



KARIBA REDD+ PROJECT

MONITORING REPORT 2019-2021



Document Prepared by South Pole

www.southpole.com

Project Title	Kariba REDD+ Project
Project ID	902
Version	4
Report ID	1
Date of Issue	01/08/2022
Project Location	Northern Zimbabwe (Provinces of Matabeleland North, Midlands, Mashonaland West and Mashonaland Central)
Project Proponent(s)	Carbon Green Investments (CGI) Contact name: Steve Wentzel Email: steve@carbongreenafrica.net Phone: +263 77 417 4025
Prepared By	South Pole Email: info@southpole.com Phone: +57 4 520 5000
Validation/Verification Body	AENOR Jose Luis Fuentes Génova 6. 28004 Madrid- Spain. Phone: +34 914326000 Email: jfuentes@aenor.com aenor.com
GHG Accounting/Crediting Period	For VCS, the project crediting period is 30 years, extending from 1 July 2011 to 30 June 2041. For CCB, the project crediting period is 30 years, extending from 1 October 2011 to 30 September 2041.
Monitoring Period of this Report	From 1 July 2019 to 30 June 2021
History of CCB Status	Validation Approved: CCB Standards Second Edition, Climate Adaptation & Biodiversity Gold Level (8 February 2012) Verification Approved (first verification): CCB Standards Second Edition, Climate Adaptation & Biodiversity Gold Level (24 July 2014) Verification Approved (second verification): CCB Standards Second Edition, Climate Adaptation & Biodiversity Gold Level (30 June 2017) Verification Approved (third verification): CCB Standards Second Edition, Climate Adaptation & Biodiversity Gold Level (3 January 2020)
Gold Level Criteria	The Kariba REDD+ Project (KRP) maintains two Gold Level criteria, Climate Change Adaptation Benefits and Exceptional Biodiversity Benefits. The project's activities provide substantial contributions to climate change adaptation through its activities in conservation farming and beekeeping. Conservation farming techniques are more drought-adapted than conventional agriculture, and beekeeping provided

alternative livelihoods, which is a broadly accepted measure to adapt to climate change. Both conservation farming and beekeeping have been successfully promoted by the project during this monitoring period.

From 1 July 2019 to 30 June 2021, over 10,000 participants benefited from trainings and workshops on improved agriculture, and 18 community gardens are currently active in the project area. The project also promotes beekeeping as an alternative and environmentally friendly source of income. From 1 July 2019 to 30 June 2021, over 1,500 participants benefitted from trainings and workshops on beekeeping in the project area. In addition, 137 boreholes were maintained, resuscitated, or repaired during this monitoring period.

The exceptional Biodiversity Benefits are guaranteed through anti-poaching activities such as snare removal and patrolling to release the pressure on wildlife and conservation farming and beekeeping that reduce deforestation. From 1 July 2019 to 30 June 2021, 3,930 team-days were spent patrolling, and 3,739 snares were removed from the field, which means a substantial decrease in pressure on the local wildlife. The exceptional Biodiversity Benefits are based on the broad range of endangered and vulnerable animals, which occur in the project area. During this monitoring period, 5,200 team-days were spent monitoring wildlife with 17 different threatened species being sighted in the project area. Species include, painted dog (EN), elephant (EN), lion (VU), leopard (VU) and cheetah (VU).

Table of Contents

1	Summary of Project Benefits	5
1.1	Unique Project Benefits.....	5
1.2	Standardized Benefit Metrics	7
2	General	11
2.1	Project Description	11
2.2	Project Implementation Status	17
2.3	Stakeholder Engagement.....	22
2.4	Management Capacity and Best Practices	25
2.5	Legal Status and Property Rights	30
3	Climate.....	32
3.1	Monitoring GHG Emission Reductions and Removals	32
3.2	Quantification of GHG Emission Reductions and Removals	103
3.3	Optional Criterion: Climate Change Adaptation Benefits	110
4	Community	111
4.1	Net Positive Community Impacts	111
4.2	Offsite Stakeholder Impacts	118
4.3	Community Impact Monitoring	119
4.4	Optional Criterion: Exceptional Community Benefits	149
5	Biodiversity	149
5.1	Net Positive Biodiversity Impacts	149
5.2	Offsite Biodiversity Impacts.....	153
5.3	Biodiversity Impact Monitoring	154
6	Additional Project Implementation Information.....	166
7	Additional Project Impact Information.....	166

1 SUMMARY OF PROJECT BENEFITS

The project has proven successful in reducing deforestation in the project area. Since the project start, over 41,955,689 tCO₂e of greenhouse gas emissions have been avoided through the reduction of deforestation. The climate benefits are also certified under the Verified Carbon Standard (VCS).

With regards to community benefits, the project includes a wide range of activities that have direct positive effects on communities. Farmers are trained for conservation agriculture. Community gardens are established and provide improved nutrition. From July 2019 to June 2021, over 10,000 participants benefited from several workshops, and 18 community gardens are currently active in the area. The project also promotes beekeeping as an alternative and environmentally friendly source of income. From July 2019 to June 2021, 71 beekeeping workshops have been held across the project area. This activity has 1,552 beneficiaries as workshop participants. In addition, 137 boreholes were maintained, resuscitated, or repaired between July 2019 and June 2021. Schools and hospitals in the project area are also supported by the project. Fire management continues to be a very important activity to reduce forest loss through firefighting training workshops, awareness meetings and early burning. Fuel wood plantations are still in initial stages and brickmaking activities are planned and subject to the availability of funding and finding an alternative that is cheaper than locally made bricks.

During a comprehensive survey carried out with 380 people in early 2021, most interview partners reported being satisfied or very satisfied with the project. No interview partners reported being unsatisfied. For employees and direct beneficiaries, the project has had a positive impact on livelihoods, food security, education and healthcare. No participant reported being restricted in use of the forests for basic livelihood or cultural needs. No grievances have been received to-date through the survey or other channels.

During this monitoring period, 5,200 team-days were spent monitoring wildlife with 17 different threatened species being sighted in the project area. The project's biodiversity benefits include a decrease in poaching pressure on wildlife through regular patrolling, in close cooperation with the local Rural District Councils (RDCs). From July 2019 to June 2021, 3,930 team-days were spent patrolling, and 3,739 snares were removed from the field, which means a substantial decrease in pressure on the local wildlife.

1.1 Unique Project Benefits

Outcome or Impact	Achievements during the Monitoring Period	Section Reference	Achievements during the Project Lifetime
1) Food security enhancement	10,061 community members were trained in improved agriculture (conservation farming and community gardening) during this monitoring period.	4.3.2	Community gardens and conservation farming has trained 22,504 people since the project started.
2) Alternative sources of income and forest conservation	Beekeeping is an alternative and environmentally friendly source of income as well	4.3.2	Beekeeping is an alternative and environmentally friendly source of income as well

	as an efficient forest conservation activity. There have been 1,552 beneficiaries from this activity, as workshop participants. 81 people also benefited from participating in workshops focused on tree planting and seedling production during this monitoring period.		as an efficient forest conservation activity. There have been 6,639 beneficiaries from this activity, as workshop participants. To date 962 people have benefited from participating in workshops focused on tree planting and seedling production since the project start.
3) Improved education	USD 14,775 was spent on schools during this monitoring period	4.3.2	Over USD 48,400 has been spent on schools since project start.
4) Improved healthcare	USD 9,180 was spent on clinics during this monitoring period.	4.3.2	USD 32,676 has been spent on clinics since the project start.
5) Forest cover conservation	Early burning is part of fire management activities and are essential to prevent forest fires. Early burning covered 2,452 km during this monitoring period.	4.3.2	Early burning covered over 5,750 km from 1 July 2014 to 30 June 2021.
6) Biodiversity conservation	17 vulnerable and endangered species protected.	5.3.2	17 vulnerable and endangered species protected.

1.2 Standardized Benefit Metrics

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
GHG emission reductions & removals	Net estimated emission removals in the project area, measured against the without-project scenario	Not applicable		Not applicable
	Net estimated emission reductions in the project area, measured against the without-project scenario	7,889,849 tCO ₂ e in the project area during this monitoring period. After the deduction of 14% for the risk buffer credits, the net VCUs to which the project is eligible for are 6,785,270 tCO ₂ e	3.2	41,955,689 tCO ₂ e since project start. After the deduction for risk buffer credits, the net VCUs are 35,801,636 tCO ₂ e during the project lifetime.
Forest ¹ cover	For REDD ² projects: Number of hectares of reduced forest loss in the project area measured against the without-project scenario	Data not available: methodology VM0009 model predicts cumulative emissions over time rather than a rate of ecosystem conversion in hectares per year.		Data not available: methodology VM0009 model predicts cumulative emissions over time rather than a rate of ecosystem conversion in hectares per year.
	For ARR ³ projects: Number of hectares of forest cover increased in the project area measured against the without-project scenario	Not applicable		Not applicable

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

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

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

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
Improved land management	Number of hectares of existing production forest land in which IFM ⁴ practices have occurred as a result of the project's activities, measured against the without-project scenario	Not applicable		Not applicable
	Number of hectares of non-forest land in which improved land management has occurred as a result of the project's activities, measured against the without-project scenario	Data not available ⁵		Data not available
Training	Total number of community members who have improved skills and/or knowledge resulting from training provided as part of project activities	11,694 people have improved skills and/or knowledge resulting from training in improved agriculture, beekeeping, and seedling production.	4.3.2	30,105 people have improved skills and/or knowledge resulting from training in improved agriculture, beekeeping, and seedling production since the project start.
	Number of female community members who have improved skills and/or knowledge resulting from training provided as part of project activities of project activities	5,972 female community members who have improved skills and/or knowledge resulting from training in improved agriculture (5,393) and beekeeping (579).	4.3.2	Over 9,500 since project start.

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

⁵ Although this figure is not monitored directly, it is estimated that each person implementing conservation farming techniques implements the techniques in approximately 1 ha of land.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
Employment	Total number of people employed in of project activities, ⁶ expressed as number of full time employees ⁷	21 people	2.4.2	22 people
	Number of women employed in project activities, expressed as number of full time employees	2 women	2.4.2	2 women
Livelihoods	Total number of people with improved livelihoods ⁸ or income generated as a result of project activities	Data not available		Data not available
	Number of women with improved livelihoods or income generated as a result of project activities	Data not available		Data not available
Health	Total number of people for whom health services were improved as a result of project activities, measured against the without-project scenario	Data not available		Data not available
	Number of women for whom health services were improved as a result of project activities, measured against the without-project scenario	Data not available		Data not available
Education	Total number of people for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario	Data not available		Data not available
	Number of women and girls for whom access to, or quality of, education was improved as a result of project	Data not available		Data not available

⁶ Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.

⁷ Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])

⁸ Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. *The Sustainable Livelihood Approach to Poverty Reduction*. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	activities, measured against the without-project scenario			
Water	Total number of people who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	34,250 ⁹	4.3.2	44,500
	Number of women who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	Data not available		Data not available
Well-being	Total number of community members whose well-being ¹⁰ was improved as a result of project activities	Data not available		Data not available
	Number of women whose well-being was improved as a result of project activities	Data not available		Data not available
Biodiversity conservation	Change in the number of hectares significantly better managed by the project for biodiversity conservation, ¹¹ measured against the without-project scenario	784,987 hectares	3.2.1	784,987 hectares

⁹ For boreholes, a conservative number of 250 people impacted by each borehole was considered.

¹⁰ Well-being is people's experience of the quality of their lives. Well-being benefits may include benefits reported in other metrics of this table (e.g. Training, Employment, Health, Education, Water, etc.), but could also include other benefits such as empowerment of community groups, strengthened legal rights to resources, conservation of access to areas of cultural significance, etc.

¹¹ Biodiversity conservation in this context means areas where specific management measures are being implemented as a part of project activities with an objective of enhancing biodiversity conservation.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	Number of globally Critically Endangered or Endangered species ¹² benefiting from reduced threats as a result of project activities, ¹³ measured against the without-project scenario	6 vulnerable and endangered species	5.3.2	6 vulnerable and endangered species

2 GENERAL

2.1 Project Description

2.1.1 Implementation Description

The Kariba REDD+ Project is located in northwestern Zimbabwe, partly along the southern shore of Lake Kariba, the largest artificial lake in the world by volume. The project area of 784,987 hectares of forest (consisting of woodland and open woodland) spans four provinces: Matabeleland North, Midlands, Mashonaland West and Mashonaland Central. The project is administered by four Rural District Councils (RDCs): Binga, Nyaminyami, Hurungwe and Mbire.

The project is community based and consists of implementation of activities in conjunction with the local population. The project, which started on July 1, 2011, is estimated to reduce net GHG emissions by 196,513,929 tCO₂e over the project lifetime¹⁴.

The main causes of deforestation are socioeconomic (subsistence agriculture, the collection of firewood and poaching activities) and settlements. Decreasing deforestation is to be achieved through a series of activities that are designed to significantly improve the livelihood of locals, through improved agriculture, beekeeping, fuel wood plantations and fire management. The implementation of project activities is an ongoing effort.

In addition, a significant share of the project's carbon income is invested in general activities that promote and guarantee project sustainability. The project's Community and Project Sustainability Fund is structured to benefit entire communities, specifically including the poorest members of society. The fund is used to improve health and education in the project area through longer-term activities.

The project area lies within the Zambezian biome of the Zambezi basin¹⁵. The major ecosystem includes mopane and miombo woodland. The project area is an important wildlife area, with significant populations of African elephants, lions, impalas, hippos, buffalo, leopard and crocodiles, along with a wide variety of birds.

¹² Per IUCN's Red List of Threatened Species

¹³ In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit

¹⁴ See validated PDD.

¹⁵ Timberlake, J. (2000), Biodiversity of the Zambezi basin. Occasional Publications in Biodiversity No. 9, Biodiversity Foundation for Africa, Bulawayo, Zimbabwe. Available online at: <http://bit.ly/1Xjsa77>

There is no significant income to offset the cost of the activities to mitigate deforestation without carbon revenues. In the absence of active protection that creates sustainable economic alternatives for communities, the land in the project area will be cleared for non-sustainable alternative land-use scenarios such as agriculture and fuelwood collection (see the validated CCB PDD for more details).

The project boundary includes CO₂ emissions in the project and the baseline scenario and includes the following carbon pools:

- Above-ground (large & small) tree biomass
- Above-ground non-tree (shrub) biomass
- Below-ground (large-and small) tree biomass
- Below-ground non-tree (shrub) biomass
- Standing dead wood
- Soil

Long-lived wood products have been proven and validated¹⁶ to not occur in the project area and are therefore not monitored. Biomass of large and small trees is not separated as discussed in the VSC PDD, Section 2.3.

The total GHG emission reduction generated in the monitoring period from 1 July 2019 to 30 June 2021 is 7,889,849 tCO₂e. The major project climate, community and biodiversity objectives are the same as those validated in the CCB PDD (for CCB G3.1, please refer to page 30 of CCB PDD).

Leakage is monitored using 50 leakage plots in the reference area for every monitoring period. There are no major non-permanence risk factors during the monitoring period, however, in case any non-permanence risk arises, they are discussed as part of the adaptive management process. Forest fires are considered a risk, especially during the dry season, but they are mitigated in the area through early burning and road maintenance activities.

2.1.2 Project Category and Activity Type

Project Scope: 14. Agriculture, Forest and other Land Use (AFOLU).

Project Category: Reduction Emission from Deforestation and Degradation (REDD).

Type of Activity: Avoided Mosaic Deforestation and Degradation.

The project is not a grouped project.

2.1.3 Project Proponent(s)

Carbon Green Investments Guernsey (CGI) is the project proponent in partnership with the landowners of Binga RDC, Hurungwe RDC, Nyaminyami RDC and Mbire RDC. CGI is a Guernsey-based company that was established to facilitate REDD+ projects in Zimbabwe. CGI is the project's central entity involved in project management, development, implementation, and operation, both from a technical and a financial perspective.

Carbon Green Africa (CGA) is a private company founded to implement and manage the Kariba REDD+ Project. Carbon Green Investments (CGI), the official project proponent, holds the majority of CGA. CGI contracts CGA as local project implementer and overseer. CGA's mandate is to work with council and community to ensure that the community project activities and direct inputs are correctly implemented and assist in the ongoing maintenance of these. CGA is also required to do the biodiversity monitoring and conservation in conjunction with each council, as well as the monitoring of social and climate impacts.

¹⁶ See validated PD, section 2.4.6.4.

Expertise in project development, carbon monitoring and accounting is provided by South Pole Carbon Asset Management Ltd. (South Pole)¹⁷, a globally active carbon project developer and consultant, with a successful track record in forest-based carbon projects.

See the table below and those in the following section (Section 2.1.4) for the contact information and roles and responsibilities of these entities.

Organization name	Carbon Green Investments (Guernsey)
Contact person	Steve Wentzel
Title	Manager
Address	18–20 Le Pollet Street St. Peter Port Guernsey UK, GY1 1WH
Telephone	+263 77 417 40 25
Email	steve@carbongreenafrica.net

2.1.4 Other Entities Involved in the Project

Organization name	South Pole Carbon Asset Management (South Pole)
Role in the project	Project Developer South Pole elaborates and oversees the development of appropriate project design and monitoring techniques in line with the guidelines of the VCS and CCBS.
Contact person	Jhoanata Bolívar
Title	Head of AFOLU Projects
Address	Technoparkstrasse 1 8005 Zurich Switzerland
Telephone	+41 43 501 35 50
Email	j.bolivar@southpole.com

Organization name	Carbon Green Africa (CGA)
Role in the project	Project Implementer CGA is a 100% subsidiary of the project proponent Carbon Green Investments. CGA is operating the monitoring and project activities of the Kariba REDD+ Project.
Contact person	Pieter Bezuidenhout
Title	Project Implementer

¹⁷ For more information visit: www.southpole.com

Address	32 Domboshawa Road Helensvale Harare Zimbabwe
Telephone	+263 774 567 729
Email	pieter@carbongreenafrica.net

2.1.5 Project Start Date (G3.4)

The project start date for VCS is 1 July 2011 and for CCB is 1 October 1, 2011.

2.1.6 Project Crediting Period (G3.4)

The project crediting period is 30 years. The start date of the crediting period for CCB is 1 October 2011, the end date is 30 September 2041. The crediting period for VCS is also 30 years, starting 1 July 2011 and ending 30 June 2041. The implementation of the management structure and activities addressing the deforestation drivers began on 1 July 2011. This included research and fieldwork as well as management and protection work such as reporting, communication, capacity and control activities.

In addition, all bilateral agreements for the verified emission reductions between CGI and the RDC were signed before the project start date in March 2011 (for Binga, Hurungwe, Mbire and Nyaminyami). Supporting documentation has been separately provided to the auditor upon project validation.

The baseline will be reassessed every 10 years after the project start date during the crediting period and is validated at the same time as the subsequent verification. The baseline will thus be re-assessed after 30 June 2021 and revalidated together with the next verification.

2.1.7 Project Location (G3.3)

The Kariba REDD+ Project is located in northwestern Zimbabwe, partly along the southern shore of Lake Kariba, the largest artificial lake in the world by volume. The project area spans four provinces: Matabeleland North, Midlands, Mashonaland West and Mashonaland Central. The project is administered by four Rural District Councils (RDCs): Binga, Nyaminyami, Hurungwe and Mbire. The project is community based and implements activities in conjunction with the local population. As the affected communities all live within the boundaries of the project area, under CCBS, the project zone equals the project area in this project. A brief description of the four participating RDCs is given below.

Binga: The Binga RDC area is located in the Matabeleland North province. It encompasses a prime wildlife area that includes 22 kilometres of Lake Kariba's shoreline. It serves as a corridor, connecting the Chizarira National Park, the Omay South Wildlife Area and the Matusadona National Park. The resulting area makes for a vast and contiguous wildlife area that is roughly 900,000 ha in size.

Nyaminyami: The Nyaminyami RDC area lies in the district of Kariba in the province of Mashonaland West. The Nyaminyami forest connects the Matusadona National Park with the Charara Safari Area. It shares borders with the Binga RDC area. Ecotourism is popular in Nyaminyami, and the most popular ecotourism destination is the shore of Lake Kariba, which has several fishing and safari camps.

Hurungwe: The Hurungwe RDC lies in a remote, rural part of the province of Mashonaland West. It is adjacent to Mana Pools National Park.

Mbire: The Mbire forest area lies within the province of Mashonaland Central. It serves as a corridor between Mana Pools National Park in the northwest and the Umfurudzi Safari Area in the southeast.

The description of project location and basic physical parameters are the same as those validated on CCB PDD. For CCB G1.1, please refer to page 3 of CCB PDD. The boundaries of the project area and the project zone are the same as those validated on CCB PDD36. For CCB G1.3, please refer to page 11 of CCB PDD as no changes occurred since validation. Maps on project location and boundaries are the same as those validated on the CCB PDD. For maps on CCB G3.3, please refer to page 36 of CCB PDD. See Figure 1 and Figure 2 for more details. There have been no changes since validation.

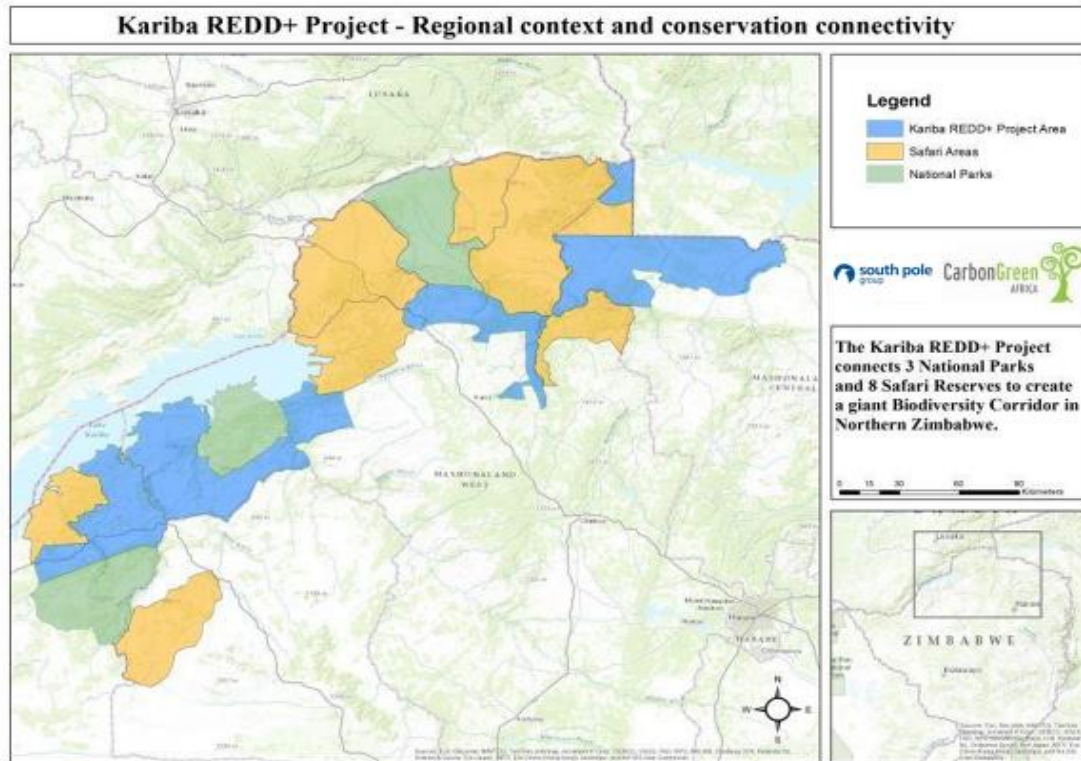


Figure 1: Location of the project

Kariba REDD+ Project - Location of project areas

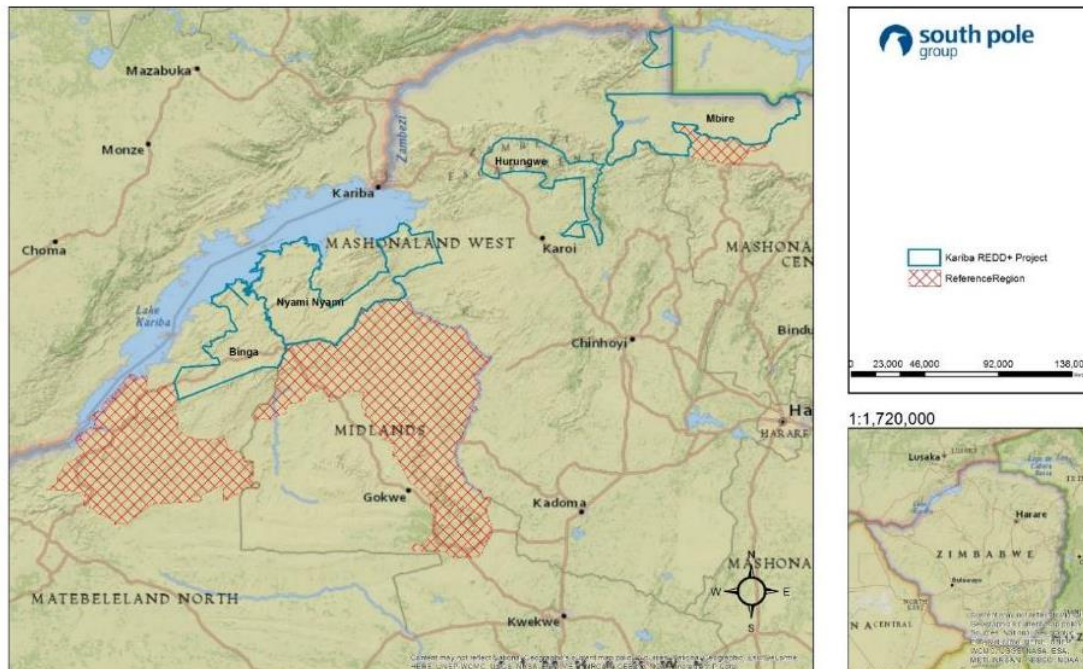


Figure 2: Location of the project and reference areas

2.1.8 Title and Reference of Methodology

The Kariba REDD+ project follows the framework of Reducing Emissions from Deforestation and Degradation (REDD) through Avoid Mosaic Deforestation of Tropical Forests using methodology VM0009 version 1.1 approved 10 November 2011.

The latest version of the AFOLU Non-permanence Risk Tool (version 4.0) was also used.

2.1.9 Other Programs (CL1.5)

The project has not been registered nor is it seeking registration under any other GHG programme. The project has not sought or received another form of social or environmental credit.

2.1.10 Sustainable Development

The country of Zimbabwe was part of the 2017 Voluntary National Review of the High-Level Political Forum on Sustainable Development and has submitted its Voluntary National Review (VNR) of SDGs for the High-Level Political Forum in July of 2017. The country has committed fully to the Agenda 2030¹⁸. Zimbabwe has committed to implementing all the SDGs with an emphasis on SDGs 2, 3, 4, 5, 6, 7, 8, 9, 13 and 17¹⁹. The Kariba REDD+ Project contribute to numerous SDGs through its project activities and some of the indicators related to the SDGs at the end of this monitoring period are presented below.

SDG 1: No Poverty

¹⁸ Sustainable Development Goals Knowledge Platform. Available at: <https://sustainabledevelopment.un.org/memberstates/zimbabwe>

¹⁹ Zimbabwe Voluntary National Review (VNR) of SDGs For the High Level Political Forum. Available at: <https://sustainabledevelopment.un.org/content/documents/15866Zimbabwe.pdf>

- Over 10,000 community members were trained in improved agriculture (conservation farming and community gardening) during this monitoring period.
- Over 22,000 community members have been trained in improved agriculture (conservation farming and community gardening) since the project start.

SDG 2: Zero Hunger

- Over 12,900 people implementing conservation farming techniques during this monitoring period.
- 21 community gardens have been established/supported.

SDG 3: Good Health and Well-Being

- 18 nutritional gardens established/supported.
- Over 17 health clinics supported.
- USD 9,180 spent on clinics during this monitoring period and over USD 32,600 spent on clinics since project start.

SDG 4: Quality Education

- 11,694 people benefiting from training activities during this monitoring period and over 30,100 people trained during the project lifetime.
- Over 46 schools in the project area are benefiting from improved education.
- USD 14,775 spent on schools during this monitoring period and over USD 48,400 spent on schools in the project area since project start.

SDG 6: Clean Water and Sanitation

- Approximately 34,250 people provided with access to safe water through borehole resuscitation and maintenance during this monitoring period.

SDG 8: Decent Work and Economic Growth

- 21 permanent jobs created by the project.
- Approximately 16,000 people benefiting from community gardening during this monitoring period.
- Over 12,000 people practicing conservation farming during this monitoring period.
- Over 10,000 kilograms of honey harvested by beekeepers during this monitoring period.

SDG 13: Climate Action

- 7,889,849 tCO₂e in the project area during this monitoring period. After the deduction of 14% for the risk buffer credits, the net VCUs to which the project is eligible for are 6,785,270 tCO₂e

SDG 15: Life on Land

- 784,987 hectares of land conserved.

2.2 Project Implementation Status

2.2.1 Implementation Schedule (G3.4)

Date	Milestone(s) in the project's development and implementation
------	--

1 July, 2011	Project implementation team established. Training and capacity building of the project implementation team began. This training and capacity building was conducted by Black Crystal and Environment Africa.
July, 2011	Biomass plots (PSPs) established and first biomass sampling conducted.
1 October, 2011	Community outreach activities concluded. This included community meetings, stakeholder engagement activities, training, community baseline surveys etc. RDC offices fully established and equipped.
October 2011, until present	The main project activities, namely Improved Agriculture, Beekeeping, Fire Management, Newsletter publication, Community and Project Sustainability Fund supporting schools and clinics as well as On the Ground Management Teams activities such as maintenance and resuscitation of boreholes, community meetings, monitoring of biodiversity are ongoing activities that are being implemented since the project start date. For further information on these activities for this monitoring period, please refer to the results sections for the Climate, Biodiversity and Community.
Early 2016	The fuelwood plantation activity, which includes Eucalyptus planting as well as multipurpose trees such as fruit trees and <i>Moringa oleifera</i> started in early 2016.
Late 2018	The biogas digester was installed in the Chitsungo Hospital in Mbire District and commissioned in October.
Early 2021	Installation of 140,000 litre rainwater harvest system for the Chikova Secondary School Garden.

2.2.2 Methodology Deviations

No methodology deviations different than the ones mentioned in the validated VCS PD were applied during this monitoring period.

2.2.3 Minor Changes to Project Description (Rules 3.5.6)

No minor changes to Project Description have occurred during this monitoring period.

2.2.4 Project Description Deviations (Rules 3.5.7 – 3.5.10)

Black Crystal and Environment Africa were listed as other entities involved in the project in the validated PDDs (VCS and CCB). After the initial validation and verification of the first monitoring period both these entities left the project and have not been involved in project activities in subsequent years. Section 2.1.4 of this monitoring report has been updated to reflect that these entities are no longer involved in the project.

Some minor deviations were applied for the third VCS monitoring period and gap validation was performed to allow the project developer to use the same climate method under CCB and VCS (refer to the third Monitoring Report going from 1 July 2014 to 30 June 2016, Section 4.2, pages 37 and 38). Also, the biomass SOP was updated during the second VCS monitoring period (refer to the second VCS Monitoring Report from 1 July 2012 to 30 June 2014, Section 2.2.2, pages 22 and 23).

After the third monitoring period (1 July 2014 to 30 June 2016) an analysis of uncertainty was conducted on the soil plots data, and it was determined that 6 sample plots (Forested) could be removed from the analysis. The uncertainty when considering only two strata (woodland and open woodland) only reduced after the removal of more than 7.5 plots. It was therefore decided to remove 3 plots from Open woodland and 3 plots from Woodland strata. After a random selection of plots, two plots were replaced - NY090 and M118. Those are replaced by plots B002 and H038. All the others remain the same.

2.2.5 Risks to the Project (G3.5)

For a detailed description of natural and human-induced risks to the expected climate, community and biodiversity benefits and the measures adopted to mitigate these risks, please refer to the validated CCB PDD, Section G3.5, page 37. Fire risks are mitigated through the project's fire management activities. For a description of this activity during the period under review, please refer to Section 4.3.2 of this document. The political and land-tenure risks identified in the validated CCB PDD established are no longer seen as significant risks to the project and are continued to be successfully mitigated through cooperation with local communities, chiefs, RDCs and the long-term contract that were signed with the RDCs covering the lifetime of the project.

The project does however follow an adaptive management process and other risks have been identified and discussed as part of this adaptive management process²⁰.

Risks identified during the adaptive management meetings that took place during this monitoring period include the following topics:

Lack of water source for community gardens

Water is crucial for the community gardens because this activity is mainly carried out during the dry season.

The Nyamakate Primary School Garden borehole collapsed during this of monitoring period. This garden has been very productive in the past. The project team has done an assessment and evaluation of the problem and have discovered that there is a significant obstruction in the borehole that is preventing the pump from accessing the bottom of the hole to benefit from the full volume of water available. Presently the borehole has a very limited supply of water from near the surface, so garden productivity is adversely affected. The project intends to drill a new borehole to resolve the problem soon.

The Chikova Secondary School Garden was established in early 2021 with a well as the primary source of water, but after the previous three years of poor rainfall it dried up and the garden came to a standstill. The project has drilled two new sites for boreholes, but unfortunately these were also dry holes. So now a 140,000-litre rainwater harvest tank has been installed and is ready to receive its first water inflow this next coming rain season.

The solar system in the Muceni Garden, mentioned in the previous report to provide constant water to the pipeline, has been completed and this issue is considered to be resolved.

The members of the Kubatana Garden are managing this garden very well; however, they share the borehole water with the general community and therefore productivity decreases during the dry months and conflict increases over the use of this water source. The solution to this problem is to drill a new borehole for the garden. The project intends to do this in the coming months to resolve this problem.

The project has not found a new place for the Musampakaruma Garden to be established. The primary school where it was hoped it could be shared has not materialised because of fears that the available water was insufficient to support both the school and the garden. At present, the community members have decided to put the garden establishment on hold until a clear way forward is established by the community members.

COVID-19 lockdown restrictions

One of the biggest challenges faced during this monitoring period was the inability to carry out training due to the COVID-19 lockdown restrictions. As a mitigating strategy, the team attempted to visit individual households, but due to the large size of the project this was not very efficient. The project team expects these impacts to stop once the COVID-19 pandemic is no longer a threat locally or globally.

²⁰ Minutes of the 2019 to 2021 meetings are provided in the Supporting Documents, 2_General/Adaptive Management Plan, Adaptive Management Meeting.

The Mazinga School Garden is suffering due to ongoing COVID-19 lockdowns that have forced the schools to shut and therefore there is no productivity. The project team remains hopeful that once this pandemic is over the school functionality will return to normal, as well as the garden productivity.

The Kariba REDD+ project has also managed to re-start eight small nurseries. One is a school nursery that has been revived after the COVID-19 lockdown and the other seven micro nurseries are community based, that at most produce a few thousand seedlings. Due to the current unpredictable COVID-19 restrictions and the risk of these nurseries collapsing due to extended lockdowns, the project team believe that keeping the nurseries small for now will be a good foundational base to expand from once COVID-19 restrictions are lifted.

Degraded beehives

As part of the projects management strategy, the project teams intend to replace old broken hives with new hives. During this monitoring period an assessment has been done to determine the number of active beekeepers so that the project team has a record of who the new replacement hives will be distributed to. Following on from this assessment, a total of 200 new beehives were distributed to beekeepers identified in each district to replace the degraded hives. This matter is now considered to be resolved. As a general note, honey production was seen to have increased because of the new hives.

Under application of mulch

Application of mulch is recommended for conservation farming because it conserves moisture in the soil and improves the crops' continued growth, when compared with crops without mulching. Some farmers didn't apply mulch and had their yield reduced, or lost it completely, when compared to the farmers that applied mulch, especially in the last severe dry season. Mulching is covered in all trainings, and this is mainly due to lack of discipline of the individual farmers. During this monitoring period the project team significantly increased the trainings and demonstration plots in each ward. This significantly improved the knowledge base and increased uptake of mulching was witnessed as compared to previous seasons. This past rain season was above average rainfall and although some specific locations suffered with water logging, most areas produced a very good crop. In general, conservation farming was very successfully implemented this monitoring period.

Illegal settlements and deforestation

Due to population growth, illegal settlements causing deforestation is one of the greatest challenges. Illegal settlements and deforestation remain a challenge during this monitoring period and the project continues to follow protocol by engaging the relevant authorities on the ground, such as local council, forestry departments and chiefs to resolve this. All incidences of illegal settlements and deforestation are reported to the local authorities. The project team also continues to engage with the general communities regularly through awareness raising campaigns.

Illegal fires

Although illegal settlements, deforestation and fire continue to be a challenge and are addressed frequently with the communities and rural district councils as well as other relevant authorities, the project team have noticed reduced frequencies of fires reported. We attribute this to the ongoing awareness and efforts to maintain roads and early burning. The project involves the local communities to actively participate in the early burning exercise and road maintenance and this has resulted in far greater awareness in general where more communities are deciding not to burn their areas because they have realised they can better care for their domestic animals this way and also have more readily available construction material for their homes such a grass for roofing.

This is further supported by the increased amount of early burning done, increased kilometres of roads maintained, and increased number of village and household fireguards established, and lastly, the ongoing

fire awareness campaigns and general awareness meetings held in conjunction with all the relevant authorities.

Climate change

No newly emerging risks about climate change have been identified.

Poaching

Poaching is a persistent human-induced risk for the expected biodiversity benefits of the project and the wildlife population inside the project area; however, the project proponent implements anti-poaching activities such as snare removal and patrolling to release the pressure on wildlife. Through the implementation of those mitigation measures, the project has successfully reduced pressure on biodiversity caused by severe poaching.

Health and safety risks to employees

It should also be noted that project employees may face some risk while conducting their duties. Although most job descriptions identified are not considered to be high risk it is accepted that there is always the element of risk of accidents and injury. Each employee needs to be fully informed of these risks before official employment commences. The main risks project employees may face include, vehicle/motorbike accident, malaria, dangerous animals, armed poachers and injuries associated with firefighting activities.

In order to mitigate these risks all project employees are expected to drive at a safe speed (adhere to the maximum and minimum speed limits as set by the laws of the country) and possess a valid driver's license. Furthermore, all vehicles need to be constantly maintained to ensure they are in good operating order.

All game scout that may encounter poachers or dangerous animals have received sufficient training in self-protection and antipoaching before employment and further refresher training by the project at the start of employment (and at regular intervals after employment has began). Each scout must wear the protective clothing provided by the project at all times while on duty. Each game scout must make sure they carry all tools such as handcuffs for the apprehension of poachers whilst on patrol. Game scouts on patrol are required to report to OGM teams on a regular basis to confirm there is no health or project related issues.

All staff are also required to wear the personal protective clothing that is provided by the project and each manager is to have a first aid kit with contents sufficient to treat minor injuries and medicines to treat common illnesses and malaria. The first aid kit must be checked frequently and updated whenever necessary.

Finally all OGM team members must always have a list of relevant medical emergency numbers to call if a serious injury ever occurs.

2.2.6 Enhancement of High Conservation Values (G3.6)

Conservation of threatened species—those with identified natural high conservation value (HCV1)—lies at the core of the Kariba REDD+ project's activities. By reducing the deforestation rate in the project area, the project preserves the habitat for endangered and vulnerable species. Anti-poaching patrolling addresses the intensive poaching challenge. See Section 5 for more details on the HCV associated with biodiversity.

The high conversation values related to the communities (HCV5 and HCV6) are maintained by our community-based approach. We aim to change natural resource management by setting incentives, providing viable alternatives to deforestation, and through education. Namely, access to forest lands is not restricted. Thereby, the cultural value of the woodlands for the locals is preserved. The supply of building material for housing also is not restricted. See Section 4 for more details on the HCVs associated with communities.

2.2.7 Benefit Permanence (G3.7)

The project activities are designed to be financially self-sufficient in the long run. By opening new sources of income, and after initial investments have been made and capacity reaches a certain level, the local population will be able and willing to continue with the project activities to generate additional income through the production of honey and increased agricultural yields. Thus, we expect all project activities to continue far beyond the lifetime of the project. In addition, the Kariba REDD+ Project has set up a sustainability fund (also known as the Longevity Trust) which receives a portion of net revenues from carbon sales. The fund is managed by The Kariba Trust and is made up of 6 Trustees (majority of whom are independent). The Kariba Trust is responsible for managing and investing the longevity fund and future allocations of this fund after the 'end' of the project. The Trust also has a sub-committee which is made up of one senior representative from each district (government representatives) involved in the project. The sub-committee is responsible for allocating the community portion of net revenue to the various Community Share trusts within the various districts. The Community Share Trusts were set up by Government predating the project to manage local matters such as resource allocation and dispute resolution (they are made up of representatives of all local stakeholders Chiefs, Headmen, local leadership, Government Representatives and all private stakeholders in the area). The Community Share Trusts have proven to be efficient and well respected on the ground. All these process/institutions will continue to operate after the project period crediting period and aim to ensure long term sustainability in the project area. This fund will ensure that the basic project activities will be continued for at least a total of 100 years. During this monitoring period (as in all previous monitoring periods) a portion of all net revenues from the sale of carbon credits has been contributed toward the fund as outlined in the benefit sharing mechanism.

2.3 Stakeholder Engagement

2.3.1 Community Consultation (G3.8)

Focus on the communities and their needs is at the heart of the project's interest to bring about livelihood changes and upliftment for the greater good and wellbeing of these communities and individual households. The project activities were identified through a baseline study conducted across the entire project area. It was during this study when the various communities were engaged as part of a 'Participatory Rural Appraisal', that some key activities were identified²¹.

All communities and other stakeholders have been engaged with continuously since the project start. Carbon Green Africa (CGA) have spent much time on the ground, meeting with local communities, various councils, various government personal and other organisations or entities. This has enabled the project to set up a structure which, with the knowledge and experience of everyone involved, has led to a very efficient, well-organised system regarding communication, project implementation and on-the-ground management'. This naturally allows the project to diversify and adapt the project implementation according to the circumstances on the ground, which will vary from one project area to another, and from one community to another within the project area. A plan for ongoing communication and consultation between the project and affected communities is included in the project's adaptive management plan²².

In addition to this process, the project's On the Ground Management (OGM) team is in continuous contact with the local communities about the project during site visits, meeting with chiefs and other leaders, and through field staff. Through this communication, the project team receives most comments from local communities. As a result of these comments, several improvements and adjustments to the project have been implemented, as part of the adaptive management approach (refer to Section 2.2.5 for examples from this monitoring period). Since the project start in June 2011 to date, the Kariba REDD+ Project has not received any formal grievances from any community member because of the project. There have only been

²¹ See Section 2.4.2 (page 30) of the validated VCS PDD for more information and the results of the PRA. A copy can be found at <https://registry.terra.org/app/projectDetail/VCS/902>

²² A copy of which is submitted in the Supporting Documents/2_General/Adaptive Management Plan.

numerous requests for additional support, awareness, training, and more inputs, none of which can be recorded as a grievance.

The adaptive management plan outlines all channels of communication and reporting to assure that all consultations and participatory processes have been undertaken directly with communities and other stakeholders, or through their legitimate representatives.

As discussed previously, the project's OGM team is in continuous contact with the local communities about the project during site visits, meeting with chiefs and other leaders, and through field staff. It is the duty and responsibility of the project's area manager to report to the regional manager or head office everyday, to give an update on the happenings in the field. The project area manager's daily on-the-ground management tasks and duties include monthly written reports and constant interaction with the project field officers, council, ward councilors, chiefs, village elders, communities and government personal. The field officers have daily meetings with the CGA area manager and the respective councils and members of the communities. The field officers write monthly reports which are submitted to CGA OGM teams, highlighting the past month's events, as well as outlining the coming month's schedule. These reports are then compiled with the OGM report and subsequent meetings at CGA head office level are held to discuss and plan all necessities regarding these reports.

The general reporting procedure in the communities is as follows. Community members usually engage their respective village heads and councilors who will then contact the RDC. The purpose of the RDC is to act on behalf of the communities with regards to development and the general wellbeing of the communities within the given district. There is also a direct channel to the council head office or chief. When there are general community issues regarding development and or grievances which need discussing, it is usually done through an organised meeting at ward level, headed by the ward councilor. Attendees to these meetings are the chiefs, village heads, members of the community and CGA. The points of discussion are then taken to the council head office where decisions are made accordingly. Communities also have a direct channel to the CGA area manager, liaison officer, field officers and council as part of the daily interaction with all these entities. The way these channels are used in these areas is extremely efficient and any news travels fast.

The CGA Area Manager is required to submit monthly reports to the CGA head office. Subsequent meetings are then held at head office level to discuss the reports and make the necessary decisions on matters pertaining to these reports. In addition, CGA send a monthly report to each RDC as well as for distribution to the communities updating everyone on the project's progress. CGA also participate in the RDC's development meetings, which are usually held quarterly.

Regular monitoring of the project's impacts on local communities has been, and will continue to be, conducted throughout the project's lifetime. The project's well-trained staff engage continuously with all local communities and community leaders. This regular engagement ensures that all project impacts on communities are effectively and accurately monitored and communicated.

The project conducts regular community meeting in all four RDCs²³. These community meetings are an ongoing activity and an important way to build and maintain the relationship with community members and local authorities. Project-related issues, project activity implementation and any new potential are discussed during these meetings. During this monitoring period a total of 511 community meetings have taken place (see Section 4.3.2 of this document for more information on the community meetings that took place). Having these community meetings continues to increase the general communities' understanding of the project, the aims and objectives of the project, and also their roles and responsibilities as communities within the project.

The project also publishes a monthly newsletter for distribution to the RDCs and local communities. To date one newsletter per project area per month has been published. These newsletters have covered topics such as general project progress, environmental awareness, grievances if any, vacancies if any and general

²³ Attendance registers are provided in Supporting Documents/4_Community/Social Monitoring/Community Meetings

topics. The newsletters are published in English, Shona and Tonga and have been distributed to the RDCs and local communities by the OGM teams²⁴.

Stakeholder participation in decision making and implementation is culturally and gender sensitive. Most agricultural activities are mainly done by women. By providing funding for training and inputs women directly participate and benefit from project implementation. Women and underrepresented groups are also encouraged to apply for work opportunities in the Kariba REDD+ Project, giving these groups an equal opportunity to fill positions and be trained by the project. These efforts are already successfully, as indicated by the many widowed women who have already received training in conservation farming, beekeeping and gardening, and have leadership roles within these activities.

Relevant and adequate information about potential costs, risks and benefits to communities has been provided to communities through the ongoing meetings and newsletters that are published monthly. The established communications channels have been explained and understood by all the stakeholders and community members throughout the development and implementation of the project and through the personal relationship developed between these stakeholders and the OGM teams. This, combined with the constant presence of the OGM teams working and interacting daily with the community members, provides adequate opportunities for information about potential costs, risks and benefits, provided to communities in an understandable form and in a timely manner. All costs, risks and benefits risks emerging from project activities are covered in the project's adaptive management process and adaptive management meetings which take place annually and are then communicated to local community members and leaders by the OGM teams.

2.3.2 Public Comment Period Publicity (G3.9)

For this monitoring period, the full Monitoring Report as well as a summary is made available to the public through the Verra website and through the local RDC offices. In addition, local communities are notified of the audit 30 days before the audit is planned.

In more detail, the dissemination was done as follows: one copy of the full Monitoring Report was sent to each council office with an additional copy sent to the council satellite office in Binga giving a total of five copies. As for the Monitoring Report summaries, one copy was sent to each council office, one copy to each chief and one copy to each ward councilor. All these copies were delivered as hard copies in person by the OGM who followed up with an explanation on how to submit any grievances through the communications channels outlined in the adaptive management plan either directly to council, OGM teams or CGA head office. Summaries of the Monitoring Report were also translated in Shona and Tonga for distribution amongst local communities.

Local community members have been directly notified by the OGM teams that there will be an upcoming audit process and that they should be able to communicate with an independent validation and verification body. The purpose of the auditor visit was made clear and approximate dates of the audit were communicated. During the audit, the auditor will have the opportunity to interview stakeholders close to the project, even in the absence of the project proponent but with their consent. Likewise, if required by the auditor, some meetings may be held directly with the community and other stakeholders. It is important to note that, due to the current COVID-19 restrictions, there is a possibility of a remote audit process, and the communities will be informed in advance if the process will be conducted virtually.

2.3.3 Distribution of Project Information (G3.9)

²⁴ See Supporting Documents/2_General/Newsletters for copies of the newsletter published during this monitoring period.

Across the project area, a summary of this Monitoring Report (translated into the local languages) was made available for the community for one month before the site audit. The distribution was done as follows: one copy of the full Monitoring Report was sent to each council office with an additional copy sent to the council satellite office in Binga giving a total of five copies. As for the Monitoring Report summaries, one copy was sent to each council office, one copy to each chief and one copy to each ward councilor. All these copies were delivered as hard copies in person by the OGM who followed up with an explanation on how to submit any grievances through the communications channels outlined in the adaptive management plan either directly to council, OGM teams or CGA head office. As described previously, the projects OGM team is in continuous contact with the local communities about the project during site visits, meeting with chiefs and other leaders, and through field staff. Through this communication, the project team is further able to ensure that informational meetings held to inform the local stakeholders were widely publicized and conducted in relevant local or regional languages.

In addition to that, all project updates are available in the monthly newsletter. See Section 2.3.2 above for more details.

2.3.4 Conflicts and Grievances (G3.10)

The established communications channels and grievance procedures has been explained and understood by all the stakeholders and community members through the development and implementation of the project and through the personal relationship developed between these stakeholders and the OGM teams.

Together with the constant presence of the OGM teams working and interacting daily with the community members, there is also constant opportunity for any person to either verbally or in writing, submit any grievance or bring to our attention any grievance. Members of the communities have been encouraged to submit any grievances in writing as the preferred way for recording and documenting purposes.

To date no grievances have been received, only requests for additional inputs and more help. An extensive survey campaign was implemented in April and May 2021²⁵. A total of 380 people were interviewed. These included local community members, direct project beneficiaries and employees. Interviews were conducted in the local language (Shona) when necessary and participants were selected randomly. See Section 4.1.2 for more results from the survey.

The survey results demonstrate that the grievance redress procedure has been well understood and explained to community members in the project area. See Table 1 below.

Table 1: Percentage of with an understanding of how the grievance procedure works

Do you know whom to address for your grievances?		
	Beneficiaries (%)	Employees (%)
No	4.6	0.0
Yes	95.4	100.0

2.4 Management Capacity and Best Practices

2.4.1 Required Technical Skills and Expertise (G4.2)

Between CGI, CGA and South Pole, the project possesses all of the following skills:

- Carbon Accounting:

²⁵ All results are provided in the Supporting Documents/4_Community/Social Monitoring/Indirect Effects

- Excellent knowledge of carbon accounting and carbon markets
- Ability to manage the geographical information system and databases to generate all required cartographic analysis
- Ability to train plot samplers
- Experience in the VCS and CCB standards

Community and Biodiversity:

- Understanding of Monitoring, Reporting, and Verification (MRV) requirements.
- Knowledge in sampling methods of wildlife and ecosystem assessment using quality indicators.
- Knowledge in anti-poaching control and sustainable agriculture activities.
- Experience in working with the local communities.

Project Management:

- Strong knowledge of REDD+ projects.
- Knowledge in planning, execution and control of administrative and financial resources.
- Good leadership skills

The Kariba REDD+ Project started in 2011 and since it began, the project team received training in the necessary technical skills and expertise to perform the activities. Both Rory Muil and Rob Lee received extensive training by Black Crustal and Environment Africa on all the necessary skills required to manage and monitor the project from a biodiversity, community and biodiversity perspective. Both managers have extensive experience working in the project area and were actively working with communities in the four participating Rural District Councils for many years prior to the project start date.

Since the project started, only a few project members have changed and because the project activities, community engagement and monitoring are ongoing in the project area, the project team is responsible for training the new staff to perform the work.

Also, anytime a question arises, the project team is always in contact and available to solve any problems. The SOPs are also available to make sure the procedures are performed accordingly throughout the project monitoring period. More information on how the required technical skills and expertise are maintained is available under Sections 2.4.2 and 3.1.3.

There has been no change in staff for this monitoring period. The only point to note is a new OGM for Mbire was appointed two months before the end of the previous monitoring period (May 2019). All staff members are local and live in Zimbabwe, with many years experience operating in the project area before the REDD+ Project was established.

The main project staff are listed below:

- Rory Muil – Project General Manager (responsibilities include: community engagement, biodiversity sampling)
- Rob Lee – Project Technical Manager (responsibilities include: biomass sampling, biodiversity sampling)
- Shadreck Ndloyu – OGM for Binga
- Manuel Nebiri – OGM for Nyaminyami
- Paradzai Matombo – OGM for Mbire
- Jerry Matiza – OGM for Hurungwe

The OGM team leaders listed above receive extensive training and have a good understanding of their job requirements. Each team leader is familiar with project activities and its manner of implementation so that correct monitoring of these activities on a regular basis can be done and to assist with awareness which should help with adoption of the different projects. Clear Standard Operating Procedures have been established which outline in detail the daily, weekly and monthly responsibilities of each OGM team leader.

The Kariba REDD+ Project continues to engage with government personnel as and when the need arises. Some of these are from the Department of Agricultural, Technical and Extension Services (AGRITEX), the Zimbabwean government's principal extension agency who are the trained and skilled in agriculture in rural communities. Also involved is the Environmental Management Agency (EMA), which brings to the project fire-management expertise, as well as general environmental management issues. They have one or two officers in each district and are usually the projects first point of contact on matters relating to the natural environment. CGA continues to support the work of these organisations through for example, provision of fuel for transportation to carry out firefighting training and awareness or wherever necessary. The project team sees this as a dual benefit for all stakeholders in the area.

2.4.2 Worker Training (G4.3)

The project currently employs 21 full time staff, of which 2 are female. The project's workers have all received sufficient training to fulfill their obligations in their various employment positions. All the training was hands on. The OGM team leaders and their team members all have previous experience working with communities in the project areas in one form or another, which was enhanced by the hands-on training. With regards to the biomass sampling, training was done under the professional guidance of the environmental consulting company, Black Crystal at the project start. Since biomass monitoring is an ongoing effort, the field team is highly qualified to perform the biomass monitoring.

The safety of the OGM teams and other employees is very important. Obviously anti-poaching patrolling and firefighting carry some risk. The OGM teams are trained by experienced members of the project team and all employees have been trained appropriately. For these, the OGM teams conduct their activities with the assistance of the RDC game scouts, who all received training for their positions of employment even before the inception of the project.

Where necessary, trainings on anti-poaching were carried out in basic to intermediate levels, which included techniques on patrolling and apprehending or arresting, map reading and GPS use, tracking and identification of animals and signs. No additional extensive training on anti-poaching was provided during the present monitoring period because anti-poaching activity is an ongoing effort, and the team has not changed since the last verification. Firefighting training was also conducted at ward and village level, where community members received trainings across all four RDCs, learning how to suppress fires and make fireguards. They also received assistance establishing their own fire-fighting teams with committees.

Training and capacity building are key for the project's agriculture activities (Conservation Farming and Community Gardens), in which over 10,000 people were provided with training during this monitoring period (refer to Section 4.3.2 for more details). The project's newsletter also serves as a means for capacity building. The project's capacity building particularly also focuses on women and widows as potentially less privileged groups. Several widows have been encouraged to take part in the Conservation Farming (CF) programme. Most community gardens are cultivated primarily by women, who also receive training and inputs.

To further formalise the project's risk management, an Employee Risk Management Plan²⁶ was developed and is used to inform employees on the key risks related to their job and to set a reporting framework around risks for employees. To guarantee that capacity is maintained, SOPs are available and are consulted by the project team when needed. Also, the project team has remained largely the same since project start and this guarantees that the capacity that has been built over the past years is not lost. When a question arises, the project team is always in contact and available to solve any problems to make sure the procedures will be performed accordingly throughout the project monitoring period.

An extensive survey campaign was implemented in April and May 2021²⁷ (see Section 4.1.2 for more information and results from the surveys). A total of 380 people were interviewed. These included local

²⁶ The plan is provided in the Supporting documents/2_General/Employee Risk Management Plan.

²⁷ All results are provided in the Supporting Documents/4_Community/Social Monitoring/Indirect Effects

community members, direct project beneficiaries and employees. Interviews were conducted in the local language (Shona) when necessary and participants were selected randomly.

The results of the survey show that most employees feel that they have received good or very good training from the project. See Table 2 below.

Table 2: Survey results from employees on training received

Did you receive sufficient training to do your work properly?	
	Employees (%)
Not at all	0.0
Not enough	0.0
Sufficiently	9.1
Good	72.7
Very good	18.2

2.4.3 Community Employment Opportunities (G4.4)

Employees of the Kariba REDD+ Project are preferably recruited from the project area. Special care is given to an adequate training (refer to previous Section 2.4.2) and remuneration.

If vacancies for particular positions are available, then postings of these vacancies are advertised at the council offices, community centres, clinics etc. for all the communities. Both genders are free to apply. However, women and underrepresented groups will be encouraged to apply, which will be indicated on the advertised vacancy posting, giving these groups an equal opportunity to fill positions and be trained for in the project. These efforts are already successful, as indicated by the many widowed women who have already received training in Conservation Farming, beekeeping and gardening, and have leadership roles within these activities.

While many positions in the project require an above-average education for simpler jobs (for example, camp attendant), less educated applicants are given preference and trained.

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

All the employees are familiar with their rights as labourers. All relevant laws and regulations related to worker's right are listed in the validated CCB PDD, and compliance is demonstrated. Refer to CCB PDD, section G4.5 (page 44). There have been no changes since validation.

The employment and worker's rights in Zimbabwe are governed by the Labour Act²⁸.

The major relevant sections of the Labour Act are as follows: Part II of the Act clearly speaks of the fundamental rights of employees; Part III deals with unfair labour practices; Part IV deals with general conditions of employment; Part V deals with wage and salary control; Part VI deals with workers committees formation and functions; Part VII deals with workers trade unions; Part VIII deals with employment councils; Part IX deals with employment boards; Part XI deals with Labour Relations Tribunal; and Part XII deals with the determination of disputes and unfair labour practices.

²⁸http://www.parlzim.gov.zw/cms/Acts/Title28_MANPOWER_AND_LABOUR_RELATIONS/LABOUR_ACT_28_01.pdf

The project abides by all the requirements put in place by the Labour Act. The project operates legally in Zimbabwe and CGA is a legally registered entity. The project is therefore governed by the laws of the country. All employees are required to sign a legally binding employment contract ²⁹. All general terms and conditions of employment are subject to the requirements put in place by the Labour Act. This is to ensure that both CGA and all their employee's fulfil their legal obligations.

All employees are paid above the national minimum wage and are entitled to 21 days of paid vacation each year. Employees are compensated for travel expenses and provided with food and airtime allowances.

All employees of the Kariba REDD+ Project are informed about their rights at the commencement of their employment. Furthermore, to ensure the workers know and use their rights, they are encouraged to form workers committees, within which all issues related to the employment are discussed and subsequently brought forward to the CGI team. Additionally, the trade union is encouraged to regularly visit the project to ensure fair employment conditions.

The project meets all applicable laws covering worker rights.

2.4.5 Occupational Safety Assessment (G4.6)

As described in section 2.4.2 there is an Employee Risk Management Plan³⁰ developed and used to inform employees on the key risks related to their job and to set a reporting framework around risks for employees. See section 2.5.5 for more information on the risks and mitigation measures included in the Employee Risk Management Plan.

The safety of the OGM teams and other employees is very important. Although most job descriptions identified are not considered to be high risk it is accepted and understood that there is always the element of risk of accidents and injury. The key risks to worker safety that have been identified include vehicle accidents and malaria.

Given the state of the roads in the project area workers are expected to drive at a safe speed and adhere to the maximum and minimum speed limits as set by the laws of the country, to reduce the chances of a vehicle accident and are required to have a valid driver's license. Vehicles are regularly maintained to ensure they are in good operating order.

Workers are also required to carry a first aid kit with contents sufficient to treat minor injuries and medicines to treat common illnesses and malaria. First aid kits are checked frequently and updated whenever necessary.

Finally, workers are required to carry a list of relevant medical emergency numbers to call if the need arises.

Obviously anti-poaching patrolling and firefighting also carry some risk. To mitigate these risks the OGM teams are trained by experienced members of the project team and the employees have been trained appropriately (see section 2.4.2 for more details on worker training).

For anti-poaching activities, the OGM teams conduct their activities with the assistance of the RDC game scouts who all received training for their positions of employment even before the inception of the project. Firefighting training was also conducted at ward and village level, where community members received trainings across all four RDCs, learning how to safely suppress fires and make fireguards. They also received assistance establishing their own firefighting teams with committees.

²⁹ See employment contract template provided as supporting documentation.

³⁰ The plan is provided in the Supporting documents/2_General/Employee Risk Management Plan.

To further formalise the project's risk management, an Employee Risk Management Plan was developed and is used to inform employees on the key risks related to their job and to set a reporting framework around risks for employees³¹.

Additional information on worker training is available under the Section 2.4.2.

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

Carbon Green Investments is a privately funded project developer and implementer. The project's activities on the ground are designed to be scalable according to the project's revenues. This allows the project to be viable, even if carbon revenues turn out to be significantly under the projections. Also, to ensure long-term longevity of the project, a fixed share of the sales revenues is held back in the Kariba REDD+ Trust, so that there will be adequate funds to continue to implement the project.

2.5 Legal Status and Property Rights

2.5.1 National and Local Laws (G5.1)

All relevant laws, statutes and other regulatory frameworks are listed in the validated CCB PDD and validated VCS PDD, and compliance is demonstrated. Refer to VCS PDD, section 1.11 (page 21) and CCB PDD, section G4.5 (page 44) and section G5.1 (page 46) for more detailed information. There have been no changes since validation.

Refer to CCB PDD, section G5.2 (page 47) for evidence that the project has ongoing approval from the authorities.

Relevant laws pertaining to property rights include:

- The Forestry Act of 1990. This act was created specifically to deal with Zimbabwe's forests and was designed with the intention of preserving such forests, aiming to deal with issues such as sustainability, agriculture and settlement and creating penalties for any breaches of its regulations. The act applies to land and property rights for the following tenure categories: gazetted forests and privately owned forests, plantations and forestry reserves only. These tenure categories are not present in the project area as it is in communal lands.
- Rural District Councils Act of 2002. This act contains information that states that the Rural District Councils have complete mandate over any proceedings that occur within their lands. The council has the power to sign contracts and agreements with project developers. This act addresses land and property rights within the communal areas, which are outside land recognised as state land. The act is of relevance for the project since all activities must be approved by the relevant council.
- Traditional Leaders Act of 1998. This act was implemented to ensure that the various indigenous tribes and leadership thereof maintained their cultural identity and authority. Traditional rules, myths and beliefs must be respected within the project area. The Traditional Leaders Act addresses land and property rights under traditional systems within a communal area. The chiefs and headman are able to allocate people communal land to stay based on their jurisdiction.

The project has been complying and will continue to comply with all project-related laws and acts. The implementation of the project activities will not lead to the violation of any applicable law including those pertaining to property rights.

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

³¹ The plan is provided in the Supporting documents/2_General/Employee Risk Management Plan.

The land in the project area is communally owned. Since 1988, when the Rural District Council Act came into force, the Rural District Councils (RDCs) have been administering the land at the district level. RDCs include democratically elected councils for each ward (comparable to municipalities) and the chiefs, which are the traditional leaders. The project has not encroached uninvited on private property, community property, or government property. There have been no changes since validation.

Refer to CCB PDD, section G5.3 (page 48) for demonstration that free, prior and informed consent has been obtained from those whose rights may be affected by project activities.

Refer to CCB PDD, section G5.4 (page 49) for demonstration that the project does not include any involuntary relocation.

2.5.3 Property Rights Protection (G5.4)

The project activities do not lead to involuntary removal or relocation of property rights holders from their lands or territories and have not forced rights holders to relocate activities important to their culture or livelihood, therefore no compensation was needed.

On the contrary, the project protects High Conservation Values such as HCV 5 (fundamental basic needs) and HCV 6 (cultural identity). This is supported by the results from the social impact survey as presented in Section 4.1.3.

2.5.4 Identification of Illegal Activity (G5.5)

Refer to CCB PDD, section G5.5 (page 49) for details on the identification of illegal activities and how the project reduces such activities to ensure that project benefits are not derived from illegal activities.

As described in Section 2.2.5 due to population growth, illegal settlements are another identified illegal activity causing deforestation. Illegal settlements and deforestation remain a challenge during this monitoring period and the project continues to follow protocol by engaging the relevant authorities on the ground, such as local council, forestry departments and chiefs to resolve this. All incidences of illegal settlements and deforestation are reported to the local authorities.

The project team also continues to engage with the general communities regularly through awareness raising campaigns.

In addition, to reduce poaching, illegal logging and fires, patrolling is carried out in the project area and those activities are reported.

To reduce poaching, snares are removed from the field and poachers can be arrested. Conservation farming techniques and beekeeping activities continue to be implemented in the project area to reduce deforestation and illegal logging. Conservation agricultural activities, including training activities, increase the agricultural output of given plots and thus reduce the need for larger fields and clearing of intact forests for new fields. Beekeeping activities add value to standing forests and enable local community members to generate income streams from activities that do not cause deforestation in the same way agricultural activities in the region do. Furthermore, the promotion of beekeeping activities and training provided by the project reduce the risk of local community members cutting down standing trees to harvest “wild” honey. To reduce fires, awareness campaigns, early burning and road maintenance is performed. See Section 4.3.2 for a detailed description of these activities that have taken place during this monitoring period.

3 CLIMATE

3.1 Monitoring GHG Emission Reductions and Removals

3.1.1 Data and Parameters Available at Validation

The allometric equations and densities of tree species used on MOVERS (web-based Monitoring and Verification System) were validated in the PD³² and used for the equations for this monitoring period.

The auditor has access to the MOVERS where an updated list of the tree species and the data can be found. The wood densities (refer to MOVERS for wood density of the tree species) are needed to convert volume (m³) to biomass in case the allometric equation only provides results in m³.

A description of the functions of MOVERS are described in an accompanying document in the supporting documents³³. In case the allometric equation only provides results for the commercial timber (stem wood), a conservative root-to-shoot ratio is applied to calculate the below-ground biomass.

Data / Parameter	Below-ground small and large tree biomass (BGLT)
Data unit	t of dry matter
Description	The below-ground tree biomass is calculated by applying a root- to-shoot ratio.
Source of data	The project participants use for all tree species the Rs mean value obtained by Ryan et al., 2011 in 'Above- and Below-ground Carbon Stocks in a Miombo Woodland Landscape of Mozambique'. ³⁴ The Rs given on page 426 represent a mean below-ground ratio (t d.m./t d.m.) and is obtained from a similar ecoregion as the project area.
Value applied	0.42
Justification of choice of data or description of measurement methods and procedures applied	The project participants are using the Rs from local sources. The value applies to similar forest formations in Mozambique and is therefore applicable to the project area. Held constant throughout the entire project lifetime
Purpose of the data	Calculate below-ground small and large tree biomass (BGLT)
Comments	

Data / Parameter	Below-ground, non-tree biomass (BGNT)
Data unit	t of dry matter
Description	The below-ground, non-tree biomass is calculated by applying a root-to-shoot ratio.

³² for allometric equations, please refer to Supporting Documents/3_Climate/MOVERS/Allometric equations

³³ refer to Supporting Documents/3_Climate/MOVERS/Functions

³⁴ BIOTROPICA 43(4): 423–432 2011. Available at: <http://onlinelibrary.wiley.com/doi/10.1111/j.1744-7429.2010.00713.x/abstract>

Source of data	The project participants use for all tree species the Rs mean value obtained by Ryan et al., 2011 in 'Above- and Below-ground Carbon Stocks in a Miombo Woodland Landscape of Mozambique'. ³⁵ The Rs given on page 426 represent a mean below-ground ratio (t d.m./t d.m.) and is obtained from a similar ecoregion as the project area.
Value applied	0.42
Justification of choice of data or description of measurement methods and procedures applied	The project participants are using the Rs from local sources. The value applies to similar forest formations in Mozambique and is therefore applicable to the project area. Held constant throughout the entire project lifetime
Purpose of the data	Calculate Below-ground, non-tree biomass (BGNT)
Comments	

Data / Parameter	δLE
Data Unit	Time
Description	Lag parameter of leakage model.
Source of Data	Estimated at project start based on cumulative deforestation model and sample of plots in the leakage area. See equation [9] of the methodology.
Value applied	-2.072
Justification of choice of data or description of measurement methods and procedures applied	Calculated using equation [9] of the methodology.
Purpose of the data	Calculation of leakage
Comments	

Data / Parameter	λ
Data Unit	Proportion
Description	Exponential soil carbon decay parameter

³⁵ BIOTROPICA 43(4): 423–432 2011. Available at: <http://onlinelibrary.wiley.com/doi/10.1111/j.1744-7429.2010.00713.x/abstract>

Source of Data	Estimated as $\lambda = 0.2$ per default or from literature.
Value applied	0.2
Justification of choice of data or description of measurement methods and procedures applied	Methodology default value.
Purpose of the data	Calculation of baseline emissions
Comments	

Data / Parameter	ρ_{sp}
Data Unit	kg m ⁻³
Description	Wood density of species <i>sp</i>
Source of Data	Species specific data from peer reviewed literature, samples taken on site, or IPCC GPG LULUCG Tables 3A.1.9-1 and 3A.1.9-2.
Value applied	See MOVERS
Justification of choice of data or description of measurement methods and procedures applied	Using peer reviewed literature, as allowed by the methodology (p. B9). The values are held constant over the whole project lifetime.
Purpose of the data	Calculation of baseline emissions
Comments	

Data / Parameter	σ_{DF}
Data Unit	Standard deviation
Description	The estimated standard deviation of the state observations used to fit the cumulative deforestation model
Source of Data	Equation [17] of the methodology
Value applied	0.3600
Justification of choice of data or description of	Using Equation [17] as per methodology.

measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions
Comments	

Data / Parameter	aj,k
Data Unit	hectares
Description	Area of plot j in stratum k
Source of Data	Specified as part of project sampling design. See guidance in section 13.3.2 of the methodology.
Value applied	0.025447
Justification of choice of data or description of measurement methods and procedures applied	Plot size may be defined by project proponent as per methodology.
Purpose of the data	Calculation of baseline emissions
Comments	

Data / Parameter	ak
Data Unit	hectares
Description	Area of stratum k.
Source of Data	GIS analysis prior to sampling. See guidance in section 13.2 of the methodology.
Value applied	See MOVERs.
Justification of choice of data or description of measurement methods and procedures applied	The project area is stratified into the two strata "Woodland (WL)" and "Open Woodland (OWL)".
Purpose of the data	Calculation of baseline emissions
Comments	

Data / Parameter	aproject
------------------	----------

Data Unit	hectares
Description	Total project area.
Source of Data	Determined at project validation using surveys and/or GIS analysis.
Value applied	784'987
Justification of choice of data or description of measurement methods and procedures applied	As per methodology. Determined using GIS analysis.
Purpose of the data	Calculation of baseline emissions Calculation of project emissions.
Comments	

Data / Parameter	aLE
Data Unit	hectares
Description	Total leakage area.
Source of Data	Determined at project validation using surveys and/or GIS analysis.
Value applied	841'824
Justification of choice of data or description of measurement methods and procedures applied	As per methodology. Determined using GIS analysis.
Purpose of the data	Calculation of leakage.
Comments	

Data / Parameter	cfdw
Data Unit	Tonnes carbon per tonne dry matter
Description	Carbon fraction of dry matter for dead wood
Source of Data	Where available, data from peer reviewed literature should be used. Where adequate literature is not available, the IPCC default value of 0.5 may be applied.

Value applied	0.47
Justification of choice of data or description of measurement methods and procedures applied	As per methodology. Held constant over entire project lifetime.
Purpose of the data	Calculation of baseline emissions. Calculation of project emissions. Calculation of leakage.
Comments	

Data / Parameter	cfsp
Data Unit	Tonnes carbon per tonne dry matter
Description	Carbon fraction of dry matter for species <i>sp</i>
Source of Data	Where available, species specific data from peer reviewed literature should be used. Where adequate literature is not available, the IPCC default value of 0.5 may be applied.
Value applied	0.47
Justification of choice of data or description of measurement methods and procedures applied	As per methodology. Held constant over entire project lifetime.
Purpose of the data	Calculation of baseline emissions. Calculation of project emissions. Calculation of leakage.
Comments	

Data / Parameter	dj,k
Data Unit	m
Description	Depth of soil sample in plot <i>j</i> in stratum <i>k</i>
Source of Data	Field measurements
Value applied	≥ 0.3 m
Justification of choice of data or description of	Soil pits are measured to a depth of 0.3 m. If a rock layer is encountered before reaching this depth, the soil profile is only

measurement methods and procedures applied	measured to the rock layer (i.e. the carbon in the rock layer is conservatively excluded). This approach is held constant of the entire project lifetime.
Purpose of the data	Calculation of baseline emissions.
Comments	

Data / Parameter	fsp(•)
Data Unit	Function
Description	Allometric equation for species <i>sp.</i> For trees, this equation generally is based on <i>dbh</i> and possibly height to biomass. Other variable types may be appropriate for shrubs, so a generic vector of potential independent variables, <i>v</i> , is used in equation description. See guidance in section 13.13 of the methodology.
Source of Data	Selected from literature or developed by project proponent.
Value applied	See MOVERS.
Justification of choice of data or description of measurement methods and procedures applied	Most appropriate species-specific allometric equations are used where available, default equations are applied where no species-specific equation is available.
Purpose of the data	Calculation of baseline emissions.
Comments	

Data / Parameter	<i>FDF</i>
Data Unit	Proportion
Description	Proportion of cumulative deforestation
Source of Data	Estimated from a model. See equation [16] of the methodology.
Value applied	Predicted for each monitoring period, see baseline model.
Justification of choice of data or description of measurement methods and procedures applied	Cumulative baseline deforestation is predicted by a linear rate, as per the methodology. The linear rate is updated when the baseline is re-assessed.
Purpose of the data	Calculation of baseline emissions. Calculation of project emissions.

Comments	
----------	--

Data / Parameter	<i>FLE</i>
Data Unit	Proportion
Description	Proportion cumulative deforestation and degradation predicted by the leakage model.
Source of Data	Estimated from a model. See equation [8] of the methodology.
Value applied	Predicted for each monitoring period, see leakage model.
Justification of choice of data or description of measurement methods and procedures applied	The leakage is fit to the logistic cumulative baseline model, using a lag period as per methodology.
Purpose of the data	Calculation of leakage.
Comments	

Data / Parameter	$\hat{m}_{DF}$
Data Unit	Count
Description	The estimated sample size in the space of the reference area given the pilot sample data
Source of Data	Equation [6] of the methodology
Value applied	3176.2
Justification of choice of data or description of measurement methods and procedures applied	This is a minimum bound on the required sample size.
Purpose of the data	Determination of baseline scenario
Comments	

Data / Parameter	$\hat{m}_{LE}$
Data Unit	Count
Description	The estimated sample size in the leakage area.
Source of Data	Equation [10] of the methodology

Value applied	49.8
Justification of choice of data or description of measurement methods and procedures applied	This is a minimum bound on the required sample size.
Purpose of the data	Calculation of leakage.
Comments	

Data / Parameter	nDF
Data Unit	Count
Description	The total number of state observations made to fit the cumulative deforestation model
Source of Data	Remote sensing image interpretation
Value applied	9902
Justification of choice of data or description of measurement methods and procedures applied	This value is re-evaluated whenever the baseline model is re-assessed.
Purpose of the data	Determination of baseline scenario Calculation of baseline emissions
Comments	

Data / Parameter	oi
Data Unit	Binary
Description	State observation for the <i>i</i> th sample point
Source of Data	Remote sensing image interpretation
Value applied	See spreadsheet.
Justification of choice of data or description of measurement methods and procedures applied	Re-evaluated whenever the baseline model is re-assessed.
Purpose of the data	Determination of baseline scenario
Comments	

Data / Parameter	pforest
Data Unit	Proportion
Description	The proportion of the project area that is forested.
Source of Data	Determined at project validation using surveys and/or GIS analysis.
Value applied	1
Justification of choice of data or description of measurement methods and procedures applied	This proportion does not change after validation. It is used for the determination of the leakage factor from the second monitoring period onwards.
Purpose of the data	Calculation of baseline emissions
Comments	

Data / Parameter	pBGLT
Data Unit	Proportion
Description	Proportion of below-ground large tree biomass removed as a result of land conversion to agriculture
Source of Data	Selected by the project proponent based on guidance provided in section 6.6.4 of the methodology.
Value applied	1
Justification of choice of data or description of measurement methods and procedures applied	This value is held constant over the lifetime of the project.
Purpose of the data	Calculation of project emissions
Comments	

Data / Parameter	rap
Data Unit	Unitless
Description	Ratio of below-ground biomass to above-ground biomass (root to shoot ratio) for species <i>sp.</i>
Source of Data	Peer reviewed literature relevant to the project area or IPCC GPG LULUCG Table 4.4.

Value applied	0.42
Justification of choice of data or description of measurement methods and procedures applied	The project participants are using the Rs from local sources. The value applies due to similar forest formations in Mozambique and is therefore applicable to the project area. Held constant throughout the entire project lifetime.
Purpose of the data	Calculation of baseline emissions. Calculation of project emissions.
Comments	

Data / Parameter	rWP
Data Unit	Proportion
Description	Proportion of above-ground large tree biomass converted to long-lived wood products
Source of Data	Selected by the project proponent using guidance provided in section 6.6.10 of the methodology
Value applied	0
Justification of choice of data or description of measurement methods and procedures applied	Re-evaluated whenever the baseline model is re-assessed.
Purpose of the data	Calculation of project emissions.
Comments	

Data / Parameter	UDF
Data Unit	Percent
Description	Estimated uncertainty in the cumulative deforestation model
Source of Data	Equation [15] of the methodology
Value applied	0.0463
Justification of choice of data or description of measurement methods and procedures applied	Re-evaluated whenever the baseline model is re-assessed.
Purpose of the data	Calculation of project emissions.

Comments	
Data / Parameter	w_i
Data Unit	Unitless
Description	The weight applied to the i th sample point
Source of Data	Equation [5] of the methodology
Value applied	See spreadsheet.
Justification of choice of data or description of measurement methods and procedures applied	Re-evaluated whenever the baseline model is re-assessed.
Purpose of the data	Determination of baseline scenario
Comments	

3.1.2 Data and Parameters Monitored

Refer to the tables below for data and parameters monitored under VCS.

Data / Parameter	Above-ground, small and large tree biomass (AGLT)
Data unit	t of dry matter
Description	The above-ground tree biomass is calculated applying allometric relationships.
Source of data	Above-ground, woody biomass
Description of measurement methods and procedures to be applied	Tree species, number of trees (numeric), diameter at breast height (DBH, cm) and tree height (m) of trees located in the permanent sample plot (PSP) are measured.
Frequency of monitoring/recording	Each monitoring period. At least every five years, which may be accomplished on an intermittently rotating basis.
Value monitored	Allometric equations are applied. Wood density values are used to convert volume (m ³) to biomass (t.d.m.); biomass is converted to carbon (tC) by a default value of 0.47; and carbon is converted to CO ₂ e (tCO ₂) by a default value of 3.667.
Monitoring equipment	Measuring tape, tree height-measuring equipment: clinometers, standard operating procedure, data webpage

QA/QC procedures to be applied	QA/QC coordinator is CTO of CGI. Before starting the fieldwork, the forestry engineers meet with CGI's CTO in the office of CGI, to schedule the exact monitoring activity. The same engineers are then responsible for the supervision during the monitoring. During the monitoring and after termination of the activity, they report directly to the CTO of CGI, who also checks if the data are reported as outlined in the monitoring plan. In addition, once CGI's CTO does his regular site visits, he verifies the monitoring activity randomly.
Purpose of the data	Calculation of baseline emissions
Calculation method	Allometric relationships
Comments	

Data / Parameter	Above-ground, non-tree biomass (shrubs) (AGNT)
Data unit	t of dry matter
Description	The above-ground, non-tree biomass is calculated applying allometric relationships.
Source of data	Above-ground, woody biomass (shrubs)
Description of measurement methods and procedures to be applied	Species, number of shrubs (numeric), diameter at breast height (DBH, cm) and height (m) of shrubs located in the permanent sample plot (PSP) are measured.
Frequency of monitoring/recording	Each monitoring period: at least every five years, which may be accomplished on an intermittently rotating basis.
Value monitored	Allometric equations are applied. Wood density values are used to convert volume (m ³) to biomass (t.d.m.); biomass is converted to carbon (tC) by a default value of 0.47; and carbon is converted to tCO ₂ e (tCO ₂ e) by a default value of 3.667.
Monitoring equipment	Measuring tape, tree height measuring equipment: clinometers, standard operating procedure, data web page
QA/QC procedures to be applied	QA/QC coordinator is the CTO of CGI. Before starting the fieldwork, the forestry engineers meet with CGI's CTO in the office of CGI, to schedule the exact monitoring activity. The same engineers are then responsible for the supervision during the monitoring. During the monitoring and after termination of the activity, they report directly to the CTO of CGI, who also checks if the data are reported as outlined in the monitoring plan. In addition, once CGI's

	CTO does his regular site visits, he verifies the monitoring activity randomly.
Purpose of the data	Calculation of baseline emissions
Calculation method	Size class, standard weight stem / shrub
Comments	

Data / Parameter	Leakage
Data unit	Biomass / CO ₂ e
Description	Represented by forest degradation and deforestation
Source of data	2.1 ha (145 m x 145 m) leakage plots monitored using walking transects
Description of measurement methods and procedures to be applied	Two walking transects per plot to determine anthropogenic clearing relative to intact forest; specific leakage training provided to each team member. The GPS coordinates are taken for each leakage plot.
Frequency of monitoring/recording	Prior to the end of the first monitoring period in order to estimate the lag period for the leakage model and at every subsequent monitoring period in order to estimate actual emissions due to leakage.
Value monitored	Degradation/deforestation percentage (0%–100%)
Monitoring equipment	GPS, standard operating procedure
QA/QC procedures to be applied	QA/QC coordinator is the CTO of CGA. Before starting the fieldwork, the forestry engineers meet with CGI's CTO in the office of CGI, to schedule the exact monitoring activity. The same engineers are then responsible for the supervision during the monitoring. During the monitoring and after termination of the activity, they report directly to the CTO of CGI, who also checks if the data are reported as outlined in the monitoring plan. In addition, once CGI's CTO does his regular site visits, he verifies the monitoring activity randomly.
Purpose of the data	Calculation of leakage
Calculation method	Leakage period, leakage model
Comments	Leakage data collected in the (first) monitoring period is used to calculate the leakage lag period and build the leakage model, against which empirical measurements of leakage will be compared. Subsequent empirical measurements of leakage are used to calculate leakage deductions. Ex-ante estimates of leakage have no bearing on actual leakage calculations.

Data / Parameter	Standing Dead Wood (SDW)
Data unit	t of dry matter
Description	The standing dead wood biomass is calculated applying allometric relationships.
Source of data	Standing dead wood biomass
Description of measurement methods and procedures to be applied	Standing dead trees are conservatively all categorised as decay class II. The carbon stock of standing dead wood is thus estimated as the biomass in the remaining boles only.
Frequency of monitoring/recording	Each monitoring period: at least every five years, which may be accomplished on an intermittently rotating basis.
Value monitored	Wood density values are used to convert volume (m ³) to biomass (t.d.m.); biomass is converted to carbon (tC) by a default value of 0.47; and carbon is converted to tCO ₂ e (tCO ₂ e) by a default value of 3.667.
Monitoring equipment	Measuring tape, tree height-measuring equipment: clinometers, standard operating procedure, data web page.
QA/QC procedures to be applied	QA/QC coordinator is the CTO of CGI. Before starting the fieldwork, the forestry engineers meet with CGI's CTO in the office of CGI, to schedule the exact monitoring activity. The same engineers are then responsible for the supervision during the monitoring. During the monitoring and after termination of the activity, they report directly to the CTO of CGI, who also checks if the data are reported as outlined in the monitoring plan. In addition, once CGI's CTO does his regular site- visits, he verifies the monitoring activity randomly.
Purpose of the data	Calculation of baseline emissions
Calculation method	Using equation 51 and 52 of the methodology
Comments	

Data / Parameter	Bulk density
Data unit	kg/m ³
Description	Mass-equivalent bulk density of fine portion of soil sample
Source of data	Soil sampled in the project area and reference area
Description of measurement methods and procedures to be applied	Measured according to the SOP 'SOPs Tree and soil collection'

Frequency of monitoring/recording	Updated at the monitoring event at least once every five years.
Value monitored	Volume of soil and rocks and dry weight of soil and rocks
Monitoring equipment	As described in the SOP: shovel, hoe, pickaxe; gardening trowel, rigid tape, metal ring, hammer, flat bladed knife, plastic wrap, buckets, water, GPS, plastic measuring cylinders
QA/QC procedures to be applied	The quality of the sample collection is ensured because the field team received training on how to take soil samples. Also, a SOP was developed to be used by the field team during fieldwork to guarantee quality data. In addition, the samples are sent to a third-party laboratory to perform the analysis.
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated using equation 60 of the methodology
Comments	

Data / Parameter	Soil organic carbon
Data unit	kg carbon per kg of soil
Description	Carbon fraction of soil sample in plot j in stratum k
Source of data	Estimated from laboratory analysis of soil samples
Description of measurement methods and procedures to be applied	Measured according to the SOPs 'SOPs Tree and soil collection'
Frequency of monitoring/recording	Updated at the monitoring event at least once every five years
Value monitored	Soil organic carbon from the soil samples collected in the field.
Monitoring equipment	As described in the SOP: shovel, hoe, pickaxe; gardening trowel, rigid tape, metal ring, hammer, flat bladed knife, plastic wrap, buckets, water, GPS, plastic measuring cylinders. In addition, lab procedures include the use of additional equipment to carry out the analysis.
QA/QC procedures to be applied	The quality of the samples collected is guaranteed by the training provided to the field team to perform the collection of soil data. Moreover, a SOP was developed to be used by the field team during fieldwork to guarantee quality data to the lab. In addition, the samples are sent to a third-party laboratory to perform the analysis.

Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated from laboratory analysis
Comments	

Data / Parameter	<i>A</i>
Data Unit	Set
Description	The set of all sampled farms in the reference area used to estimate the maximum proportion of soil carbon loss
Source of Data	A sample of farms in the reference area.
Description of measurement methods and procedures to be applied	Equation [12] of the methodology
Frequency of monitoring/recording	Observed once prior to the end of the first monitoring period, held constant over entire project lifetime.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of project emissions
Calculation method	Not applicable
Comments	

Data / Parameter	<i>C</i>
Data Unit	Set
Description	The set of all selected carbon pools
Source of Data	Includes all required and selected optional carbon pools
Description of measurement methods and procedures to be applied	Equation [20] of the methodology
Frequency of monitoring/recording	Held constant over entire project lifetime.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	See monitoring plan

Purpose of the data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage
Calculation method	Not applicable
Comments	

Data / Parameter	<i>D</i>
Data Unit	Set
Description	The set of all decay classes
Source of Data	Decay classes are sound, intermediate, and rotten.
Description of measurement methods and procedures to be applied	Equation [58] of the methodology
Frequency of monitoring/recording	Held constant over entire project lifetime.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	See monitoring plan
Purpose of the data	Calculation of baseline emissions
Calculation method	Not applicable
Comments	

Data / Parameter	<i>E</i>
Data Unit	Set
Description	The set of all burning events
Source of Data	Records of biomass burning and charcoal production in the project area
Description of measurement methods and procedures to be applied	Equation [31] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of monitoring records

Purpose of the data	Calculation of project emissions
Calculation method	GIS analysis
Comments	

Data / Parameter	$J, J^{[m]}$
Data Unit	Set
Description	The set of all observations of deforestation. When superscripted with a monitoring period, the deforestation observations are taken for leakage analysis.
Source of Data	Remote sensing image interpretation or field observations in the leakage area.
Description of measurement methods and procedures to be applied	Equation [17] of the methodology
Frequency of monitoring/recording	Re-evaluated whenever the baseline model is re-assessed or, for leakage analysis, at every monitoring period.
Value monitored	Not applicable
Monitoring equipment	Review of monitoring records
QA/QC procedures to be applied	Review of monitoring records
Purpose of the data	Calculation of leakage
Calculation method	Review of monitoring records
Comments	

Data / Parameter	$\mathcal{L}_k$
Data Unit	Set
Description	Set of all transects used for measurement of lying dead wood in stratum k
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equations [48], [56], [57] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Not applicable

Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$\mathcal{M}$
Data Unit	Set
Description	The set of all monitoring periods prior to $[m]$
Source of Data	Previous monitoring periods
Description of measurement methods and procedures to be applied	Equation [29] of the methodology
Frequency of monitoring/recording	Every monitoring period
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	Review of monitoring records
Comments	

Data / Parameter	$\mathcal{P}_k$
Data Unit	Set
Description	Set of all plots in stratum k
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equations [44], [46], [47], [49] of the methodology
Frequency of monitoring/recording	Determined at first carbon inventory. May be updated prior to additional carbon inventories.
Value monitored	Various
Monitoring equipment	Not applicable

QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	Review of monitoring records
Comments	

Data / Parameter	S
Data Unit	Set
Description	Set of all strata in the project area.
Source of Data	Stratification carried out based on guidance in section 13.2 of the methodology
Description of measurement methods and procedures to be applied	Equations [39], [40], [41], [44], [47], [48], [49] of the methodology
Frequency of monitoring/recording	Determined at first carbon inventory. May be updated prior to additional carbon inventories.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	Review of monitoring records
Comments	

Data / Parameter	$x_{j,k}$
Data Unit	Set
Description	Set of all measurements of a type in plot j in stratum k
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equations [45], [58] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Not applicable

QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions Calculation of project emissions
Calculation method	Review of monitoring records
Comments	

Data / Parameter	α
Data Unit	Real
Description	Intercept of linear predictor of cumulative deforestation model
Source of Data	Parameter of model fit to observations of deforestation given time and a vector of deforestation covariates. See equation [7] and section 6.4.7 of the methodology for details.
Description of measurement methods and procedures to be applied	Equations [7], [9] of the methodology
Frequency of monitoring/recording	Re-evaluated whenever the baseline model is re- assessed.
Value monitored	0.261
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	Section 6.4.7 of the methodology.
Comments	

Data / Parameter	β
Data Unit	Real
Description	Time parameter of linear predictor of cumulative deforestation model
Source of Data	Parameter of model fit to observations of deforestation given time and a vector of deforestation covariates. See equation [7] and section 6.4.7 of the methodology for details.
Description of measurement methods and procedures to be applied	Equations [7], [9] of the methodology

Frequency of monitoring/recording	Re-evaluated whenever the baseline model is re- assessed.
Value monitored	0.0217
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	Section 6.4.7 of the methodology.
Comments	

Data / Parameter	η
Data Unit	Real
Description	Linear predictor of cumulative deforestation model
Source of Data	Estimated as $\hat{\eta}$ using a model fit to observations of deforestation given time and a vector of deforestation covariates. See equation [7] and section 6.4.7 of the methodology for details.
Description of measurement methods and procedures to be applied	Equation [16] of the methodology
Frequency of monitoring/recording	Re-evaluated whenever the baseline model is re- assessed.
Value monitored	$0.261 + 0.0217t$
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	Section 6.4.7 of the methodology.
Comments	

Data / Parameter	$\hat{\eta}$
Data Unit	Real
Description	Estimated linear predictor of cumulative deforestation model

Source of Data	Model fit to observations of deforestation given time and a vector of deforestation covariates. See equation [7] and section 6.4.7 of the methodology for details.
Description of measurement methods and procedures to be applied	Equations [21], [22], [23], [24], [25], [26], [27], [28], [29], [33] of the methodology
Frequency of monitoring/recording	Re-evaluated whenever the baseline model is re- assessed.
Value monitored	$0.261 + 0.0217t$
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	Section 6.4.7 of the methodology.
Comments	

Data / Parameter	θ
Data Unit	Real, vector
Description	Parameter vector of cumulative deforestation model
Source of Data	Parameter of model fit to observations of deforestation given time and a vector of deforestation covariates. See equation [7] and section 6.4.7 of the methodology for details.
Description of measurement methods and procedures to be applied	Not applicable
Frequency of monitoring/recording	Re-evaluated whenever the baseline model is re- assessed.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$\hat{\lambda}$
Data Unit	Proportion
Description	Estimated exponential soil carbon decay parameter
Source of Data	Calculated using field data.
Description of measurement methods and procedures to be applied	Not applicable
Frequency of monitoring/recording	Re-evaluated whenever the baseline model is re-assessed.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$\bar{\rho}_d$
Data Unit	kg m ⁻³
Description	Mean density of lying dead wood in decay class <i>d</i>
Source of Data	Not applicable
Description of measurement methods and procedures to be applied	Not applicable
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	m_{soil}
Data Unit	kg/m ³
Description	Mass-equivalent bulk density of fine portion of soil sample
Source of Data	Equation [60]
Description of measurement methods and procedures to be applied	[61]
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	$m_{soil\ j,k}$ that is the dry mass of soil sample taken from plot j in stratum k
Monitoring equipment	soil ring
QA/QC procedures to be applied	SOP document and reviewing of monitoring records
Purpose of the data	Calculation of baseline emissions
Calculation method	Laboratory analysis
Comments	

Data / Parameter	$\hat{\sigma}_{SE,AGB}^{[m]}$
Data Unit	Tonnes CO ₂ e
Description	Estimated standard error of carbon stock in above- ground large and small trees at monitoring period [m]
Source of Data	Calculated using the procedures described in section 13.5.1 of the methodology
Description of measurement methods and procedures to be applied	Equation [63] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	6,268,068.73
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of monitoring records
Purpose of the data	Calculation of confidence deduction
Calculation method	Equation [47] of the methodology
Comments	

Data / Parameter	$\hat{\sigma}_{SE,AGNT}^{[m]}$
Data Unit	Tonnes CO2e
Description	Estimated standard error of carbon stock in above- ground non tree biomass at monitoring period $[m]$
Source of Data	Calculated using the procedures described in section 13.5.3 of the methodology
Description of measurement methods and procedures to be applied	Equations [63], [65] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	77,601.56
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of monitoring records
Purpose of the data	Calculation of confidence deduction
Calculation method	Equation [47] of the methodology
Comments	

Data / Parameter	$\hat{\sigma}_{SE,Total}^{[m]}$
Data Unit	Tonnes CO2e
Description	Estimated standard error of total carbon stock in the project area at monitoring period $[m]$
Source of Data	Calculated from the standard errors of all required and optional carbon pools using equation [63].
Description of measurement methods and procedures to be applied	Equation [67] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	7,125,118.787
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of monitoring records
Purpose of the data	Calculation of confidence deduction

Calculation method	Equation [63] of the methodology
Comments	

Data / Parameter	$\hat{\sigma}_{\bar{C}}$
Data Unit	Tonnes CO2e
Description	Estimated standard deviation of carbon stocks in project area
Source of Data	Estimated using a pilot sample or literature search prior to sampling.
Description of measurement methods and procedures to be applied	Equation [37] of the methodology
Frequency of monitoring/recording	May be updated at each monitoring period.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	Not applicable
Comments	If the sample size is updated in an effort to improve precision between monitoring periods, the standard deviation calculated from previous inventories may be used to update the required sample size.

Data / Parameter	$\hat{\sigma}_{SE,BGB}^{[m]}$
Data Unit	Tonnes CO2e
Description	Estimated standard error of carbon stock in below-ground large and small tree biomass at monitoring period [m]
Source of Data	Calculated using the procedures described in section 13.6.1 of the methodology
Description of measurement methods and procedures to be applied	Equation [63] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	2,632,588.87

Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of monitoring records
Purpose of the data	Calculation of confidence deduction
Calculation method	Equation [47] of the methodology
Comments	

Data / Parameter	$\hat{\sigma}_{SE,BGNT}^{[m]}$
Data Unit	Tonnes CO2e
Description	Estimated standard error of carbon stock in below-ground non tree biomass at monitoring period [m]
Source of Data	Calculated using the procedures described in section 13.6.3 of the methodology
Description of measurement methods and procedures to be applied	Equation [63] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	32,592.65
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of monitoring records
Purpose of the data	Calculation of confidence deduction
Calculation method	Equation [47] of the methodology
Comments	

Data / Parameter	$\hat{\sigma}_k$
Data Unit	Tonnes CO2e
Description	Estimated standard deviation of carbon stocks in stratum <i>k</i> .
Source of Data	Estimated using a pilot sample or literature search prior to sampling when used for sample size estimates. Calculated from field measurements otherwise.
Description of measurement methods and procedures to be applied	Equations [39], [40], [41], [47], [48], [49] of the methodology

Frequency of monitoring/recording	May be updated at each monitoring period.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$\hat{\sigma}_{SE,LDW}^{[m]}$
Data Unit	Tonnes CO2e
Description	Estimated standard error of carbon stock in lying dead wood at monitoring period $[m]$
Source of Data	Not applicable
Description of measurement methods and procedures to be applied	Equation [63] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$\hat{\sigma}_{SE,SDW}^{[m]}$
Data Unit	Tonnes CO2e
Description	Estimated standard error of carbon stock in standing dead wood at monitoring period $[m]$
Source of Data	Calculated using the procedures described in section 13.7 of the methodology

Description of measurement methods and procedures to be applied	Equation [63] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	137,728.53
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of monitoring records
Purpose of the data	Calculation of confidence deduction
Calculation method	Equation [47] of the methodology
Comments	

Data / Parameter	$\hat{\sigma}_{SE,SOIL}^{[m]}$
Data Unit	Tonnes CO2e
Description	Estimated standard error of carbon stock in soil carbon at monitoring period [m]
Source of Data	Calculated using the procedures described in section 13.9
Description of measurement methods and procedures to be applied	[63]
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	2,126,512.29
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of monitoring records
Purpose of the data	Calculation of confidence deduction
Calculation method	Equation [49] of the methodology
Comments	

Data / Parameter	a_{plot}
Data Unit	hectares
Description	Area of a plot.
Source of Data	Specified as part of project sampling design.

Description of measurement methods and procedures to be applied	Equations [37], [41] of the methodology
Frequency of monitoring/recording	May be updated at each monitoring period.
Value monitored	0.0248 to 0.0254
Monitoring equipment	Review monitoring plan
QA/QC procedures to be applied	Review monitoring plan
Purpose of the data	Calculation of baseline emissions
Calculation method	Specified as part of project sampling design.
Comments	8.9 and 9 square meters radius

Data / Parameter	$\bar{C}$
Data Unit	Tonnes CO ₂ e/ha
Description	Estimated mean carbon stock in the project area.
Source of Data	Estimated using a pilot sample or literature search prior to sampling.
Description of measurement methods and procedures to be applied	Equations [37], [41] of the methodology
Frequency of monitoring/recording	May be updated at each monitoring period.
Value monitored	300.93
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review monitoring plan
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculations spreadsheet
Comments	If the sample size is updated in improve precision between monitoring periods, the carbon stock estimates calculated from previous inventories may be used to update the required sample size.

Data / Parameter	$C[m]$
Data Unit	Tonnes CO ₂ e
Description	Quantified emissions reductions and/or removals

Source of Data	Equation [34] of the methodology
Description of measurement methods and procedures to be applied	Equation [34] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	7,889,849
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of emissions reductions
Calculation method	Equation [34] of the methodology
Comments	Final estimate of project greenhouse gas benefits (or emissions) for monitoring period [$m=5$]

Data / Parameter	$C_{AGB}^{[m]}$
Data Unit	Tonnes CO ₂ e
Description	Estimated carbon stock in above-ground large and small trees at monitoring period [m]
Source of Data	Calculated using the procedures described in section 13.5.1 of the methodology
Description of measurement methods and procedures to be applied	Equations [21], [62] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	84,662,806.44
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated using the procedures described in section 13.5.1 of the methodology
Comments	

Data / Parameter	$C_{AGNT}^{[m]}$
Data Unit	Tonnes CO ₂ e

Description	Estimated carbon stock in above-ground non tree biomass at monitoring period [m]
Source of Data	Calculated using the procedures described in section 13.5.3 of the methodology
Description of measurement methods and procedures to be applied	Equations [23], [64], [62] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	1,417,186.35
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated using the procedures described in section 13.5.3 of the methodology
Comments	

Data / Parameter	$C_{BE}^{[m]}$
Data Unit	Tonnes CO ₂ e
Description	Estimated baseline emissions
Source of Data	Equation [20] of the methodology
Description of measurement methods and procedures to be applied	Equations [20], [32], [34], [35] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	7,889,849
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Equation [20] of the methodology
Comments	

Data / Parameter	$C_{BGB}^{[m]}$
Data Unit	Tonnes CO ₂ e

Description	Estimated carbon stock in below-ground large and small tree biomass at monitoring period [m]
Source of Data	Calculated using the procedures described in section 13.5.1 of the methodology
Description of measurement methods and procedures to be applied	Equation [24], [62] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	35,558,398.73
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated using the procedures described in section 13.5.1 of the methodology
Comments	

Data / Parameter	$C_{BGNT}^{[m]}$
Data Unit	Tonnes CO ₂ e
Description	Estimated carbon stock in below-ground non tree biomass at monitoring period [m]
Source of Data	Calculated using the procedures described in section 13.6.3 of the methodology
Description of measurement methods and procedures to be applied	Equation [26], [62] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	595,212.89
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated using the procedures described in section 13.6.3 of the methodology
Comments	

Data / Parameter	$C_{LDW}^{[m]}$
------------------	-----------------

Data Unit	Tonnes CO ₂ e
Description	Estimated carbon stock in lying dead wood at monitoring period $[m]$
Source of Data	Not applicable
Description of measurement methods and procedures to be applied	Equation [28], [62] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$C_{LE}^{[m]}$
Data Unit	Tonnes CO ₂ e
Description	Estimated emissions from leakage
Source of Data	Equation [32] of the methodology
Description of measurement methods and procedures to be applied	Equation [34] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	0
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of leakage
Calculation method	Equation [32] of the methodology
Comments	

Data / Parameter	$C_{SDW}^{[m]}$
------------------	-----------------

Data Unit	Tonnes CO ₂ e
Description	Estimated carbon stock in standing dead wood at monitoring period [<i>m</i>]
Source of Data	Calculated using the procedures described in section 13.7 of the methodology
Description of measurement methods and procedures to be applied	[27], [62]
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	540,996.92
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated using the procedures described in section 13.7 of the methodology
Comments	

Data / Parameter	$C_{SOIL}^{[m]}$
Data Unit	Tonnes CO ₂ e
Description	Estimated carbon stock in soil carbon at monitoring period [<i>m</i>]
Source of Data	Calculated using the procedures described in section 13.9 of the methodology
Description of measurement methods and procedures to be applied	Equation [12], [62] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	102,663,952.45
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated using the procedures described in section 13.9 of the methodology
Comments	

Data / Parameter	$C_{TOTAL}^{[m]}$
Data Unit	Tonnes CO2e
Description	Estimated total carbon stock in the project area at monitoring period [m]
Source of Data	Calculated as the sum of all required and optional carbon pools using equation [62]
Description of measurement methods and procedures to be applied	Equation [67] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	225,438,553.77
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated as the sum of all required and optional carbon pools using equation [62]
Comments	

Data / Parameter	$C_U^{[m]}$
Data Unit	Tonnes CO2e
Description	Confidence deduction
Source of Data	Equation [35] of the methodology
Description of measurement methods and procedures to be applied	Equation [34] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	0
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of confidence deduction
Calculation method	Equation [35] of the methodology
Comments	

Data / Parameter	$C_{PE}^{[m]}$
Data Unit	Tonnes CO2e
Description	Estimated project emissions
Source of Data	Equation [31] of the methodology
Description of measurement methods and procedures to be applied	Equation [34] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	0
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of project emissions
Calculation method	Equation [31] of the methodology
Comments	

Data / Parameter	$cf_{soil,j,k}$
Data Unit	kg carbon per kg soil
Description	Carbon fraction of soil sample in plot j in stratum k
Source of Data	Estimated from laboratory analysis of soil samples.
Description of measurement methods and procedures to be applied	Equation [61] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Soil ring
QA/QC procedures to be applied	SOP, review of field records and laboratory results.
Purpose of the data	Calculation of baseline emissions
Calculation method	Estimated from laboratory analysis of soil samples
Comments	

Data / Parameter	C_k
------------------	-------

Data Unit	See below
Description	Relative cost of making an observation in stratum k
Source of Data	Estimated by project proponent.
Description of measurement methods and procedures to be applied	[40]
Frequency of monitoring/recording	May be updated at each monitoring period.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$dbh_{i,j,k}$
Data Unit	Generally measured in centimeters or inches. The measurement units actually used must correspond with the input requirements of the allometric equations selected for the project area.
Description	Diameter at breast height of the i^{th} tree in plot j in stratum k .
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [50] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Metric tape
QA/QC procedures to be applied	Review of monitoring plan
Purpose of the data	Calculation of baseline emissions
Calculation method	Diameter at breast height of the i^{th} tree in plot j in stratum k .
Comments	

Data / Parameter	$\bar{E}$
Data Unit	Percent
Description	Mean cross-validated bias
Source of Data	Result of cross-validation of newly developed allometric equations. See section 13.13.1. of the methodology
Description of measurement methods and procedures to be applied	Not applicable
Frequency of monitoring/recording	Used only when new allometric equations are developed.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$\hat{e}_i$
Data Unit	kg
Description	Estimated cross-validated residual for observation i
Source of Data	Intermediate variable used in cross-validation of newly developed allometric equations. See section 13.13.1. of the methodology
Description of measurement methods and procedures to be applied	Equation [70] of the methodology
Frequency of monitoring/recording	Used only when new allometric equations are developed.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$f_{-i}(\bullet)$
Data Unit	Function
Description	Allometric function re-fit without observation i
Source of Data	Intermediate variable used in cross-validation of newly developed allometric equations. See section 13.13.1. of the methodology
Description of measurement methods and procedures to be applied	Equation [69] of the methodology
Frequency of monitoring/recording	Used only when new allometric equations are developed.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$G(t, \lambda)$
Data Unit	Proportion
Description	Proportion of soil lost at time t with decay parameter λ
Source of Data	Exponential decay model. See equations [11] and [13].
Description of measurement methods and procedures to be applied	[14]
Frequency of monitoring/recording	Re-evaluated whenever the baseline model is re-assessed.
Value monitored	Time (years)
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	the one described at equation [11]
Comments	Further details are given in section 6.5.1

Data / Parameter	$h_{i,j,k}$
Data Unit	Generally measured in meters or feet. The measurement units actually used must correspond with the input requirements of the allometric equations selected for the project area. When this variable is an input to equation [52], it must be expressed in meters.
Description	Height of the i^{th} tree in plot j in stratum k.
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equations [50], [52] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Clinometers
QA/QC procedures to be applied	Cross-check of information
Purpose of the data	Calculation of baseline emissions
Calculation method	Check SOP for data collection
Comments	

Data / Parameter	l_j
Data Unit	meters
Description	Length of transect j used for measuring lying dead wood.
Source of Data	Field measurements.
Description of measurement methods and procedures to be applied	Equations [56], [58] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable

Comments	
----------	--

Data / Parameter	ℓ_{max}
Data Unit	Proportion
Description	The maximum proportion of soil carbon lost over time
Source of Data	Equations [13], [18] of the methodology
Description of measurement methods and procedures to be applied	Equations [13], [18] of the methodology
Frequency of monitoring/recording	Re-evaluated whenever the baseline model is re- assessed.
Value monitored	time [years]
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	The one described in equations [13] and [18]
Comments	

Data / Parameter	$\hat{\ell}_{max}$
Data Unit	proportion
Description	The estimated maximum proportion of soil carbon lost over time
Source of Data	Soil carbon is measured on plots that have been converted to agriculture in the reference region and compared to the mean carbon stock in the project area at the initial monitoring period. $\hat{\ell}_{max}$ is estimated as the mean of the loss on these plots.
Description of measurement methods and procedures to be applied	Equation [12] of the methodology
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re- assessed.
Value monitored	Soil carbon stock in the project area and in the reference region

Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	The one described at equation [12]
Comments	

Data / Parameter	$mburned,i$
Data Unit	Tonnes
Description	The mass of wood burned during the i^{th} event
Source of Data	Records of biomass burning and charcoal production in the project area
Description of measurement methods and procedures to be applied	Equation [31] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$mdry,j,k$
Data Unit	kg
Description	Dry mass of non-tree sample harvested from clip plots in plot j , stratum k
Source of Data	Field measurements. May be estimated from wet mass using equation [55] of the methodology.
Description of measurement methods and procedures to be applied	Equation [53] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Not applicable

Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$m_{soil,j,k}$
Data Unit	kg
Description	Dry mass of soil sample take from plot j in stratum k.
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [60] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Soil ring
QA/QC procedures to be applied	SOP file, reviewing field records, and laboratory results
Purpose of the data	Calculation of baseline emissions
Calculation method	Analytical balance at laboratory
Comments	

Data / Parameter	$mr_{f,j,k}$
Data Unit	kg
Description	Dry mass of rock fraction of soil sample in plot j in stratum k
Source of Data	Field measurements. Soil samples must be sieved to 2 mm and fragments larger than 2mm weighed.
Description of measurement methods and procedures to be applied	Equation [60] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various

Monitoring equipment	Soil ring
QA/QC procedures to be applied	SOP file, reviewing field records, and laboratory results
Purpose of the data	Calculation of baseline emissions
Calculation method	Analytical balance at laboratory
Comments	

Data / Parameter	$m_{dry,subsample}$
Data Unit	Kg
Description	Dry mass of subsample of non-tree biomass collected to estimate dry wet ratio
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [55] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$m_{Wet,j,k}$
Data Unit	kg
Description	Wet mass of non-tree sample harvested from clip plots in plot j, stratum k
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [55] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Not applicable

Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$m_{wet,subsample}$
Data Unit	kg
Description	Wet mass of subsample of non-tree biomass collected to estimate dry wet ratio
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [55] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$\hat{n}_k$
Data Unit	Count
Description	Estimated total number of plots required in stratum k .
Source of Data	Calculated using equation [38] or equation [42] of the methodology.
Description of measurement methods and procedures to be applied	None. Used to guide field sampling design.
Frequency of monitoring/recording	May be updated if a new sample with greater precision is desired at a monitoring period.
Value monitored	Various

Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated using equation [38] or equation [42] of the methodology.
Comments	

Data / Parameter	N_P
Data Unit	Count
Description	Total number of possible plots in project area
Source of Data	GIS analysis at the time of stratification
Description of measurement methods and procedures to be applied	Equation [47] of the methodology
Frequency of monitoring/recording	Updated whenever stratification is updated.
Value monitored	31,399,480
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of confidence deduction
Calculation method	See section 13.5 of the methodology
Comments	$N_p = \frac{a_{project}}{a_{plot}} = \frac{784,987}{0.025}$

Data / Parameter	NP,k
Data Unit	Count
Description	Total number of possible plots in stratum k
Source of Data	GIS analysis at the time of stratification
Description of measurement methods and procedures to be applied	Equation [47] of the methodology
Frequency of monitoring/recording	Updated whenever stratification is updated.
Value monitored	WL: 11,042,360 OWL: 20,357,120
Monitoring equipment	Not applicable

QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of confidence deduction
Calculation method	See section 13.5 of the methodology
Comments	$N_{p,k} = \frac{a_k}{a_{plot}}$

Data / Parameter	$nSCL$
Data Unit	Count
Description	The actual sample size used to estimate the maximum proportion of soil carbon loss in section 6.5.2 of the methodology.
Source of Data	Equation [19] of the methodology
Description of measurement methods and procedures to be applied	None. Used to determine number of point sample required in leakage area.
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re- assessed.
Value monitored	sample size units
Monitoring equipment	Not applicable
QA/QC procedures to be applied	SOP, field records
Purpose of the data	Calculation of baseline emissions
Calculation method	Stratified random sampling
Comments	

Data / Parameter	$\hat{n}_{total}$
Data Unit	Count
Description	Estimated total number of plots required.
Source of Data	Calculated using equation [37] or equation [41].
Description of measurement methods and procedures to be applied	Equations [38], [42] of the methodology
Frequency of monitoring/recording	May be updated if a new sample with greater precision is desired at a monitoring period.
Value monitored	Not applicable

Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	$O_i^{[m]}$
Data Unit	Proportion
Description	State observation for the i^{th} sample point during monitoring period $[m=5]$
Source of Data	Field observations
Description of measurement methods and procedures to be applied	Equation [33] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of leakage
Calculation method	State observation for the i^{th} sample point during monitoring period $[m=5]$
Comments	

Data / Parameter	$\bar{O}^{[m]}$
Data Unit	Proportion
Description	Average of state observations taken in the leakage area for the during monitoring period $[m=5]$
Source of Data	Field observations
Description of measurement methods and procedures to be applied	Equation [33] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	0.108

Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of leakage
Calculation method	Average of state observations taken in the leakage area for the during monitoring period $[m=5]$
Comments	

Data / Parameter	$P(t_i)$
Data Unit	Probability
Description	Probability of making an observation at time t_i
Source of Data	Equation [4] of the methodology
Description of measurement methods and procedures to be applied	Equation [2] of the methodology
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re- assessed.
Value monitored	Not available
Monitoring equipment	GIS processes
QA/QC procedures to be applied	Determined in the validation, reevaluated whenever the baseline model is re- assessed.
Purpose of the data	Determination of baseline scenario
Calculation method	GIS analysis
Comments	

Data / Parameter	$P(t_i, x_i, y_i)$
Data Unit	Probability
Description	Probability of observing a sample point in the reference area located at (x_i, y_i) at time t_i
Source of Data	Equation [2] of the methodology
Description of measurement methods and procedures to be applied	Equation [2] of the methodology
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re- assessed.
Value monitored	Not available

Monitoring equipment	GIS processes
QA/QC procedures to be applied	Determined in the validation, reevaluated whenever the baseline model is re- assessed.
Purpose of the data	Determination of baseline scenario
Calculation method	GIS analysis
Comments	

Data / Parameter	$P(x_i, y_i t_i)$
Data Unit	Probability
Description	probability of observing location (x_i, y_i) given on observation is made at time t_i
Source of Data	Equation [3] of the methodology
Description of measurement methods and procedures to be applied	Equation [2] of the methodology
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re- assessed.
Value monitored	Not available
Monitoring equipment	GIS processes
QA/QC procedures to be applied	Determined in the validation, reevaluated whenever the baseline model is re- assessed.
Purpose of the data	Determination of baseline scenario
Calculation method	GIS analysis
Comments	

Data / Parameter	$rBASE_{i,j,k}$
Data Unit	Meters
Description	Base radius of the i^{th} tree in plot j in stratum k.
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [52] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various

Monitoring equipment	Metric tape
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	DBH measurements
Comments	

Data / Parameter	$r_{LE}^{[m]}$
Data Unit	Proportion
Description	The estimated leakage factor as a proportion of baseline emissions
Source of Data	Estimated based on the difference between observed deforestation in the reference area and predicted deforestation in the reference area as described in section 10.4. of the methodology
Description of measurement methods and procedures to be applied	Equation [32] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	0
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of leakage
Calculation method	Estimated based on the difference between observed deforestation in the reference area and predicted deforestation in the reference area as described in section 10.4. of the methodology
Comments	

Data / Parameter	$r_{TOP,i,j,k}$
Data Unit	Meters
Description	Top radius of the i^{th} tree in plot j in stratum k
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [52] of the methodology

Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Metric tape
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	DBH measurements
Comments	

Data / Parameter	t
Data Unit	Time
Description	Variable used to represent a point in time
Source of Data	Numbers of days
Description of measurement methods and procedures to be applied	Equations [7], [11], [13], [21], [22], [23], [24], [25], [26], [27], [28], [29], [33] of the methodology
Frequency of monitoring/recording	Each monitoring period
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation baseline emissions Calculation of project emissions Calculation of leakage
Calculation method	Numbers of days
Comments	

Data / Parameter	t_0, t_1, t_2
Data Unit	Time
Description	t_0 = Time zero, the project start date t_1 = A point in time earlier than t_2 t_2 = A point in time later than t_1
Source of Data	Numbers of days

Description of measurement methods and procedures to be applied	Equations [14], [18] of the methodology
Frequency of monitoring/recording	Each monitoring period
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation baseline emissions Calculation of project emissions Calculation of leakage
Calculation method	Numbers of days
Comments	

Data / Parameter	t_i
Data Unit	Time
Description	The time of the i^{th} sample point
Source of Data	Remote sensing image interpretation
Description of measurement methods and procedures to be applied	Equations [1], [3], [5] of the methodology
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re- assessed.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation baseline emissions
Calculation method	Numbers of days
Comments	

Data / Parameter	$U[m]$
Data Unit	Percent
Description	Average uncertainty in carbon stocks and the baseline model
Source of Data	Equation [36] of the methodology

Description of measurement methods and procedures to be applied	Equation [35] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	0.076623734
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of confidence deduction
Calculation method	Equation [36] of the methodology
Comments	

Data / Parameter	<i>USCL</i>
Data Unit	Percent
Description	Estimated uncertainty in the soil carbon loss model
Source of Data	Equation [19] of the methodology
Description of measurement methods and procedures to be applied	Equation [36] of the methodology
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re-assessed.
Value monitored	0.136066015
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of confidence deduction
Calculation method	Equation [19] of the methodology
Comments	

Data / Parameter	$U_{TOTAL}^{[m]}$
Data Unit	Percent
Description	Estimated uncertainty of total carbon stocks
Source of Data	Equation [67] of the methodology

Description of measurement methods and procedures to be applied	Equation [36] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	0.061946959
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of confidence deduction
Calculation method	Equation [67] of the methodology
Comments	

Data / Parameter	$v_{i,j,k}$
Data Unit	m ³
Description	Volume of the i^{th} tree in plot j in stratum k .
Source of Data	Equation [52] of the methodology
Description of measurement methods and procedures to be applied	Equation [51] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Equation [52] of the methodology
Comments	

Data / Parameter	$v_{soil,j,k}$
Data Unit	m ³
Description	Total volume of soil sample in plot j in stratum k
Source of Data	Field measurements

Description of measurement methods and procedures to be applied	Equation [60] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Equation [60] of the methodology
Comments	

Data / Parameter	$vr_{f,j,k}$
Data Unit	m ³
Description	Volume rock fragments (> 2mm) in soil sample taken in plot j in stratum k
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [60] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Field measurements
Comments	

Data / Parameter	$w_i^{[m]}$
Data Unit	Unitless
Description	The weight of the i^{th} sample point during monitoring period $[m]$
Source of Data	Equation [5] of the methodology

Description of measurement methods and procedures to be applied	Equation [33] of the methodology
Frequency of monitoring/recording	Updated at every monitoring period
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Equation [5] of the methodology
Comments	

Data / Parameter	w_k
Data Unit	Unitless
Description	Proportion of plots allocated to stratum k .
Source of Data	Calculated using equation [39] or [40].
Description of measurement methods and procedures to be applied	[41], [42]
Frequency of monitoring/recording	May be updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Equation [5] of the methodology
Comments	Intermediate variable used in estimating required sample size.

Data / Parameter	x
Data Unit	Real, vector
Description	Vector of observed covariates to deforestation
Source of Data	Independent variable used in deforestation model. See equation [7] and section 6.4.7 for details.

Description of measurement methods and procedures to be applied	[7]
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re- assessed.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	t
Data Unit	Real, vector
Description	Vector of observed times to forest state.
Source of Data	Time variable used in deforestation model. See equation [7] and section 6.4.7 of the methodology for details.
Description of measurement methods and procedures to be applied	Equation [7] of the methodology
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re- assessed.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Equation [7] of the methodology
Comments	

Data / Parameter	w
Data Unit	Real, vector
Description	Vector of observation weights

Source of Data	The initial vector of weights used when fitting the deforestation model using IRLS. See equation [7] and section 6.4.7 for details of the methodology.
Description of measurement methods and procedures to be applied	Equation [7] of the methodology
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re- assessed.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	o
Data Unit	Real, vector
Description	Vector of observed forest states
Source of Data	The response variable used to fit the cumulative deforestation model using IRLS. See equation [7] and section 6.4.7 of the methodology for details.
Description of measurement methods and procedures to be applied	Equation [7] of the methodology
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re- assessed.
Value monitored	Not available
Monitoring equipment	GIS processes
QA/QC procedures to be applied	Determined in the validation, reevaluated whenever the baseline model is re- assessed.
Purpose of the data	Determination of baseline scenario
Calculation method	GIS analysis
Comments	

Data / Parameter	x_i
Data Unit	Varies
Description	The latitude of the i^{th} sample point
Source of Data	Remote sensing image interpretation
Description of measurement methods and procedures to be applied	Equation [1], [3], [5] of the methodology
Frequency of monitoring/recording	Reevaluated whenever the baseline model is re- assessed.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	GIS processing
Comments	

Data / Parameter	$x_{i,j,k}$
Data Unit	Varies
Description	i^{th} measurement in plot j in stratum k
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [45] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	Various
Comments	This is a generic variable. For example, it may represent the diameter of the i^{th} tree in plot j in stratum k .

Data / Parameter	$x_{i,j,k,d}$
Data Unit	m
Description	Diameter of i^{th} piece of lying dead wood on transect j in stratum k , decay class d
Source of Data	Field measurements.
Description of measurement methods and procedures to be applied	Equation [58] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Not applicable
Calculation method	Not applicable
Comments	

Data / Parameter	y
Data Unit	Varies
Description	y is a placeholder variable. It is used to represent plot level carbon stocks as well as transformed variables in a regression context.
Source of Data	As described for each equation.
Description of measurement methods and procedures to be applied	Equation [12] of the methodology
Frequency of monitoring/recording	Various
Value monitored	Not applicable
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Calculation of baseline emissions
Purpose of the data	Various
Calculation method	Various
Comments	

Data / Parameter	y_i
Data Unit	Longitude
Description	The longitude of the i^{th} sample point
Source of Data	Remote sensing image interpretation
Description of measurement methods and procedures to be applied	Equations [1], [3], [5] of the methodology
Frequency of monitoring/recording	Re-evaluated whenever the baseline model is re- assessed.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	GIS processing
Comments	

Data / Parameter	$y_{INTACT,j,k}$
Data Unit	Tonnes CO2e per hectare
Description	Carbon stock in standing dead trees in decay class I, plot j , stratum k
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [66] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Equation [45] of the methodology
Comments	

Data / Parameter	$y_{DECAYED,j,k}$
Data Unit	Tonnes CO ₂ e per hectare
Description	Carbon stock in standing dead trees in decay class II, plot j, stratum k
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [66] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Review of calculations spreadsheet
Purpose of the data	Calculation of baseline emissions
Calculation method	Equation [66] of the methodology
Comments	

Data / Parameter	$y_{j,k}$
Data Unit	Varies
Description	Attribute of plot j, stratum k
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equations [44], [46], [56], [57] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	Various
Comments	This is a generic variable. For example, it may represent the total carbon stock per unit area in standing dead wood in plot j, stratum k.

Data / Parameter	y_k
Data Unit	Varies
Description	Attribute of stratum k
Source of Data	Field measurements
Description of measurement methods and procedures to be applied	Equation [59] of the methodology
Frequency of monitoring/recording	Updated at each monitoring period.
Value monitored	Various
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Calculation of baseline emissions
Calculation method	Various
Comments	This is a generic variable. For example, it may represent the average carbon stock per unit area in lying dead wood in stratum k .

3.1.3 Monitoring Plan

Overview

The climate impact monitoring of the project has been monitored and reported in line with the VCS PDD requirements and the applied VCS methodology. In line with the VCS PDD and the monitoring plan, the project's monitoring followed the approach laid out in the applied VCS methodology and the VCS PDD, using a network of permanent sampling points.

The procedures described in this section refer to the data needed to calculate the total carbon stock in selected pools within the project area, and their uncertainty. These procedures are used both for establishing the initial carbon stock within the project area and the carbon stock at each monitoring event. The project employs permanent sample plots (PSP) coupled with allometric equations for estimating carbon stocks in trees. Non-tree biomass and standing dead wood are also measured in the PSP, while carbon pools of lying dead wood are conservatively omitted. Soil carbon is estimated using soil samples collected by the project team. These sampling procedures are designed to detect both increases in carbon stocks, such as those that occur because of forest growth, and decreases in carbon stocks, such as changes that may take place as a result of degradation or natural disturbance events.

Carbon stocks are estimated for the fifth monitoring period using 235 (100%) of the previously established PSPs. 112 of these PSPs were resampled during the monitoring period. This achieves a target of re-measurement of well above 20% of all PSPs per year of the crediting period and a complete re-measurement every five years as recommended in the VM0009 V1.1. All soil plots and leakage plots in the

project area were remeasured during this monitoring period. Please, see Figure 3 below for the location of biomass plots in the project area.

The climate impact is monitored for every monitoring period and should take place at least once every five years.

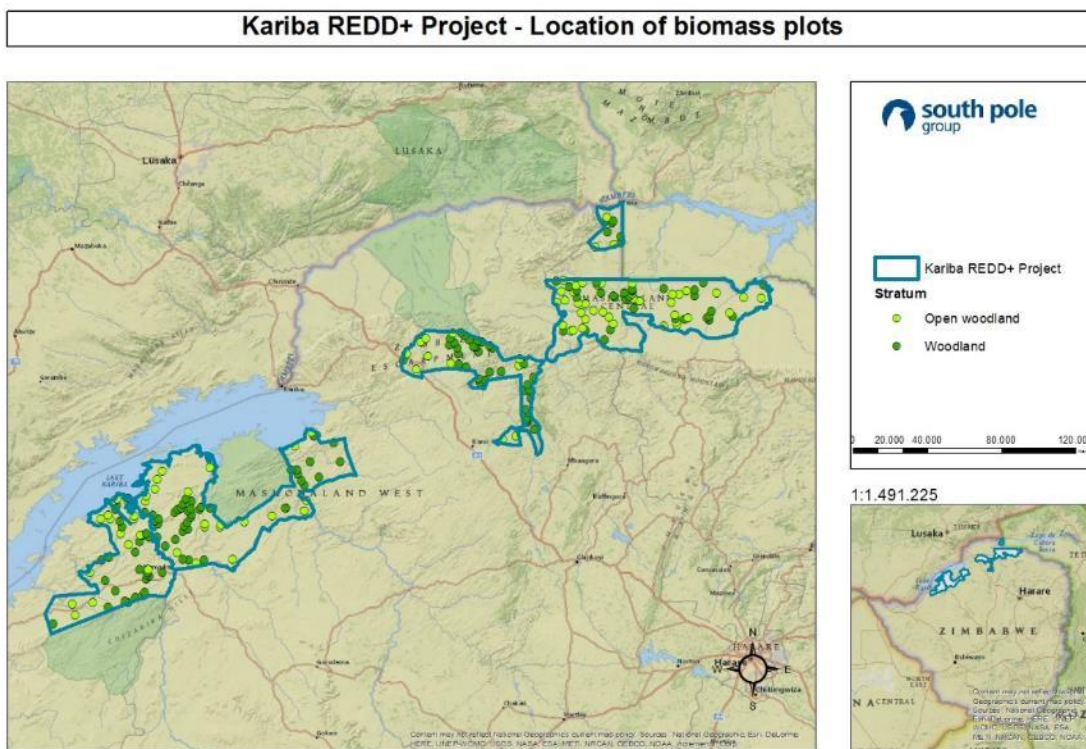


Figure 3: Location of biomass plots in the project area

In the monitoring process, the project team applied the update version of the validated SOP³⁶.

The stratum Woodland accounts for 269,457 ha, the stratum Open Woodland accounts for 478,345 ha and the temporarily unstocked forest stratum Non-Forest accounts for 37,186 ha.

Sampling

PSP are used to measure changes in carbon stocks in conjunction with the baseline models to quantify the net GHG emissions or removals as a result of project activities. The measurements reflect changes due to natural processes, like growth and mortality, and changes due to human activities, such as management, harvest and degradation. Plots are permanently marked with a magnetic marker buried in the ground and their GPS coordinates recorded. In cases where obstacles (tree, rock, river etc.) obstruct a particular location, the permanent marker is placed as close as possible to the starting point of the plot and notes are made on the field data sheet.

The sampling error is calculated by using equation 47 of the methodology VM0009 v1.1.

To sample biomass, coordinates of random biomass plot locations are used.

Leakage plots are assessed differently than the biomass plots. They are located in the reference area/leakage area and were placed in random spatial locations. See Section 3.3 of the validated VCS PDD

³⁶ The updated SOPs are provided on Supporting Documents/3_Climate/SOPs/Tree and Soil SOPs

for more details on how the leakage plots were selected. The leakage plots cannot be conspicuously marked like the biomass plots. Within the leakage area, a sample of plot locations were randomly selected with uniform probability with a sample size determined by equation 10 of the methodology or based on the Sourcebook for LULUCF projects. The dimension (two square ha; 145m x 145m) of all plots are the same. The proportion of degradation is determined by the observed aboveground biomass that is absent for each plot area. Record factors (i.e. 0.2, 0.4, etc.) corresponding to degradation is applied. The leakage plot is recorded in a GIS system. The Kariba REDD+ Project implemented a total of 50 leakage plots following its SOPs for leakage plots following the requirements of VM0009 V1.1.

So far, no systematic variations potentially present in the project area due to topography, management history, or other factors have been identified. In case systematic variation is identified in the future, how the sampling design avoids bias that may result from these variations will be documented in the monitoring report.

Soil organic carbon plots are assessed differently than biomass plots. They are located in forest areas inside the biomass plots. Each stratum must contain at least two sample plots.

For further information on tree biomass, soil organic carbon, leakage monitoring, please refer to Supporting Documents/3_Climate/SOPs.

The sampling teams have been specially trained for each monitoring activity described above.

Organisational structure

The project entity implements procedures that ensure independent verification. Should there be differences in the electronic and paper-based formats, these are clarified in the terms defined and procedures followed. Particular attention has been paid to monitoring and measurement errors. This issue will be addressed through mandatory data checks and training of sampling teams.

The forest inventory field crews had at least two members, taking into account the amount of information to be collected and the tasks of each individual. Additional persons may be included to improve performance of the field crews when conditions require greater resources. If necessary, some in-the-field crews were hired locally and acted as guides in the field.

One of the crewmembers is experienced in tree species identification or is familiar with methods of plant collection and identification using taxonomic keys.

The responsibilities of each crewmember have been clearly defined. Their tasks are proposed as follows:

The crew leader is responsible for organising all the phases of the fieldwork, from the preparation to the data collection. He/she has the responsibility of contacting and maintaining good relationships with the community and the informants and has a good overview of the progress achieved in the fieldwork. He/she administers the location of plots; takes care of crew logistics by organising and obtaining information on accommodation facilities; recruits local workers; organises access to the plots; interviews external informants and local people; ensures field forms are properly filled in and collected data are reliable; organises meetings after fieldwork to sum up daily activities; and implements field worker safety measures. Training of the crews on the survey methodology were undertaken at the beginning of the fieldwork in theoretical and practical sessions, during which techniques of different forest and tree measurements, tally of data and techniques were reviewed.

Data collection and storage

The personnel involved in the measurement of carbon pools have been fully trained in field data collection and analysis by the technical manager, Pieter Bezuidenhout. SOPs have been developed for each step of the field measurements and followed so that measurements are comparable over time. If different

interpretations of the SOPs exist among the sampling teams, they have been jointly revised to ensure clearer guidance.

Proper data entry is required to produce reliable carbon estimates. Therefore, a web-based data entry form is used for all the data, except soil carbon and leakage, measured in the field, as required by the methodology. All data sheets included a field to record crew composition. Hard copies are kept for the data on soil carbon. The data is analysed using an excel sheet and various copies are kept as a backup. Communication between all personnel involved in measuring and analysing data took place to resolve any apparent anomalies before final analysis of the monitoring data was completed. If there were any problems with the monitoring plot data that cannot be resolved, the plot has not been used in the analysis. Additionally, field data have been reviewed by the technical manager or a team leader of the sampling team to ensure that the data are accurate, and analyses are realistic.

Due to the long length of the project and the speed at which technology changes, data archiving will be an essential component of the project. Data is archived in several forms: all original field data sheets are saved, and copies of the original data sheets are stored in another file as backup. All documents are stored in the CGI office. Furthermore, the Monitoring and Verification System (MOVERS) is used for obtaining, recording, compiling and analysing data relevant for the project. MOVERS is a centralised online data system, which is server based and backed up, and serves as the project's GHG information system. All data are therefore kept in a secure and retrievable manner for at least two years after the end of the crediting period. Access to MOVERS has been provided to the auditors.

Quality Assurance (QA)/Quality Control (QC)

The project follows the IPCC GPG, using two types of procedures in order to ensure that the inventory estimates and their contributing data are of high quality^{37,38,39}. The plan that describes specific QA/QC procedures is as follows^{40,41}:

- Standard Operating Procedures (SOP) are used for field data measurements.
- Training courses are held for all relevant personnel on all data collection and analysis procedures.
- To reduce uncertainty in leakage measurement, trainings and field protocol for sampling forest degradation are implemented.
- Steps are taken to control for errors in the sampling and data analysis to develop a credible plan for measuring and monitoring carbon stock change in the project context. Following the requirements in VM0009 V1.1 section 13.10 a check cruise has been established. In accordance with the guidance from the LULUCF Sourcebook (Pearson et al. 2005) A random sample of 20 biomass plots were re-measured in this monitoring period. These plots were subject to re-measurement by a different field crew with the same level of training, following the same SOPs⁴² The results of the original monitoring session were compared with the outcome of the QA/QC samples to ensure that no non-conformities are identified.
- Data collection is an ongoing process. A centralised data system (such as an online server-based and backed-up MOVERS) is used for all the pools, except for soil carbon and leakage. The integration of carbon-credit centred monitoring activities into one central platform contributes significantly to increasing efficiency and decreasing the amount of errors.

The project proponent CGI is managing the project and is responsible for the centralised documentation of all project planning and implementation. QA/QC procedures have been implemented to ensure that

³⁷ IPCC GPG for LULUCF; Chapter 5.5 Quality assurance and quality control

³⁸ IPCC GPG and Uncertainty management in National GHG Inventories; Ch. 8 QA and QC

³⁹ IPCC GPG for LULUCF; Chapter 3.2 Forest land

⁴⁰ IPCC GPG for LULUCF; Chapter 5.5 Quality assurance and quality control

⁴¹ IPCC GPG and Uncertainty management in National GHG Inventories; Ch. 8 QA and QC

⁴² See MOVERS Quality check data sheets tab.

biomass, soil and leakage plots are measured and monitored precisely, credibly, verifiably and transparently.

CGA ensured that the QA/QC plan is developed and implemented, coordinated QA/QC activities, and is responsible for documenting QA/QC procedures. For this purpose, CGA designated its CTO Pieter Bezuidenhout as a QA/QC coordinator.

Additionally, South Pole reviewed the biomass data in MOVERS as well as the raw soil data and following internal QA/QC procedures minor mistakes were identified. This was informed to CGA and was corrected using original field sheets and discussing with the field teams.

Finally, during this period there were no non-conformances with the monitoring plan.

Allometric equations

The project applies allometric equations from peer-reviewed literature that are similar to the project location and the location in which the equations were derived in terms of climatic, edaphic, geographical and taxonomic conditions. When possible, species-specific equations are used from similar locations including Zimbabwe, Tanzania, South Africa, Botswana and Mozambique. If the allometric equations include only above-ground biomass, species or forestry type specific default values are used for calculating the below-ground biomass. A list of allometric equations has been provided separately to the auditor at the validation stage⁴³.

All data, including field data, equations, densities and root-shoot ratio, are uploaded to the centralised data system MOVERS during the monitoring and verification stage of the project, except for carbon organic soil and leakage. All calculations are then processed automatically; firstly, on a plot basis implemented for each strata, and by calculating the carbon sequestered in the soil, based on the soil plots, these values are extrapolated to the total amount of ha (per stratum) and then totaled. The total carbon stock for the project area is calculated by using equation 62 of the methodology.

The carbon stock per unit area in each plot is calculated using equation 45 and equation 54 for shrubs. The predicted carbon stock for the large and small trees is calculated using equation 50 of the methodology. The total carbon stock in above-ground, large, small and non-tree biomass is calculated with equation 44, and the standard error of the carbon stock in above-ground, large, small and non-trees with equation 47. The same equations apply for the calculation of the below-ground, large and small-tree biomass. For non-tree biomass equation 64 is applied and for the estimation of the standard error of the below-ground biomass equation 65 is used.

The carbon stock in standing dead wood in a plot is calculated using equation 66. The same equations as above are applied for calculating the total carbon stock in standing dead wood (equation 44) and the standard error of the carbon stock in standing dead wood (equation 47).

The carbon stock in soil organic carbon for each plot is calculated using equation 61 of the methodology. Baseline emissions of soil for the monitoring period is calculated using equation 29, which uses the soil carbon loss function defined by equation 18. The standard error used for soil organic carbon is calculated using equation 49 and the uncertainty of the soil carbon loss model calculated using equation 19. The estimated variance and estimated standard error are calculated using equation 46 and 49, respectively. However, soil was not monitored during this monitoring period.

For conservative estimate, all deadwood is assumed to be part of decay class II. DBH and height are measured on each dead tree. The volume of each dead tree is then estimated as a cone. The carbon stock for each plot is calculated using equation 45, where equation 51 is applied for calculating the carbon stock per tree, and equation 52 for calculating the amount of carbon in the stratum.

⁴³ The list of allometric equations is also available under the Supporting Documents/3_Climate/Allometric Equations

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

According to the already validated information from the CCB PDD, page 62, a full monitoring plan was submitted to the CCBS for publication on its website, which is still available there⁴⁴.

The results of the monitoring are disseminated and made public in the project area. The results of the monitoring are published in the monitoring reports, which is not only published online for public consultation, but was also distributed locally through summaries, which have been translated to Tonga and Shona and distributed in the project area. Community members have also been invited to comment on the Monitoring Report (refer to Section 2.3).

The distribution was done as follows: one copy of the full Monitoring Report was sent to each council office with an additional copy sent to the council satellite office in Binga giving a total of five copies. As for the Monitoring Report summaries, one copy was sent to each council office, one copy to each chief and one copy to each ward councilor. All these copies were delivered as hard copies in person by the OGM who followed up with an explanation on how to submit any grievances through the communications channels outlined in the adaptive management plan either directly to council, OGM teams or CGA head office. As described previously, the projects OGM team is in continuous contact with the local communities about the project during site visits, meeting with chiefs and other leaders, and through field staff. Through this communication, the project team is further able to ensure that the results of the monitoring undertaken in accordance with the monitoring plan, have been communicated to the communities and other stakeholders.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

According to section 8 of the methodology, for any monitoring period, baseline emissions $C_{BE}^{[m]}$ are a sum of estimated emissions over selected carbon pools as defined by equation [20] of the methodology. Below is an estimation of the emissions from the different carbon pools selected.

Estimating emissions from above-ground biomass in trees

As stated in section 8.1 of the methodology, for any given monitoring period, emissions from above-ground biomass in trees are estimated as a proportion of measured carbon in above-ground biomass in trees at the end point in time of the monitoring period following the equation below.

$$C_{BE,AGB}^{[m]} = F_{DF}\left(t_2^{[m]}, \hat{\eta}^{[m]}\right) C_{AGB}^{[m]} - F_{DF}\left(t_2^{[m-1]}, \hat{\eta}^{[m-1]}\right) C_{AGB}^{[m-1]}$$

Using the equation above and the information obtained during the last monitoring report (m=4) and the current data (m=5) as can be seen in the table below; it is possible to obtain the baseline emissions from above-ground biomass in trees.

Table 3: Baseline emissions from above-ground biomass in trees

Parameter	Description	Value
$F_{DF}\left(t_2^{[m=4]}, \hat{\eta}^{[m=4]}\right)$	Predicted proportion of cumulative deforestation at monitoring period m=4	0.25507
$C_{AGB}^{[m=4]}$ WL	Carbon stock in above-ground for Woodland stratum for monitoring period m=4	36,358,952.38
$C_{AGB}^{[m=4]}$ OWL	Carbon stock in above-ground for Open Woodland stratum for monitoring period m=4	53,287,677.42

⁴⁴ Available at: <https://registry.terra.org/app/projectDetail/VCS/902>

Parameter	Description	Value
$F_{DF}(t_2^{[m=5]}, \hat{\eta}^{[m=5]})$	Predicted proportion of cumulative deforestation at monitoring period m=5	0.31884
$C_{AGB}^{[m=5]} \text{ WL}$	Carbon stock in above-ground for Woodland stratum for monitoring period m=5	33,496,969.72
$C_{AGB}^{[m=5]} \text{ OWL}$	Carbon stock in above-ground for Open Woodland stratum for monitoring period m=5	51,165,836.71
$C_{BE,AGB}^{[m=5]} \text{ WL}$	Baseline emissions in above ground in trees for Woodland for monitoring period m=5	1,406,096
$C_{BE,AGB}^{[m=5]} \text{ OWL}$	Baseline emissions in above ground in trees for Open Woodland for monitoring period m=5	2,721,627
$C_{BE,AGB}^{[m=5]} \text{ Total}$	Baseline emissions in above ground in trees for monitoring period m=5	4,127,723

Estimating emissions from above-ground biomass in non-trees

As stated in section 8.3 of the methodology, for any given monitoring period, emissions from above-ground non-tree biomass are estimated as a proportion of measured carbon in above-ground non-tree biomass at the end point in time of the monitoring period following the equation below.

$$C_{BE,AGNT}^{[m]} = F_{DF}(t_2^{[m]}, \hat{\eta}^{[m]})C_{AGNT}^{[m]} - F_{DF}(t_2^{[m-1]}, \hat{\eta}^{[m-1]})C_{AGNT}^{[m-1]}$$

Using the equation above and the information obtained during the last monitoring report (m=4) and the current data (m=5) as can be seen in the table below; it is possible to obtain the baseline emissions from above-ground non-tree biomass.

Table 4: Baseline emissions from above-ground non-tree biomass

Parameter	Description	Value
$F_{DF}(t_2^{[m=4]}, \hat{\eta}^{[m=4]})$	Predicted proportion of cumulative deforestation at monitoring period m=4	0.25507
$C_{AGNT}^{[m=4]} \text{ WL}$	Carbon stock in above-ground non-trees for Woodland stratum for monitoring period m=4	614,550.37
$C_{AGNT}^{[m=4]} \text{ OWL}$	Carbon stock in above-ground non-trees for Open Woodland stratum for monitoring period m=4	808,545.78
$F_{DF}(t_2^{[m=5]}, \hat{\eta}^{[m=5]})$	Predicted proportion of cumulative deforestation at monitoring period m=5	0.31884
$C_{AGNT}^{[m=5]} \text{ WL}$	Carbon stock in above-ground non-trees for Woodland stratum for monitoring period m=5	602,613.43
$C_{AGNT}^{[m=5]} \text{ OWL}$	Carbon stock in above-ground non-trees for Open Woodland stratum for monitoring period m=5	814,572.92
$C_{BE,AGNT}^{[m=5]} \text{ WL}$	Baseline emissions in above ground non-trees for Woodland for monitoring period m=5	35,384
$C_{BE,AGNT}^{[m=5]} \text{ OWL}$	Baseline emissions in above ground non-trees for Open Woodland for monitoring period m=5	53,483
$C_{BE,AGNT}^{[m=5]} \text{ Total}$	Baseline emissions in above ground non-trees for monitoring period m=5	88,867

Estimating emissions from below-ground biomass in trees

As stated in section 8.4 of the methodology, for any given monitoring period, emissions from below-ground biomass in trees are estimated as a proportion of measured carbon in below-ground biomass in trees at the end point in time of the monitoring period following the equation below.

$$C_{BE,BGB}^{[m]} = p_{BGB} \left[F_{DF}(t_2^{[m]}, \hat{\eta}^{[m]}) C_{BGB}^{[m]} - F_{DF}(t_2^{[m-1]}, \hat{\eta}^{[m-1]}) C_{BGB}^{[m-1]} \right]$$

Using the equation above and the information obtained during the last monitoring report (m=4) and the current data (m=5) as can be seen in the table below; it is possible to obtain the baseline emissions from below-ground biomass in trees.

Table 5: Baseline emissions from below-ground biomass in trees

Parameter	Description	Value
p_{BGB}	Proportion of below-ground biomass in trees removed as a result of land conversion to agriculture	100
$F_{DF}(t_2^{[m=4]}, \hat{\eta}^{[m=4]})$	Predicted proportion of cumulative deforestation at monitoring period m=4	0.25507
$C_{BGB}^{[m=4]} \text{ WL}$	Carbon stock in below-ground trees for Woodland stratum for monitoring period m=4	15,270,769.70
$C_{BGB}^{[m=4]} \text{ OWL}$	Carbon stock in below-ground trees for Open Woodland stratum for monitoring period m=4	22,380,832.17
$F_{DF}(t_2^{[m=5]}, \hat{\eta}^{[m=5]})$	Predicted proportion of cumulative deforestation at monitoring period m=5	0.31884
$C_{BGB}^{[m=5]} \text{ WL}$	Carbon stock in below-ground trees for Woodland stratum for monitoring period m=5	14,068,722.43
$C_{BGB}^{[m=5]} \text{ OWL}$	Carbon stock in below-ground trees for Open Woodland stratum for monitoring period m=5	21,489,676.29
$C_{BE,BGB}^{[m=5]} \text{ WL}$	Baseline emissions in below ground in trees for Woodland for monitoring period m=5	590,556
$C_{BE,BGB}^{[m=5]} \text{ OWL}$	Baseline emissions in below ground in trees for Open Woodland for monitoring period m=5	1,143,090
$C_{BE,BGB}^{[m=5]} \text{ Total}$	Baseline emissions in below ground in trees for monitoring period m=5	1,733,646

Estimating emissions from below-ground non-tree biomass

As stated in section 8.6 of the methodology, for any monitoring period, emissions from below-ground non-tree biomass are estimated as a proportion of measured carbon in below-ground non-tree biomass at the end point in time of the monitoring period following the equation below.

$$C_{BE,BGNT}^{[m]} = F_{DF}(t_2^{[m]}, \hat{\eta}^{[m]}) C_{BGNT}^{[m]} - F_{DF}(t_2^{[m-1]}, \hat{\eta}^{[m-1]}) C_{BGNT}^{[m-1]}$$

Using the equation above and the information obtained during the last monitoring report (m=4) and the current data (m=5) as can be seen in the table below; it is possible to obtain the baseline emissions from below-ground non-tree biomass.

Table 6: Baseline emissions from below-ground non-tree biomass

Parameter	Description	Value
$F_{DF}(t_2^{[m=4]}, \hat{\eta}^{[m=4]})$	Predicted proportion of cumulative deforestation at monitoring period m=4	0.25507

Parameter	Description	Value
$C_{BGNT}^{[m=4]}$ WL	Carbon stock in below-ground non-trees for Woodland stratum for monitoring period m=4	258,112.77
$C_{BGNT}^{[m=4]}$ OWL	Carbon stock in below-ground non-trees for Open Woodland stratum for monitoring period m=4	339,576.79
$F_{DF}(t_2^{[m=5]}, \hat{\eta}^{[m=5]})$	Predicted proportion of cumulative deforestation at monitoring period m=5	0.31884
$C_{BGNT}^{[m=5]}$ WL	Carbon stock in below-ground non-trees for Woodland stratum for monitoring period m=5	253,100.87
$C_{BGNT}^{[m=5]}$ OWL	Carbon stock in below-ground non-trees for Open Woodland stratum for monitoring period m=5	342,112.02
$C_{BE,BGNT}^{[m=5]}$ WL	Baseline emissions in below ground non-trees for Woodland for monitoring period m=5	14,862
$C_{BE,BGNT}^{[m=5]}$ OWL	Baseline emissions in below ground non-trees for Open Woodland monitoring period m=5	22,463
$C_{BE,BGNT}^{[m=5]}$ Total	Baseline emissions in below ground non-trees for monitoring period m=5	37,325

Estimating emissions from standing dead wood

As stated in section 8.7 of the methodology, for any monitoring period emissions from standing dead wood are estimated as a proportion of measured carbon in standing dead wood at the end point in time of the monitoring period following the equation below.

$$C_{BE,SDW}^{[m]} = F_{DF}(t_2^{[m]}, \hat{\eta}^{[m]})C_{SDW}^{[m]} - F_{DF}(t_2^{[m-1]}, \hat{\eta}^{[m-1]})C_{SDW}^{[m-1]}$$

Using the equation above and the information obtained during the last monitoring report (m=4) and the current data (m=5) as can be seen in the table below; it is possible to obtain the baseline emissions from standing dead wood.

Table 7: Baseline emissions from standing dead wood

Parameter	Description	Value
$F_{DF}(t_2^{[m=4]}, \hat{\eta}^{[m=4]})$	Predicted proportion of cumulative deforestation at monitoring period m=4	0.25507
$C_{SDW}^{[m=4]}$ WL	Carbon stock in standing dead wood for Woodland stratum for monitoring period m=4	96,627.25
$C_{SDW}^{[m=4]}$ OWL	Carbon stock in standing dead wood for Open Woodland stratum for monitoring period m=4	368,468.80
$F_{DF}(t_2^{[m=5]}, \hat{\eta}^{[m=5]})$	Predicted proportion of cumulative deforestation at monitoring period m=5	0.31884
$C_{SDW}^{[m=5]}$ WL	Carbon stock in standing dead wood for Woodland stratum for monitoring period m=5	198,023.88
$C_{SDW}^{[m=5]}$ OWL	Carbon stock in standing dead wood for Open Woodland stratum for monitoring period m=5	342,973.04
$C_{BE,SDW}^{[m=5]}$ WL	Baseline emissions in standing dead wood for Woodland for monitoring period m=5	38,491
$C_{BE,SDW}^{[m=5]}$ OWL	Baseline emissions in standing dead wood for Open Woodland for monitoring period m=5	15,368

Parameter	Description	Value
$C_{BE,SDW}^{[m=5]}$ Total	Baseline emissions in standing dead wood for monitoring period m=5	53,859

Estimating emissions from soil

As stated in section 8.9 of the methodology, for any monitoring period emissions from soil are estimated as a proportion of measured carbon in soil at the end point in time of the monitoring period following the equation below.

$$C_{BE,SOIL}^{[m]} = \sum_{i \in M} S(t_2^{[m-1]} - t_2^{[m-i-1]}, t_2^{[m]} - t_2^{[m-i]}, \hat{\lambda}, \hat{l}_{max}) [F_{DF}(t_2^{[m-i]}, \hat{\eta}^{[m-i]}) - F_{DF}(t_2^{[m-i-1]}, \hat{\eta}^{[m-i-1]})] C_{SOIL}^{[m-i]}$$

Using the equation above and the information obtained during the last monitoring report (m=4) and the current data (m=5) as can be seen in the table below; it is possible to obtain the baseline emissions from soil.

Table 8: Baseline emissions from soil

Parameter	Description	Value
$S(t_2^{[m-1]} - t_2^{[m-i-1]}, t_2^{[m]} - t_2^{[m-i]}, \hat{\lambda}, \hat{l}_{max})$	Soil carbon loss function	0.28234
$F_{DF}(t_2^{[m=4]}, \hat{\eta}^{[m=4]})$	Predicted proportion of cumulative deforestation at monitoring period m=4	0.25507
$F_{DF}(t_2^{[m=5]}, \hat{\eta}^{[m=5]})$	Predicted proportion of cumulative deforestation at monitoring period m=5	0.31884
$C_{SOIL}^{[m=5]} WL$	Carbon stock in soil for Woodland for monitoring period m=5	43,264,423.24
$C_{SOIL}^{[m=5]} OWL$	Carbon stock in soil for Open Woodland for monitoring period m=5	59,399,529.21
$C_{BE,SOIL}^{[m=5]} WL$	Baseline emissions in soil for Woodland for monitoring period m=5	778,961
$C_{BE,SOIL}^{[m=5]} OWL$	Baseline emissions in soil for Open Woodland for monitoring period m=5	1,069,468
$C_{BE,SOIL}^{[m=5]}$ Total	Baseline emissions in soil for monitoring period m=5	1,848,429

As mentioned earlier, baseline emissions $C_{BE}^{[m]}$ are a sum of estimated emissions over selected carbon pools as defined by equation [20] of the methodology. Therefore, baseline emissions for this monitoring period are as follows:

Parameter	Woodland	Open Woodland	Total
$C_{BE,AGB}^{[m=5]}$	1,406,096	2,721,627	4,127,723
$C_{BE,AGNT}^{[m=5]}$	35,384	53,483	88,867
$C_{BE,BGB}^{[m=5]}$	590,556	1,143,090	1,733,646
$C_{BE,BGNT}^{[m=5]}$	14,862	22,463	37,325
$C_{BE,SDW}^{[m=5]}$	38,491	15,368	53,859
$C_{BE,SOIL}^{[m=5]}$	778,961	1,069,468	1,848,429
$C_{BE}^{[m]}$	2,864,350	5,025,499	7,889,849

3.2.2 Project Emissions

According to section 9 of the methodology, project emissions for any monitoring period are estimated by the events of woody biomass consumption.

Emissions from burning: no emissions from the burning of woody biomass have occurred as a result of project activities in the project area. The project activities do not encourage increased burning of woody biomass. Instead, reduced burning, firefighting training and cold burning of non-woody biomass to avoid serious woody-biomass burning are integral parts of the project.

Forest fires: the project proponent understands that significant forest fires could occur during the project crediting period. No major forest fires occurred in the monitoring period. This is likely to be a direct result of the fire management activities implemented in the project area.

Therefore, no project emissions have occurred during this monitoring period.

3.2.3 Leakage

The project activities were designed to mitigate leakage and include improved agriculture, beekeeping, fuelwood plantation, social forestry and fire management activities. All project activities were designed to reduce the impacts of deforestation and human-wildlife conflicts as well as to enhance livelihoods throughout the project area and outside the project area. The status of project activities during the current monitoring period are described in full detail in Section 4.3.

The project remains convinced that its leakage mitigation and management strategies are fully adequate and effective. Further, we topically defend that there is no causal relationship between observed degradation in the monitored leakage plots and the project activities. In our expert opinion, all forest degradation observed in the leakage plots is either due to increased population levels in the region or caused by natural causes such as elephant damage, but not related to the activities implemented in the project area.

The project proponent monitored 50 leakage plots and calculated the average of observations $\bar{o}^{[m=5]} = 0.108$

According to equation 33, the leakage factor is estimated as the difference between $\bar{o}^{[m]}$ and the maximum of three options:

1. the prediction of the leakage model at monitoring period = 0.2164
2. the observed leakage in the previous monitoring period = 0.12
3. The prediction of the leakage model at the last monitoring period prior to baseline re-evaluation = 0.2164

Considering that this is the last monitoring period prior to baseline re-evaluation option 1 and 3 are the same and is the value selected. Since the difference between $\bar{o}^{[m]}$ and the maximum of the options above is negative, the leakage factor ends up as 0⁴⁵.

To formally comply with the calculation approach of VM0009 V1.1, we estimate a leakage factor of zero⁴⁶. Therefore, the calculated leakage emissions amount to 0 tCO₂e (Equation 32) and are deduced from Net Emission Reductions (NERs) calculated in equation 34⁴⁷.

⁴⁵ Refer to Supporting Documents/3_Climate/ER Estimations/Leakage

⁴⁶ Refer to Supporting Documents/3_Climate/ER Estimations/Leakage/file 'Leakage_MP5'.

⁴⁷ Refer to Supporting Documents/3_Climate/ER Estimations/file 'KARIBA ER MP5', worksheet 'm-5 (tb verified)', section 'Leakage'

3.2.4 Net GHG Emission Reductions and Removals

Net GHG Emission Reductions and Removals (NERs) are calculated using Equation 34 of the methodology. The below table summarises all components of Equation 34⁴⁸. The confidence deduction for this monitoring has been calculated according to Equation 35 based on the average uncertainty (Equation 36) and accounts for 0 tCO₂e⁴⁹.

The total amount of VCUs is separated by 25% into vintage year 2019, 50% into vintage year 2020 and 25% into vintage year 2021.

Vintage year 2019 consists of the period of 01/07/2019 to 31/12/2019, vintage year 2020 consists of the period of 01/01/2020 to 31/12/2020 and vintage year 2021 consists of the period of 01/01/2021 to 30/06/2021⁵⁰.

Net GHG emission reductions or removals are calculated by solving equation 34 of VM0009 V1.1. All equations leading up to equation 34 are solved in the provided supporting documents⁵¹.

$C^{[m]} = C_{BE}^{[m]} - C_U^{[m]} - C_{PE}^{[m]} - C_{LE}^{[m]}$		[34]
Variables	$C^{[m]}$ = net GHG Emission Reductions and Removals (NERs) for monitoring period [m] $C_{BE}^{[m]}$ = estimated baseline emissions for monitoring period [m] $C_U^{[m]}$ = confidence deduction for monitoring period [m] $C_{PE}^{[m]}$ = estimated project emissions for monitoring period [m] $C_{LE}^{[m]}$ = estimated emissions from leakage for monitoring period [m]	
Section References	11, 11.1, 11.3	
Comments	This equation estimates total net GHG Emission Reductions and Removals (NERs) for monitoring period [m]	

Therefore, 7,889,849tCO₂e ($C^{[m]}$) = 7,889,849 tCO₂e ($C^{[m]}_{BE}$) – 0 tCO₂e ($C^{[m]}_U$) – 0 tCO₂e ($C^{[m]}_{PE}$) – 0 tCO₂e ($C^{[m]}_{LE}$). The table below shows the net GHG emission reductions per year for the monitoring period.

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2019	1,972,462	0	0	1,972,462

⁴⁸ Refer to Supporting Documents/3_Climate/ER Estimations/file 'KARIBA ER MP5', worksheet 'm-5 (tb verified)', section 'Net Emission Reductions'.

⁴⁹ Refer to Supporting Documents/3_Climate/ER Estimations/file 'KARIBA ER MP 5', worksheet 'm-5 (tb verified)', section 'Confidence Deduction Uncertainty'

⁵⁰ Refer to Supporting Documents/3_Climate/ER Estimations/file 'KARIBA ER MP5', worksheet 'm-5 (tb verified)', section 'Vintage packages of VCUs'

⁵¹ Refer to Supporting Documents/3_Climate/ER Estimations/file 'KARIBA ER MP5'

2020	3,944,925	0	0	3,944,925
2021	1,972,462	0	0	1,972,462
Total	7,889,849	0	0	7,889,849

The non-permanence risk rating was calculated using the AFOLU Non-Permanence Risk-Tool_V4.0 and was 14%⁵². Therefore, the total number of buffer credits that need to be deposited into the AFOLU pooled buffer account are 1,104,579 and the net VCUs (rounded down) to which the project is eligible after deduction of the buffer credits are shown in Table 9 below.

Table 9: Eligible VCUs

Net VCUs in tCO ₂ e, vintage 2019	1,696,318
Net VCUs in tCO ₂ e, vintage 2020	3,392,635
Net VCUs in tCO ₂ e, vintage 2021	1,696,318
Total net VCUs to project proponent in tCO₂e	6,785,270

3.3 Optional Criterion: Climate Change Adaptation Benefits

For Climate Change Adaptation Benefits and how the project will provide the means to adapt to the impacts of climate change, please refer to the validated CCB PDD, pages 80, 81 and 82.

As outlined in the CCB PDD, section GL1.2 (page 80), risks emerging from ongoing climate change are covered in the project's adaptive management process⁵³. As pointed out in the CCB PDD, section GL1.3, (page 81), the productivity of main crops such as maize and wheat is predicted to decrease in the project area due to increasing temperatures and reduced rainfall. During the project's activities, the communities are given assistance to adapt to these impacts of climate change, particularly the reduced productivity of crops. The introduction of beekeeping using local wild bees, direct employment, training for farmers on more drought-adapted and yield-increasing conservation farming techniques and technical support on irrigation schemes help communities to adapt to a changing climate. These activities increase the income of local communities, diversify income sources, make communities less dependent on crops susceptible to climate-change, and increase the yield of field crops, thereby counteracting the effects of climate change.

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

According to CCB PDD, most common adaptation strategies include diversification of income beyond agriculture, different crops and varieties, irrigation and water conservation and conservational agriculture.

The Kariba REDD+ Project is promoting all these adaptation strategies on a large scale in the project area.

Honey production systems provide new income opportunities to large parts of the local population, beyond traditional farming activities. This helps to alleviate the impact of climate extremes on the locals' livelihoods and adds real value to standing forests. Honeybees can live in very different climatic zones. There are subspecies of *Apis mellifera* occurring in northern Europe and sub-Saharan Africa. Our beekeeping activity uses exclusively local wild bee species, caught using catcher boxes. This promotes local bee species diversity, as well as reduces the risk of negative effects from climate change on our beekeeping activities. Our beekeeping is therefore likely to be possible despite a changing climate.

⁵² Refer to Supporting Documents/3_Climate/ER Estimations/NPRT for further details on the calculation.

⁵³ The full minutes of the meetings are provided in the Supporting Documents/2_General/Adaptive Management Plan/Adaptive Management Meetings

Many locals also benefit from direct employment or additional income sources because of the project activities, thus providing income diversification.

As part of its agricultural improvement activities, the project enhances drought-resistant species and varieties as well as conservational agriculture. Certain agricultural species such as groundnut, cassava and sorghum are likely to be relatively unaffected by climate change in southern Africa. Meanwhile, conservational agriculture activities have a proven potential to mitigate the effects of drought that must be expected because of climate change.

Irrigation in Zimbabwe's northern region is a sustainable means of climate change adaptation. The irrigation potential within the basin of the Zambezi River is relatively high. Establishment, recovery, and maintenance of the boreholes in the area by the Kariba REDD+ Project therefore also contributes significantly to the climate change adaptation in the project area.

The project's adaptive management approach helps to continuously address issues of adaptation that emerge with a changing climate. Refer to Section 4.3 of this document for a more detailed description of the status of the mentioned project activities.

4 COMMUNITY

4.1 Net Positive Community Impacts

4.1.1 Community Impacts (CM1.1)

The Kariba REDD+ Project's direct and indirect impacts on the local communities and community leaders have been monitored throughout the last monitoring period according to the project's monitoring plan and Standard Operation Procedure⁵⁴.

It should be noted that because of the COVID-19 lockdown restrictions that were implemented in Zimbabwe during this monitoring period, not all the planned activities were able to take place, particularly during the first half of 2020. Wherever possible the project team made alternative arrangements and most activities were proceeding as planned by mid to late 2020.

The direct impacts of project activities recorded in previous monitoring reports continue to be observed throughout the project area and the project continued to employ 21 permanent staff members. In total, 255 workshops were conducted on improved agriculture and community gardens, reaching a total of 10,061 recorded participants over this monitoring period. 21 community gardens were also supported at the end of the monitoring period. A total of 1,552 recorded participants benefited from 71 beekeeping workshops and 200 beekeeping kits were provided to local community members.

Finally, 46 schools and 17 clinics in the project area were supported during this monitoring period⁵⁵.

Indirect impacts of the project also continue to be monitored in the project area through comprehensive surveys and continuous engagement by the On the Ground Management (OGM) team. Through this process affected communities are able to actively participate in the evaluation of project impacts. Detailed results from these surveys are provided in more detail in Section 4.1.2 below.

The tables below provide more details on the main impacts resulting from project activities under the with-project scenario. More detailed information on the net positive community impacts for each project activity are provided in Section 4.3.

⁵⁴ A copy of this is available under the Supporting Documents/4_Community/SOPs/Social Monitoring/SOPs.

⁵⁵ The results of all indicators for the project's direct effects are provided separately in the Supporting Documents/4_Community/Social Monitoring/Direct Effects

Community Group	Local communities living in the Binga, Nyaminyami, Hurungwe and Mbire RDCs
Impact	Improved health and education in the project area
Type of Benefit/Cost/Risk	Actual direct and indirect benefits
Change in Well-being	During this monitoring period 17 clinics in the project area have been supported through the ongoing provision of clean water and building materials such as cement. 46 schools have also been supported through ongoing access to clean water, improved nutrition from community gardens and income generated from these community gardens.

Community Group	Local communities living in the Binga, Nyaminyami, Hurungwe and Mbire RDCs and the community leaders from these four districts (community leaders include representatives of local associations, traditional leaders, the RDCs and local NGOs).
Impact	Improved knowledge and skills
Type of Benefit/Cost/Risk	Actual direct benefit
Change in Well-being	During this monitoring period 255 training workshops on improved agriculture and community gardens were conducted (reaching a total of 10,061 participants), 71 beekeeping workshops were conducted (reaching a total of 1,552 participants) and three workshops on tree planting and seedling production were conducted (reaching a total of 81 participants). This brings the total number of workshops aimed at improving the knowledge and skills of local community members in the project area to 329 during this monitoring period. These activities directly impacted 11,694 people.

Community Group	Local communities living in the Binga, Nyaminyami, Hurungwe and Mbire RDCs and the community leaders from these four districts (community leaders include representatives of local associations, traditional leaders, the RDCs and local NGOs).
Impact	Improved infrastructure in the project area
Type of Benefit/Cost/Risk	Actual direct benefit
Change in Well-being	During the monitoring period under review approximately 2,719 km of road were maintained through activities in the project area. The project also repaired and maintained 137 boreholes in the project area ensuring continued access to clean water for thousands of local community members.

Community Group	Local communities living in the Binga, Nyaminyami, Hurungwe and Mbire RDCs
-----------------	--

Impact	Improved food security
Type of Benefit/Cost/Risk	Actual direct and indirect benefits
Change in Well-being	The projects' conservation farming and community gardening activities have had a direct impact on local communities' food security in the project area. During this monitoring period at least 12,926 people were recorded to be practicing conservation farming techniques in the project area (see Section 4.3.2 for detailed information on crop yields per district during this monitoring period). Similarly, community gardening continued to play an important role in improving food security for local communities in the project area during this period. More than 16,000 people were positively impacted both directly and indirectly by community gardens. This includes school students and their families as well as the community garden members and their families.

Community Group	Local communities living in the Binga, Nyaminyami, Hurungwe and Mbire RDCs
Impact	Improved access to water (water resources)
Type of Benefit/Cost/Risk	Actual direct benefit
Change in Well-being	Safe potable drinking water continues to be provided to local communities through project activities. During this monitoring period the project managed to maintain 137 boreholes as part of ongoing maintenance of the previously reported boreholes, which were resuscitated. The total number of people estimated to have been positively impacted by this activity is over 34,250 people ⁵⁶ .

Community Group	Community leaders from Binga, Nyaminyami, Hurungwe and Mbire RDCs (community leaders include representatives of local associations, traditional leaders, the RDCs and local NGOs).
Impact	Improved tools and technology
Type of Benefit/Cost/Risk	Actual direct benefit
Change in Well-being	Community leaders have benefited from the capacity building that has continued to take place during this monitoring period. The anti-poaching and fire management activities that took place during this monitoring period management continued to involve community leaders from local associations, NGOs and RDCs. These activities contributed towards trainings and materials.

⁵⁶ It is estimated that each borehole impacts more than 250 people.

Community Group	Community leaders from Binga, Nyaminyami, Hurungwe and Mbire RDCs (community leaders include representatives of local associations, traditional leaders, the RDCs and local NGOs).
Impact	Improved investment in the four participating districts
Type of Benefit/Cost/Risk	Actual direct benefit
Change in Well-being	Project activities continue to provide new sources of income throughout the project area. During this monitoring period (as in all previous monitoring periods) a portion of all net revenues from the sale of carbon credits has been contributed towards a sustainability fund (also known as the Longevity Trust) which receives a portion of net revenues from carbon sales. The fund is managed by The Kariba Trust and is made up of 6 Trustees (majority of whom are independent). The Kariba Trust is responsible for managing and investing the longevity fund and future allocations of this fund after the 'end' of the project. The Trust also has a sub-committee which is made up of one senior representative from each district (government representatives) involved in the project. The sub-committee is responsible for allocating the community portion of net revenue to the various Community Share trusts within the various districts. The Community Share Trusts were set up by Government predating the project to manage local matters such as resource allocation and dispute resolution (they are made up of representatives of all local stakeholders Chiefs, Headmen, local leadership, Government Representatives and all private stakeholders in the area). The Community Share Trusts have proven to be efficient and well respected on the ground. All these process/institutions will continue to operate after the project period crediting period and aim to ensure long term sustainability and investment in the project area.

Community Group	Local communities living in the Binga, Nyaminyami, Hurungwe and Mbire RDCs
Impact	Improved employment opportunities
Type of Benefit/Cost/Risk	Actual direct benefit
Change in Well-being	The Kariba REDD+ project currently employs 21 permanent staff. Employees of the Kariba REDD+ Project are preferably recruited from the project area (see section 2.4.3 for more details on community employment opportunities).

Community Group	Local communities living in the Binga, Nyaminyami, Hurungwe and Mbire RDCs
-----------------	--

Impact	Improved availability of forest and non-timber products
Type of Benefit/Cost/Risk	Actual direct benefit
Change in Well-being	Forest conservation in the project area continues to provide important natural resources and ecosystem services to local community members in the project area. During this monitoring period a comprehensive survey was conducted amongst local community members and 100% of people interviewed responded that they were in no way restricted from collecting and using forest products or using the forest to fulfill their cultural needs (see section 4.1.3 for more details).

Community Group	Local communities living in the Binga, Nyaminyami, Hurungwe and Mbire RDCs
Impact	Improved availability of forest and non-timber products
Type of Benefit/Cost/Risk	Actual direct benefit
Change in Well-being	Forest conservation in the project area continues to provide important natural resources and ecosystem services to local community members in the project area. During this monitoring period a comprehensive survey was conducted amongst local community members and 100% of people interviewed responded that they were in no way restricted from collecting and using forest products or using the forest to fulfill their cultural needs (see section 4.1.3 for more details).

Community Group	Local communities living in the Binga, Nyaminyami, Hurungwe and Mbire RDCs
Impact	Improved natural capital
Type of Benefit/Cost/Risk	Actual direct benefit
Change in Well-being	Forest conservation in the project area continues to protect wildlife and biodiversity in the project area. Healthy ecosystems contribute to valuable ecosystem services which many local community members rely upon for their livelihoods. Similarly, the continued conservation of the Miombo and Mopane forests in the project area decreases the risks of desertification and reduces the vulnerability of local communities to the impacts of climate change.

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

The project activities (described in more detail in Section 4.3.2) were all designed to have net positive impacts on communities' well-being. For further details on the net positive impacts, refer to the project activities listed under Section 4.3.2.

To monitor the project's indirect social effects, an extensive survey campaign was implemented in April and May 2021⁵⁷.

A total of 380 people were interviewed. These included local community members, direct project beneficiaries and employees. Interviews were conducted in the local language (Shona) when necessary and participants were selected randomly.

Most interview partners expressed their satisfaction with the project, as shown in Table 10.

Table 10: Satisfaction with the Kariba REDD+ Project

Satisfaction with the Kariba REDD+ Project			
	Community Members (%)	Beneficiaries (%)	Employees (%)
Very unsatisfied	0.0	0.0	0.0
Unsatisfied	0.0	0.0	0.0
Indifferent	12.9	0.0	0.0
Satisfied	61.1	48.3	63.6
Very satisfied	26.1	51.7	36.4
N/A	0.0	0.0	0.0

Direct beneficiaries and employees reported consistently positive impacts of the Kariba REDD+ Project on their livelihoods, food security, children's access to education and healthcare, as shown in Table 11, Table 12, Table 13 and Table 14. This shows the project's positive impacts on local community members in the project area.

Table 11: Project impact on livelihoods

Reported project impact on livelihoods by beneficiaries and employees		
	Beneficiaries (%)	Employees (%)
Very negatively	0.0	0.0
Negatively	0.0	0.0
No impact	1.1	0.0
Positively	48.3	63.6
Very positively	50.6	36.4

Table 12: Project impact on food security

Reported project impact on food security by beneficiaries and employees		
	Beneficiaries (%)	Employees (%)
Very negatively	0.0	0.0
Negatively	0.0	0.0
No impact	0.0	0.0

⁵⁷ All results are provided in the Supporting Documents/4_Community/Social Monitoring/Indirect Effects

Positively	52.9	63.6
Very positively	47.1	36.4

Table 13: Project impact on children's access to education

Reported project impact on children's access to education by beneficiaries and employees		
	Beneficiaries (%)	Employees (%)
Very negatively	0.0	0.0
Negatively	0.0	0.0
No impact	5.7	45.5
Positively	52.9	54.5
Very positively	41.4	0.0

Table 14: Project impact on healthcare

Reported project impact on healthcare by beneficiaries and employees		
	Beneficiaries (%)	Employees (%)
Very negatively	0.0	0.0
Negatively	0.0	0.0
No impact	5.7	0.0
Positively	49.4	63.6
Very positively	44.8	36.4

4.1.3 Protection of High Conservation Values (CM1.2)

As described in the project documentation the project area is identified as being of the community-related High Conservation Values (HCVs) 5 (fundamental basic needs) and 6 (cultural identity). To assess the project's impact on these HCVs, four specific questions have been included in the project's social impact survey (See Section 4.1.2 above for more information on the survey conducted for this monitoring period). A total of 380 people were interviewed. These included local community members, direct project beneficiaries and employees. Interviews were conducted in the local language (Shona) when necessary and participants were selected randomly

To assess projects impacts on HCV 5, the following questions were asked:

- "Through the project, are you, or members of your household, restricted in collecting the following forest products?" (for building materials, firewood, fruits and other products separately)
- "If yes, did the project provide you with alternative sources to collecting these products in natural forests?"
- "If yes, are the alternative provided by the project attractive to you?"

The answer to the first question was "not restricted" in 100% of the cases, which left the following two questions not answered.

With regards to HCV 6, the following question was included in the survey:

- “Through the project, are you or members of your household restricted in using the forest to fulfill your cultural needs?”

Also, here, the answer was “not restricted” in 100% of the cases.

According to the social impact survey, the project High Conservation Values related to community wellbeing was not negatively affected. Please refer to the results of the social impact survey provided separately for further reference⁵⁸. All community members interviewed during this monitoring period responded that they were not restricted in any way in collecting forest products or using the forests to fulfill their cultural needs.

4.2 Offsite Stakeholder Impacts

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

Not applicable as no other stakeholders have been identified. Please, refer to the CCB PDD (page 69). However, any potential negative impacts can be identified and mitigated through the adaptive management process and other measure.

The Kariba REDD+ Project focuses on providing communities with attractive alternative livelihoods, which reduce the pressure on local forests. Since the project relies on providing positive incentives, negative impacts on stakeholders are not expected and have not been observed to date. On the contrary, the project provided numerous positive benefits to local communities in the area.

The only identified potentially affected stakeholders include the local populations from the four participating RDCs which do not form part of the project. To identify and mitigate any potentially negative impacts on these communities, there is an ongoing dialogue with these stakeholders through the RDCs councils. The RDC councils have a full council meeting at minimum four times per year. These meetings include every ward councilor, so also the councilors from wards, which are not part of the project. The councilors update the council on all activities and issues within their wards. If there are any negative impacts by the project these will be reported to the council during these meetings and reported to CGA through the councils.

The project also conducts comprehensive community surveys and interviews during each monitoring period to ensure that no negative impacts on any stakeholders or HCVs are occurring (See Section 4.1.3 above for more details).

Finally, CGA takes an adaptive management approach to ensure that any negative impacts are mitigated. A plan for ongoing communication and consultation between the project and affected communities is included in the project’s adaptive management plan⁵⁹. In addition to this process, the project’s OGM team is in continuous contact with the local communities about the project during site visits, meeting with chiefs and other leaders, and through field staff. Through this communication, the project team receives most comments from local communities. To date, no negative reports have been made and only requests to extend the project, so that these offsite stakeholders can also benefit directly from the project.

4.2.2 Net Impacts on Other Stakeholders (CM2.3)

Not applicable as no other stakeholders were identified. Please, refer to the CCB PDD (page 69). Sections 4.1.2 and 4.1.3 also provide more details on how project activities have not had any negative impacts during this monitoring period.

⁵⁸ Supporting Documents/4_Community/Social Monitoring/Indirect Effects.

⁵⁹ See Supporting Documents/2_General/Adaptive Management Plan for more details.

4.3 Community Impact Monitoring

4.3.1 Community Monitoring Plan Development (CM3.3)

Not applicable.

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

For community impact monitoring, please refer to the sections of CCB PDD CM3.1 and CM3.2 (pages 69 to 73)⁶⁰. The results and evaluation of this monitoring period are presented in the section below. This section serves as a quantitative description of the project activities for the period going from 1 July 2019 until 30 June 2021. All community activities are monitored continuously by the OGM teams and are reported upon verification. The progress in implementing these activities is monitored through a set of indicators measuring direct effects. These indicators are tracked on an on-going basis by the OGM teams, while activities are implemented.

In order to monitor indirect socio-economic effects of the project, a second set of indicators is used. These indicators are assessed in survey campaigns, which are carried out prior to verifications, i.e. at least every 5 years. The surveys address a) the general population in the project area b) direct beneficiaries of the project and c) employees of the project. The surveys also cover the High Conservation Values (HCVs) identified in the project area.

The collected information is reported then verified by a third party auditor.

The project activities will be summarized for all RDCs, namely Binga, Nyaminyami, Hurungwe and Mbire. It should also be noted that at the core of every project activity implemented the intention is to ultimately impart knowledge to the beneficiaries through training and provisional support for the purpose of making all the community members more independent and to reduce deforestation in the area.

IMPROVED AGRICULTURE

The activities focused on improved agriculture centre on Conservation Farming (CF) and Community Gardens. These activities will be discussed separately in more detail below.

Conservation Farming (CF)

Conservation farming continues to be a major activity of the Kariba REDD+ project. The standard of implementation remains high, and the success of increased yields continues to grow, particularly amongst those farmers who diligently apply all the correct principles of CF. These principles are to do it on time (not later than 25 November), at a high standard (with mulch, straight planting lines, weed free), without wastage (correct application of inputs) and with joy (strong work ethic). These core foundational principles are all taught in the training. CF continues to be implemented successfully during the monitoring period with two cropping seasons being implemented during this monitoring period, the first ran from November 2019 to April 2020 and the second cropping season ran from November 2020 to April 2021.

As in previous monitoring periods, the project team has noted with interest the number of farmers who continue to do CF without inputs. This is encouraging because it supports the project goal to empower people with knowledge so that they can better solve their own problems and meet their own needs independently.

⁶⁰) For information on community groups and HCVs related to community wellbeing, community variables selected in the validated project description, frequency, sampling methods used and dates, please refer to the Supporting Documents/4_Community/Social Monitoring/SOPs.

The Kariba REDD+ project also continues to focus on trainings for CF by ensuring that all community members have a fair and equal opportunity to attend these trainings if they wish to do so. The demonstration plots have proven valuable as a visual impact on the communities who can see the success following the trainings, and also as a meeting point for the communities to discuss points related to CF. We intend to consider increasing the number of demonstration plots at ward level over time.



Figure 4: Kariba REDD+ Project Conservation Farming activities



Figure 5: Kariba REDD+ Project Conservation Farming activities

The recorded yield information for each district for this monitoring period for CF is described in more detail below.

Binga

1st cropping season (From November 2019 to April 2020): 412 people were recorded to have implemented CF. Out of these 191 were men and 221 were women. The recorded harvest totals in kilograms are as follows:

- Maize 100,747 kg,
- Sorghum 144,681 kg,
- Legumes and other crops 16,050 kg.

2nd cropping season (From November 2020 to April 2021): 4,124 people were recorded to have implemented CF. Out of these 1,902 were men and 2,222 were women. The recorded harvest totals in kilograms are as follows:

- Maize 204,598 kg,
- Sorghum 248,385 kg,
- Legumes and other crops 30,386 kg.

Nyaminyami

1st cropping season (From November 2019 to April 2020): 755 people recorded to have implemented CF. Out of these 343 were men and 412 were women. The recorded harvest totals in kilograms are as follows:

- Maize 298,180 kg,
- Sorghum 39,700 kg,
- Legumes or other crops 22,040 kg.

2nd cropping season (From November 2020 to April 2021): 1,301 people were recorded to have implemented CF. Out of these 684 were men and 617 were women. The recorded harvest totals in kilograms are as follows:

- Maize 891,790 kg,
- Sorghum 351,110 kg,
- Legumes or other crops 336,545 kg.

Hurungwe

1st cropping season (From November 2019 to April 2020): 566 people were recorded to have implemented CF. Out of these 233 were men and 333 were women. The recorded maize harvest for this period is 449,400 kg.

2nd cropping season (From November 2020 to April 2021): 5,969 people were recorded to have implemented CF. Out of these 2,777 were men and 3,192 were women. The recorded maize harvest for this period is 223,660 kg.

Mbire

1st cropping season (From November 2019 to April 2020): 1,342 people were recorded to have implemented CF. Out of these 790 were men and 552 were women. The recorded harvest totals in kilograms are as follows:

- Maize 91,580 kg,
- Sorghum 164,585 kg,
- Legumes and other crops 59,420 kg.

2nd cropping season (From November 2020 to April 2021): 1,532 people were recorded to have implemented CF. Out of these 933 were men and 599 were women. The recorded harvest totals in kilograms are as follows:

- Maize 550,700 kg,
- Sorghum 572,040 kg,
- Legumes and other crops 230,460 kg.

Summary of conservation farming activities

In the 2019 to 2020 period a total of 3,075 people were recorded to have done CF with 1,557 being men and 1,518 being women. This is almost a 50% split in gender showing that women significantly participate in CF as an activity. This season was another difficult season due to a third consecutive year of below normal rainfall and as a result was considered as another drought year experienced in Zimbabwe. Rainfall was well below average, so it was with great relief that some of the community members took CF seriously and managed to harvest a crop. Although some of the harvested yields were less than previous years, the overall harvest was better than expected at the time. This is another testament of the true benefit that CF has in times of climate change.

The 2020 to 2021 season recorded a total of 12,926 people to have done CF with 6,296 being men and 6,630 being women. This season was a very wet season and good rains were received throughout the project area. In fact, in some areas there was waterlogging experienced which negatively affected the crops, however in most cases the farmers were happy with the results of the growth of their crops and judging by the yield information above it confirms the results.

CGA continues to receive feedback from community members expressing their gratitude for the Kariba REDD+ Project and the training they received. Community members have expressed that through these project activities they have been able to achieve food security through the CF farming method and are able to sell their surplus to buy products for other domestic needs.

It is the intention of the project to continue expanding this activity to more and more members of the communities with more ward level training workshops, and increased extension work by engaging the communities directly. It will also increase support to farmers implementing the CF method which has the potential to further impact individual households, improve food security, increase wealth, and reduce deforestation through reducing the need to clear more land in search of more fertile soils (shifting agriculture).

Trainings for conservation farming activities

The Kariba REDD+ project continues to successfully implement trainings for CF. As discussed previously, because of the COVID-19 lockdown restrictions in Zimbabwe during this monitoring period not all the planned trainings were able to take place, particularly during the first half of 2020. Wherever possible the project team made alternative arrangements and most training activities were proceeding as planned by mid to late 2020. During this monitoring period all trainings were well received by the local community members. The trainings covered practical and theory topics, which included field preparation, and management and demo plot establishment. Community members showed increased confidence and independence thus achieving our aims and objective of empowering people with knowledge to better problem solve by themselves. The results of the trainings can be read below.



Figure 6: Kariba REDD+ Project Conservation Farming training

A breakdown of the trainings per district is as follows:

Binga

1st period (From 1 July 2019 to 30 June 2020): seven trainings and 308 people were recorded to have attended the training. 169 were men and 139 were women.

2nd period (From 1 July 2020 to 30 June 2021): 61 trainings and 2,280 people were recorded to have attended the training. 1,033 were men and 1,247 were women.

Hurungwe

1st period (From 1 July 2019 to 30 June 2020): 13 trainings and 1,013 people were recorded to have attended the training. 479 were men and 534 were women.

2nd period (From 1 July 2020 to 30 June 2021): 14 trainings and 532 people were recorded to have attended the training. 251 were men and 281 were women.

Mbire

1st period (From 1 July 2019 to 30 June 2020): 11 trainings and 636 people were recorded to have attended the training. 342 were men and 294 were women.

2nd period (From 1 July 2020 to 30 June 2021): 39 trainings and 1,681 people were recorded to have attended the training. 776 were men and 905 were women.

Nyaminyami

1st period (From 1 July 2019 to 30 June 2020): 11 trainings done and 985 people were recorded to have attended the training. 485 were men and 500 were women.

2nd period (From 1 July 2020 to 30 June 2021): 13 trainings done and 503 people were recorded to have attended the training. 243 were men and 260 were women.

Summary of training on Conservation Farming

In the first period a total of 42 trainings were conducted and a total of 2,942 people were recorded to have received training. Out of this 1,475 were men and 1,467 were women. In the second period 127 trainings were conducted and a total of 4,996 people were recorded to have received training. Out of this 2,303 were men and 2,693 were women.

This has been by far the greatest number of people that have been trained in any CF season since project start and shows that women have an equal opportunity to participate in the trainings with a higher number of women being recorded at the trainings. It also shows how positively the training of trainers (ToT) trainings has impacted the lives of the community members so that they can conduct their own trainings with knowledge learnt and take more ownership of the project.

Community Gardens

Community gardens have been shown by previous monitoring reports to be an effective way to enhance food security and improve general nutrition during times of the year when field crops are not grown. Moreover, the community gardens that have been established in the project area have become a means of providing knowledge to children in school as well.

In the project area, gardening tends to be seasonal from a cultural perspective, whereby field crops of maize, sorghum, groundnuts etc. are the focus during the rainy season and gardening during the winter and dry months. Community gardening has remained unchanged since the last monitoring period. No new community gardens were established during this monitoring period but 21 existing gardens are supported and continue to enhance food security and improve nutrition in general during times of the year when field crops are not grown.

The Kariba REDD+ Project continues to monitor all gardening activities and record all related data to demonstrate the positive impacts on the lives of the beneficiaries. During this monitoring period it is noted that garden members continue to benefit and grow crops that serve their families' nutrition and wellbeing requirements, and surplus continues to be sold to the general surrounding communities. This has been particularly important for many community members during the COVID-19 lockdown restrictions. During this monitoring period an estimated excess of 16,000 lives have been positively impacted both directly and indirectly. This includes school students and the families they represent, as well as the community garden members and their families.



Figure 7: Kariba REDD+ Project Community Gardening

Training for Community Gardening

As with the training activities for the CF, training activities for community gardening were impacted by the COVID-19 lockdown restrictions. Trainings were however, still conducted in all four districts during this monitoring period. Gardening training can take place any time of the year; however traditionally it takes place during the month of May towards the end of the field crop seasonal harvest when community members then redirect their attention towards garden crops for the dry months. These trainings covered theory and fieldwork and were assisted and supported by our OGM. Due to significant COVID-19 restrictions during the first period (1 July 2019 to 30 June 2020), trainings were conducted in Binga only.



Figure 8: Kariba REDD+ Project Community Gardening training

A breakdown of the trainings per district are as follows.

Binga

1st period (From 1 July 2019 to 30 June 2020). Three trainings were conducted, and a total of 62 people were recorded to have attended these trainings. 10 were men and 52 were women.

2nd period (From 1 July 2020 to 30 June 2021). 37 trainings were conducted, and a total of 705 people were recorded to have attended these trainings. 249 were men and 456 were women.

Hurungwe

1st period (From 1 July 2019 to 30 June 2020). Due to COVID-19 restrictions no gardening training for Hurungwe took place.

2nd period (From 1 July 2020 to 30 June 2021). 14 trainings were conducted, and a total of 224 people were recorded to have attended. 74 were men and 150 women.

Mbire

1st period (From 1 July 2019 to 30 June 2020). Due to COVID-19 restrictions no gardening training for Mbire took place.

2nd period (From 1 July 2020 to 30 June 2021). 11 trainings were conducted, and a total of 320 people were recorded to have attended. 185 were men and 135 women.

Nyaminyami

1st period (From 1 July 2019 to 30 June 2020): Due to COVID-19 restrictions no gardening training for Nyaminyami took place.

2nd period (From 1 July 2020 to 30 June 2021): 21 trainings were conducted, and a total of 812 people were recorded to have attended. 372 were men and 440 women.

Summary of community gardening training

In the first period, Binga was the only district able to start their seasonal gardening due to COVID-19 lockdown restrictions. Three trainings were conducted, and a total of 62 people were recorded to have attended these trainings. 10 were men and 52 were women

In the second period (From 1 July 2020 to 30 June 2021) there were a total of 83 trainings. A total of 2,061 people were recorded to have received training. Out of this 880 were men and 1,181 were women. This shows women having an equal opportunity to participate in the trainings with a higher number of women being recorded at the trainings. As with the CF training it also shows how positively the ToT training has impacted the lives of the community members so that they can conduct their own trainings with knowledge learnt and take more ownership of the project.

BEEKEEPING

Beekeeping continues to be successfully implemented amongst community members who are aware of its benefits as an alternative income or food source. Although the seasonal patterns of weather seem to be inconsistent and unpredictable, a reasonable harvest has still been achieved. This has been very helpful to community members who may not have harvested a good yield from their field crops and can therefore at least use the income from the sale of honey to support their livelihoods.

No new honey processing centres have been established this monitoring period. Beekeeping as an activity has not changed since the previous monitoring period with the exception of 200 new Kenya Top-Bar (KTB) hives distributed as replacement hives. It was recognised that several the original hives had become weathered and deteriorated and therefore the project supported beekeepers with new hives as part of the ongoing support, and maintenance of these activities. This will ensure the continued success of beekeeping amongst community members who are aware of its benefits as an alternative income or food source. The honey harvest recorded during this monitoring period is given below per district.



Figure 9: Kariba REDD+ Project beekeeping

The breakdown of beekeeping activities per district are as follows.

Binga

1st period (From 1 July 2019 to 30 June 2020): Three beekeepers harvested honey. Total recorded honey harvested was 155 kg.

2nd period (From 1 July 2020 to 30 June 2021): 42 beekeepers harvested honey. Total recorded honey harvested was 357 kg.

Hurungwe

1st period (From 1 July 2019 to 30 June 2020): 111 beekeepers harvested honey. Total recorded honey harvested was 1,266 kg.

2nd period (From 1 July 2020 to 30 June 2021): 78 beekeepers harvested honey. Total recorded honey harvested was 1,856 kg.

Mbire

1st period (From 1 July 2019 to 30 June 2020): 92 Beekeepers harvested honey. Total recorded honey harvested was 2,854 kg.

2nd period (From 1 July 2020 to 30 June 2021): 39 Beekeepers harvested honey. Total recorded honey harvested was 755kg.

Nyaminyami

1st period (From 1 July 2019 to 30 June 2020): 20 beekeepers harvested honey. Total recorded honey harvested was 407 kg.

2nd period (From 1 July 2020 to 30 June 2021): 29 beekeepers harvested honey. Total recorded honey harvested was 2,349 kg.

Summary of beekeeping activities

A total of 10,010 kg of honey was produced during this monitoring period (4,682kg of honey was produced during the 2019/2020 harvests and total of 5,328 kg of honey was produced during the 2020-2021 harvests). It should be noted that not all the honey harvested was sold. Some of it was consumed at household level and some of it was also barter-traded. The Kariba REDD+ Project aims to continue enhancing this activity through additional trainings, support of materials and assistance in establishing markets for the honey.

Trainings for beekeeping

Beekeeping training usually takes place in May of every year. Unfortunately, no refresher trainings were done during the first period (1 July 2019 to 30 June 2020) due to COVID-19 restrictions. 71 beekeeping trainings were conducted during the second period (1 July 2020 and 30 June 2021). A total of 1,552 people were recorded to have attended with 973 being men and 579 women.



Figure 10: Kariba REDD+ Project beekeeping training

A breakdown of the trainings per district as are described below.

Binga

1st period (From 1 July 2019 to 30 June 2020): Due to COVID-19 restrictions no beekeeping refresher trainings took place in Binga.

2nd period (From 1 July 2020 to 30 June 2021): 27 trainings were conducted, and a total of 449 people were recorded to have attended. 208 were men and 241 women.

Hurungwe

1st period (From 1 July 2019 to 30 June 2020): Due to COVID-19 restrictions no beekeeping refresher trainings took place in Hurungwe.

2nd period (From 1 July 2020 to 30 June 2021): 14 trainings were conducted, and a total of 212 people were recorded to have attended. 105 were men and 107 women.

Mbire

1st period (From 1 July 2019 to 30 June 2020): Due to COVID-19 restrictions no beekeeping refresher trainings took place in Mbire.

2nd period (From 1 July 2020 to 30 June 2021): 11 trainings were conducted, and a total of 290 people were recorded to have attended. 225 were men and 65 women.

Nyaminyami

1st period (From 1 July 2019 to 30 June 2020): Due to COVID-19 restrictions no beekeeping refresher trainings took place in Nyaminyami.

2nd period (From 1 July 2020 to 30 June 2021): 19 trainings were conducted, and a total of 631 people were recorded to have attended. 450 were men and 181 women.

FUEL WOOD PLANTATIONS



Figure 11: Kariba REDD+ Project tree nursery

The status of fuel wood plantations has not changed much since the last monitoring report. No new areas have been established as plantation. The breakdown of the seedling distribution for donation or sales is as follows:

Binga

1st period (From 1 July 2019 to 30 June 2020): There were 12 members from the local community that received a donation of 25 seedlings.

2nd period (From 1 July 2020 to 30 June 2021): There were 25 members in two micro nurseries that donated 50 seedlings to general community members and sold 25 seedlings.

Hurungwe

1st period (From 1 July 2019 to 30 June 2020): Chitindiva Primary School germinated 4,500 seedlings. The school enrolment is 800 students.

2nd period (From 1 July 2020 to 30 June 2021): Chitindiva Primary School donated 400 seedlings to their students to take home and transplant.

Mbire

1st period (From 1 July 2019 to 30 June 2020): The small eucalyptus plantation recorded in the last monitoring report is still the only nursery/plantation that is functioning in the project area.

2nd period (From 1 July 2020 to 30 June 2021): There are two small nurseries have been re-established in Mbire with 29 members of which 15 men and 14 are women. They had germinated 1,770 assorted seedlings of which 1,045 seedlings were donated to the general members of the community.

Nyaminyami

1st period (From 1 July 2019 to 30 June 2020): There has been no change since the last monitoring period.

2nd period (From 1 July 2020 to 30 June 2021): Three small nurseries have been re-established with a total of 44 members. 23 are men and 21 are women. The nurseries donated 2,180 seedlings to the general community and 314 assorted seedlings for fruit trees and domestic use were germinated at the nurseries.

Summary of fuelwood plantations

During the first period (1 July 2019 to 30 June 2020) there were 25 seedlings redirected as donations and 4,500 seedlings were germinated by Chitindiva primary school. 36 seedlings sold to the general communities. In addition, 200 planting pockets were given to a new group of community members in Binga as an incentive to start a nursery. Therefore, the fuel wood plantations project is still at nursery stage for this time.

In the second period (1 July 2020 to 30 June 2021) the Kariba REDD+ Project managed to re-establish seven tree nurseries after it had been reported that these had died due to COVID19 lockdown requirements the previous year and there was nobody at the schools to water the seedlings. There are a total of 798 beneficiaries to these seven nurseries; most of them (700) are students from Chitindiva School and the balance made up of other community members as per the details per district above. During this period three training workshops in tree planting and seedling production were conducted which were attended by 81 community members.

SOCIAL FORESTRY

At present, the number of wards are not mapped in which forests are traditionally conserved. However, this activity continues to be implemented and explored. The second part of the harvest season, which takes place from January to May, was unfortunately significantly reduced due to COVID19 lockdown restrictions during 2020. *Moringa oleifera* is still being readily harvested for a small local market. Baobab powder and other indigenous trees are on the radar and recently we have had an increase in market interest. We are hoping that a more positive breakthrough will be realised soon. *Moringa oleifera* has become a well-known naturalized tree within the communities. Some community members have also come to understand that there is a potential cash value for the dried leaf and seed. CGA has been purchasing moringa leaf and seed for the past few years now. The market is predominantly local and remains small. However, it has proven to help those households who have harvested moringa with added income to assist their families. During

this monitoring period a total of two schools and over 500 community members benefitted from the use of moringa trees.



Figure 12: Kariba REDD+ Project Moringa seedlings

FIRE MANAGEMENT

Fire management continues to be an important activity in the project area. This protection of habitat together with good anti-poaching has also seen an increase in numbers of wildlife particularly in the Nyaminyami and Mbire districts⁶¹. The positive impact that early burning activities are having is supported by the increase in visual numbers of small tree seedlings which have been seen to survive in some areas. It is mostly these small seedlings, which are burned during the late season hot fires. The project will continue enhancing this activity through continued road maintenance and early burning, continued fire awareness and firefighting training in the coming years.

⁶¹ See Section 5 for more details on the biodiversity monitoring for this monitoring period.



Figure 13: Kariba REDD+ Project early burning

A breakdown of the fire management activity per district during this monitoring period is as follows:

Binga

1st period (From 1 July 2019 to 30 June 2020): 29 firefighting committees, approximately 493 km early burning was done along roads in the project area doubling as fireguards. OGM maintained approximately 96 km of roads.

2nd period (From 1 July 2020 to 30 June 2021): 15 firefighting committees and 15 village fireguards were implemented with approximately 310 km early burning was done along roads in the project area doubling as fireguards. OGM maintained approximately 369 km of roads.

Hurungwe

1st period (From 1 July 2019 to 30 June 2020): Three firefighting committees were recorded.

2nd period (From 1 July 2020 to 30 June 2021): 23 firefighting committees were recorded, and 1,617 village fireguards were implemented with a total of approximately 240 km early burning was done along roads in the project area doubling as fireguards. OGM maintained approximately 526 km of roads.

Mbire

1st period (From 1 July 2019 to 30 June 2020): 13 Firefighting committees were recorded.

2nd period (From 1 July 2020 to 30 June 2021): 12 firefighting committees were recorded, and 74 village fireguards were implemented with a total of approximately 402 km early burning done around the communities and surrounding bush roads. OGM maintained approximately 275 km of roads.

Nyaminyami

1st period (From 1 July 2019 to 30 June 2020): 11 firefighting committees were recorded at the time and three village fireguards were implemented with a total of approximately 267 km early burning done around the communities and surrounding bush roads. OGM maintained approximately 62 km of roads.

2nd period (From 1 July 2020 to 30 June 2021): 11 firefighting committees were recorded, and 415 village fireguards were implemented with a total of approximately 735 km early burning done around the communities and surrounding bush roads. OGM maintained approximately 1,390 km of roads.

Summary of Fire Management activities

During the first year of this monitoring period (from 1 July 2019 to 30 June 2020), 189 man-days were recorded spent on fire management and roads between OGM and communities. There are 22 recorded community fire awareness meetings with over 1,500 attendees in total. A total of 33 fireguards have been recorded between OGM and communities as part of the early burning activity, covering approximately 765 km across the project area. In addition to this, CGA has also repaired and maintained approximately 158 km of bush roads from July 2019 to June 2020 across the project area, which assist as fireguards. It was also along these same roads and other areas in the bush identified as vulnerable to fire where early burning was done.



Figure 14: Kariba REDD+ Project Fire Management

During the 2020 to 2021 period, 1,319 man-days were recorded spent on fire management and roads between OGM and communities. There are 70 recorded community fire awareness meetings with over 1,858 attendees in total. A total of 2,121 fireguards have been recorded between OGM and communities as part of the early burning activity, covering approximately 1,687 km across the project area. A point to note is that a large percentage of these fireguards come from Hurungwe district. Since this district has a historic reputation of being responsible for some of the highest fire occurrences, many community members had made household fireguards that include their fields to protect them from wildfires and also to prevent any fire escaping from their fields during the time they burn the weeds etc. For the past two years the community members have consistently averaged 800 smaller household fireguards in Hurungwe. CGA also repaired and maintained approximately 2,561 km of bush roads from 1 July 2020 to 30 June 2021 across the project area, which also assist as fireguards. It was also along these same roads and other areas in the bush identified as vulnerable to fire where early burning was done.



Figure 15: Kariba REDD+ Project Fire Management

ALTERNATIVE AND SUSTAINABLE CONSTRUCTION (BRICK MAKING)

This activity has not yet been implemented. A competitively priced alternative compared to cost of local bricks has not been found to date.

ON THE GROUND MANAGEMENT (OGM) TEAMS

The project has four OGM teams covering the four RDCs. There are currently 21 employees in the OGM teams. Each team has successfully managed to fulfill its obligations and supplied reports to the CGA head office on a regular basis. These obligations include the following:

- Maintenance and resuscitation of boreholes and water pumps.
- Receiving feedback and grievances from the local communities through meetings and general interaction.
- Facilitating the relations to the local authorities through meetings and general interaction.
- Carrying out the proper monitoring requirements according to the applied standards.
- Prevention of fire.
- Maintaining roads for accessibility.



Figure 16: Kariba REDD+ Project On the Ground Management team

The activities of the OGM teams during this monitoring period with regards to maintenance of boreholes, community/council meetings and monitoring will be described in more detail below. The OGM activities around fire prevention and road maintenance have already been described above. The OGM team also spend 10,699 man days patrolling during the monitoring period. More details of the OGM activities with regards to biodiversity can be found in section 5.3.2.

Borehole Resuscitation and Maintenance

The aim of this project activity is to secure access to clean water for local communities. Before the Kariba REDD+ project started, communities had been suffering from major water challenges resulting from poor infrastructure development and maintenance. Local Authorities and CGA were engaged to install boreholes for local people in the project area. Safe potable drinking water can be considered as the very essence of life itself, and borehole resuscitation and maintenance has had a positive impact on local communities living in the project area. It is estimated that each borehole impacts more than 250 people. While no new boreholes were established during this monitoring period, existing boreholes were maintained in all four districts. See below for more details.



Figure 17: Kariba REDD+ Project borehole resuscitation

The breakdown of borehole maintenance per district is summarised below:

Binga

1st period (From 1 July 2019 to 30 June 2020): 12 boreholes

2nd period (From 1 July 2020 to 30 June 2021): 10 boreholes

Hurungwe

1st period (From 1 July 2019 to 30 June 2020): 20 boreholes

2nd period (From 1 July 2020 to 30 June 2021): 14 boreholes

Mbire

1st period (From 1 July 2019 to 30 June 2020): 88 boreholes

2nd period (From 1 July 2020 to 30 June 2021): 93 boreholes

Nyaminyami

1st period (From 1 July 2019 to 30 June 2020): 17 boreholes

2nd period (From 1 July 2020 to 30 June 2021): 14 boreholes

Summary of borehole resuscitation and maintenance activities.

During the first period (1 July 2019 to 30 June 2020), the Kariba REDD+ Project managed to maintain 137 boreholes as part of ongoing maintenance of the previously reported boreholes, which were resuscitated. The total number of people estimated to have been positively impacted by this activity is over 34,250 people.

During the second period (1 July 2020 to 30 June 2021), the project has managed to maintain 131 boreholes as part of ongoing maintenance of the previously reported boreholes, which were resuscitated. The total number of people estimated to have been positively impacted by this activity is over 32,000 people.

This activity has a profound impact on the lives of the communities in these areas when considering that this is one of the basic essentials of life and saves many family members, especially girl children and women, the very challenging task of walking many kilometers to fetch water from long distances. This also ensures more girls stay in school as they no longer have to spend their days collecting water.



Figure 18: Kariba REDD+ Project Madzomba School borehole

Community Meetings

Community meetings are an ongoing activity. It is an important way to build and maintain the relationship with community members, local authorities and CGA. Project related issues, project activity implementation

and any new potential activities that would uplift livelihoods and at the same time reduce deforestation are discussed during these meetings.

It is also the time that any grievances can be reported and addressed. However, to date no grievances have ever been received because of the project. Only continual requests for more support have been made. This is of course not considered as a grievance but rather a positive response where the project is concerned.



Figure 19: Kariba REDD+ Project community meeting

The following shows the number of community meetings held per district during the entire monitoring period. These meetings cover conservation farming, gardening, beekeeping, fire awareness, tree planting, environmental awareness, council related to climate change and the Kariba REDD+ Project and general community meetings.

Binga

1st period (From 1 July 2019 to 30 June 2020): 48 community meetings were held.

2nd period (From 1 July 2020 to 30 June 2021): 77 community meetings were held.

Hurungwe

1st period (From 1 July 2019 to 30 June 2020): 40 community meetings were held.

2nd period (From 1 July 2020 to 30 June 2021): 57 community meetings were held.

Mbire

1st period (From 1 July 2019 to 30 June 2020): 67 community meetings were held.

2nd period (From 1 July 2020 to 30 June 2021): 51 community meetings were held.

Nyaminyami

1st period (From 1 July 2019 to 30 June 2020): 68 community meetings were held.

2nd period (From 1 July 2020 to 30 June 2021): 103 community meetings were held.

Summary of community meetings during this monitoring period

This gives a total of 511 community meetings during the monitoring period. 223 meetings in the first period (1 July 2019 to 30 June 2020) and 288 meetings during second period (1 July 2020 to 30 June 2021). Having these community meetings continues to increase the general communities' understanding of the project, the aims and objectives of the Kariba REDD+ Project and also their roles and responsibilities as communities within the project.

Monitoring biodiversity

Biodiversity monitoring has been validated and verified for the gold standard based on high value biodiversity, which occurs in the area. Biodiversity monitoring is continuously implemented to monitor the project impact on wildlife and tree species. Wildlife monitoring is done every month via 'walking- based' monitoring and 'vehicle-based' monitoring.



Figure 20: Kariba REDD+ Project biodiversity monitoring

Animals recorded during walking-based monitoring are restricted to council and CGA game scouts who record animal sightings and tracks whilst on foot patrol and vehicle-based monitoring is done by OGM teams who record animal sightings and tracks whilst driving between communities. The recordings also include total number of man-days spent monitoring, number of snares collected, number and species of animals poached, and number of poachers arrested. It should be noted that the total number of animals recorded does not reflect the actual population but are sightings, so in some cases the same animals could have been recorded more than once on different days. Further information on the results of the biodiversity monitoring is presented in Section 5.3.

NEWSLETTERS

During the monitoring period from July 2019 to June 2021 the project has been publishing a monthly letter for distribution to the RDCs and local communities. To date one newsletter per project area per month has been published. Sometimes more than one month is covered in one newsletter. These newsletters have covered topics such as general project progress, environmental awareness, grievances if any, vacancies if any and general topics.

These newsletters have been published in English, Shona and Tonga and have been distributed to the RDCs and local communities by the CGA OGM teams⁶². The project aims to enhance the above obligations through increased communications, workshops and awareness to the local authorities and local communities.

⁶² Copies of all newsletters from this monitoring period are available in the Supporting Documents/2_General/Newsletters folder.

COMMUNITY AND PROJECT SUSTAINABILITY FUND

A community and project sustainability fund (also known as the Longevity Fund) was set up at the start of the project to be invested into general activities to promote and guarantee the sustainability of the project in the long term. During this monitoring period the fund provided a total of USD 101,047 towards general activities. USD 36,747 was spent overall across the four districts in the period from 1 July 2019 to 30 June 2020 and USD 64,300 was spent across the four districts in the period from 1 July 2020 to 30 June 2021⁶³.



Figure 21: Kariba REDD+ Project inputs from the Longevity Fund

The following additional inputs have been provided by this fund to general community members, local leaders and authorities, schools and others during this monitoring period.

Fuel

3,937 litres of fuel were provided during this monitoring period to support local leaders and community members for water pumps, local law enforcement officers and the Environmental Management Agency to assist in carrying out various tasks necessary for community benefit and environmental protection.

Water access

⁶³ See Supporting Documents/4_Community/Social Monitoring for a detailed breakdown of how these funds were spent.

Various direct inputs were supplied to clinics and communities for water related activities during this monitoring period. These included, cement, building materials, piping, solar panels, pumps and storage tanks amongst others⁶⁴. A new borehole was also drilled at the Tashinga Community Garden and a 140,000-litre rainwater harvest system was installed at the Chikova Secondary School.

Healthcare

USD 9,180 was provided to clinics by the community and project sustainability fund during this monitoring period. USD 1,623 was spent on 17 clinics during the first period (from 1 July 2019 to 30 June 2020) and USD 7,557 was provided to 16 clinics during the second period (from 1 July 2020 to 30 June 2021)⁶⁵. Clinics were mostly supported with ongoing access to water from the repair and maintenance of boreholes and building materials. The biogas digester at Chitsungu clinic was also maintained with these funds during this monitoring period.

Education

USD 14,775 was provided to schools during this monitoring period. USD 6,367 was provided to 46 schools during the first period (from 1 July 2019 to 30 June 2020) and USD 8,408 was provided to 40 schools during the second period (from 1 July 2020 to 30 June 2021)⁶⁶. These are schools were mostly supported with ongoing access to water from the repair and maintenance of boreholes and inputs for their gardens. A 140,000-litre rainwater harvest system was also installed at the Chikova Secondary School during this monitoring period.

⁶⁴ See Supporting Documents/4_Community/Social Monitoring/Community and Project Sustainability Fund for a detailed breakdown the inputs that were provided for water access during this monitoring period.

⁶⁵ See Supporting Documents/4_Community/Social Monitoring/Community and Project Sustainability Fund for a detailed breakdown the inputs that were provided for healthcare during this monitoring period.

⁶⁶ See Supporting Documents/4_Community/Social Monitoring/Community and Project Sustainability Fund for a detailed breakdown the inputs that were provided for education during this monitoring period.



Figure 22: School children in the Kariba REDD+ Project area



Figure 23: Kariba REDD+ Project Chinkova rainwater harvest system

Inputs for training activities

The community and project sustainability fund provided numerous inputs for the training sessions and workshops that were conducted during this monitoring period including stationery, pens, notebooks and food⁶⁷.

Inputs for beekeeping activities

The community and project sustainability fund provided numerous inputs for the beekeeping activities that took place during this monitoring period including new hives, bee suits and smokers⁶⁸.

Inputs for agriculture activities (Conservation Farming and Community Gardens)

The community and project sustainability fund provided numerous inputs for the agricultural activities that took place during this monitoring period. These inputs included stationery, seed packs, fuel, piping, cement, construction materials, wire, and water tanks amongst others⁶⁹.

⁶⁷ See Supporting Documents/4_Community/Social Monitoring/Community and Project Sustainability Fund for a detailed breakdown the inputs that were provided for training activities.

⁶⁸ See Supporting Documents/4_Community/Social Monitoring/Community and Project Sustainability Fund for a detailed breakdown the inputs that were provided for beekeeping activities.

⁶⁹ See Supporting Documents/4_Community/Social Monitoring/Community and Project Sustainability Fund for a detailed breakdown the inputs that were provided for agricultural activities

Inputs for firefighting activities

The community and project sustainability fund provided numerous inputs for the firefighting activities that took place during this monitoring period. These inputs included rakes, slashers, sickles, shovel, hoes and fire beaters⁷⁰.

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

According to the already validated information from the CCB PDD (page 62), a full monitoring plan was submitted to the CCBS for publication on its website and remains available.

The results of the monitoring are disseminated and made public in the project area. The results of the monitoring are published in the monitoring reports, which are not only published online for public consultation, but also distributed locally through summaries, which have been translated to Tonga and Shona and distributed in the project area. Community members have also been invited to comment on the Monitoring Report and its Summary (refer to Section 2.3).

The distribution was done as follows: one copy of the full Monitoring Report was sent to each council office with an additional copy sent to the council satellite office in Binga giving a total of five copies. As for the Monitoring Report summaries, one copy was sent to each council office, one copy to each chief and one copy to each ward councilor. All these copies were delivered as hard copies in person by the OGM who followed up with an explanation on how to submit any grievances through the communications channels outlined in the adaptive management plan either directly to council, OGM teams or CGA head office. As described previously, the projects OGM team is in continuous contact with the local communities about the project during site visits, meeting with chiefs and other leaders, and through field staff. Through this communication, the project team is further able to ensure that the results of the monitoring undertaken in accordance with the monitoring plan, have been communicated to the communities and other stakeholders.

4.4 Optional Criterion: Exceptional Community Benefits

This section has not been subject to validation, therefore is not applicable. However, for a description of the project's impact on the poorest segments of the local communities, please refer to the CCB PDD.

4.4.1 Barriers to Benefits (GL2.3)

Not applicable.

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

Not applicable.

5 BIODIVERSITY

5.1 Net Positive Biodiversity Impacts

5.1.1 Biodiversity Changes (B1.1)

As described in the validated CCB PDD, section B1.1 (page 74), in the without project case, the wildlife populations would continue to decline sharply due to undamped deforestation and poaching.

⁷⁰ See Supporting Documents/4_Community/Social Monitoring/Community and Project Sustainability Fund for a detailed breakdown the inputs that were provided for firefighting activities.

Before the project, wildlife in the area had suffered strongly from the economic breakdown in Zimbabwe and the consequent increase in poaching activities. Furthermore, deforestation and forest degradation destroyed fauna and flora and the natural ecosystems that support them. Land use change from agricultural expansion is the most important driver for loss of biodiversity in southern Africa. The project area's wildlife had strongly decreased in the years before the project. Without the project, it is unlikely that significant populations of large mammals would be left in the area today.

The project has developed several activities directly or indirectly enhancing biodiversity. Reduced deforestation achieved through project activities such as regenerative agriculture, regeneration of woodlots for firewood, and beekeeping have halted biodiversity loss by preventing loss of habitat. The protection of the project area has had a synergic effect because the project area acts as a corridor between adjacent national parks.

Patrolling has been an integral part of the project since it started, and this monitoring period has been no different. Through patrolling, the project has successfully reduced pressure on biodiversity caused by severe poaching. Overall, the conservation of habitat and biodiversity has been achieved as a direct result of the project activities.

The negative impacts of poaching and unsustainable resource use have been kept out of the project area. The reduction of habitat loss through project activities is also important in assisting the biodiversity in adapting to the impacts of climate change. This provides better conditions for biodiversity in terms of refuge and the provision of ecosystem services such as food, water and shelter. By protecting the project area, it becomes a self-regulating natural system that can adapt dynamically to changing conditions over time and maintain a high level of biodiversity and resilient ecosystem functions to support both wildlife and provide critical services to local communities.

The Kariba REDD+ Project not only reduces the deforestation rate in the project area significantly, but it also reduces the poaching pressure on wildlife through patrolling and further anti-poaching measures.

The Kariba REDD+ Project's changes and impacts on the biodiversity have been monitored according to the project's monitoring plan and Standard Operation Procedure⁷¹. See Section 5.3 for more details on the project's biodiversity impacts during this monitoring period.

Change in Biodiversity	Increase in total sightings of threatened species
Monitored Change	Sightings of threatened species for the two years being monitored were eight times higher than those reported during the project's first full year. For full information about biodiversity monitoring, refer to Section 5.3.
Justification of Change	This is a consequence of the project conservation efforts, directly through reduction of poaching by continuous patrolling activities, indirectly through habitat conservation and restoration and by increasing overall biodiversity in the landscape through regenerative agriculture.

Change in Biodiversity	Increase in total sightings of all species
Monitored Change	Total sightings of all species during 2020 was 14 times higher than the first full year of the project and for 2021 it is, so far, 12 times higher. For full information about biodiversity monitoring, refer to Section 5.3.
Justification of Change	This is a consequence of the project conservation efforts, directly through reduction of poaching by continuous patrolling

⁷¹ Available under the Supporting Documents/5_Biodiversity/Biodiversity Monitoring/SOP.

	activities, indirectly through habitat conservation and restoration and by increasing overall biodiversity in the landscape through the project activities.
--	---

5.1.2 High Conservation Value Protection (B1.2)

The conservation of threatened species (HCV 1 – as described in the validated CCB PDD (Section G3.6) lies at the core of the Kariba REDD+ project's activities. Threatened species are identified as having high conservation value. The project area hosts painted dogs (*Lycaon pictus*), which are an endangered (EN) species according to the IUCN. Furthermore, the project area contains many individuals of vulnerable (VU) species, such as African elephant (*Loxodonta africana*), lion (*Panthera leo*), leopard (*Panthera pardus*) and cheetah (*Acinonyx jubatus*), among others. Endangered species are at the focus of the project's biodiversity impact monitoring.

A significant population of different threatened species has been recorded since the project start and Section 5.3 provides more details of the biodiversity impacts during this monitoring period. These results show a continuation of sightings of all species and threatened species. This demonstrates the project's efficacy in its conservation efforts through its conservation, restoration, regenerative agriculture, and patrolling activities and that no HCVs related to biodiversity have been negatively affected by the project during this monitoring period. Conversely, the improved protection of the project area because of project activities has preserved the biodiversity. The identified HCV 1 is a major focus of the project. Through reduced forest loss and poaching pressure, the project significantly improves the habitat conditions for threatened wildlife in the area, resulting in affecting positively HCV 1.

The project proponents prevent and manage any negative impacts derived from project activities by implementing an adaptive management strategy. As described in the validated VCS and CCB PDDs, the project team holds an adaptive management workshop on an annual basis. During this workshop, the results of the monitoring procedures, as well as the received feedback from locals and employees is discussed⁷². The goal of these workshops is to steadily improve the effectiveness and efficiency of the project while identifying new emerging risks and addressing them appropriately. The projects OGM team also works in close communication and collaboration with local communities, local authorities and other stakeholders throughout the year to ensure any feedback around negative impacts on biodiversity are identified and mitigated.

Some examples of processes implemented to mitigate negative impact on biodiversity and to maintain and enhance the HCV attributes in the project area during this monitoring period resulting from the adaptive management approach are explained below.

During December 2020 and January 2021, an increase in animal movement in Binga was noted by local communities and the projects OGM team because of the availability of food and water in the area. The project team quickly deployed council scouts to the area in early February to monitor poaching activities in the area and ensure that there were no negative biodiversity impacts occurring. Similarly, in February 2021 it was noted that baboons, monkeys and hyenas were moving around in Hurungwe with the potential to affect crops and livestock and lead to human-wildlife conflict. The OGM team was quick to reach out to local communities and encourage them to watch their livestock or drive them into protective places like paddocks to avoid risks from wildlife⁷³.

⁷² See Supporting Documents/2_General/Adaptive Management Plan/Adaptive Management Meetings for minutes and details from the two adaptive management workshops held this monitoring period.

⁷³ See the monthly newsletters provided in Supporting Documents/2_General/Newsletters folder for detailed descriptions of the anti-poaching and biodiversity activities that took place during this monitoring period.



Figure 24: Kariba REDD+ Project adaptive management meeting

5.1.3 Invasive Species (B1.3)

As stated in the validated PDD, no invasive or exotic species were used in the project activities. In addition to that, as the project evolves, new species could be introduced, taking into account their invasive potential. No species that are likely to have a negative effect will be used. The population of any invasive species does not increase because of the project. The project uses several different plant species in its agricultural activities and woodlot establishments. Invasive species are not used.

Species used in the Kariba REDD+ Project include the following:

- Garlic (*Allium sativum*)
- Peanuts (*Arachis hypogaea*)
- Chilli Peppers (*Capsicum* spp.)
- Eucalyptus (*Eucalyptus robusta* and *E. tereticornis* for firewood and tobacco curing)
- Soybean (*Glycine max*)
- Jatropha (*Jatropha curcas*; for oil and life fences)
- Cassava (*Manihotes culenta*)
- Moringa (*Moringa oleifera* is used as vegetable and fodder)
- Sugar Bean (*Phaseolus lunatus*)
- Sorghum (*Sorghum bicolor*)
- Cowpea (*Vigna unguiculata*)

- Maize (Zea mays)

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

Refer to the validated CCB PDD, section B1.4 (page 76), for possible more details on the effects of non-native species used in the project.

Species	<i>Jatropha curcas, Moringa oleifera</i>
Justification of Use	Multi-purpose species with substantial agroforestry benefits
Adverse Effect	None identified

Species	<i>Capsicum so., Allium sativum, Sorghum bicolor, Manihotes culenta, Arachis hypogaea Vigna unguiculata</i>
Justification of Use	Traditional agricultural species with multiple benefits related to food security and cash crops promoted as an alternative to extensive agriculture and tobacco.
Adverse Effect	None identified

Species	<i>Eucalyptus sp.</i>
Justification of Use	Eucalyptus has become naturalized in Zimbabwe. They are included in the woodlot plantation project activity because they are known to be very fast growing. Thus, they can provide substantial relief to resource demand from existing natural forests over a relatively short time.
Adverse Effect	None identified

Species	Glycine max, Phaseolus lunatus, Zea mays
Justification of Use	Exotic agricultural species with multiple benefits related to food security and cash crops promoted as an alternative to extensive agriculture and tobacco.
Adverse Effect	None identified

5.1.5 GMO Exclusion (B1.5)

As stated in the validated CCB PDD, no GMOs are used in the project activities.

5.2 Offsite Biodiversity Impacts

5.2.1 Negative Offsite Biodiversity Impact Mitigation (B2.2)

No negative offsite biodiversity impacts have been identified. Rather, by providing a corridor for wildlife in three adjacent national parks, the project has had a positive impact on biodiversity outside the project area. This positive impact could also include improvement of the habitat conditions for the species. Leakage of poaching activities is not possible as there is hardly any wildlife left outside the project area, except for in the well-guarded national parks. Furthermore, the poachers mostly live within the project area where they

benefit from the project activities. The poachers have a low level of mobility and cannot easily displace themselves to faraway locations.

Similarly, restrictions on illegal logging do not result in negative offsite impacts. The project activities were specifically designed to mitigate leakage. As stated previously, most community members have a low level of mobility and are benefiting from project activities. See section 4.1.2 for more details on community impacts. It is highly unlikely that they could move offsite to conduct logging activities. The project has 50 permanent leakage plots which are monitored regularly and the project remains convinced that its project activities are fully adequate and effective (see section 3.2.3 for more details).

Although no negative impacts are envisioned, any negative impact will be addressed through active adaptive management. In addition to that, biodiversity is monitored and the effect of the project on biodiversity is positive. See Section 5.3 for more details on the biodiversity impacts of the project.

5.2.2 Net Offsite Biodiversity Benefits (B2.3)

The project activities do not cause negative offsite biodiversity impacts. Rather, by providing a corridor for wildlife in three adjacent national parks, the project has had a positive impact on biodiversity outside the project area. This positive impact could also include improvement of the habitat conditions for the species. Leakage of poaching activities is not possible as there is hardly any wildlife left outside the project area, except for in the well-guarded national parks. Furthermore, the poachers mostly live within the project area where they benefit from the project activities. The poachers have a low level of mobility and cannot easily displace themselves to faraway locations.

On the contrary, the project activities only enhance biodiversity benefits for the areas outside the project area. The project area hosts painted dogs (*Lycaon pictus*), which are an endangered (EN) species according to the IUCN. Furthermore, the project area contains many individuals of vulnerable (VU) species, such as the African elephant (*Loxodonta africana*), lion (*Panthera leo*), and cheetah (*Acinonyx jubatus*), as well as critically endangered (CR) species such as leopard (*Panthera pardus*) and white-headed vulture (*Trigonoceps occipitalis*).

Endangered species are at the focus of the project's biodiversity impact monitoring. A significant population of different threatened species has been recorded since the project start in 2011, showing the positive effect of the project, especially regarding anti-poaching activities. For detailed information on the positive impacts the project activities have had on biodiversity, please refer to Section 5.3 of this document.

5.3 Biodiversity Impact Monitoring

5.3.1 Biodiversity Monitoring Plan Development (B3.3)

Not applicable.

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

For biodiversity impact monitoring, please refer to the project's monitoring plan and Standard Operation Procedure⁷⁴. The monitoring plan is based on a framework of pressure, state, and response of biodiversity to ensure a system that is both effective and efficient (see the validated CCB PDD, section B.3 for more details).

⁷⁴ Available under the Supporting Documents/5_Biodiversity/Biodiversity Monitoring/SOP



Figure 25: Kariba REDD+ Project biodiversity

The Kariba REDD+ Project is successfully reducing the pressure on the wildlife in the project area by reducing the deforestation rates (conserving habitat) and relieving the wildlife from poaching through the project's patrolling efforts. To monitor these impacts, the monitoring plan includes indicators that represent the still encountered poaching activities in the project area, the prevalent biodiversity in flora and fauna and the project's efforts to reduce poaching. This set of indicators gives a holistic picture of the state of the biodiversity over time in the project area, as well as the pressure on the wildlife and the project's efforts to reduce these pressures.

Specifically, the following variables are monitored:

Pressure

- The number of wire snares encountered by patrols (monitored continuously).
- The number of poached game (monitored continuously).

State

- The number of big game and endangered animals encountered by patrols per man-days spent patrolling (monitored continuously). These species are used as indicator species for the state of the faunal biodiversity in the area⁷⁵.
- The number of tree species on the permanent carbon monitoring plots. The number of tree species acts as an indicator of floral biodiversity in the project area.

Response

⁷⁵ See Supporting Documents/5_Biodiversity/Biodiversity Monitoring/Fauna.

- Increase the number of anti-poaching patrols and number of man-days spent patrolling per year (monitored continuously).
- Arresting poachers (monitored continuously).

In line with the project's monitoring plan, the following indicators are measured: Poaching, Animal species richness and Plant species richness. There are two main approaches to biodiversity monitoring. Vehicle-based monitoring of the OGM teams and walking-based monitoring done by the RDC game scouts. The OGM teams do predominately vehicle-based monitoring. OGM teams record all sightings or signs of animals and birds whilst carrying out their daily duties. This is entered into an excel template as per the example attached. The total number of days spent monitoring is also recorded so that the sightings versus number of days spent on biodiversity can be monitored over time. All species are recorded, however as per monitoring plan, the focus is on the IUCN red listed species. This monitoring is ongoing all the time every month. RDC scouts do all their monitoring whilst walking on patrol doing anti-poaching. Both sightings and signs of animals are recorded. Since they have access to areas of the forest that cannot be accessed by vehicle, it is necessary to record their biodiversity encounters whilst on anti-poaching patrols. Their total number of days on patrol is also recorded versus their sightings and compared over time. This data is sent to CGA head office in hard copy and processed.

Whenever possible, photos are taken and GPS co-ordinates recorded. Also, the number of poachers arrested are recorded, species and number of animals poached are recorded and snares collected are also recorded.

Each district provides independent biodiversity information for both OGM and anti-poaching.

Dates

Reporting done monthly by the RDCs to CGA using the data sheets supplied by CGA. Data collection is continuously linked with other activities happening in the project area.

Frequency

The biodiversity monitoring was ongoing as per the CCBS Monitoring Plan. That means the game scouts and project key people are equipped with GPS units and they are able to record any data of interest they see during patrol trips or routine work in the project area. Data is collected as follows:

Poaching

Each Rural District Council (RDC) submitted a monthly poaching report to the GGA head office using the anti-poaching reporting sheet provided separately. Number of team-days spent in the field by each patrol mission are recorded together with their sightings.

Animal species richness

Monitoring is done simultaneously to any work carried out in the field, both by RDC teams and OGM teams targeting mammals (endangered species as well). Teams used the reporting sheet provided separately. Reporting to CGA was done monthly. Both actual sightings as well as signs (e.g., tracks) were recorded. The number of observations were recorded on the data sheet at monthly intervals.

Plant species richness

Total encountered tree species and individual trees per species were monitored as part of the carbon monitoring campaign.

Locations

The location for monitoring is within the greater project area. Both the poachers and the wildlife are mobile and the project personnel have a monitoring plan to ensure that every part of the key project areas are monitored.

Monitoring aspect	Indicator
Poaching	Number of snare wires found
	Number of poachers arrested
	Poached game encountered
	Team-days spent patrolling
Animal species richness	Species sighted in the field
	Number of animals per species
	Number of threatened species
Plant species richness	Tree species observed in the biomass sampling plots
	Number of individuals per tree species

The following section summarises the results of biodiversity monitoring for the monitoring period under review, which encompasses the period of 1 July 2019 until 30th June 2021.

Wildlife sightings⁷⁶

The results of the project's biodiversity impacts for this monitoring period are given in Table 15. It shows a significant presence of wildlife in the area. Overall, indicator results for these years show a continuation of sightings of all species and threatened species. This demonstrates the project's efficacy in its conservation efforts through its conservation, restoration, regenerative agriculture, and patrolling activities. It is important to note that some of the districts have reported that bird identification is still a challenge for field officers. The project aims to implement a bird identification workshops to address this challenge.

⁷⁶ Please note that the data for 2019 and 2021 only represents six months for each of the years to align with the monitoring period under review.



Figure 26: Kariba REDD+ Project hippos spotted during patrol

During this monitoring period, 5,200 team-days were spent monitoring wildlife. A total of 84,956 animal sightings and tracks were registered, from which 31,666 corresponded to over 17 different threatened species. Some of the species with most sightings this monitoring period are elephants, common hippos, and buffaloes⁷⁷.

Table 15: Sightings and tracks of wildlife in the project area

Year		2019 ⁷⁸	2020	2021 ⁷⁹
Team-days spent monitoring		673	2280	2247
Species	Status			
Lion	VU	27	113	96
Elephant	EN	1,360	4,449	5,142
Black rhino	CR	0	0	0
Common hippo	VU	1,790	4,925	4,824
Cheetah	VU	0	0	0

⁷⁷ Evidence of biodiversity monitoring and anti-poaching activities are presented under the Supporting Documents/5_Biodiversity/Biodiversity Monitoring/Fauna.

⁷⁸ Please note that the data for 2019 only represents six months (1 July to 31 December).

⁷⁹ Please note that the data for 2021 only represents six months (1 January to 30 June).

Southern ground hornbill	VU	126	270	300
Hooded vulture	VU	86	226	179
Egyptian vulture	EN	0	0	0
Cape vulture	VU	0	0	0
Lappet-faced vulture	VU	8	16	12
White-headed vulture	VU	46	43	96
White-backed vulture	VU	50	350	228
Martial eagle	VU	39	94	89
Crowned eagle	NT	29	40	26
Bateleur	NT	31	70	59
Secretary bird	EN	39	65	39
Southern crowned crane	EN	16	13	8
Lilian's lovebird	NT	162	196	519
Painted dog	EN	24	54	24
Leopard	VU	33	103	80
Buffalo	NT	559	2,321	1,779
Zebra	NT	51	151	191
Other spp.		11,176	22,647	16,777
Total threatened spp.		4,476	13,499	13,691
Total spp.		1,8343	36,146	30,468
Threatened spp. sightings/team-day		6.65	5.92	6.09
All spp. sightings/team-day		27.26	15.85	13.56

Throughout its lifetime, the project has seen an increase in total sightings of threatened species (Figure 27⁸⁰). Some of the species that have seen an increase in sightings throughout the project lifetime are elephants, hippopotamus, southern ground hornbill, martial eagles, crowned eagles, leopards, and zebras. Overall, sightings of threatened species during this monitoring period followed this increasing trend. Total sightings of all species have also increased continuously since the project start date (Figure 28). An exception to this might appear to be sightings of all species in 2021, however it is important to keep in mind that the value showed in this report only encompasses the months from January until June. Figure 29 to Figure 43⁸¹ show the total sightings of some key species from the project start to the end of this monitoring period.

⁸⁰ Please note that the data for 2021 only represents six months (1 January to 30 June).

⁸¹ Please note that the data for 2021 only represents six months (1 January to 30 June).

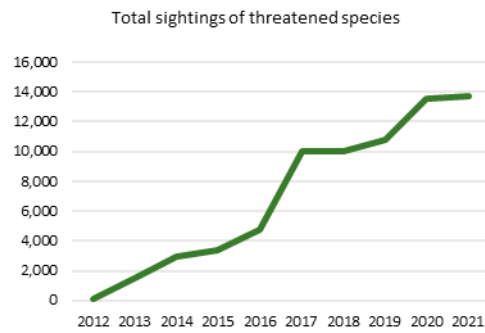


Figure 27. Total wildlife sightings of threatened species including tracks.

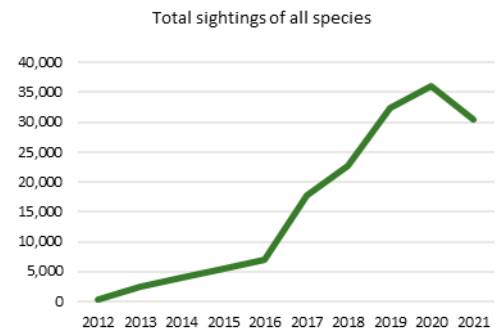


Figure 28. Sightings of all species including tracks.

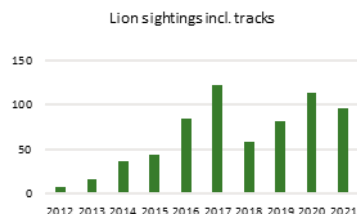


Figure 29. Total lion sightings including tracks per year.

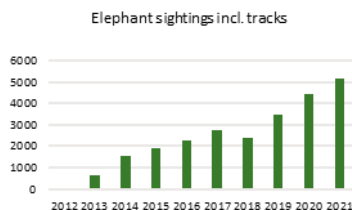


Figure 30. Total elephant sightings including tracks per year.

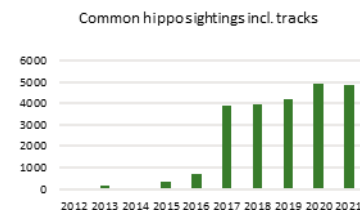


Figure 31. Total hippo sightings including tracks per year.

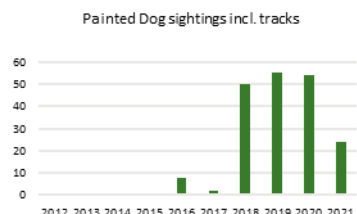


Figure 32. Total painted dog sightings including tracks per year.

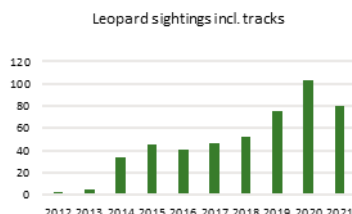


Figure 33. Total leopard sightings including tracks per year.

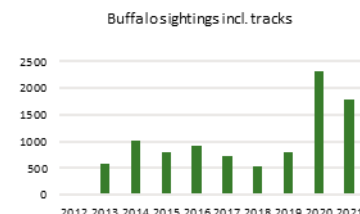


Figure 34. Total buffalo sightings including tracks per year.

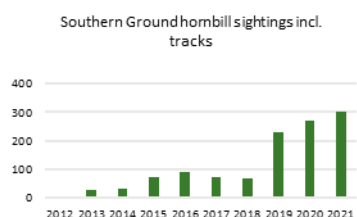


Figure 35. Total southern ground hornbill sightings including tracks per year.



Figure 36. Total hooded vulture sightings including tracks per year.

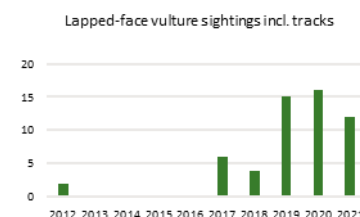


Figure 37. Total lapped-face vulture sightings including tracks per year.

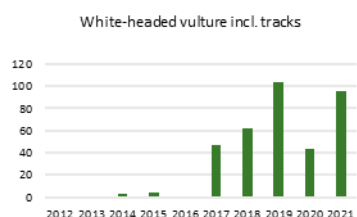


Figure 38. Total white-headed vulture sightings including tracks per year.

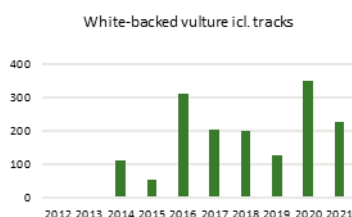


Figure 39. Total white-backed vulture sightings including tracks per year.



Figure 40. Total martial eagle sightings including tracks per year.

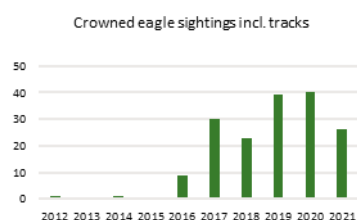


Figure 41. Total crowned eagle sightings including tracks per year.

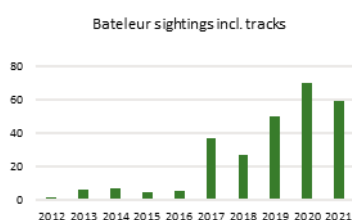


Figure 42. Total bateleur sightings including tracks per year.

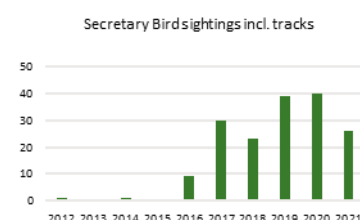


Figure 43. Total secretary bird sightings including tracks per year.

Tree diversity

Tree diversity was assessed during the forest inventory monitoring campaign throughout the monitoring period. The monitoring campaign was fully integrated into the carbon stock assessment implemented on 235 Permanent Sampling Plots (PSPs). During this monitoring period, a total of 166 tree species were identified. Of the 11,232 living trees measured, the ten most common identified species are shown below in Table 16.



Figure 44: Kariba REDD+ Project monitoring floral diversity

The results show that *Colophospermum mopane* is still the most common tree species in the project area with an abundance of 11.33 per cent (compared with 11.52 per cent during the last monitoring period). The ten most common trees recorded make up 55.66 per cent of all trees sampled in the project area (compared with 52.29 per cent during the last monitoring period). These results demonstrate that the project activities are successfully preserving the tree diversity in the project area⁸².

Table 16: Twenty most common tree species in the project area

Species	Number of trees	Abundance (%)
<i>Colophospermum mopane</i>	1273	11.33%
<i>Combretum celastroides</i>	830	7.39%
<i>Combretum apiculatum</i>	630	5.61%
<i>Julbernardia globiflora</i>	623	5.55%
<i>Diospyros quiloensis</i>	598	5.32%
<i>Combretum elaeagnoides</i>	456	4.06%
<i>Brachystegia boehmii</i>	437	3.89%
<i>Croton longipedicellata</i>	280	2.49%
<i>Diplorhynchus condylocarpon</i>	273	2.43%
<i>Friesodielsia obovata</i>	226	2.01%
<i>Combretum mossambicense</i>	203	1.81%
<i>Hippocratea parvifolia</i>	190	1.69%
<i>Pteleopsis anisoptera</i>	188	1.67%
<i>Artabotrys brachypetalus</i>	153	1.36%
<i>Croton gratissimus</i>	149	1.33%
<i>Dichrostachys cinerea</i>	139	1.24%
<i>Karomia tettensis</i>	126	1.12%
<i>Bauhinia petersiana</i>	120	1.07%
<i>Commiphora mossambicensis</i>	114	1.01%
<i>Combretum zeyheri</i>	112	1.00%
Total	7,746	68.96%

Anti-poaching activities

The project's positive impact on biodiversity is particularly visible in its anti-poaching measures, e.g. through snares which are removed from the forest habitats. Anti-poaching patrols are implemented in close cooperation with the local RDCs. Patrols monitor wildlife, remove snares and other traps from the forest, inform local communities and, where necessary, enforce the existing anti-poaching regulations.

Table 17 below gives an overview over the project's anti-poaching activities for this monitoring period. This period, project proponents have identified an increase in poaching pressure. Gold panning has likely contributed to this.

During the monitoring period a total of 3,930 team-days were spent patrolling, 3,739 snares were removed from the field and 159 poachers were arrested, which means a substantial relief of pressure on the local wildlife⁸³. Nevertheless, as seen in previous monitoring periods, poached wildlife was still recorded (95

⁸² The complete analysis is provided in the Supporting Documents/5_Biodiversity/Biodiversity Monitoring/Flora.

⁸³ Evidence of biodiversity monitoring and anti-poaching activities are presented under the Supporting Documents/5_Biodiversity/Biodiversity Monitoring/Fauna.

animals registered), including the poaching of threatened species (29 animals) such as buffaloes, elephants, and, in lower grade, lions and hippos. Elephants are typically poached by commercial poachers, which partly come from outside the project area. Poaching of other animals such as impala is typically done by locals for subsistence. Poaching is illegal in the project area and would be illegal even without the project. Through the projects adaptive management approach, the project team is continuously working on further reducing the pressure of poaching on the local wildlife, as a necessary complementary activity to habitat conservation, to further increase the project's positive impact on the local biodiversity.

Table 17: Overview of the project's anti-poaching activities

Year		2019 ⁸⁴	2020	2021 ⁸⁵
Team-days spent patrolling		1042	1970	918
No of snares removed		840	2145	754
No of poachers arrested		36	104	19
Poached species	Status			
Lion	VU	0	0	1
Elephant	EN	5	1	1
Black Rhino	CR	0	0	0
Common Hippo	VU	0	0	1
Cheetah	VU	0	0	0
Southern Ground hornbill	VU	0	0	0
Lappet-faced vulture	VU	0	0	0
White-headed vulture	VU	0	0	0
Painted Dog	EN	0	0	0
Buffalo	NT	4	3	3
Leopard	VU	2	0	0
Impala	LC	1	9	10
Other spp.		31	44	22
Total threatened spp.		7	1	3
Total all spp.		43	57	38

5.3.3 Monitoring Plan and Results Dissemination (B3.3)

As described in the validated CCB PDD (page 62), a full monitoring plan was submitted to Verra for dissemination on its website and remains available⁸⁶.

The results of the monitoring are disseminated and made public in the project area. The results of the monitoring are published in the monitoring report, which is not only published online for public consultation, but was also distributed locally through summaries, which have been translated to Tonga and Shona and distributed in the project area. The results of the biodiversity monitoring are also discussed during the OGM teams' regular community visits, in the monthly newsletters and at the adaptive management meetings⁸⁷.

⁸⁴ Please note that the data for 2019 only represents six months (1 July to 31 December).

⁸⁵ Please note that the data for 2021 only represents six months (1 January to 30 June).

⁸⁶ Available at <https://registry.verra.org/app/projectDetail/VCS/902>

⁸⁷ See Supporting Documents/2_General for the minutes of the adaptive management meetings and the monthly newsletters.

The distribution was done as follows: one copy of the full Monitoring Report was sent to each council office with an additional copy sent to the council satellite office in Binga giving a total of five copies. As for the Monitoring Report summaries, one copy was sent to each council office, one copy to each chief and one copy to each ward councilor. All these copies were delivered as hard copies in person by the OGM who followed up with an explanation on how to submit any grievances through the communications channels outlined in the adaptive management plan either directly to council, OGM teams or CGA head office. As described previously, the projects OGM team is in continuous contact with the local communities about the project during site visits, meeting with chiefs and other leaders, and through field staff. Through this communication, the project team is further able to ensure that the results of the monitoring undertaken in accordance with the monitoring plan, have been communicated to the communities and other stakeholders.

6 ADDITIONAL PROJECT IMPLEMENTATION INFORMATION

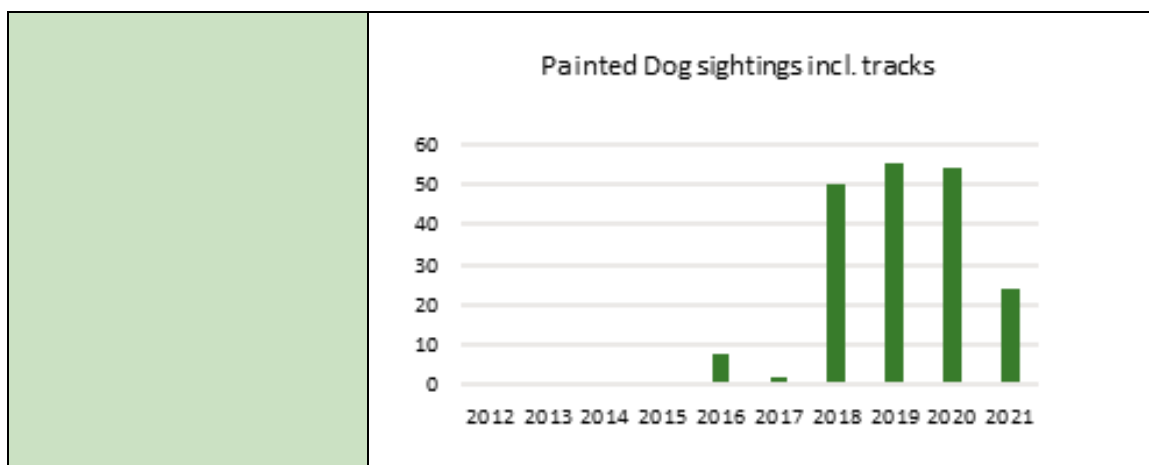
There is no additional information related to the implementation of the project.

7 ADDITIONAL PROJECT IMPACT INFORMATION

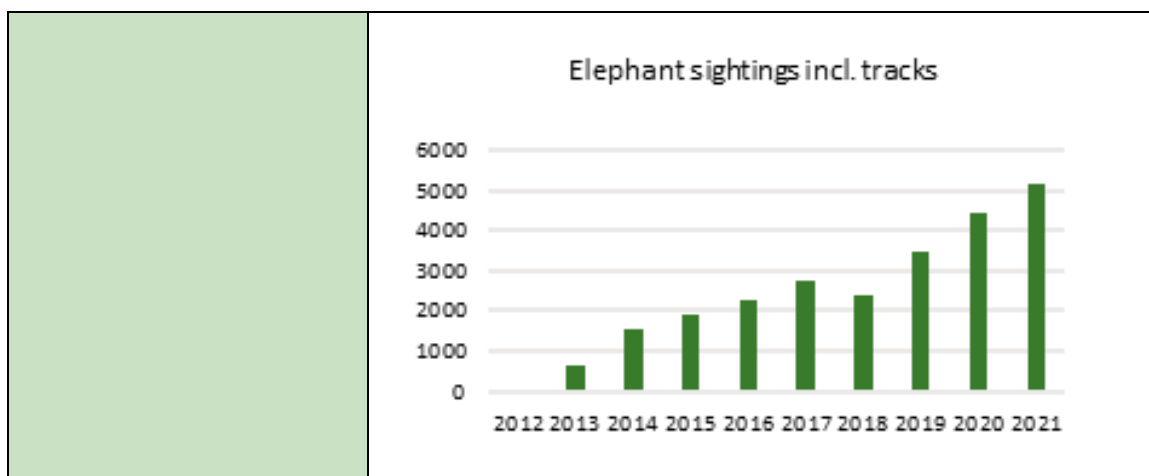
The project area of the Kariba REDD+ Project fulfils both vulnerability criteria GL3.1.1 and GL3.1.2. The area hosts Painted dogs (*Lycaon pictus*), which are endangered (EN) species according to the IUCN. Furthermore, the project area contains many individuals of vulnerable (VU) species, such as African elephant (*Loxodonta africana*), Lion (*Panthera leo*), Leopard (*Panthera pardus*) and Cheetah (*Acinonyx jubatus*), among others.

Endangered species are at the focus of the project's biodiversity impact monitoring. A significant population of different threatened species has been recorded since the project start in 2011. The tables below describe the population trends of each trigger species and actions taken to maintain or enhance the population status of each species in the project area.

Trigger Species	Painted dog (<i>Lycaon pictus</i>)
With-project Scenario	Project activities contribute to the conservation of the species through the protection of their natural habitats, an improvement in connectivity between the area and its surroundings and relieving the population from poaching through the project's patrolling efforts. During the monitoring period, no evidence of poaching of this species has been recorded showing that the project has ensured that populations are protected. 102 sightings and tracks of painted dog have been recorded by the project team during this period. The graph below shows the total Painted Dog sightings, including tracks per year from the project start. The evidence suggests that population trends in the project area are increasing because of the project activities. Please note that the data for 2021 only represents six months (1 st January to 30 th June) and does not represent a decrease in overall sightings.



Trigger Species	Elephant (<i>Loxodonta africana</i>)
With-project Scenario	Project activities contribute to the conservation of the species by protecting their natural habitats and reducing the potential for human conflicts. Landscape connectivity is also important for this species. During the monitoring period, 7 elephants were killed by poachers in the project area. While this number is still high it is significantly lower than in previous monitoring periods (see previous Monitoring Reports). In 2015 for example 27 elephants were reported to have been killed by poachers in the project area. It is also promising to see that in 2020 and the first half of 2021 only 2 elephants have been killed, suggesting that project activities are having a positive impact. 10,951 sightings and tracks of elephants were recorded during the monitoring period. The graph below shows the total Elephant sightings, including tracks per year from the project start. The evidence suggests that population trends in the project area are increasing because of the project activities. Please note that the data for 2021 only represents six months (1st January to 30th June) and does not represent a decrease in overall sightings.



Trigger Species	Lion (<i>Panthera leo</i>)																						
With-project Scenario	Project activities contribute to the conservation of the species through the protection of their natural habitats, an improvement in connectivity between the area and its surroundings and relieving the population from poaching through the project's patrolling efforts. During this monitoring period, only one lion was killed by poachers in the project area. The total number of sighting and tracks recorded were 236. The graph below shows the total Lion sightings, including tracks per year from the project start. The evidence suggests that population trends in the project area are increasing because of the project activities. Please note that the data for 2021 only represents six months (1st January to 30th June) and does not represent a decrease in overall sightings. <table border="1"> <caption>Lion sightings incl. tracks</caption> <thead> <tr> <th>Year</th> <th>Sightings incl. tracks</th> </tr> </thead> <tbody> <tr><td>2012</td><td>~5</td></tr> <tr><td>2013</td><td>~15</td></tr> <tr><td>2014</td><td>~35</td></tr> <tr><td>2015</td><td>~45</td></tr> <tr><td>2016</td><td>~85</td></tr> <tr><td>2017</td><td>~120</td></tr> <tr><td>2018</td><td>~60</td></tr> <tr><td>2019</td><td>~80</td></tr> <tr><td>2020</td><td>~110</td></tr> <tr><td>2021</td><td>~95</td></tr> </tbody> </table>	Year	Sightings incl. tracks	2012	~5	2013	~15	2014	~35	2015	~45	2016	~85	2017	~120	2018	~60	2019	~80	2020	~110	2021	~95
Year	Sightings incl. tracks																						
2012	~5																						
2013	~15																						
2014	~35																						
2015	~45																						
2016	~85																						
2017	~120																						
2018	~60																						
2019	~80																						
2020	~110																						
2021	~95																						