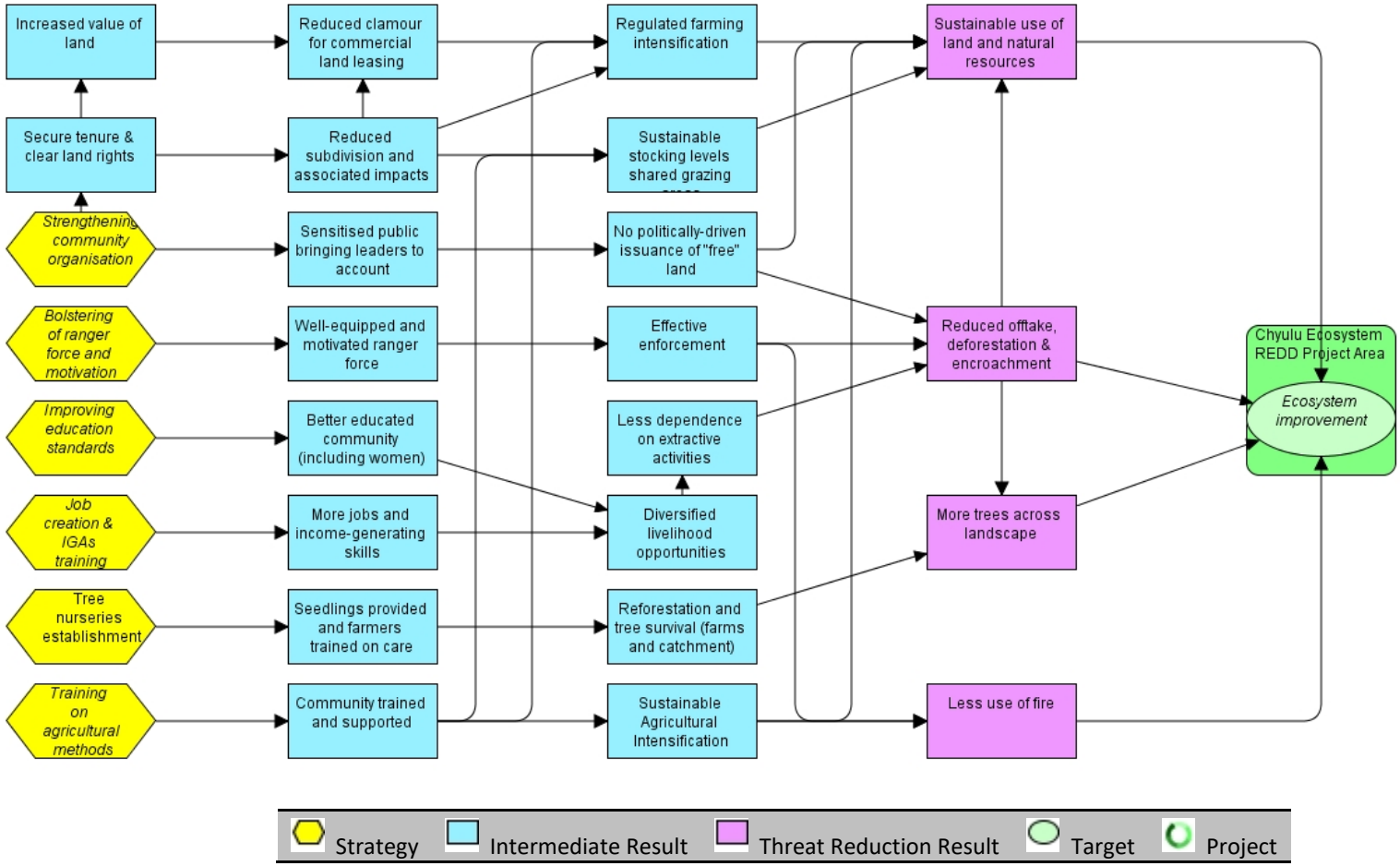


Figure 33: Ecosystem enhancement

Theory of Change Statement:

Ecosystem enhancement: IF there is sustainable agricultural intensification, IF there is sustained reforestation across the landscape, IF there is less dependence on extractive activities, and IF there is more effective enforcement, THEN there will be ecosystem improvement.

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

Section 4.4.3 outlines the 'Without Project' scenario. In summary, the direct threats to ecosystem degradation are i) unsustainable land use and low productivity, ii) encroachment, iii) unsustainable off-take and iv) fire. In the absence of the project, these are expected to worsen and thereby lead to a further degraded ecosystem.

The Result Chain Diagram depicts how the CHRP aims to enhance the ecosystem over the Project's Lifetime. Project Activities (strategies) are designed to achieve intermediate results, which will lead to a threat reduction result that lead to an improved outcome. Strategies include both directly conservation related activities (e.g. bolstering ranger force and motivation), whilst also approaching the problem from a socio-economic angle. It is anticipated, for example, that by strengthening community organization, land tenure and land rights will be clarified, which would reduce the demand for subdivision, which in return would allow regulated farming and organized grazing agreements leading to more sustainable use of land an natural resources. Thus, the 'With Project' scenario builds a clear case for being able to enhance the ecosystem for the benefit all communities as well as wildlife.

Similar result chains from each other Project Activities regarding ecosystem enhancement are displayed in the above diagram, all of which support a net-positive impact of the 'With Project' scenario. Monitoring will confirm the ability of the Project to achieve these positive impacts and provide information for adjusting activities and approaches over time to ensure these results are achieved.

Biodiversity improvement

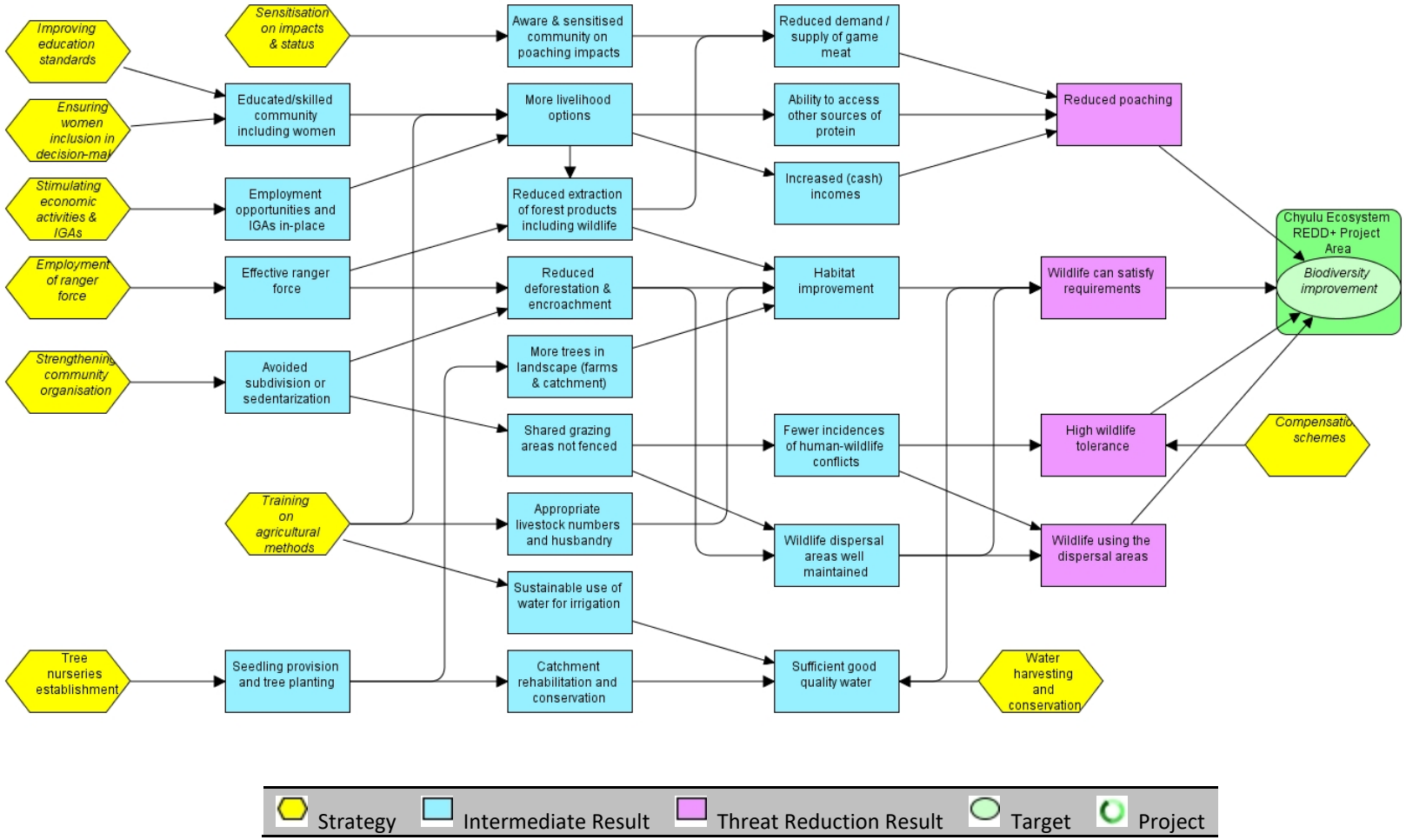


Figure 34: Biodiversity improvement

Theory of Change Statement:

Biodiversity improvement: IF livelihood diversification is achieved, IF wildlife habitat and dispersal areas are maintained, IF human-wildlife conflicts are reduced, and IF there is more effective enforcement, THEN biodiversity will flourish.

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

Section 4.5.3 outlines the 'Without Project' scenario. In summary, the direct threats to biodiversity include i) poaching, ii) persecution, iii) loss of access to critical resources and iv) diminished dispersal and migration. In the absence of the project, these conditions are expected to worsen and thereby lead to biodiversity decline.

The Result Chain Diagram depicts how the CHRP aims to improve and safeguard biodiversity over the project's lifetime. Project Activities (strategies) are designed to achieve intermediate results, which will lead to a threat reduction result that lead to an improved outcome. Strategies include both directly conservation related activities (e.g. bolstering ranger force and motivation), whilst also approaching the problem from a socio-economic angle. For example, employing more rangers will increase the effectiveness of the ranger force, which is expected to reduce deforestation and stop encroachment, which in turn result in habitat improvement. This in effect will result in a diverse habitat that is able to satisfy wildlife-use requirements, and consequently lead to improved biodiversity.

Similar result chains from each other Project Activities regarding biodiversity improvement are displayed in the above diagram, all of which support a net-positive impact of the 'With Project' scenario. Monitoring will confirm the ability of the Project to achieve these positive impacts and provide information for adjusting activities and approaches over time to ensure these results are achieved.

8.1.2 Demonstrate that the project's net impacts on biodiversity in the Project Zone are positive, compared with the biodiversity conditions under the without-project land use scenario (CCB V3: B2.2).

By protecting habitats, safeguarding water availability and ensuring landscape connectivity, the CHRPs' net impacts on biodiversity values will be positive in the 'With Project' versus 'Without Project' scenario for the reasons noted in the section above. As is detailed in Section 6.2.3 there were no habitat disturbances in the Project Area, and no areas of deforestation or grassland conversion that met the Project's definition of a significant event. As the existing forest cover was maintained and no forest or grassland loss or fragmentation occurred, based on our theory of change analysis this demonstrates that the Project's net impact on biodiversity for this monitoring period was positive in comparison to the with-out project scenario. Section 5.3.1.2 details the biodiversity impact assessment that was completed for this monitoring period. Additionally, the results of the climate monitoring demonstrate that no significant ecosystem conversion has taken place since the Project's Validation.

8.1.3 No Negative Affect on HCVs as a Result of the Project (B1.2)

The CHRP has positive affects on the HCVs present in the Project Area. The following biodiversity related HCVs have been identified per section 1.3.6 of the CHRP PD:

- G1.8.1 b) Endangered and Vulnerable plant and animal species
- G1.8.1 c) 9 Endemic subspecies and races
- G1.8.1 d) Significant concentrations of a species during any time in their life cycle
- G1.8.2 Viable populations of plants and animals in natural patterns of distribution and abundance
- G1.8.3 Threatened ecosystems

By protecting habitats, safeguarding water availability and ensuring landscape connectivity, these high conservation values will not have any negative effects in the 'With Project' versus the 'Without Project' scenario. As is noted in section 8.1.2 above, there were no habitat disturbances in the Project Area, and no areas of deforestation or grassland conversion. Therefore, under the theory of change analysis this demonstrates that the Project's net impact on biodiversity, including HCVs, for this monitoring period was positive in comparison to the with-out project scenario. Therefore, beyond the Project Activities of protection of the Project Area, and other conservation focused activities no other measures are needed or taken for the maintenance or enhancement of the biodiversity HCVs.

8.1.4 Species Used by the Project, Including and Invasive Species (B1.3)

No non-native species will be used in the Project Accounting Areas. The Project Activities do not include any planting or reforestation within the Project Area. Some Project Partners perform some reforestation activities within the Project Area as part of their on-going operations. However, indigenous tree species from the area are always used for the reforestation. All farms in the Project Zone have been excised from the Project Accounting Area a priori.

8.1.5 Potential Adverse Effects of Non-native Species, Including Impacts on Native Species and Disease Introduction or Facilitation, and Justification for their Use over Native Species (B1.4)

As discussed in Section 8.1.5 above, no non-native species will be used in this project.

8.1.6 Genetically Modified Organisms (B1.5)

No GMOs will be used to generate GHG reductions or removals.

8.2 Negative Offsite Biodiversity Impacts (B2)

8.2.1 Identify potential negative offsite biodiversity impacts that the project is likely to cause (B2.1)

There is little chance of having significant negative biodiversity impacts outside the Project Zone for two reasons. Firstly, the sources of threat to biodiversity are mainly local and they are unlikely to be transferred outside the Project Zone (e.g. fuelwood collection and subsistence poaching). Secondly, commercial poaching threats, which could be transferred further, are unlikely to be because of the national drive and commitment to reducing poaching and should show an overall decrease.

8.2.2 Measure needed and taken to mitigate potential negative impacts on biodiversity outside of the Project Zone (B2.2.).

Due to the reasoning outlined in Section 8.2.1, mitigation strategies are non-applicable.

8.2.3 Evaluation of Unmitigated Negative Offsite Impacts against the Biodiversity Benefits of the Project within the Project Boundaries (B3.3.).

As there are no anticipated negative offsite impacts to biodiversity, evaluation of unmitigated offsite impacts is not applicable.

8.3 Exceptional Biodiversity Benefits (GL3)

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

8.3.1.1 Vulnerability: Critically Endangered (CR) and Endangered (EN) species

There are a number of plant and animal species in the Project Area that are classified as either near threatened, vulnerable, endangered or critically endangered. The following lists threatened species according to the IUCN within the Project Area:

Critically Endangered (CR):

- Black rhinos *Diceros bicornis*

Endangered (EN):

- Wild dogs *Lycaon pictus*
- Basra reed warbler *Acrocephalus griseldis* (migrant)
- *Afrocarpus usambarensis* (tree)
- White-backed Vulture *Gyps africanus*
- Rüppell's Vulture *Gyps rueppelli*
- Hooded Vulture *Necrosyrtes monachus*

Vulnerable (VU):

- African Elephant *Loxodonta Africana*
- Cheetah *Acinonyx jubatus*
- Lion *Panthera leo*
- Abbott's Starling *Cinnyricinclus femoralis*
- Martial Eagle *Polemaetus bellicosus*
- Lappet-faced Vulture *Torgos tracheliotos*
- Red stinkwood *Prunus africana*

Near-Threatened (NT):

- Leopard *Panthera pardus*
- Gerenuk *Litocranius walleri*
- Lesser kudu *Tragelaphus imberbis*
- Thompson's gazelle *Eudorcas thomsonii*

In addition, Kenya has created a national species list that defines species' status using IUCN criteria, yet applies it to species at the national level. Although not independently validated, this National List of Species is found in the Sixth Schedule of the Wildlife Conservation and Management Bill, 2013. The following species thereby are identified nationally as Critically Endangered, Endangered, and Vulnerable.

Mammals:

Critically Endangered

- Black rhinoceros (*Diceros bicornis*)

Endangered

- African Wild Dog (*Lycaon pictus*)
- African Elephant (*Loxodonta Africana*)
- African Lion (*Panthera Leo*)
- Cheetah (*Acinonyx jubatus*)
- Striped hyaena (*Haeyna haeyena*)
- Leopard (*Panthera pardus*)

Vulnerable

- African Golden Cat (*Profelis aurata)*
- Kenyan big-eared free-tailed bat (*Tadarida lobata*)
- Red Bush Squirrel (*Paraxerus palliates*)
- Vermiculate shrew (*Crocidura Xantippe*)
- Spotted hyaena (*Crocuta crocuta*)
- Lesser Kudu (*Tragelaphus imerbis*)
- Greater Kudu (*Tragelaphus stripsiceros*)

Birds

Endangered

- Egyptian Vulture (*Neophron percnopterus*)

Vulnerable

- Lesser Kestrel (*Falco naumanni*)
- Lapped-faced Vulture (*Torgos tracheliotos*)
- White-headed Vulture (*Trigonoceps occipitalis*)
- Madagascar Pratincole (*Glareola ocularis*)
- Abott's Starling (*Cinnyricinclus femoralis*)

Reptiles

Endangered

- Rock python (*Python sebae*)

Trees

Endangered

- East African Sandalwood (*Osyris lanceolata*)

Vulnerable

- Red stinkwood (*Prunus Africana*)

8.3.1.2 Eastern Black Rhinos

The Project Zone contains a site of global significance for biodiversity conservation. As outlined in Section 1.3.6.3, the Project Zone is home to a small remnant population of the Eastern Black Rhino (*Diceros bicornis*) population, which is classified by the IUCN as Critically Endangered (CE), meaning they "face an extremely high risk of extinction in the wild". In total, there are c. 799 *Diceros bicornis michaeli* (as at 31 December 2012, figures provided by the IUCN SSC African Rhino Specialist Group), of which 631 are in Kenya, 100 in Tanzania and 68 are out-of-range in South Africa. The black rhino has been identified as a trigger species due to the fact that they occur naturally at the site. These rhinos represent one of the last wild populations in Kenya, as most rhino today are kept in fenced sanctuaries, and their survival is key if there is to be any hope for the future of this species in the wild. Globally, rhinos are under severe threat of poaching, which makes the sanctuary even more important.

The Rhino Area in the Project Zone extends from KALRO, the CHNP to Mbirikani Group Ranch in the north of the Project Area and has been identified as a site of high biodiversity conservation priority. About 80% of the Chyulu Hills' black rhinos' home range is inside the CHNP, and the other 20% outside the park on community land (KWS, 2009). The total rhino area is 1,195km² or 119,500 ha (Save the Rhino, retrieved 20 February 2014).

Rhino population trend

From 1970 to the early 1980s the numbers and range of black rhinos in Africa declined drastically. The black rhino population in Kenya underwent drastic decline from about 10,000 animals in the 1950s to less than 400 in the 1980s (KWS, 2009). To date, there are approximately 620 black rhinos in Kenya. A small number of these live in the Chyulu Hills. In 2009, a study undertaken by KWS established that the minimum number of individuals in the CHNP is 14, with a sex ratio of 7 males, 6 females and 1 unsexed individual (KWS, 2009). This population was found to be inbred and there is a dire need for genetic rescue through introductions of new genes from other populations in Kenya (ibid.).

In 2013, the population was still estimated at 14. Three new calves were born in that year, though three further rhinos were also lost to poaching. Poaching for the international illegal trade in rhino horn is the main, and most obvious, threat to the Eastern black rhinos. Given the critical status of the black rhinos and risk to its continued existence, it is of vital importance to enhance security in the CHRP Project Area. In the absence of the Project, it is likely that Project Partners will not be able to provide adequate protection due to shortage of resources and funds, which could lead to a decline and possibly extinction of the rhinos in the Chyulu Hills landscape.

8.3.1.3 Other species

There are a number of other threatened species in the Project Zone. The most obvious is the presence of African elephants (*Loxodonta Africana*) that use the Project Zone as a corridor between TWNP and Amboseli National Park. As stated in section 1.3.6.3. African elephants are classified as vulnerable (VU). Presence of other species include lions (*Panthera leo*) and cheetah (*Acinonyx jubatus*), who are also both IUCN classified as vulnerable (VU). There have also been occasional sightings of the endangered (EN) wild dogs (*Lycaon pictus*), and despite the lack of further scientific information of their population, it is confirmed that wild dogs use the Project Zone as a dispersal area. Finally, a recent biodiversity assessment report recorded a number of species of conservation interest within the Project Zone, including the endangered (EN) white backed vulture (*Gyps africanus*) and Vulnerable (VU) Martial Eagle (*Polemaetus bellicosus*) (Githiru *et al.*, 2011). Other globally-threatened bird species mentioned as likely in the area although not recorded during that assessment include Abbott's Starling (*Cinnyricinclus femoralis*) and Lappet-faced Vulture (*Torgos tracheliotos*), both designated as VU.

Endemic Species

To our knowledge, there are no full species that are endemic to the Project Area; but there are a number of endemic sub-species (races) particularly in the CHNP, perhaps reflecting the relatively young age (in evolutionary terms) of these hills. More research needs to be undertaken to investigate further endemism in the area. The following sub-species are known to be endemic:

- Birds: endemic races of:
    - Shelley's Francolin Francolinus shelleyi
    - White-starred Robin Pogonocichla stellata
    - Orange Ground Thrush Zoothera gurneyi chyulu
- Butterflies:
    - Pentila tropicalis chyulu
    - Acraea anacreon chyulu
    - Papilio desmondi desmondi
    - Amauris echeria chyuluensis
- Amphibians
    - Afrixalus pygmaeus septentrionalis

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

As detailed above in section 8.1.2 the nature of the Project Activities will actively maintain and enhance the existing populations of trigger species in the Project Zone. For one species, the black rhino, some additional measures are anticipated. In order to enhance the protection and population status of the black rhinos, KWS and BLF have identified a number of measures. These include increased anti-poaching and monitoring patrols, rhino dung DNA analysis, afforestation program, improved landscape management and water availability, as well as community involvement.

A key goal is to designate the northern end of the Chyulu Hills as an IPZ (Intensive Protection Zone), with increased manpower, a new waterhole and a fence on the eastern boundary, to allow the translocation of more black rhino into the park, bringing this important rhino population up to viable breeding levels (Save the Rhino, seen 24 February 2014).

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

The monitoring plan has indicators that include the monitoring of the trigger species listed in section 8.3.1.1 above. The biodiversity monitoring includes actions such as the presence, abundance and diversity of wildlife, and assessments of the movement of wildlife through the Project Area to other protected areas. Please refer to ‘Annex 6 – Chyulu Hills Community and Biodiversity Monitoring Plan’ for more details on the Biodiversity Monitoring Plan and the indicators it utilizes.

9 ADDITIONAL INFORMATION

9.1 Allometric Equations

MRR.99 A list of all selected allometric equations used to estimate biomass for trees and non-trees.

Please refer to Annex 7 – Development of Allometry – Chyulu Hills REDD+ Project

MRR.100 For each selected allometric equation, a list of species to which it is being applied and the proportion of the total carbon stocks predicted by the equation.

Please refer to Annex 7 – Development of Allometry – Chyulu Hills REDD+ Project

MRR.101 For each selected allometric equation, indication of when it was first employed to estimate carbon stocks in the project area (monitoring period number and year of monitoring event).

Please refer to Annex 7 – Development of Allometry – Chyulu Hills REDD+ Project

MRR.102 For each selected allometric equation, indication of whether was validated per sections 9.3.1.1 or 9.3.1.2.

Please refer to Annex 7 – Development of Allometry – Chyulu Hills REDD+ Project

MRR.103 Documentation of the source of each selected allometric equation and justification for their applicability to the project area considering climatic, edaphic, geographical and taxonomic similarities between the project location and the location in which the equation was derived.

Please refer to Annex 7 – Development of Allometry – Chyulu Hills REDD+ Project

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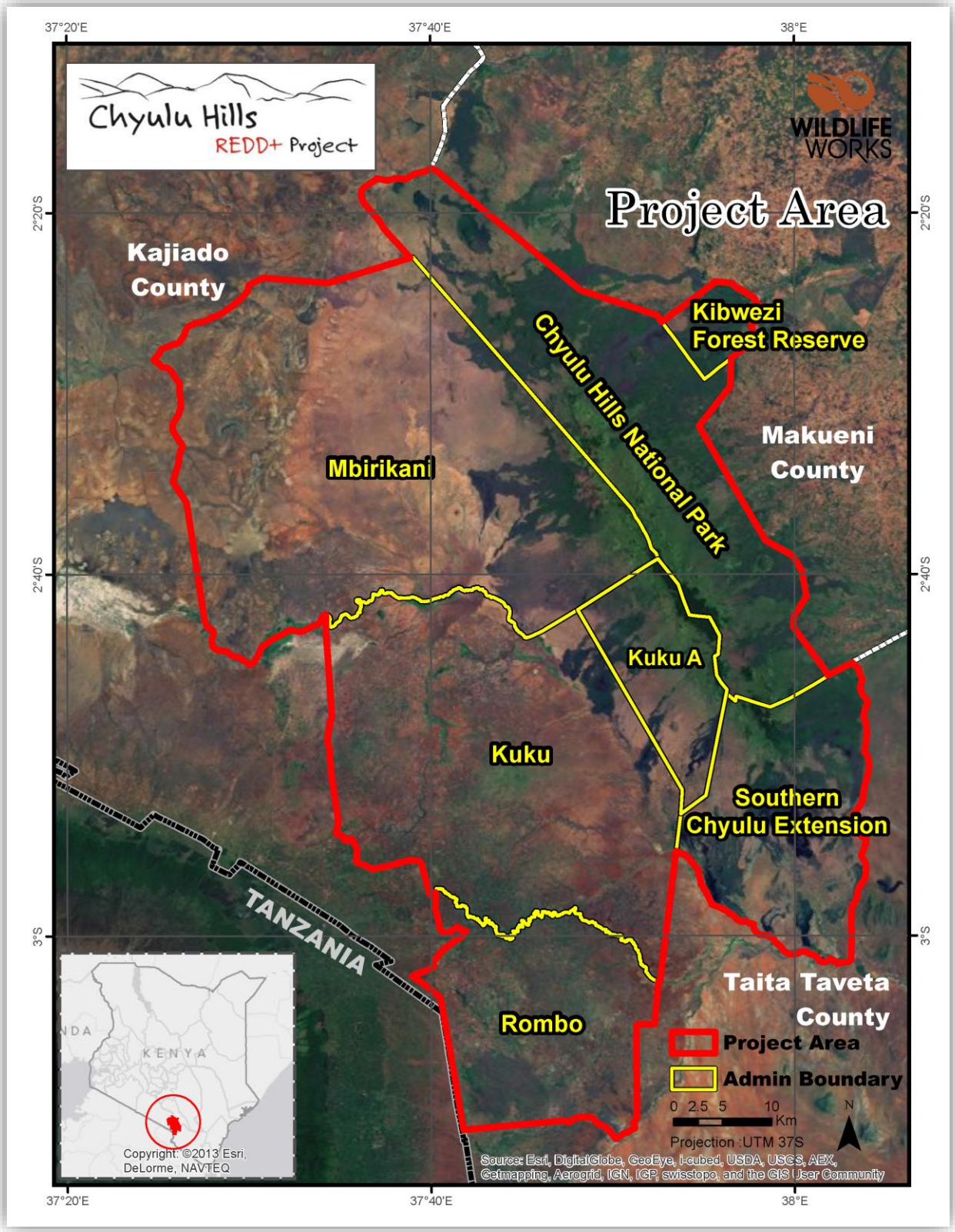
APPENDIX A. The Project Area and Project Accounting Areas


Chyulu Hills
REDD+ Project
WILDLIFE WORKS
Project Area
Kajiado County
Kibwezi Forest Reserve
Chyulu Hills National Park
Makueni County
Mbirikani
Kuku A
Kuku
Southern Chyulu Extension
TANZANIA
Rombo
Taita Taveta County
Project Area
Admin Boundary
0 2.5 5 10 Km
Projection :UTM 37S
N
KENYA
Copyright: ©2013 Esri, DeLorme, NAVTEQ
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
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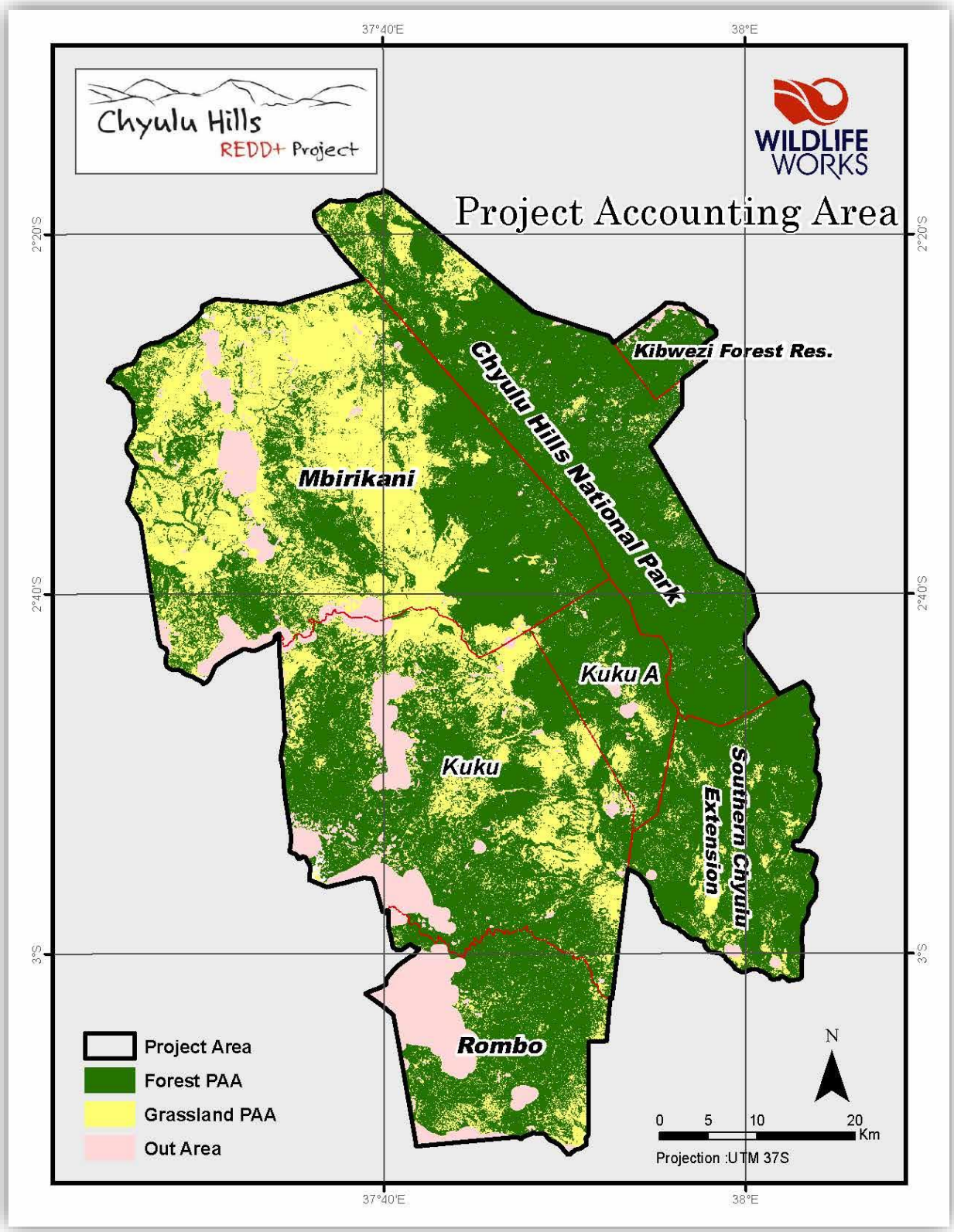
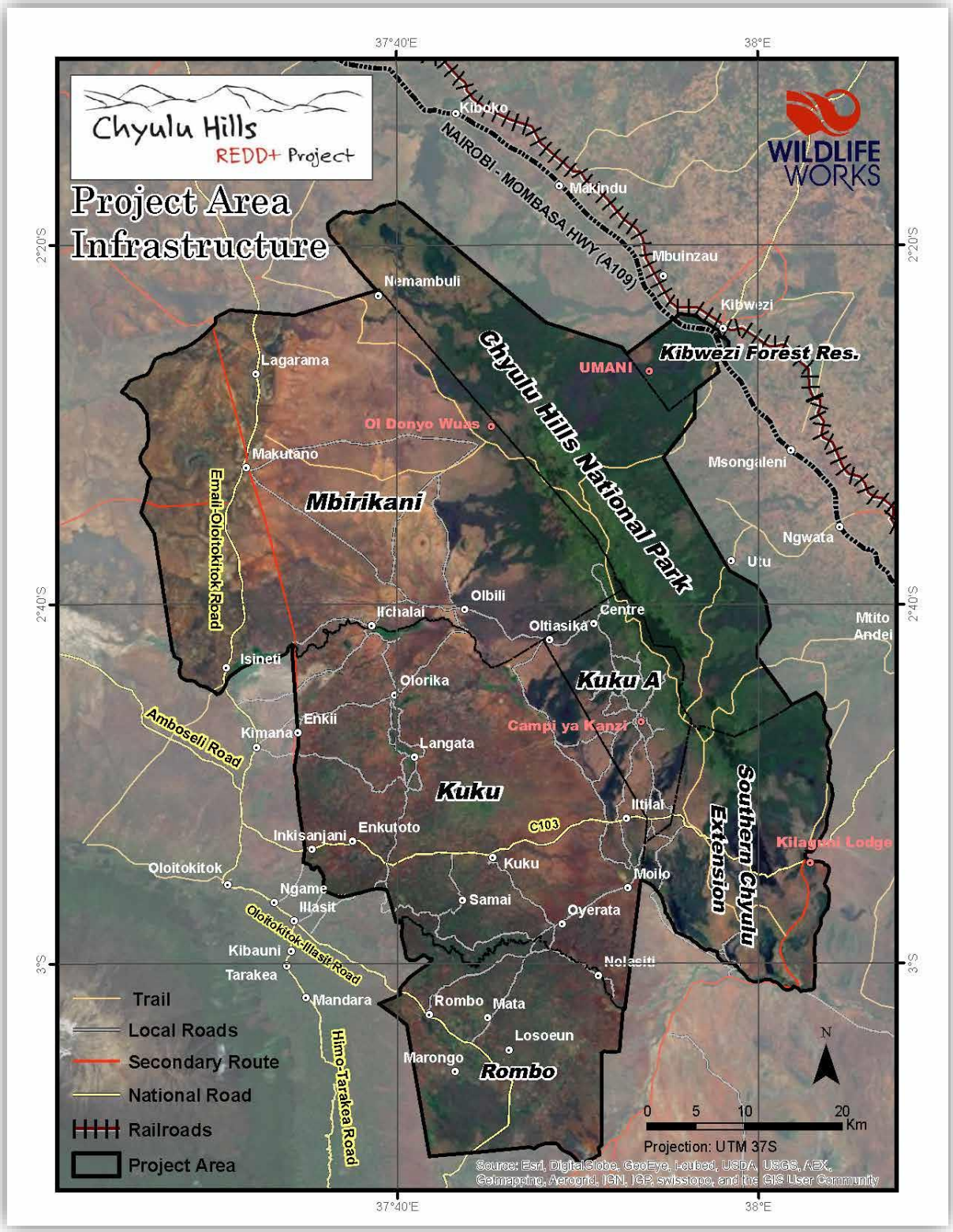
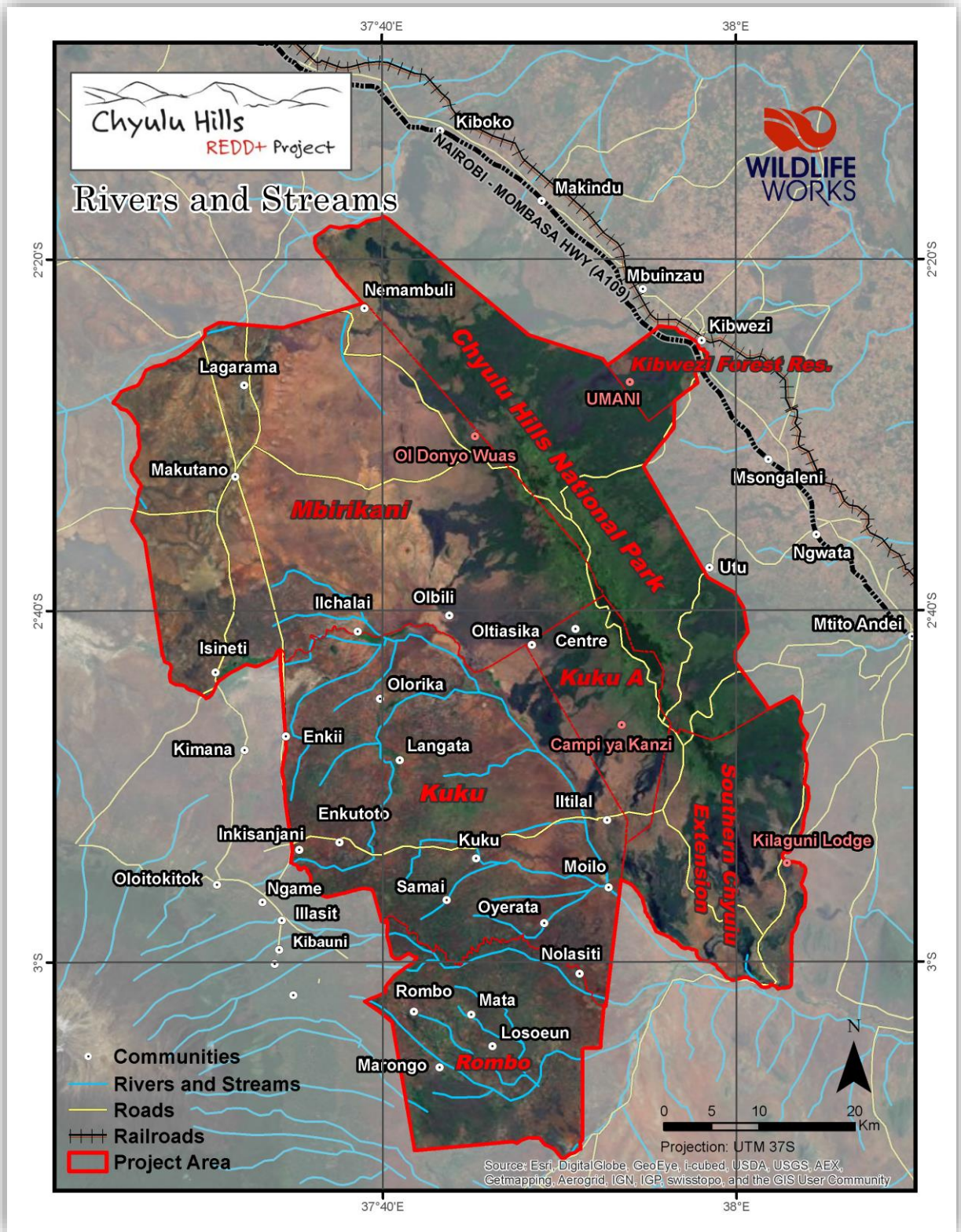
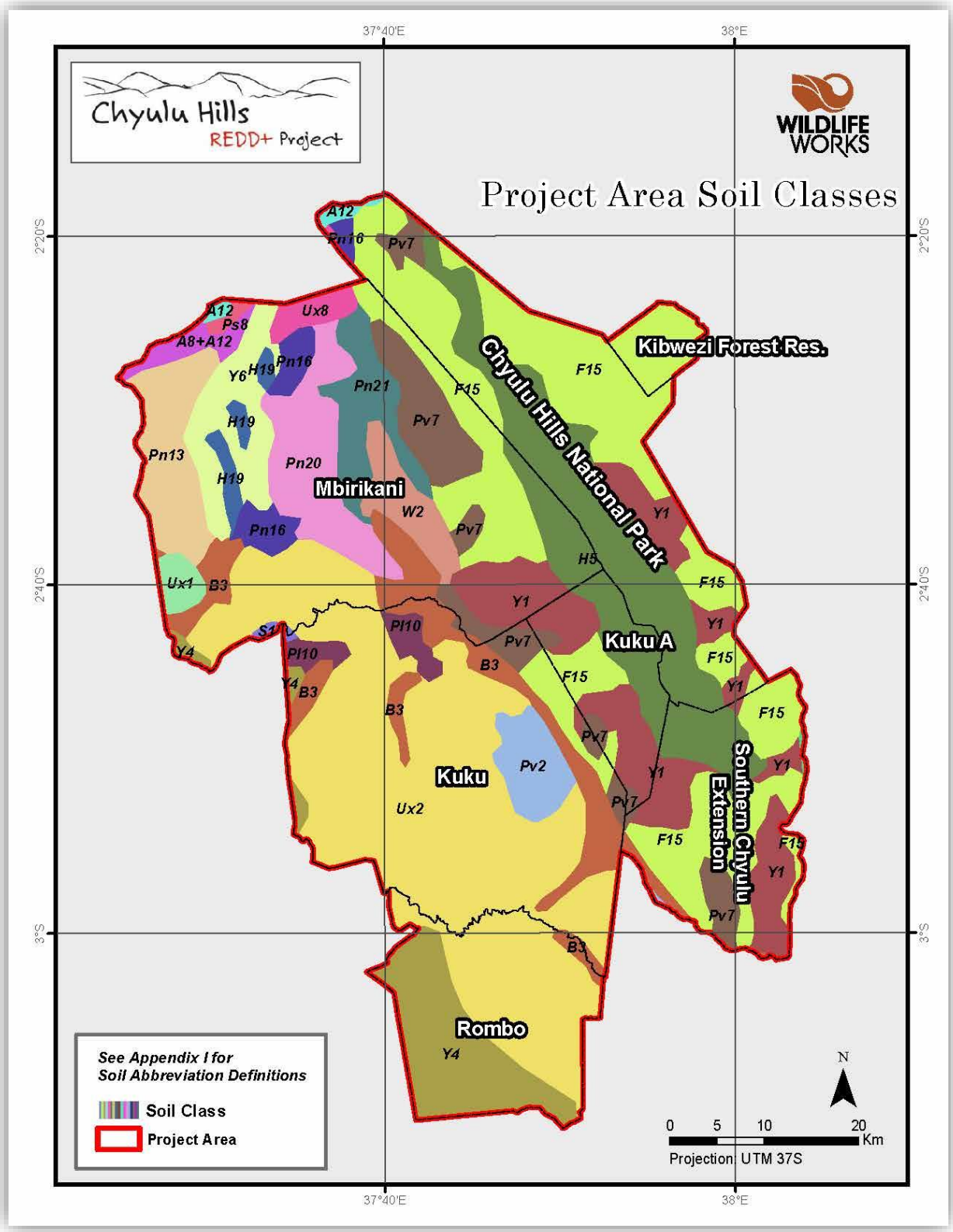
37°40'E
38°E
2°20'S
2°40'S
3°S


Chyulu Hills
REDD+ Project
WILDLIFE WORKS
Project Accounting Area
37°40'E
38°E
2°20'S
2°40'S
3°S
Kibwezi Forest Res.
Chyulu Hills National Park
Mbirikani
Kuku A
Kuku
Southern Chyulu Extension
Rombo
Project Area
Forest PAA
Grassland PAA
Out Area
N
0 5 10 20 Km
Projection :UTM 37S

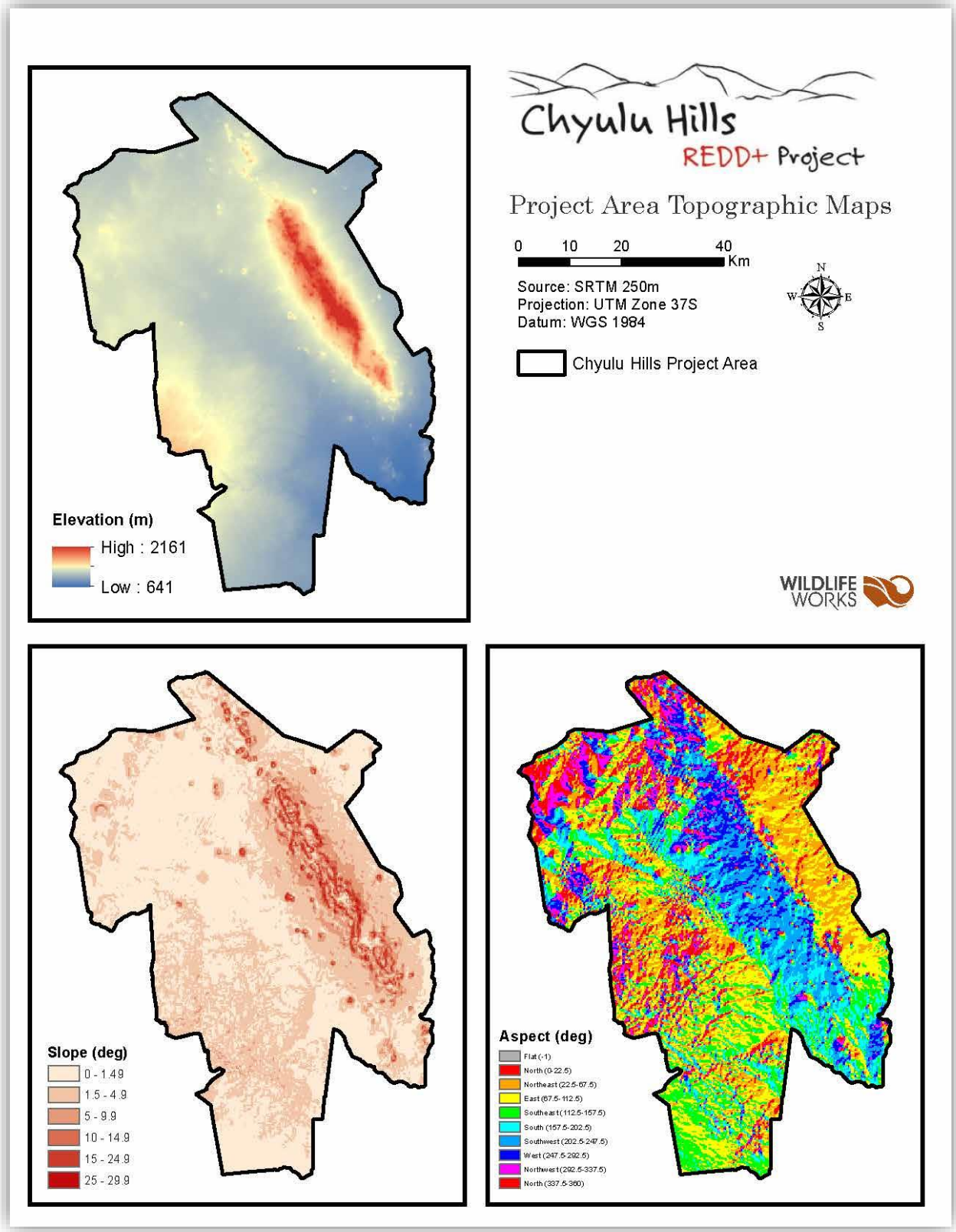
APPENDIX B. Project Area Vegetation, Rivers & Streams, Biomass and Soil Plots, Soil Types, Infrastructure, Communities and Landscape Configuration

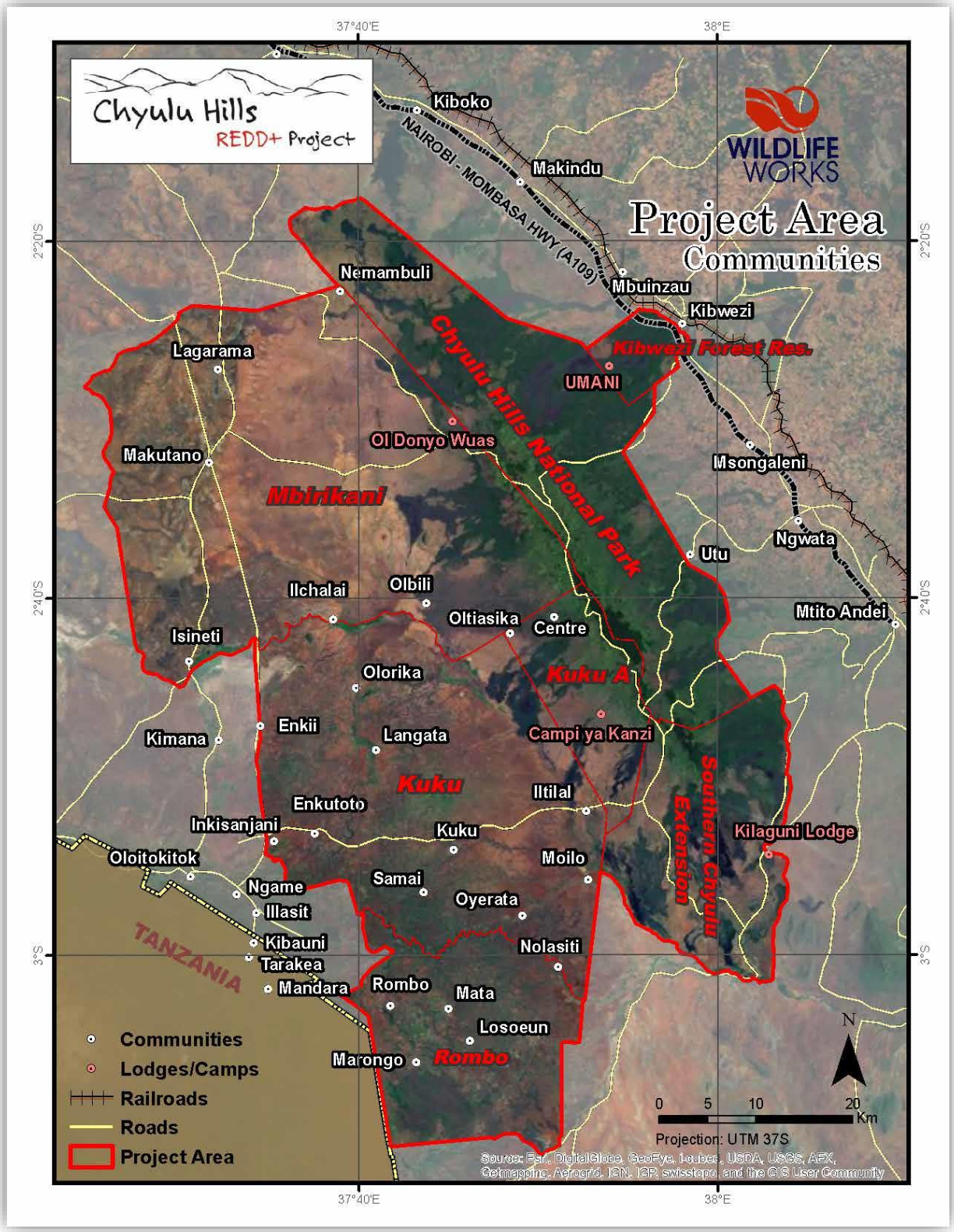

Chyulu Hills
REDD+ Project
Project Area
Infrastructure
WILDLIFE WORKS
37°40'E
38°E
2°20'S
2°40'S
3°S
Kiboko
Makindu
NAIROBI - MOMBASA HWY (A109)
Mbuinzau
Kibwezi
Nemambuli
Lagarama
UMANI
Kibwezi Forest Res.
Chyulu Hills National Park
Ol Donyo Wuas
Makutano
Msongaleni
Email-Oloitokitok Road
Mbirikani
Ngwata
Uru
Olbili
Ilchalai
Centre
Oltiasika
Mtito Andei
Isineti
Olorika
Kuku A
Enkii
Kimana
Amboseli Road
Campi ya Kanzi
Langata
Kuku
Iltilai
Southern Chyulu Extension
Kilaguni Lodge
Inkisanjani
Enkutoto
C103
Kuku
Oloitokitok
Moilo
Ngame
Samai
Illasit
Oyerata
Oloitokitok-Illasit Road
Kibauni
Nolasiti
Tarakea
Mandara
Rombo
Mata
Losoeun
Marongo
Rombo
Himo-Tarakea Road
Trail
Local Roads
Secondary Route
National Road
Railroads
Project Area
N
0 5 10 20 Km
Projection: UTM 37S
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

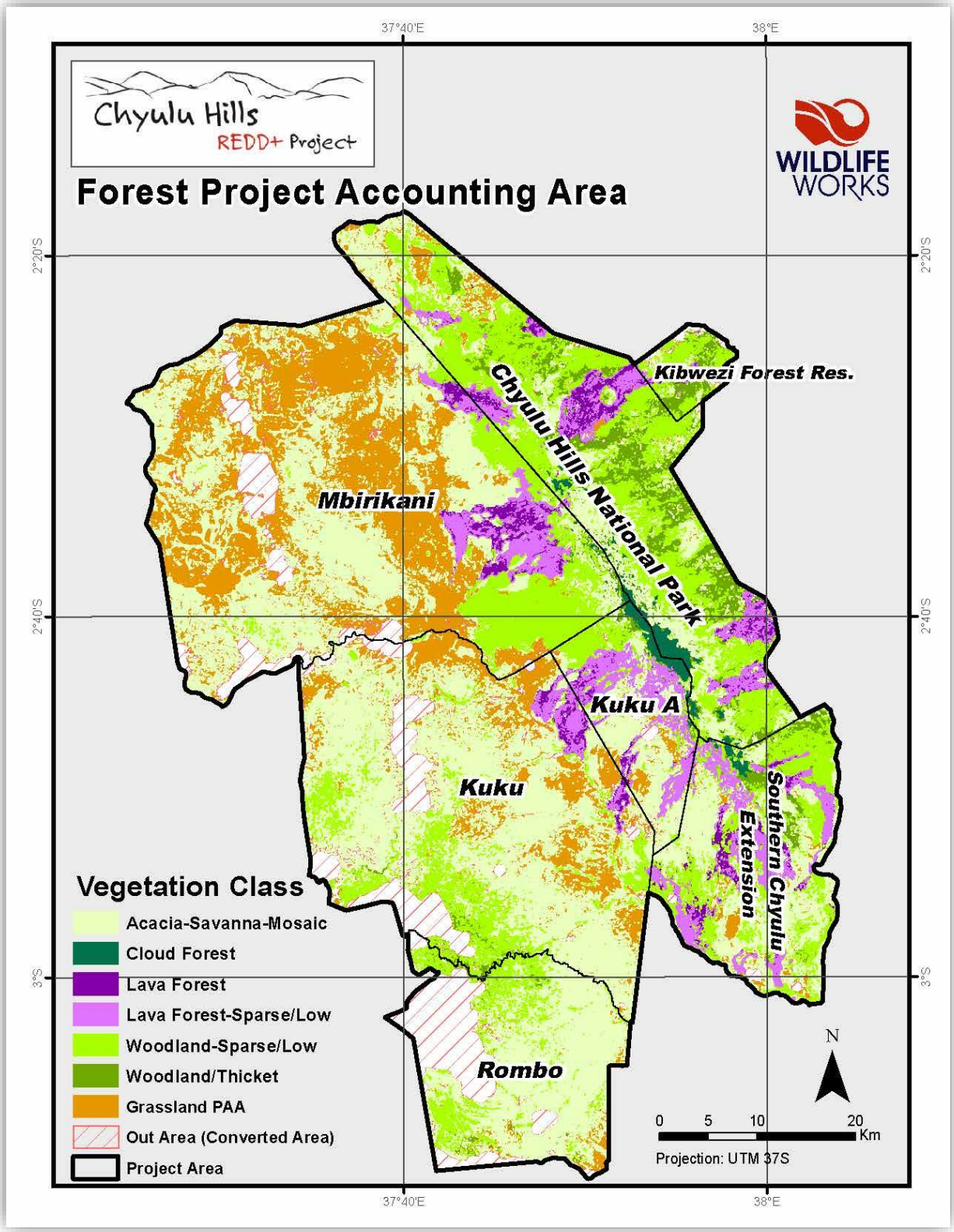

Chyulu Hills
REDD+ Project
Rivers and Streams
WILDLIFE WORKS
37°40'E
38°E
2°20'S
2°40'S
3°S
Kiboko
Makindu
NAIROBI - MOMBASA HWY (A109)
Mbuinzau
Kibwezi
Nemambuli
Lagarama
Kibwezi Forest Res.
UMANI
Chyulu Hills National Park
Ol Donyo Wuas
Makutano
Msongaleni
Mbirikani
Ngwata
Utu
Ilchalai
Olbili
Mtito Andei
Oltiasika
Centre
Isineti
Kuku A
Olorika
Enkii
Langata
Campi ya Kanzi
Kimana
Kuku
Southern Chyulu Extension
Iltilal
Enkutoto
Inkisanjani
Kuku
Kilaguni Lodge
Moilo
Oloitokitok
Ngame
Samai
Illasit
Oyerata
Kibauni
Nolasiti
Rombo
Mata
Losoeun
Marongo
Rombo
N
0 5 10 20 Km
Projection: UTM 37S
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Communities
Rivers and Streams
Roads
Railroads
Project Area

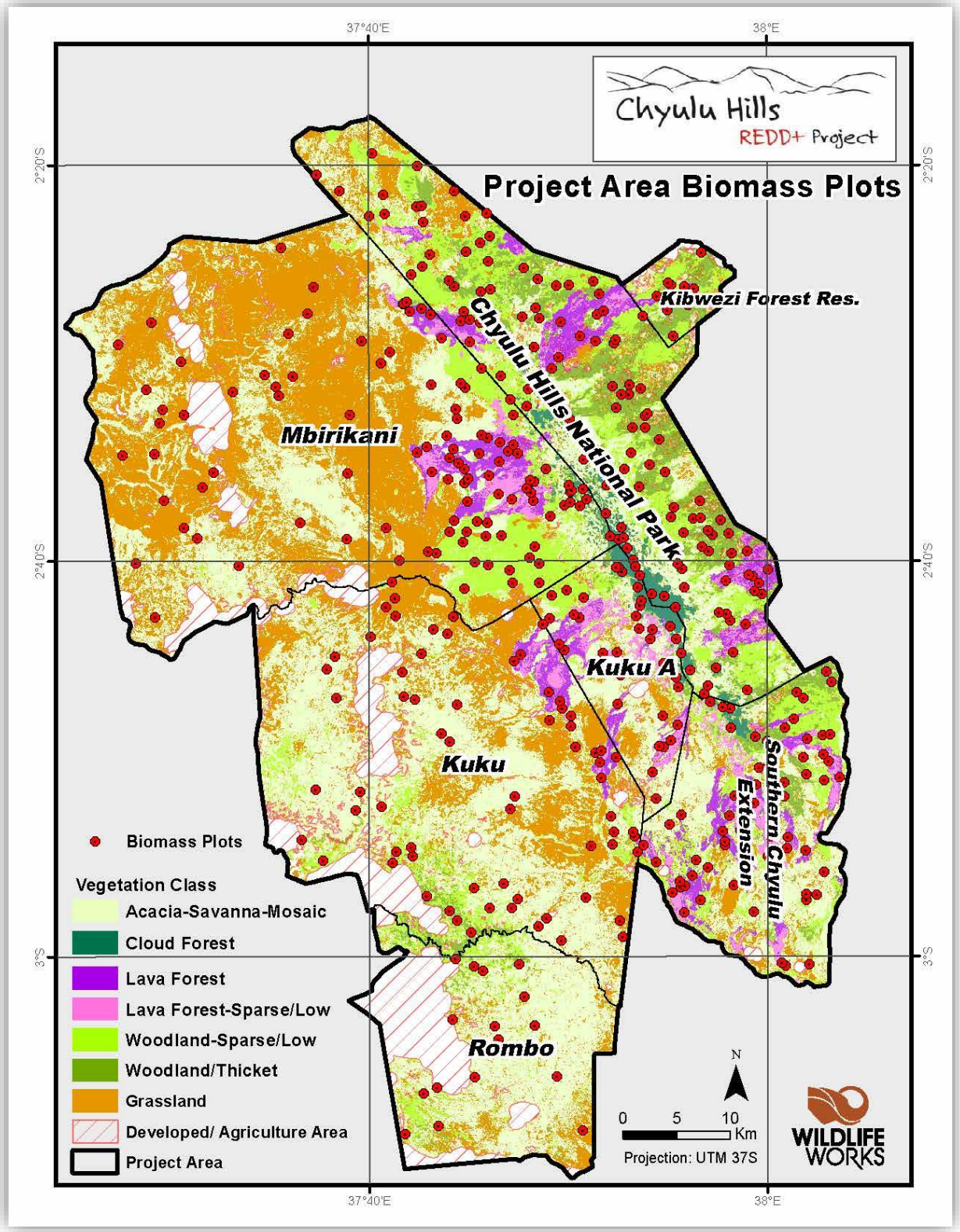


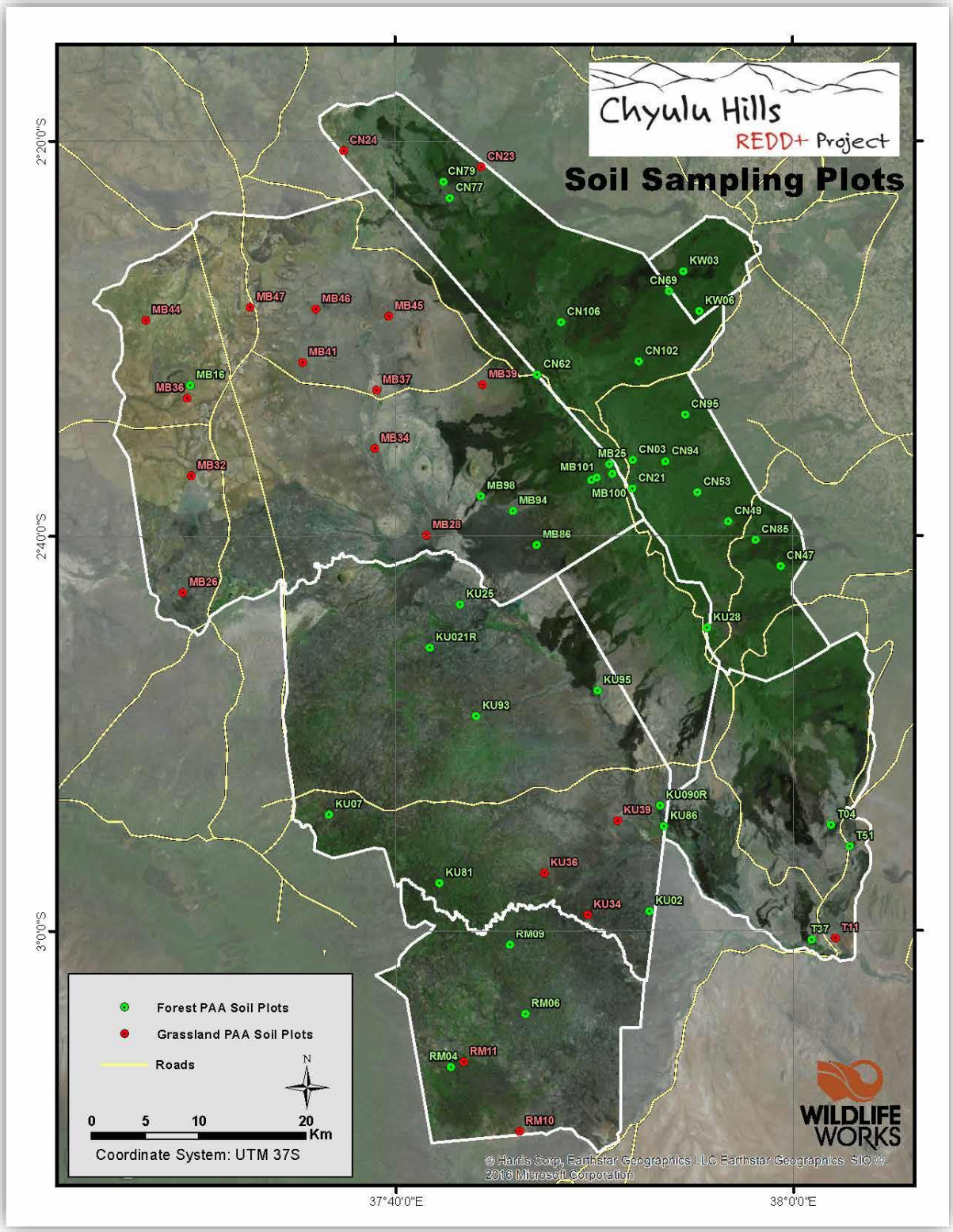
Please See Appendix H for the key for the Soil Class Abbreviations


Chyulu Hills
REDD+ Project
Project Area Topographic Maps
0 10 20 40
Km
Source: SRTM 250m
Projection: UTM Zone 37S
Datum: WGS 1984
N
W
E
S
Chyulu Hills Project Area
WILDLIFE WORKS
Elevation (m)
High : 2161
Low : 641
Slope (deg)
0 - 1.49
1.5 - 4.9
5 - 9.9
10 - 14.9
15 - 24.9
25 - 29.9
Aspect (deg)
Flat (-1)
North (0-22.5)
Northeast (22.5-67.5)
East (67.5-112.5)
Southeast (112.5-157.5)
South (157.5-202.5)
Southwest (202.5-247.5)
West (247.5-292.5)
Northwest (292.5-337.5)
North (337.5-360)


Chyulu Hills
REDD+ Project
WILDLIFE WORKS
Project Area
Communities
37°40'E
38°E
2°20'S
2°40'S
3°S
Kiboko
Makindu
NAIROBI - MOMBASA HWY (A109)
Mbuinzau
Kibwezi
Kibwezi Forest Res.
UMANI
Nemambuli
Lagarama
Chyulu Hills National Park
Ol Donyo Wuas
Makutano
Mbirikani
Msongaleni
Ngwata
Utu
Ilchalai
Olbili
Oltiasika
Centre
Mtito Andei
Isineti
Olorika
Kuku A
Enkii
Langata
Campi ya Kanzi
Kimana
Kuku
Iltilal
Southern Chyulu Extension
Enkutoto
Inkisanjani
Kuku
Kilaguni Lodge
Oloitokitok
Moilo
Samai
Ngame
Oyerata
Illasit
TANZANIA
Kibauni
Nolasiti
Tarakea
Mandara
Rombo
Mata
Losoeun
Marongo
Rombo
Communities
Lodges/Camps
Railroads
Roads
Project Area
N
0 5 10 20 Km
Projection: UTM 37S
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


Chyulu Hills
REDD+ Project
Forest Project Accounting Area
WILDLIFE WORKS
37°40'E
38°E
2°20'S
2°40'S
3°S
Kibwezi Forest Res.
Chyulu Hills National Park
Mbirikani
Kuku A
Kuku
Southern Chyulu Extension
Rombo
Vegetation Class
Acacia-Savanna-Mosaic
Cloud Forest
Lava Forest
Lava Forest-Sparse/Low
Woodland-Sparse/Low
Woodland/Thicket
Grassland PAA
Out Area (Converted Area)
Project Area
N
0 5 10 20 Km
Projection: UTM 37S


Chyulu Hills
REDD+ Project
Project Area Biomass Plots
37°40'E
38°E
2°20'S
2°40'S
3°S
Kibwezi Forest Res.
Chyulu Hills National Park
Mbirikani
Kuku A
Kuku
Southern Chyulu Extension
Rombo
Biomass Plots
Vegetation Class
Acacia-Savanna-Mosaic
Cloud Forest
Lava Forest
Lava Forest-Sparse/Low
Woodland-Sparse/Low
Woodland/Thicket
Grassland
Developed/ Agriculture Area
Project Area
N
0 5 10 Km
Projection: UTM 37S
WILDLIFE WORKS


Chyulu Hills
REDD+ Project
Soil Sampling Plots
CN24
CN23
CN79
CN77
KW03
CN69
KW06
MB44
MB47
MB46
MB45
CN106
MB41
CN102
MB16
MB36
MB37
MB39
CN62
CN95
MB34
MB25
CN03
CN94
MB32
MB101
CN21
CN53
MB98
MB100
MB94
CN49
MB28
MB86
CN85
CN47
MB26
KU25
KU28
KU021R
KU95
KU93
KU090R
KU07
KU39
KU86
T04
T51
KU81
KU36
KU34
KU02
T37
T11
RM09
RM06
RM04
RM11
RM10
Forest PAA Soil Plots
Grassland PAA Soil Plots
Roads
N
0 5 10 20 Km
Coordinate System: UTM 37S
WILDLIFE WORKS
© Harris Corp, Earthstar Geographics LLC Earthstar Geographics SIO © 2016 Microsoft Corporation
2°20'0"S
2°40'0"S
3°0'0"S
37°40'0"E
38°0'0"E

APPENDIX C: An example of the form used during community member and stakeholder engagement.

Chyulu Hills REDD+ Project

Location of meeting:	
Date:	Number of attendees:
Type of meeting (*landowner meeting, community baraza, school, other* (please specify)):	
Overview of attendees (*e.g. country rep, chiefs, etc*):	
Starting time:	End time:

Meeting outline
Questions raised

Comments
Signature(s) of key attendee(s): (*specify name and position*)

Project partner staff comments/ follow up

Appendix D: The number of households interviewed in each villages and Location

Household sampling on the western side of the Chyulu Hills REDD+ Project

Location	Sub-location	Village	No. HHs
Kuku	Enkusero	Enkutoto	1
		Inkisanjani	1
		Loolepo	1
		Nenjani	1
		Olmakarikara	1
		Samai	2
	Iltilal	Iltilal	4
		Kuku	1
		Lorkine	2
		Moilo	2
		Nalasiti	1
		Oleyieri	1
		Olpusare	2
		Oyarata	3
	Kuku	Marlal	2
	Olorika	Inkisanjani	1
		Marlal	1
Mbirikani	Emukutan	Ilchura	1
		Oremit	1
	Isinet	Edikirr	1
		Esambu	1
		Isinet	1
		Kalesirua	1
		Marura	1
		Nabulaa	2
		Olashaiki	2
		Orkina	2
	Mbirikani	Bsambo	1
		Edikirr	1
		Ilchura	1
		Inkoisuk	4
		Mabatini	1
		Nasipa	2
		Orng'osua	5
	Namelok	Inkoroshoni	1
		Naningo	1
Olorika	Elangata	Enkii	3
		Enkutoto	1
		Esilange	3
		Ilchalai	1
		Inkisanjani	1
		Intarakweti	1
		Irkodin	2
		Lenkaitole	1
		Lesimiti	1
		Loosuyian	1
		Lormeuti	1
		Lorngojine	1
		Naado kejek	1
		Oldonyio Lenkai	1

Location	Sub-location	Village	No. HHs
		Olepolos	1
		Oltemuai	1
		Ramaita	1
	Iltilal	Iltilal	4
	Olorika	Enkolili	2
		Marlal	1
		Narok enterit	1
		Nenjani	1
		Tiririka	1
Oltiasika	Emukutan	Emukutan	1
		Indoinyio wuarikon	1
		Inkoisuk	2
		Nasipa	3
		Noosilale	2
		Oiti	1
		Ologarama	2
	Ilchalai	Esambu	2
		Ilchalai	1
	Orbili	Orbili	1
Rombo	Elerai	Elerai	4
		Maarwe	2
		Orgumaet	1
	Maili tatu	Maili tatu	3

Location	Sub-location	Village	No. HHs
	Njukini	Entepesi	2
		Njukini	1
		Nkiitok	1
		Ntoomani	2
		Oloibor soit	1
	Rombo	Emboliei	1
		Empalakae	1
		Enchurai	2
		Enderkesi	3
		Enduet	2
		Esukuta	4
		Lekakaya	1
		Lemong'o	1
		Lenkopito	1
		Matepes	2
		Nalasiti	3
		Nasipa	5
		Ng'asakion	1
		Ntoomani	1
		Oldule	3
		Olmapinu	1
		Orgira	5
		Ormapinu	1

Household sampling on the western side of the Chyulu Hills REDD+ Project

Location	Sub-location	Village	No. HHs

Location	Sub-location	Village	No. HHs
Kiboko	Kasuvi	Molomuwi	1
	Kiboko	Smart future	1
	Mulili	Ikoyo	1
		Ilandi	1
		Kimboo	4
		Kyandani	1
		Miaani	1
		Mtakuja	1
		Mutamboni	1
		Nzeveni	2
		Ung'oleni	1
Makindu	Kiu	Bondeni	1
		Katheka Kai	2
		Kivutini	1
		Kiwanzani	1
		Kwa Malai	1
		Miambani	1
		Muangeni	1
		Muusini	1
		Mwaani	1
		Vombo	1
		Yinzau	4
	Kiundwani	Mwangeni	1
	Manyatta	Kiu	1
	Mulili	Kwaselu	1
		Miaani	1
	Muuni	Kathekani	1
		Kinguu	1

Location	Sub-location	Village	No. HHs
		Kwa Kaviti	1
		Mukameni	1
Nguumo	Kaunguni	Isaani	1
		Kakuyuni	1
		Kambi	1
		Kamwenge	1
		Kawelu	1
		Mathaayoni	1
		Maumbuni	1
		Ndeini	1
		Ngeyani	1
		Windiu	1
		Yala	1
	Kiundwani	Wimboo	1
	Mulili	Yiiyani	1
	Muuni	Kanaani	1
		Kavoleni	1
		Kithimani	2
		Kwa Mbui	1
		Mauluni	3
		Mwaani	2
		Siungani	1
		Uvileni	1
	Ndovoini	Kithioni	1
	Thange	Mukameni	1
Nthongoni	Ivingoni	Makutano	1
	Makindu	Kasitamu	1
	Mang'elete	Ivingoni	2

Location	Sub-location	Village	No. HHs
		Kambusya	1
		kiambani	1
		Kitheini	1
		Kiuani	1
		Kiundwani	2
		Kivuthini	1
		Kongo	1
		Lamini	1
		Maia Atatu	1
		Makutano	2
		Mangelete	1
		Matithini	2
		Mbembani	1
		Mbotela	1
		Mbulutini	2
		Miamani	1
		Miitasyano B	1
		Mikauni	1
		Milelani	1
		Mitamaiyo	1
		Mukameni	1
		Mukanda	1
		Nzayo	1
		Timboni	1
		Wikiliilye	1
		Yumbuni	1
Nzambani	Iiani	Iiani	1
	Muthingiini	Iiani	1

Location	Sub-location	Village	No. HHs
		Kativani	1
		Kithayoni	1
		Mbenuu	1
		Mikameni	1
		Uiini	1
	Mwithingiini	Nzambani	1
Utithi	Kinyambu	Kyazili	1
		Muthungue	1
	Thange	Isunguluni	2
		Ithimani	1
		Itumo	3
		Iyiani	1
		Kalamba	1
		Kamunyuni	1
		Kasarani	1
		Kasasule	2
		Katangi	1
		Kiukuni	1
		Kiundwani	1
		Kyandani	1
		Maikuu	2
		Metava	1
		Muthungue	1
		Muumoni	1
		Muusini	3
		Ndulaka	2
		Nduti	1
		Nthilani	1

Location	Sub-location	Village	No. HHs
		Thange	1
		Usalama	2
		(blank)	1
	Utithi	Ivoleni	1
		Kathiani	1

Location	Sub-location	Village	No. HHs
		Kiaoni	1
		Kithemboni	1
		Kitulu	1
		Mitooni	1
		Utithi	3