KARIBA REDD+ PROJECT MONITORING & IMPLEMENTATION REPORT 2014-2016

Document Prepared By South Pole Group

Project Title	Kariba REDD+ Project
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Cover page information for CCBS

Project Name	Kariba REDD+ Project
Project Location	Northern Zimbabwe, provinces Matabeleland North, Midlands, Mashonaland West and Mashonaland Central
Project proponent	Carbon Green Investments (CGI) Robert Hume, robert@carbongreenafrica.net, +263 77 802 05 39 In partnership with the landowners: Binga RDC Hurungwe RDC Nyaminyami RDC Mbire RDC
Auditor	SCS Global Services, Francis Eaton, FEaton@scsglobalservices.com, +1 510 452 8000
Project start date	July 1, 2011
GHG accounting period	July 1, 2011 – June 30, 2041
Project lifetime	30 years
Project Implementation period covered for CCB by this PIR	February 1, 2014 – June 30, 2016
History of CCB Status	Validation Approved - CCB Standards Second Edition, Climate Adaptation & Biodiversity Gold Level (February 8, 2012) Verification Approved – CCB Standards Second Edition, Climate Adaptation & Biodiversity Gold Level (July 24, 2014)
Edition of CCB Standards used under this verification	Second Edition, December 2008
Summary of climate, community and biodiversity benefits generated	The project has proven successful in reducing deforestation in the project area. Since project start, over 5.6 million tCO_2e 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, which have direct positive effects on communities. Farmers are trained for conservation agriculture and necessary material inputs are provided. Community gardens are established and provided improved nutrition. From February 2014 to June 2016, over 2,800 participants benefited from several workshops, and 24 community gardens have been established in the area. The project also promotes beekeeping as an alternative and environmental friendly source of income. From February 2014 to June 2016, sixteen beekeeping workshops have been held across the project area. This activity has 287 beneficiaries and over 700 beekeeping starter kits distributed since project start. In addition, 188 boreholes were resuscitated from February 2014 to June 2016. Schools and hospitals are supported through the provision of

	direct inputs. Fire management is a very important activity to reduce forest loss through firefighting training workshops, awareness meetings and early burning. Fuelwood plantations is in its initial stage and 37,500 planting pockets were distributed up to June 2016. Brick making activities are planned and subject to the availability of funding. During a survey carried out in April, May and June 2016, most interview partners reported to be satisfied or very satisfied with the project. Only 3.5% reported to be not satisfied. For employees and direct beneficiaries, the project has a positive impact on livelihoods, food security, children's education and healthcare. No participant reported to be restricted in his use of the forest for basic livelihoods or cultural needs. No grievances have been received to-date through the survey or other channels. More indirect social effects of the project have been assessed in a community survey covering all participating Rural District Councils (RDCs) in April, May and June 2016. In the survey, 282 community members, 85 direct beneficiaries and 13 employees were interviewed. The project's biodiversity benefits include a reduction of the poaching pressure on wildlife through regular patrolling, in close cooperation with the local RDCs. From February 2014 to June 2016, roughly 3,500 team-days where spent patrolling, and over 3,400 snares have been removed from the field, which means a substantial relieve of the pressure on the local wildlife. As part of the project's biodiversity monitoring, 131 trees species have been identified and many threatened wildlife species have been sighted.
Gold Level criteria used	The *Kariba REDD+ Project* maintains two CCBS 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 the first implementation phase. The exceptional Biodiversity Benefits are based on the broad range of endangered and vulnerable animals, which occur in the project area. Species include Painted Dog, Elephant, Lion, Southern Ground Hornbill and others.
Date of completion of this version of the PIR, and version number as appropriate	28 September 2016; Version 1

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1 GENERAL

1.1 Summary Description of the Project (G3)

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 1st 2011 will generate a total of around 51'925'950 carbon credits from the reduction of deforestation. Additional carbon benefits resulting from stopping degradation will not be claimed. The main causes of deforestation are socio-economic (subsistence agriculture, the collection of firewood and poaching activities) and settlements. Decreasing deforestation will be achieved through a series of activities that are designed to improve significantly the livelihoods of locals, such as improved agriculture, beekeeping, fuelwood plantations and fire management. In addition, a significant (20% of net profit) share of the project's carbon income will be invested in general activities that promote and guarantee project sustainability. The project's Community and Project Sustainability Fund is structured to benefit whole communities, specifically including the poorest members of society. The fund will be used to improve health and education in the project area due to long-term activities.

The project area lies within the Zambezian biome of the Zambezi basin[1]. The major ecosystem includes mopane and miombo woodland. The project area is an important wildlife area, showing significant populations of African elephants, lions, impalas, hippos, buffalo, leopard and crocodiles, along with a wide variety of birds, including the IUCN red list vulnerable species Southern Ground Hornbill, Lappet-faced Vulture, White-headed Vulture and White-headed Vulture.

In the past, the natural resources of the project areas supported significant populations of wildlife, including elephants, which, in turn, supported a variety of tourism and safari activities. However, the economic and political crises over the past decade led to a decrease in tourism. Poaching also escalated in the project area. As a result, wildlife populations have been severely reduced.

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.

The project boundary includes CO_2 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

[1]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

- Soil
- Long-lived wood products

Long-lived wood products have been proven and validated[2] 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 PD, section 2.3.

The total GHG emission reduction generated in the monitoring period from 01-07-2014 to 30-06-2016 is 7,791,939 tCO_2e.

The major project climate, community and biodiversity objectives are the same as the validated in the CCB PDD. For CCB G3.1, please refer to page 30 of CCB PDD.

1.2 Project Location (G1 & G3)

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 kilometers 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, with its several fishing and safari camps.

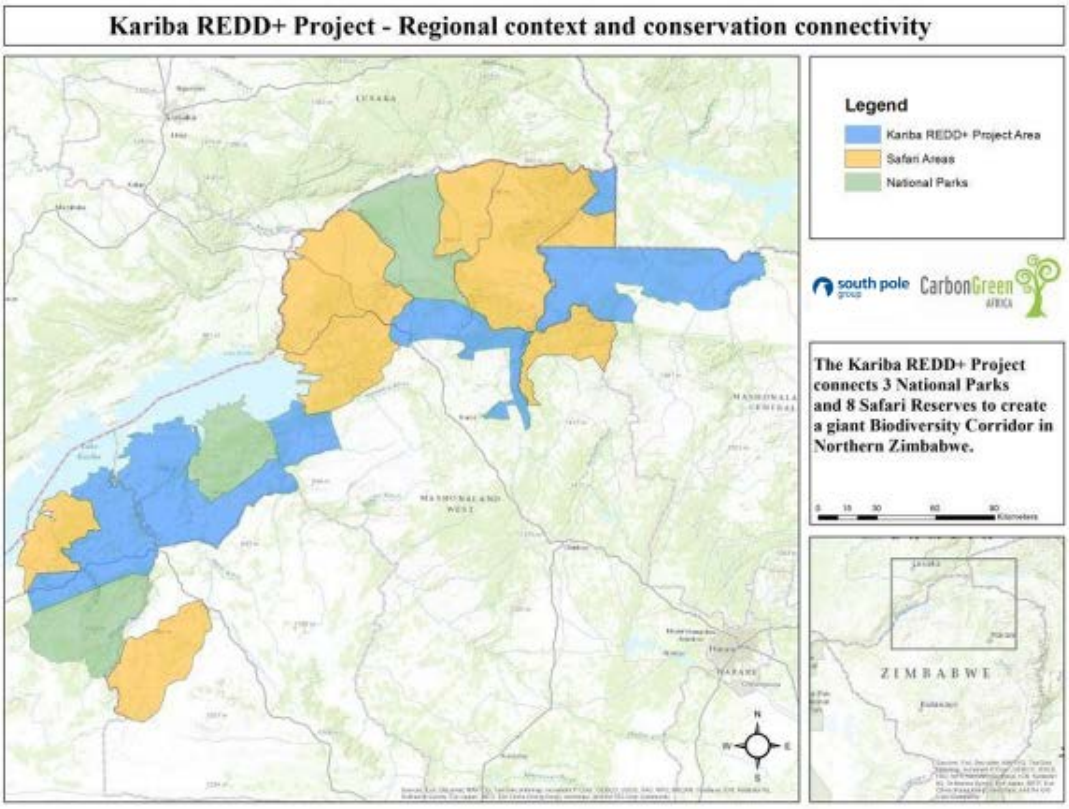
Hurungwe

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

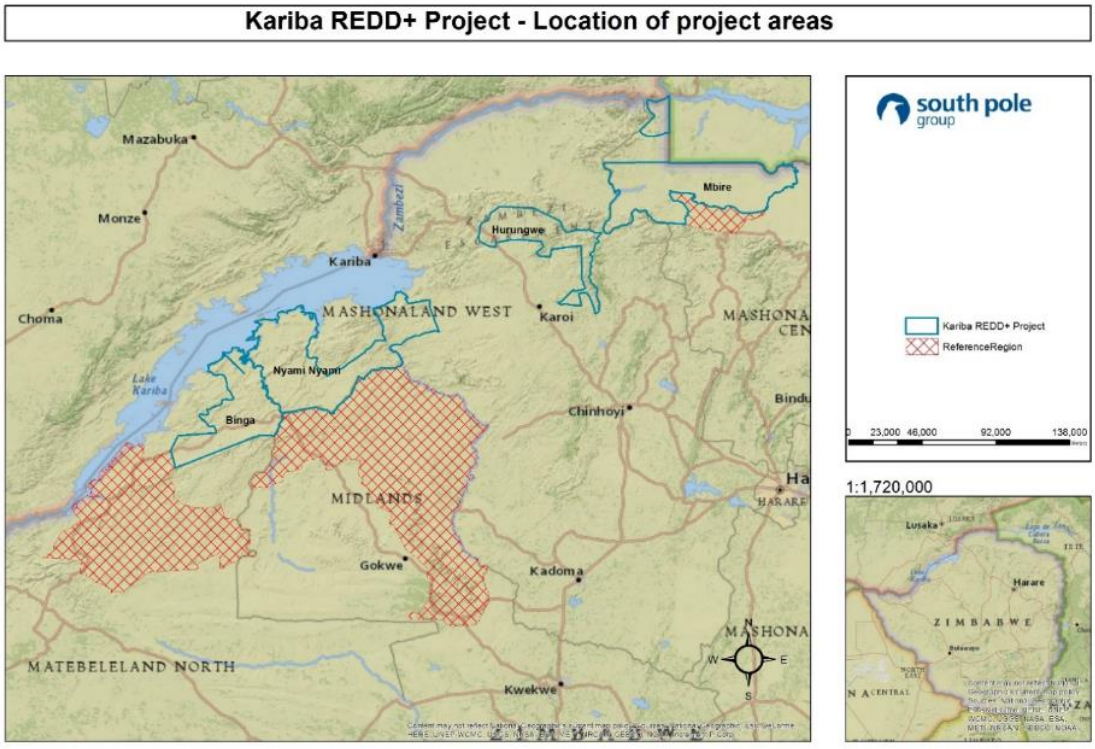
Mbire

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

[2] See PD, section 2.4.6.4.



Map 1. Location of the project in Zimbabwe



Map 2. Location of the project areas

The description of project location and basic physical parameters are the same as 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 validated on CCB PPD[3]. 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 validated on the CCB PDD. For maps on CCB G3.3, please refer to page 36 of CCB PDD.

1.3 Project Proponent (G4)

Organization name	Carbon Green Investments (Guernsey)
Contact person	Robert Hume
Title	Manager
Address	18-20 Le Pollet Street St. Peter Port Guernsey UK, GY1 1WH
Telephone	+263778020539
Email	robert@carbongreenafrica.net

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 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.

Expertise in project development, carbon monitoring and accounting is provided by South Pole Carbon Asset Management Ltd. ("South Pole Group")[4], a globally active carbon project developer and consultant, with a successful track record in forest-based carbon projects.

1.4 Other Entities Involved in the Project (G4)

Organization name	South Pole Carbon Asset Management (South Pole Group)

[3] Clarification note: "Project area" definition under VCS is different from CCB second edition.
[4] For more information: www.thesouthpolegroup.com

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	Christian Dannecker
Title	Mr
Address	Technoparkstrasse 1 8005 Zurich Switzerland
Telephone	Phone: +41 43 501 35 50
Email	c.dannecker@thesouthpolegroup.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	Mr
Address	32 Domboshawa Road, Helensvale, Harare, Zimbabwe
Telephone	+263 774 567 729
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The only staff changes since validation are the leave of Environment Africa (EA) and of Warren Thorne and this was communicated on former PIR. The field officers based in the communities who were trained with the necessary technical skills and employed under EA have continued with their employment in the project therefore no technical skills have been lost, which means no negative effect on the project. Warren Thorne is fully replaced by Pieter Bezuidenhout, Rob Lee, Chris Moore and external organizations (see below), which have the technical skills for namely biodiversity assessments and fire control, for which Warren was planned at PDD stage.

The only change for this monitoring period is that Ken Worsley was the OGM for Nyaminyami and covering Binga with Rory Muil, but is no longer involved with Kariba project. He was replaced for 2 area managers namely Shadeck Ndlovu for Binga and Manuel Nebiri for Nyaminyami. This

improves the effectiveness of the project because there is a permanent manager on the ground for each area. See project staff listed below:

- Rory Muil - Project General Manager
- Rob Lee - Project Technical Manager
- Shadreck Ndloyu - OGM for Binga
- Manuel Nebiri - OGM for Nyaminyami
- Japie Smit - OGM for Mbire
- Jerry Matiza - OGM for Hurungwe

The government personal that the project has engaged includes Agritex staff, which also has the trained skills for farming, gardening and beekeeping. There is one Agritex officer in each ward. 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. The staff of these organizations is fully hired and paid by the organizations themselves. However, CGA supports their operations through e.g. provision of fuel for transportation where necessary.

Financial resources have been adequate to implement the project as supported by the results of each project activity under section 2.2 and by the financial supporting documents for the Kariba REDD+ Project (refer to Supporting documents, Financial folder).

1.5 Project Start Date (G3)

The project start date is July 1st, 2011.

1.6 Project Crediting Period (G3)

The project crediting period is 30 years. The start date of the crediting period is July 1st 2011, the end date is June 30th 2041.

The implementation of the management structure and activities addressing the deforestation drivers (protection plans) began on, as well partially before, July 1st, 2011 together with the associated investments. These investments refer to research, fieldwork and capacities conducted by Black Crystal and Environment Africa and further to 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 have been signed before the project start date, in March 2011 (for Binga, Hurungwe, Mbire and Nyaminyami). Supporting documentation has been provided separately to the auditor at project validation.

The baseline is reassessed every 10 years after the project start date and during the crediting period and is validated at the same time as the subsequent verification. The baseline will thus be re-assessed latest after June 30th 2021 and re-validated at the same time the monitoring period July 1st 2021 to June 30th 2022 is verified.

The project lifetime coincide with the project crediting period.

The schedule to implement the project activities are an ongoing effort and are always performed along the project lifetime up to date. Fuel wood plantations activities started in early 2016 and

alternative and sustainable construction has not started yet. Please, see figure below on implementation schedule.

Schedule	Years																											
	2014											2015												2016					
Project Activity	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June
Improved agriculture																													
Beekeeping																													
Fuel wood plantations																													
Fire management																													
Alternative and sustainable construction																													
On the ground management teams																													
Community and project sustainability fund																													
Newsletter																													

Figure 1. Implementation schedule of project activities

2 IMPLEMENTATION OF DESIGN

2.1 Sectoral Scope and Project Type

This is an AFOLU REDD project that aims to avoid mosaic deforestation and degradation. The project is not a grouped project.

2.2 Description of the Project Activity (G3)

This section serves as a qualitative and quantitative description of the project activities for the period going from February 2014 until June 2016. The project activities will be summarized for all 4 project areas combined 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.

IMPROVED AGRICULTURE (Photo 1)

Photo 1. Training on compost

Conservation Farming (CF) has continued to be implemented successfully during the monitoring period with 2 cropping seasons being implemented during this monitoring period, the 1st running from November 2014 to April 2015 and the 2nd cropping season running from November 2015 to April 2016. One notable difference was the change of beneficiaries from 3 wards per district to including members of the community from every ward and marginally increasing the number of beneficiaries from 1,000 at project start to 1,065 current. The decision to do this came from the communities themselves who felt that instead of only a select number of wards benefiting, but rather members in the project area from each ward should benefit. This was seen as a positive response and that it would indeed have a positive impact on the desired intention to reach more people with this farming concept so each beneficiary was supported by the project with enough inputs for a ¼ of a hectare with the breakdown per district as follows for both cropping periods mentioned above.

- Binga: 213 beneficiaries – Maize 20%, Cowpeas 20%, Sorghum 60% split. Yield difference increase 131% (2014/2015) & 89% (2015/2016) respectively.
- Nyaminyami: 305 beneficiaries – Maize 60%, Sorghum 20%, Cowpeas 20% split. Yield difference increase 225% (2014/2015) & 93% (2015/2016) respectively.
- Hurungwe: 205 beneficiaries – Maize 50%, Soya Beans 50% split. Yield difference increase 250% (2014/2015) & 312% (2015/2016) respectively.

- Mbire: 342 beneficiaries – Maize 60%, Sorghum 20%, Cowpeas 20% split. Yield difference increase 119% (2014/2015) & 849% (2015/2016) respectively.

The 2014/2015 season was seen as a great success with a staggering average 181% increase in yield for maize as compared with traditional farming practices, across the board in spite of an erratic rainy season which saw the first part of the season receive heavy rainfall, but was then followed by a very long dry spell. The Kariba REDD+ Project viewed this as yet more evidence to support the

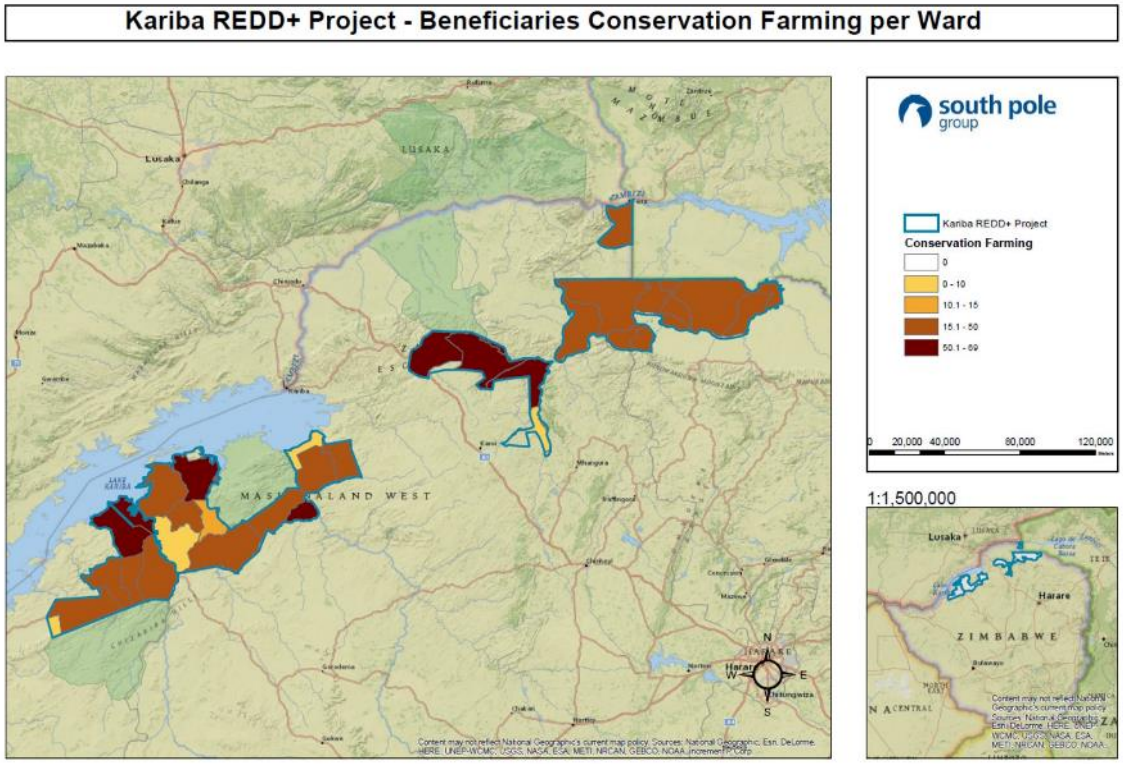
positive impact CF has over traditional cropping methods and having the potential of making people more food secure even during times when the season's weather is less favorable. The impact of including community members from each ward was further increased by a greater number of community members who were not beneficiaries, also adopting the farming method on their own accord upon seeing the visual difference in quality of crops grown by the CF farmers.

2015/2016 was the 2nd season of implementing CF during the monitoring period. The rains during this cropping season was much worse than the 2014/2015 season with below average rains experienced nationwide and was seen as a drought year. This season was the ultimate test for farmers and especially for CF whereby this method would be stressed to its maximum potential under times of duress. It was very evident that all the farmers who implemented all the principles of CF as per the training which they had received managed to harvest a decent crop with the main game changer being the applying of mulch to conserve moisture making all the difference, getting 6 weeks worth of growth from a rainfall event (without mulching only getting through 3 weeks without rain). Most other crops planted using the traditional method failed and there was very little to no difference with those who did CF without mulch and traditional cropping. As a result, the general food production from field crops was much lower than average, however the CF method of farming still managed to show a staggering 383% difference in greater yield than traditional cropping, a truly amazing result achieved under the most difficult circumstances. With an average of 4.4 people per household this equates to an estimated 4,686 people positively benefiting from this project activity during this monitoring period under review and excludes the previous beneficiaries since project start.

CGA also received some very welcome letters from some individuals, one being a widow, within the communities who expressed their gratitude to CGA for either the training they had received directly or indirectly through the ToT (Training of Trainers) where they expressed how they have achieved food security through the CF method of farming and are even able to sell their surplus to buy 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 training workshops at ward level and increase the extension work through engaging the Agritex extension officers who are based at ward level and increase support to farmers implementing the CF method as it is recognized as having the potential to 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). It is also the consideration of the project to reduce the need to monitor traditional yields for comparative purposes based on 3 years of evidence which supports CF as undoubtedly being the intended farming method to promote as much as possible going forward and therefore all efforts should be focused in this area under "Improved Agriculture".

Please, see Map 3 below with distribution of beneficiaries of conservation farming activities implemented per ward.



Map 3. Distribution of beneficiaries of conservation farming activities implemented per ward

Trainings were conducted by the organization named “Sustainable Agricultural Technologies” who provided the trainers and training material. Training was done at district level where a central location was used as a training center or base. In 2014 for CF, there were 4 separate 1 day trainings for each activity across the project area including ToT (Training of Trainers). In 2015, trainings on conservation farming consisted on a 3 day event per each activity and recorded as 1 single training event per activity, covering theory and field work as well as ToT and demonstration plot establishment.

A breakdown of the trainings per district as follows:

- Binga – 5 trainings.
- Hurungwe – 5 trainings.
- Mbire – 5 trainings.
- Nyaminyami - 5 trainings.

This gives us a total of 20 trainings. Evidence of training on conservation farming (CF) is provided in the Supporting documents. Additional evidence on trainings can be provided upon request.

Community garden has long since been recognized as a means to enhance food security and improve nutrition in general and is thus an additional food source for times in the year when field crops are not grown. Therefore, 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.

Photo 2. Harvest in a community garden

The Kariba REDD+ Project has provided support to a total of 24 gardens during the monitoring period under review with 7 of these being school gardens across the project area because agriculture is part of the teaching curriculum and previously it was a purely theoretical exercise without hand-on work. The support has been in the form of trainings, assorted seed packs (some gardens only received this once in 2015), wire for fencing, basic chemicals for pests, cement, 19 hand water pumps with piping, 4 large plastic water storage tanks, 4 drip irrigation kits etc. The most note-worthy achievement has been of a particular garden in Hurungwe called the Tashinga garden whose members have also been supporting 10 orphans with school fees from the sale of their produce. Below is a breakdown of the garden beneficiaries per district;

- Binga – 637 beneficiaries including students from 2 schools. Recorded income generated from sale of produce $7,044.

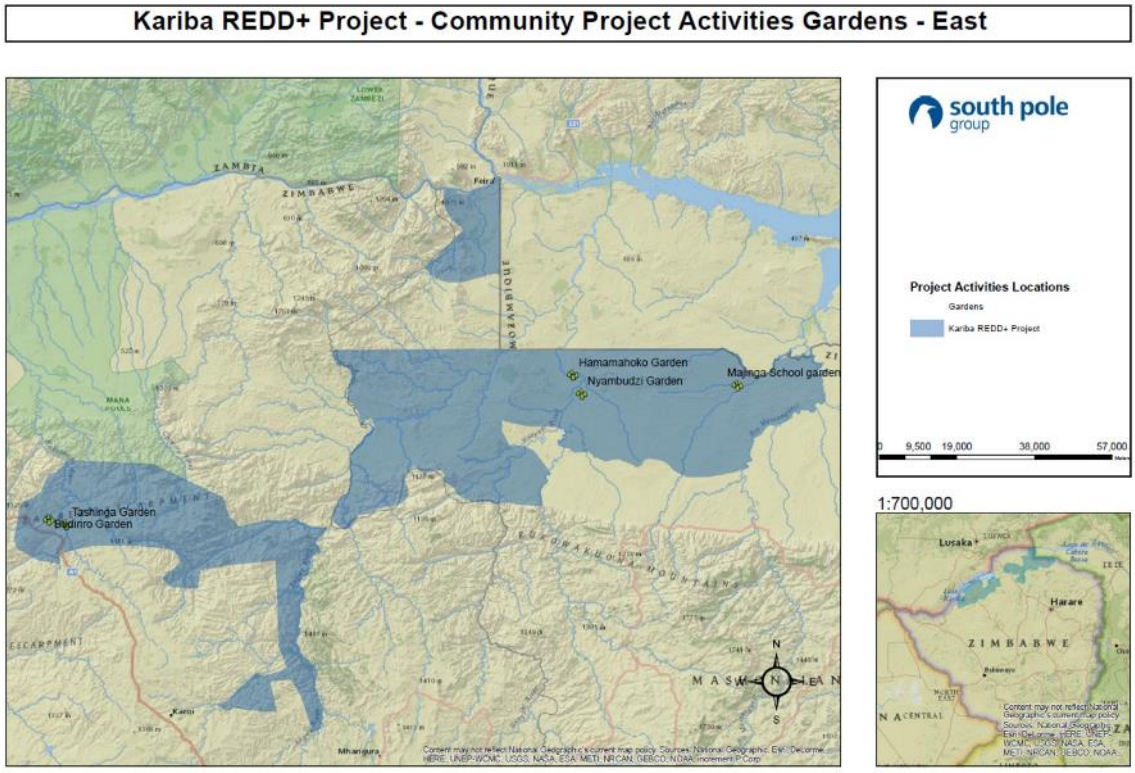
- Hurungwe – 1,085 Beneficiaries including students from 1 school. Recorded income generated from sale of produce $26,079.

- Mbire – 446 beneficiaries including students from 1 school. Recorded income generated from sale of produce $9,750.

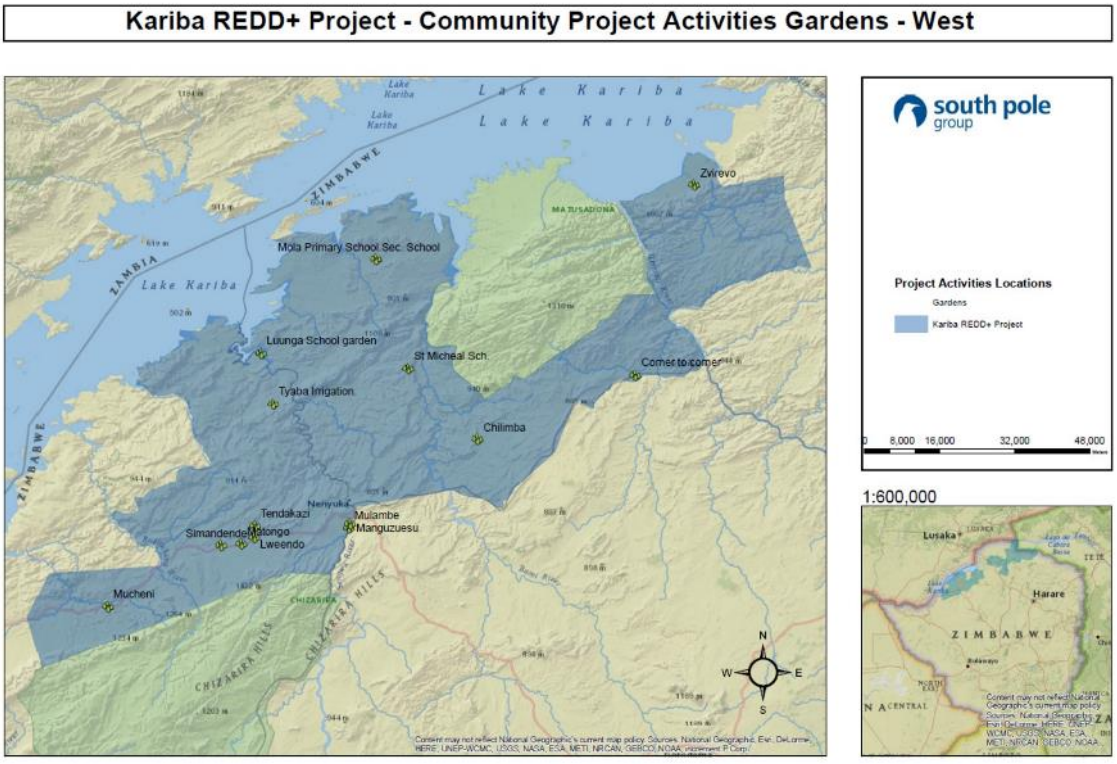
- Nyaminyami – 654 beneficiaries including students from 3 schools. Recorded income generated from sale of produce $2,370.

This gives a total recorded income of $45,243 from February 2014 to June 2016 and an excess of 2,822 lives being positively impacted both directly and indirectly. Please, see Map 4 and Map 5

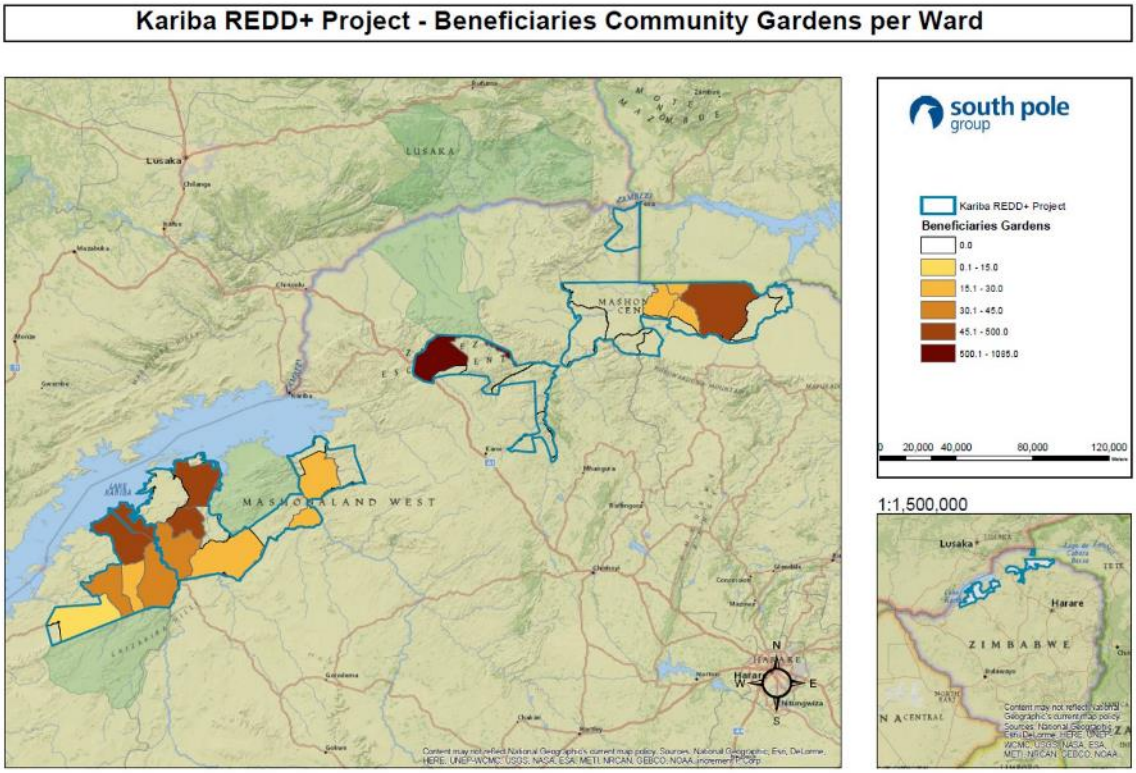
below for location of community gardens and Map 6 for distribution of beneficiaries on community gardens activities per ward.



Map 4. Location of community gardens in the Eastern part of the project



Map 5. Location of community gardens in the Western part of the project



Map 6. Distribution of beneficiaries of community gardens activities implemented per ward

Trainings (Photo 3) were conducted by an organization called "Sustainable Agricultural Technologies" who provided the trainers and training material. Training was done at district level where a central location was used as a training center or base. In 2014, 3 separate 1 day trainings was carried out. In 2015, trainings consisted of a 3 day event per each activity and recorded as 1 single training event per activity, covering theory and field work.

A breakdown of the trainings per district as follows:

- Binga – 4 trainings.
- Hurungwe – 4 trainings.
- Mbire – 4 trainings.
- Nyaminyami - 4 trainings.

This gives a total of 16 trainings. Evidence of training on community garden is provided in the Supporting documents, Training, Improved agriculture. Additional evidence on trainings can be provided upon request.

Photo 3. Training on improved agriculture

BEEKEEPING

Beekeeping has continued to be implemented successfully during this monitoring period under review with the most noticeable part being the number of occupied hives which stands at approximately 50% of a total of 730 KTB which have been distributed to 287 beneficiaries across the project area. This activity has shown to improve livelihoods in general but especially during lean times when other crops have faltered or as an additional income source.

A total of 4,631 kg of honey was produced during the 2014/2015 harvest which was a respectable 1,061 kg increase from the 3,570 kg recorded in 2013. However in 2015/2016 there was 3,442 kg of honey recorded, which was an almost equal decrease by 1,189 kg of honey produced. The reason for this decrease, although not scientifically proven by the project is attributed to the very dry season experienced over this time where rainfall was below average and it was considered a drought year. This resulted in very little to no food and water available to the bees, so many occupied hives had very little to no honey to harvest because it was seen that the bees were sustaining themselves from their own honey. Below is the breakdown of honey harvest recorded and income generated per district during the monitoring period under review:

- Binga – Total No. of Beneficiaries – 55. Total recorded honey harvested – 1,353 kg. Total recorded income $1,018.00.

- Hurungwe – Total No. of Beneficiaries – 84. Total recorded honey harvested – 2,974 kg. Total recorded income $5,485.00.

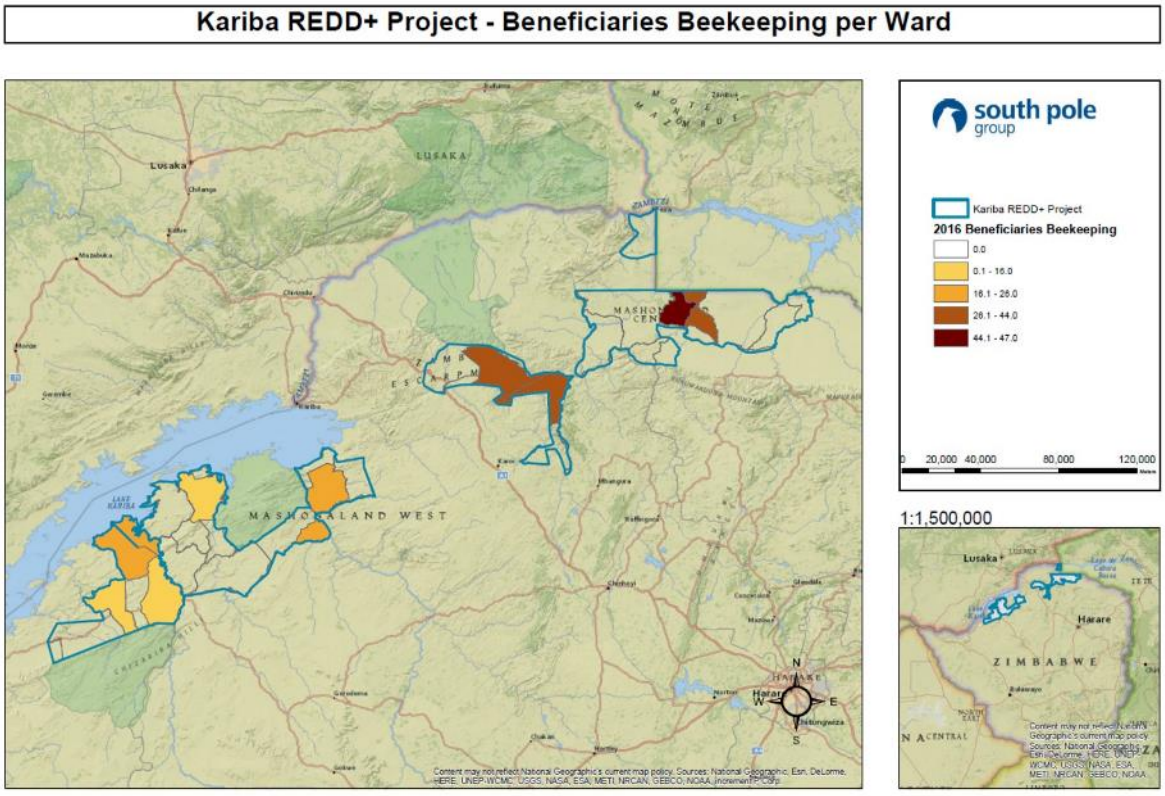
- Mbire – Total No. of Beneficiaries – 90. Total recorded honey harvested – 2,078 kg. Total recorded income $1,496.00.

- Nyaminyami – Total No. of Beneficiaries – 58. Total recorded honey harvest – 1,668 kg. Total recorded income $1,922.00.

This gives a total recorded income of $9,921. 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 views this as a very positive impact in the lives of the beneficiaries. An average household of 4.4 members per household equates to 1,254 direct beneficiaries alone.

The Kariba REDD+ Project aims to continue enhancing this activity through additional trainings, support of materials and assistance in establishing markets for the honey.

Please, see Map 7 below for distribution of beneficiaries of beekeeping activities implemented per ward.



Map 7. Distribution of beneficiaries of beekeeping activities implemented per ward

Trainings were conducted by "Sustainable Agricultural Technologies" who provided the trainers and training material. Training was done at district level where a central location was used as a training center or base. In 2014, 3 separate 1 day trainings were carried out. In 2015, training on beekeeping consisted on 3 day event per each activity and recorded as 1 single training event per activity, covering theory and field work as well as ToT.

A breakdown of the trainings per district as follows:

- Binga –4 trainings.
- Hurungwe –4 trainings.
- Mbire –4 trainings.
- Nyaminyami - 4 trainings.

This gives us a total of 16 trainings (Photo 4). Evidence of training on beekeeping is provided in the Supporting documents, Training, Beekeeping. Additional evidence on trainings can be provided upon request.


Photo 4. Training on beekeeping

FUEL WOOD PLANTATIONS

This activity was a 2nd phase project activity with the focus to implement this as a means to provide an alternative to curing tobacco, also for construction, cooking and fencing and any other possible domestic use. The Kariba REDD+ Project embarked on the initial steps to implement these plantations during the early part 2016. The "Forestry Commission", who is seen to have all the technical expertise, has been used to assist with training and so far 10 trainings on tree nursery have been conducted across the project area and 303 people attend to the training sections (for evidence of training on tree nursery, refer to Supporting documents, Training, Fuel wood plantations. Further documentation on tree nursery training is available upon request). Also instead of just focusing on planting eucalyptus trees, the project has decided to also incorporate additional multi-purpose trees such as fruit trees and *Moringa oleifera* which would be of value to the communities.

The fuel wood plantations project is at the nursery stage of implementation (Photo 5). Identification of suitable areas for the establishment of these nurseries was based on the criteria of water availability and it was also agreed to include schools as the main beneficiaries to implement as it is considered that they could sell the seedlings as a source of income for the school and funds could be used to further assist with any shortages needed to enhance education.

Photo 5. Production of seedlings

The location of these nurseries would also serve as a meeting point for trainings and awareness. So currently 15 schools have been identified to benefit from this activity with the majority of them being in Hurungwe which is the main district being affected by tobacco curing. A total of 37,500 planting pockets have been distributed up to the June 2016 with the seeds for the multi-purpose trees being sourced locally by the beneficiaries. The breakdown of the schools and the planting pockets received is as follows:

- Binga – 2 Schools, Siabuwa Primary and Secondary Schools received a total of 14,000 planting pockets.
- Hurungwe – 8 schools and 1 individual, Nyamakate Primary and Secondary schools, Chitindiva Primary and Secondary schools, Huyo school, Kabidza school, Chikova school, Ketsanga school and Mr Chirikudenga received a total of 15,500 planting pockets.
- Mbire – 2 schools, Kanongo School and Majinga school received a total of 5,000 planting pockets.
- Nyaminyami – 5 schools, Munamata school, Kalundu school, Siakobvu School, Kasvsiva School and Gunguhwe school received a total of 3,000 planting pockets.

SOCIAL FORESTRY

This activity has not yet been fully implemented, although some trees such as the Masua, baobab and Marula trees have been identified so far, and there is assuredly more, as potential value adding to the communities, however there is a very niche market for these.

In the meantime the Kariba REDD+ Project has identified the *Moringa oleifera* tree, which has naturalized in the project area as a local tree having the potential of amazing benefits both physically for general health and well being and financially to the community members. The tree is highly nutritious and is also valued internationally in cosmetics and health products. 6 schools were identified as the beneficiaries as an income generating project for them and a trial was started in 2013. In 2014 the first seedlings were purchased and with a promising market more seeds were distributed with the intention of growing plantations at schools. This activity is not restricted to schools only and general community members are also encouraged to harness the resource from natural trees. Up to June 2016 $3,254 worth of seedlings has been purchased from schools and

has been used for redistribution for further propagation to increase the available yield. There are also 10 adults and 4 children who have benefit from the sale of $62 worth of seed and leaf. Some of the children bought exercise books and assorted stationary with the funds received from the sale. This shows the potential to even impact individual households in the project area. It is anticipated that the use of moringa trees will hopefully become a valuable source of cash income for the communities in the near future. The breakdowns of the schools that have participated and benefitted from this activity are as follow:

- Binga – Sinamwenda School, Luunga School and Njobola School with a combined total income recorded of $1,077.
- Hurungwe – Tashinga garden and Budiriro garden received 1 kg of seed each.
- Mbire – Kushinga school, Majinga school and Nyambudzi garden with a combined total recorded income of $1,000.
- Nyaminyami – Mola School, Mvuramachena school, Majazu School and Chibwezulu schools with a combined total income recorded of $1,177.

This is a total of 8 schools and 3 gardens benefitting so far from the use of moringa trees with a combined total income of $3,254 recorded so far.

FIRE MANAGEMENT

This has been an important activity since the project start date and during the monitoring period under review there have been a total of 87 combined firefighting training workshops and awareness meetings conducted (for evidence of training, please refer to Supporting documents, Training, Fire management). There are 62 recorded community firefighting teams and they have all been supported with and assortment of firefighting equipment including knapsack sprayers, sickles, hoes and shovels. A total of 89 community based fire guards covering a distance of approximately 1,200 km has been recorded mostly in the Hurungwe district which has historically been viewed nationally as an area very susceptible to wild fires.

In addition to this, CGA has also repaired and maintained approximately 1,700 km of bush roads from 2014 to 2016 across the project area which assist as fireguards. It was also along these same roads for approximately 1,250 km where early burning (controlled fire burns) was carried out and it was estimated by our OGM that the reduction of fire occurrence was approximately 30% (Photo 6). This was estimated by comparing previous years in the same areas where ordinarily the entire areas would have been burnt compared with the witnessed unburned areas particularly in 2015, which saw an improvement in number of fire incidences as compared to 2014. This positive impact is further 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. This was further evidenced by the biomass sampling team headed by CGA staff member Rob Lee who recorded young growth in and around some of the PSP's. Any fire damage or lack thereof including observations of increase young tree growth is also recorded on the PSP data sheets.

Photo 6. Early burning and road maintenance 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 district.

A breakdown of the fire management activity per district during the monitoring period from February 2014 to June 2016 is as follows;

- Binga – 15 Firefighting committees, 14 training workshops/meetings, 10 village fire guards, approximately 350 km of roads maintained and approximately 250 km of early burning done.

- Hurungwe – 15 Firefighting committees, 14 training workshops/meetings, 63 village fire guards extending an approximate total distance of 1,129 km around communities, approximately 530 km of roads maintained and approximately 404 km of early burning done.

- Mbire – 16 Firefighting committees, 24 training workshops/meetings, approximately 594 km of roads maintained, approximately 424 km of early burning done.

- Nyaminyami – 16 Firefighting committees, 35 training workshops/meetings, 16 village fire guards, approximately 594 km of roads maintained, approximately 429 km of early burning done.

The project aims to continue enhancing this activity through continued road maintenance and early burning, continued fire awareness and firefighting training.

ALTERNATIVE AND SUSTAINABLE CONSTRUCTION (BRICK MAKING)

This activity has not yet been implemented however comparative costs between traditionally made bricks which uses wood to fire-cure the bricks has been compared with normal cement blocks and at current costs it shows that cement blocks are cheaper to make, purchase and use. The main saving comes during construction when less cement is used between the blocks as compared with bricks per equivalent square meter.

What remains is for the project to initiate this alternative for construction with some workshops explaining the advantages and disadvantages and then engaging the brick making groups to do some trials for their own understanding and to see the results.

ON THE GROUND MANAGEMENT TEAMS (OGM)

The project has four OGM Teams covering the four project areas. Each team has successfully managed to fulfill its obligations as per supplied reports to the CGA head office on a regular basis. These obligations include the following:

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

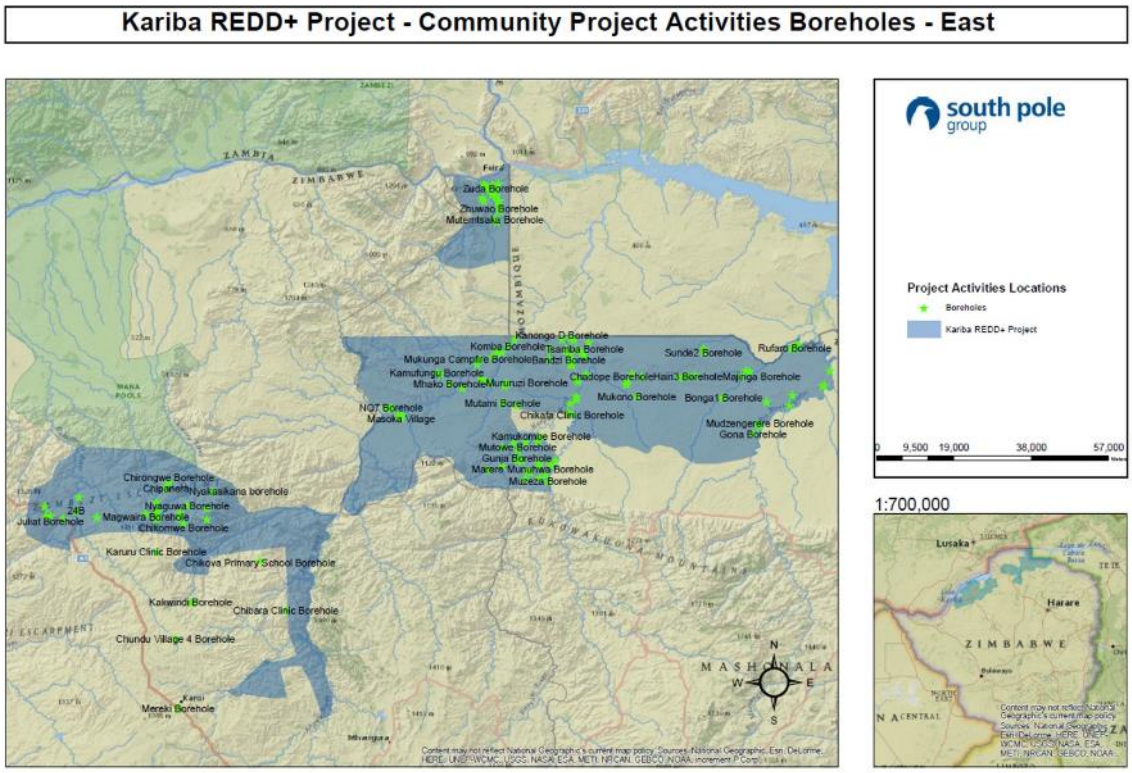
Borehole resuscitation and maintenance (Photo 7 and Photo 8) has been a valuable benefit to the communities as safe potable drinking water can be considered as the very essence of life itself because each borehole impacts more than 250 people. The Kariba REDD+ Project has embarked on a very comprehensive re-habilitation program where a total of an incredible 188 boreholes have been worked on and re-habilitated and maintained between February 2014 and June 2016, this includes 11 clinic boreholes and 24 school boreholes. This is to say that this is not all new resuscitations, but it should be understood that this is the number of repairs done and some of these boreholes have been repaired more than once, however each repair has been recorded as an individual repair. This activity has had the most profound impact to the lives of the communities in these areas when considering that many of these boreholes had not been functioning for more than 10 years and saved many family members the very challenging task of walking many kilometers to fetch water from long distances. The total number of people estimated to have been positively impacted by this activity is 85,000 people. Maintenance is ongoing with continuous break downs and repairs required. This is largely due to the overall number of people that use any single borehole which is most often beyond what the equipment can handle for any long period of time.

Photo 7. Borehole resuscitation and maintenance by the On the Ground Management Teams

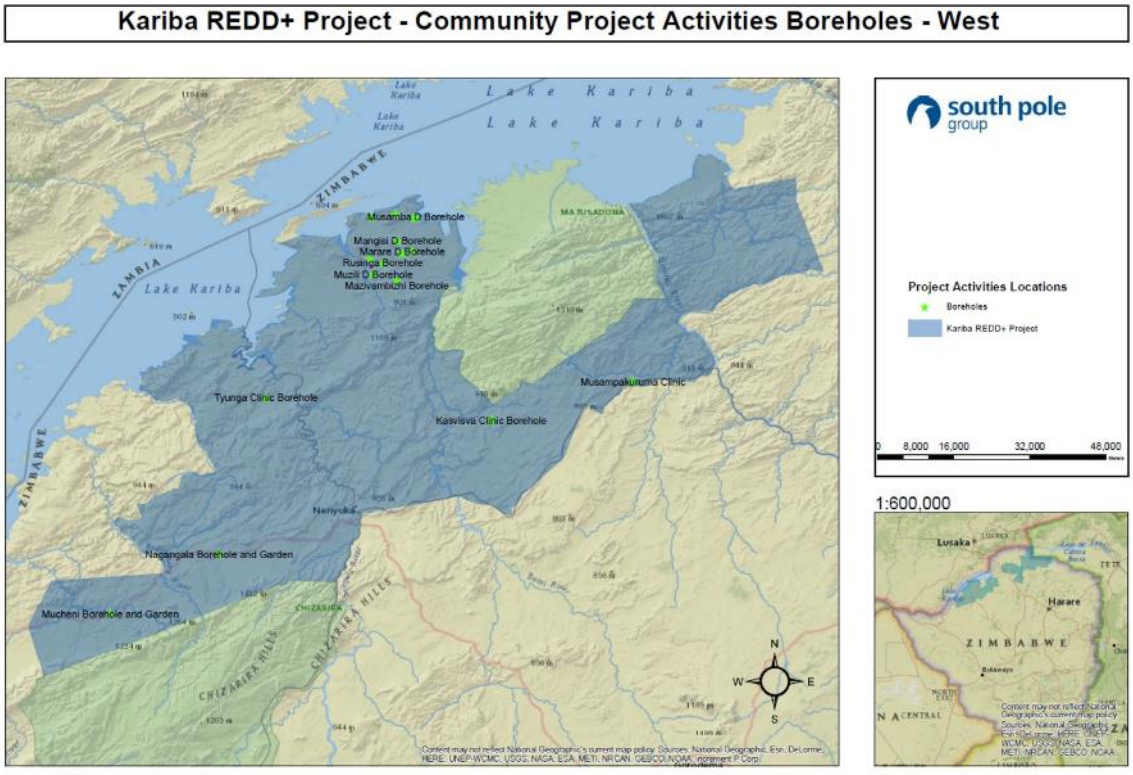
The breakdown of boreholes per district is summarized below:

- Binga – 3 boreholes.
- Hurungwe – 37 Boreholes.
- Mbire – 134 Boreholes.
- Nyaminyami – 14 Boreholes.

Out of this listed, a total of 34 boreholes which are included would fall under maintenance and have been repaired more than once. Please, see Map 8 and Map 9 below for boreholes location.



Map 8. Location of boreholes in the Eastern part of the project



Map 9. Location of boreholes in the Western part of the project

Photo 8. Borehole repair

Community meetings are ongoing all the time. 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 which would uplift livelihoods and at the same time reduce deforestation are discussed during these meetings. It is also the time that grievances are addressed if any. However to date no grievances have ever been received as a result 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.

The following shows the number of community meetings held per district during the period of February 2014 to June 2016. These meetings cover CF, gardening, beekeeping, fire awareness, environmental awareness related to climate change and the Kariba REDD+ Project and general community meetings (for evidence of community meeting, please refer to the Supporting documents, Community meetings).

- Binga – 62 community meetings.
- Hurungwe – 58 community meetings.
- Mbire – 56 community meetings.
- Nyaminyami – 57 community meetings.

This gives a total of 233 meetings in the project. Having these community meetings has increased 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 thus continuously bridging the gap of understanding all round.

Monitoring on biodiversity has been validated and verified for double gold standard based on the high value biodiversity which occurs in the area. Biodiversity monitoring is being implemented to monitor the project impact on wildlife and tree species. Wildlife monitoring is done every month using 2 principle ways being “walking based” monitoring and “vehicle based” monitoring. Animals recorded during walking based monitoring is restricted to council and CGA game scouts who record animal sightings and tracks whilst on foot patrol and vehicle based monitoring is restricted to OGM 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. This is all compared with number of man days spent monitoring over time to assess what the impact is. It should be noted that total number of animals recorded does not reflect the actual population but are sightings, so in some cases the same animal could have been recorded more than once on different days. This data is available separately.

COMMUNITY AND PROJECT SUSTAINABILITY FUND

This activity has not been fully implemented yet however additional inputs have been provided to general community members, local leaders and authorities and schools etc. and the following summary is a general list of the variety of inputs provided:

- Fuel – 571 l of fuel has been provided to local leaders, local law enforcement officers, Agritex field officers, garden water pumps and local football clubs.

- Education – Assorted basic stationary such as pens, pencils, sharpeners, erasers have been given to 5 schools and 20 desks and chairs was provided to Sizemba School. The roof of Luunga Primary School was also repaired. There were also 24 school boreholes repaired as mentioned above.

- Agriculture – 400 kg of compost was purchased from a group of community members as an initiative to promote organic fertilizers as opposed to inorganic fertilizers, 10 hand water pumps and fertilizer was provided as prizes given to farmers during the agricultural field days and 1 groundnut sheller was given to a community group (Photo 9).

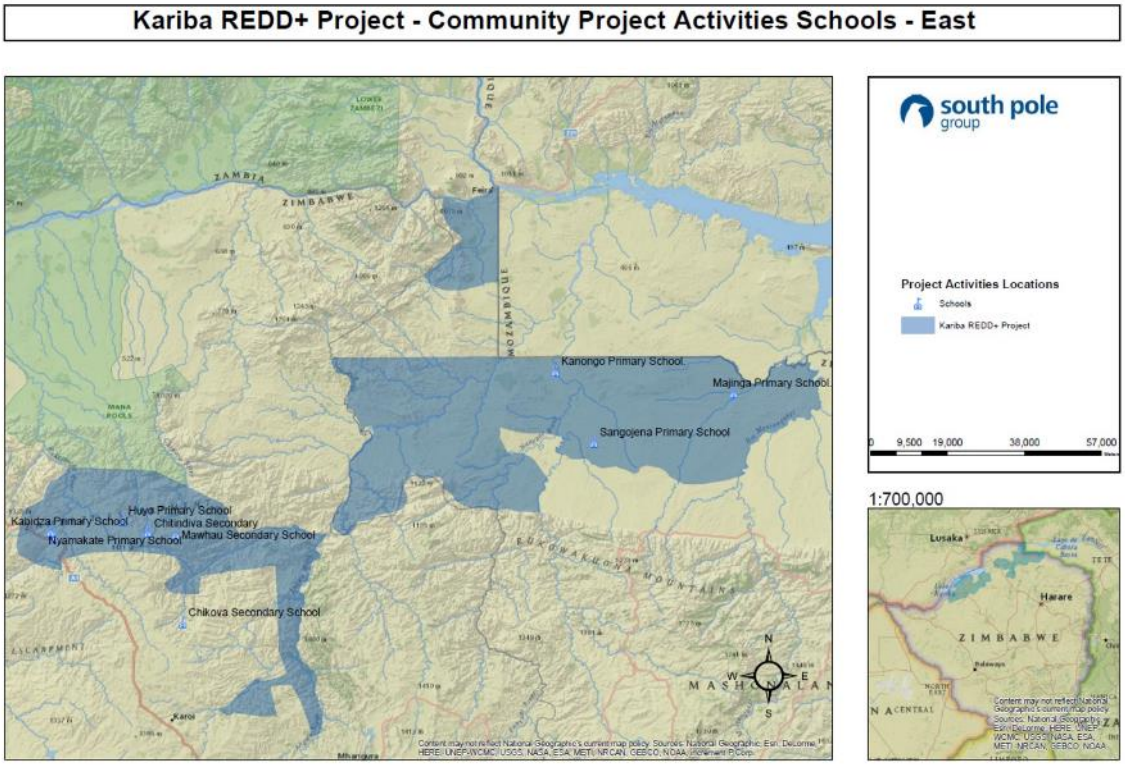
Photo 9. Kanyemba women receiving peanut sheller

- Health – the roof on a doctor's house for Siakobvu clinic was repaired. Before the house was not in good conditions and there was not resident doctor, however now the accommodation is in better conditions and puts the district in a position to look for and engage a permanent doctor. There was also 11 clinic boreholes.

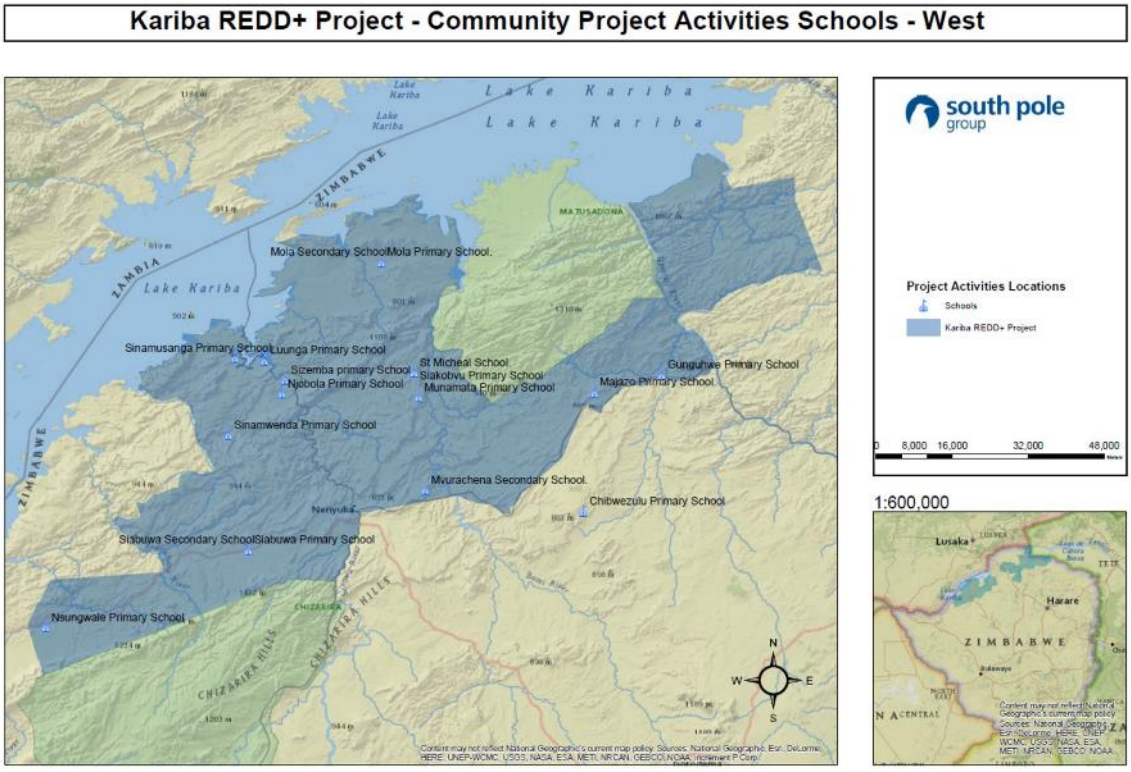
- Energy – 8 gas stoves were provided as prizes given to chiefs during a project awareness launch.

- General – Cement was provided for head works on boreholes and a dip tank.

  Please, see Map 10 and Map 11 below for location of schools benefited from the project.



Map 10. Location of schools supported in the Eastern part of the project



Map 11. Location of schools supported in the Western part of the project

The project aims to ramp this up further in the near future once more finance becomes available.

NEWSLETTER

During the monitoring period from February 2014 to June 2016 the project has been publishing a monthly letter for distribution to the RDC's 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 RDC's and local communities by the CGA OGM teams. Copies of these newsletters are available in the Supporting documents, Newsletter or Implementation progress reports.

The project aims to enhance the above obligations through increased communications, workshops and awareness to the local authorities and local communities.

2.3 Management of Risks to Project Benefits (G3)

For section G3.5, please refer to CCB PDD, section G3.5, page 37.

In addition, fire risks are mitigated through project's fire management activities. For a description of this activity, please refer to section 2.2 above.

Other risks have been discussed as part of CGA's adaptive management process (minutes of the January 2015 and February 2016 meeting are provided in the Supporting documents, Adaptive management plan, Adaptive management meeting).

Risks identified during the adaptive management process include lack to following topics:

Lack of community commitment on community gardens
In three community gardens (Mola, Sinamwenda and Luunga), the lack of community commitment resulted in a low use and productivity of the garden. This often was because in these communities' focus was laid on their personal gardens, rather than on the communal one. In order to address this, the three gardens were relocated to close-by schools, which use the garden for educational benefits and to produce food for the students. The changes resulted that the gardens were very well received in the schools and they are now used as part of the school agenda with the students. However, due to the dry spell, Luunga and Sinamwenda Gardens replace the garden for *Moringa oleifera* tree planting inter-cropped with maize and some vegetables.

Bees absconding the hives
This was discussed before with the beekeepers and trainings were carried out, therefore this was mainly caused due to lack of discipline of the beekeepers. Beekeepers are aware on the cause of the problem and they are able to take the actions to avoid it.

Lack of applying mulch
Application of mulch is recommended for conservation farming because it conserves moisture in the soil and the crops continued to growth when comparing with crops without mulching. Some farmers didn't apply mulch and had their yield reduced when comparing to the farmers that applied mulch. Mulching is covered in all trainings and this is mainly due to lack of discipline of the individual farmers.

No newly emerging risks with regard to climate change have been identified.

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 to continue with the project activities and willing to do so as it generates additional income, e.g. through the production of honey and increase agricultural yields. Thus we expect the project activities to continue far beyond the lifetime of the project. In addition, the financial architecture of the *Kariba REDD+ Project* includes a Community and Project Sustainability Fund. This fund will ensure that the basic project activities will be continued for at least a total of 100 years. An update on the fund's status for each RDC from July 2014 to June 2016 is provided in the Supporting documents, Financial, KRT Overview, file "KRT Full Overview".

2.4 Measures to Maintain High Conservation Values (G3)

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 will preserve the habitat for endangered and vulnerable species. Anti-poaching patrolling will address the intensive poaching challenge.

In terms of the high conversation values related to the communities (HCV5 and HCV6), these 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, all cultural values of the woodlands to the locals are preserved. In terms of supply of building material for housing, this will not be restricted.

Please, refer to section 7.1 for further information on HCV.

2.5 Project Financing (G3 & G4)

G3.11

The main flow of project's revenues derive from the sale of verified emission reduction certificates. The project activities are scaled with the available revenue, which provides the project with flexibility with regards to the market situation. In order to ensure long-term longevity of the project, a fix share of the sales revenue is held back in the Kariba REDD+ Trust. Updated incomes overview for this monitoring period are provided to evidence Kariba REDD+ Trust (Council, Community and Longevity Fund) for each RDC under the Supporting documents, Financial, Project area_District Income.

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 in case the carbon revenues turn out to be significantly under the projections.

Further evidence on the project's financial health is given in the overview of the project's trust fund, provided in the Supporting documents, Financial, KRT Overview, document "KRT Full Overview".

2.6 Employment Opportunities and Worker Safety (G4)

G4.3

The OGM members and their teams have received sufficient training to fulfill their obligations in their various employment positions. All of the training was done hands-on or as in the case of 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. All the employees are familiar with their rights as laborers. With regards to the biomass sampling, training was done under the professional guidance of the environmental consulting company Black Crystal for former monitoring period and since biomass monitoring is an ongoing effort, the field team is highly qualified to perform the biomass monitoring (refer to Supporting documents, Training, Biomass and soil for training evidence on biomass sampling).

Safety of our field teams is of great importance to us particularly when it comes to anti- poaching or firefighting. For this the OGM teams conduct their activities with the assistance of the RDC game scouts who have all received training for their positions of employment even before the inception of the project. Trainings on anti-poaching were carried out during the last monitoring period. They were basic to intermediate level and 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 as anti-poaching activity is an ongoing effort and the team did not change since last verification. Firefighting training was also conducted at ward and village level, where members of the communities received 87 trainings across all four RDCs and were taught how to suppress fires and make fireguards. They were also assisted in establishing their own fire-fighting teams with committees.

Training and capacity building is key in our agriculture project activities through improved agriculture and community gardens, where over 2,822 farmers were provided with training (refer to section 7.1). Also the project's newsletter serves a means for capacity building (refer to Supporting documents, Newsletter or Implementation progress reports for implementation progress reports/newsletter).

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 CF program, most community gardens are cultivated primarily by women – which also receive training and inputs.

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 G4.3) and remuneration.

If vacancies for particular positions are available then postings of these vacancies are advertised at the council offices, community centers, clinics etc. for all the communities. Both gender, men and women are free to apply. However women or underrepresented groups will be encouraged to apply and this will be indicated on the advertised vacancy posting, giving these groups an equal opportunity to fill positions which they can be further trained for in the project.

That is supported by the number of women who are widows and have already received training in CF, beekeeping and gardening and women who already have leadership roles within these activities.

Direct employees of the project are particularly targeted by the project's social impact monitoring and where surveyed in April, May and June 2016 (refer to section 7.1. For full survey data and analysis, refer to Supporting documents, CCB monitoring, Social Monitoring, Indirect effects).

During the survey, 100% of the interviewed employees originated from the project area. The average age was 39.5, and 100% of the interviewed employees where men. All employees received either primary (38.4%), secondary (53.9%) or tertiary (7.7%) education.

During the survey, all employees reported to be either satisfied or very satisfied with the project.

When comparing these numbers to the average of all interview partners in our survey, employees are more often male, younger than average (which was 41) and better educated than the average interview participant. These differences are explained by the specific requirements to the project's employees. Nevertheless, through its adaptive management process, CGA is considering ways to open up employment to more women and uneducated staff, where possible. This will be achieved by including specific encouragement to apply for women into future job postings and by preferring female over male applicants, in case qualifications are equal.

While many positions in the project require an above-average education for simpler jobs (e.g. camp attendant), specifically less educated applicants will be preferred and trained.

G4.6

The safety of the OGM teams and other employees is very important. Obviously anti-poaching patrolling and firefighting carry significant risk. Our OGM teams are trained by experienced members of the project team. The employees have been trained appropriately and stated to be sufficiently trained during our social impact survey, which also covered employees.

To further formalize the project's risk management, an Employee Risk Management Plan was developed and will be used going forward to inform employees on the key risks related to their job and to set a reporting framework around risks for employees. The plan is provided in the Supporting documents, Employee Risk Management Plan.

2.7 Stakeholders (G3)

G3.8 & 3.9

For this monitoring period, a summary of the VCS CCB Monitoring & Implementation Report is translated into each Shona and Tonga, and made available to the public through the CCBS website and through the local RDC offices. In addition, local communities are notified of the auditor's site visit 30 days before the site visit.

In more detail the dissemination was done as follows: one copy of the full PIR 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 PIR summaries, one copy was sent to each council office, one copy to each chief and on copy to each ward councilor were sent out. All these copies were delivered as hard copies in person by the OGM who followed up with an explanation of the need to submit any grievances through the communications channels outlined in the Adaptive Management Plan being either directly to council, OGM or CGA head office.

A plan for ongoing communication and consultation between the project and affected communities is included in the project's adaptive management plan, an updated version of which is submitted in the Supporting documents, Adaptive management plan. 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 rather informal 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 2.3). Since the project start date in June 2011 to date, the *Kariba REDD+ Project* has not received any formal grievances from any community member as a result of the project. There have only been numerous requests for additional support, awareness, training and more inputs, none of which can be recorded as a grievance.

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.

3 LEGAL STATUS

3.1 Compliance with Laws, Statues, Property Rights and Other Regulatory Frameworks (G4 & G5)

All relevant laws, statutes and other regulatory frameworks are listed in the CCB and 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.

3.2 Evidence of Right of Use (G5)

Refer to CCB PDD, section G5.6, page 50 for evidence of right of use with respect to the GHG emission reductions and removals.

3.3 Emissions Trading Programs and Other Binding Limits (CL1)

Not applicable. Zimbabwe has not set its own emission cap or did not commit to emissions reductions. Therefore, GHG emission reductions or removals generated by the project will not be used for compliance with an emission trading program or to meet binding limits on GHG emissions.

3.4 Participation under Other GHG Programs (CL1)

Not applicable. The project does not participate or seek registration in other GHG programs.

3.5 Other Forms of Environmental Credit (CL1)

Not applicable. The project does not participate and does not intent to generate any in other forms of Environmental Credit. In addition, any credit has been or will be cancelled from this program.

3.6 Projects Rejected by Other GHG Programs (CL1)

Not applicable. The project was not rejected by any other GHG programs.

3.7 Respect for Rights and No Involuntary Relocation (G5)

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.

3.8 Illegal Activities and Project Benefits (G5)

Refer to CCB PDD, section G5.5, page 49 for the identification of illegal activities and how to reduce such activities in the project area to avoid that project benefits derive from illegal activities.

4 APPLICATION OF METHODOLOGY

4.1 Title and Reference of Methodology

VM0009 - Methodology for Avoided Mosaic Deforestation of Tropical Forests, v1.1.

4.2 Deviations from the Monitoring Plan

4.2.1 Deviation on climate section for CCB

For the climate section of this monitoring period, we followed the monitoring plan as described for VCS. Therefore, CCB climate section will be performed using the same method as used and described in the VCS PDD and MR. Document on gap validation for the climate section of CCBS is also provided.

4.2.2 Deviation on soil organic carbon SOPs

Some minor changes regarding soil sampling procedures in the field were done in the soil organic carbon SOPs aiming to describe the procedure with more details, reduce sources of errors in the field and also have a more consistent soil sampling method (i.e. use the same distance between the pits in the same plot instead of having different distances for pits in the same plot for circular and transect plot and also plots in the reference area). Deviations are described below:

According to section 2.4.5 of VCS PDD, page 58, each sampling plot in a forested area consist on two soil samples pits consisting of 2 sub-samples were collected. However there is a clarification

on the location of each soil sample pit in order to keep the same distance between soil samples in the same biomass plot and not different distances as it was presented in the validated VCS PD. Therefore, for a circular sampling plot, the soil samples are taken in North and South direction, a distance of 3 meters respectively, from the center of the biomass plot. For a transect biomass sampling plot, the two soil samples are taken in North and South direction, a distance of 3 meters respectively, from the center of the biomass plot (for further details and figure showing the location of each soil sampling, please refer to Supporting documents, SOPs, Tree and soil SOPs, document "SOPs Tree and soil collection", section 2.4, Figure 9).

Digital balance is not used in the field in order to avoid human mistakes on the reading of the weight in the field. The seal samples will be weighted in the lab aiming higher precision on the measurement as exterior problems as reflection from sunlight will be avoided. In addition, sieve is not performed in the field because precision is very important and it is important to focus the efforts to perform what is crucial in the field (i.e. soil could be lost while sieving the sample). Therefore, the samples will be sieved by the lab technician in the lab.

The former SOP foresees to sample 2 depths, one going from 0 to 7,5 cm depth and the other one from 22,5 cm depth to 30 cm depth. The new SOP is sampling also 2 depths, however one going from 0 to 10 cm depth and the second sample going from 10 cm to 30 cm depth. The change was done aiming to assess the carbon stock along the whole gradient from 0 to 30 cm and not only the soil carbon from 0 to 7,5 cm and 22,5 to 30 cm as was proposed before.

According to validated VCS PDD, samples would be analyzed in the Chemistry & Soil Laboratory on the Department for Research & Specialist Services of the Ministry of Agriculture in Harare. However, for this verification the soil organic carbon was determined by the ICRISAT (International Crops Research Institute for the Semi-Arid Tropic) and the bulk density of the samples was determined by the Chemistry and Soil Research Institute.

According to validated VCS PDD, section 2.4.5.3 "Minimizing uncertainty", page 59, soil data will be stored in MOVERs. However, the soil data will not be stored in MOVERs. A hard copy of the original field data sheets will be store at CGI office in Harare, Zimbabwe and a copy of the field sheets are also kept at the South Pole office in Medellín, Colombia. In addition, several backups of the data will be stored in different memory discs in Harare and Medellín to assure the data will be always available until the end of the crediting period.

4.2.3 Deviation on monitoring of degradation and deforestation in the reference area

There is a minor deviation on the monitoring of degradation and deforestation in the leakage area. For the next monitoring periods, the trees located in the plots to identify degradation and deforestation in the leakage area will not be counted anymore because this is not a requirement of the methodology and does not affect the assessment of degradation in the plots measured. Therefore, the document "SOP Leakage area data collection" located under the Supporting documents, SOPs, Leakage SOP, was updated accordingly.

4.3 Project Boundary (G1)

Refer to VCS PDD, section 2.3, page 28 for more detailed information on VCS project boundary.

Source		Gas	Included?	Justification/Explanation
Baseline	Deforestation	CO_2	Yes	Included in line with the methodology

Source		Gas	Included?	Justification/Explanation
		CH_4	No	Conservatively excluded in line with the methodology
		N_2O	No	Conservatively excluded in line with the methodology
		Other	No	Conservatively excluded in line with the methodology
Project	Deforestation & Degradation	CO_2	Yes	Included in line with the methodology
		CH_4	No	Conservatively excluded in line with the methodology
		N_2O	No	Conservatively excluded in line with the methodology
		Other	No	Conservatively excluded in line with the methodology

4.4 Baseline Scenario (G2)

Refer to VCS PDD, section 2.4, page 30 and CCB PDD, section G2.1, page 22 for further information on identification and justification of baseline scenario.

Refer to CCB PDD, section G2.4, page 28 and CCB PDD, section G2.5, page 29 for description on how the most likely land use scenario associated with the baseline scenario would affect communities and biodiversity in the project zone.

4.5 Additionality (G2)

Refer to VCS PDD, section 2.5, page 63 for assessment and demonstration of Project additionality under the methodology.

Refer to CCB PDD, section G2.2, page 24 for justification that project benefits would not have occurred in the absence of the project.

5 MONITORING DATA AND PARAMETERS

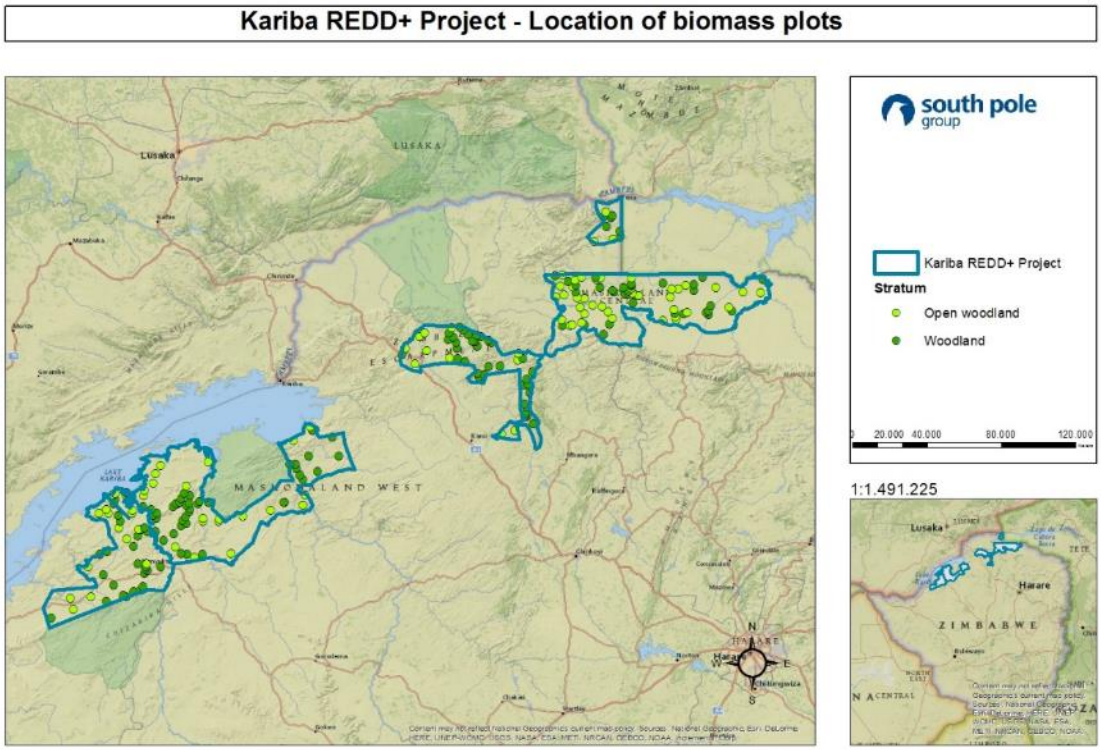
5.1 Description of the Monitoring Plan (CL3, CM3 & B3)

5.1.1 Overview

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 is conservatively omitted. Soil carbon is estimated using soil samples collected. These sampling procedures are designed to detect both increases in carbon stocks, such as those that occur as a result 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 second monitoring period by sampling 119 (40%) of the previously established PSPs. This achieves a target of re-measurement of 20% of all PSPs per year of the crediting period and a complete re-measurement every 5 years as recommend in the VM0009 v1.1. Please, see Map 12 below for location of biomass plots in the project area.



Map 12. Location of biomass plots in the project area

In the monitoring process, the project team applied the update version of the validated SOP[5].

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.

5.1.2 Sampling

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 such as growth and mortality, and changes due to human activities, such as management, harvest and degradation. Plots are marked permanent with a magnetic marker buried in the ground and by recording of GPS coordinates. In cases where obstacles (tree, rock, river etc.) obstruct a particular location, the

[5] The updated SOPs are provided on Supporting documents, SOPs, Tree and soil SOPs under the title "150812_SOP Tree and soil data collection_2015 version.docx"

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.

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

Leakage plots are assessed differently than both biomass plots. They are located in the reference area/leakage area, and necessarily placed in random spatial locations. They therefore cannot be conspicuously marked like the biomass plots. Within the leakage area, a sample of plot locations are 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 (2 square ha; 145m x 145m) of all plots will be the same. The proportion of degradation is determined by the observed above-ground 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, it will be documented in the monitoring report how the sampling design avoids bias that may result from these systematics.

Soil organic carbon plots are assessed differently than biomass plots. They are located in forest areas inside the biomass plots and non-forested areas in the reference area in fallow fields and agricultural lands with different age classes. 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, SOPs for SOPs on Tree and soil and Leakage.

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

5.1.3 Organizational structure

The project entity implemented 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, taking into account the amount of information to be collected and the tasks of each individual, had at least two members. 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 crew members has been experienced in tree species identification, or has been familiar with methods of plant collection and identification using taxonomic keys.

The responsibilities of each crew member has been clearly defined. Their tasks are proposed as follows:

The crew leader is responsible for organizing 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; take care of logistics of the crew by organizing and obtaining information on accommodation facilities; recruit local workers; organize access to the plots; interview external informants and local people; ensure field forms are properly filled in and collected data are reliable; organize meetings after fieldwork in order to sum up daily activities; and implement field worker safety measures.

Training of the crews on the survey methodology have been 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.

5.1.4 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. 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 entry of data is required to produce reliable carbon estimates. Therefore a web-based data entry form for all those data, but soil carbon and leakage, measured in the field required by the methodology is used. All data sheets included a field to record crew composition. Hard copies are kept for the data on soil carbon and the data is analyzed using an excel sheet and various copies are kept as a backup. Communication between all personnel involved in measuring and analyzing data took place to resolve any apparent anomalies before final analysis of the monitoring data has been 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 are archived in several forms: All original field data sheets are saved and in addition copies of the original data sheets are stored in another file as backup. All documents are stored in the office of CGI. Furthermore the Monitoring and Verification System (MOVERS) is used for obtaining, recording, compiling and analyzing data relevant for the project. MOVERS is a centralized online data system, which is server-based and backed-up and serve 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. An access to MOVERS has been provided to the auditors.

5.1.5 Quality Assurance (QA)/Quality Control (QC)

The project follows the IPCC GPG of using two types of procedures in order to ensure that the inventory estimates and their contributing data are of high quality:[6,7,8]The plan that describes specific QA/QC procedures is as follows:[9,10]

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 a field protocol for sampling forest degradation and trainings 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) 10% biomass sample plots measured in the 3rd monitoring period were subject to remeasurement by a different field crew with the same level of training, following the same SOPs.

Data collection is an ongoing process. A centralized data system such as an online server-based and backed-up MOVERS is therefore used for all the pools, except for soil carbon and leakage. The integration of carbon-credit centered 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 centralized documentation of all project planning and implementation. QA/QC procedures have been implemented to ensure that 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.

5.1.6 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 was derived in terms of climatic, edaphic, geographical and taxonomic conditions. When possible, species-specific equations are used from similar locations such as Zimbabwe itself, 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 validation stage.

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[6] IPCC GPG for LULUCF; Chapter 5.5 Quality assurance and quality control

[7] IPCC GPG and Uncertainty management in National GHG Inventories; Ch. 8 QA and QC

[8] IPCC GPG for LULUCF; Chapter 3.2 Forest land

[9] IPCC GPG for LULUCF; Chapter 5.5 Quality assurance and quality control

[10] IPCC GPG and Uncertainty management in National GHG Inventories; Ch. 8 QA and QC

All data such as field data, equations, densities and root-shoot-ratio are uploaded to the centralized 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 also 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 summed up. 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 by equation 50 of the methodology. The total carbon stock in above-ground large, small and non-tree biomass is calculated as equation 44, the standard error of the carbon stock in above-ground large, small and non-trees as equation 47 of the methodology. 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 of the methodology. Same equations as above are applied for calculating the total carbon stock in standing dead wood (44) and the standard error of the carbon stock in standing dead wood (47).

The carbon stock in soil organic carbon for each plot is calculated using equation 61 of the methodology. Baseline emissions on soil for monitoring period is calculated using equation 29 which uses the soil carbon loss function defined by equation 18. Standard error used for soil organic carbon is calculated using equation 49 and uncertainty of the soil carbon loss model calculated using equation 19. Estimated variance and estimated standard error was calculated using equation 46 and 49 respectively.

For conservativeness, 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 the equation 45 where equation 51 is applied for calculating the carbon stock per tree and equation 52 for calculation of the carbon in the stratum.

CL3

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 line out in the applied VCS methodology and the VCS PDD, using a network of permanent sampling points.

With regards to the accounting procedures for the climate impacts under CCBS, these were accounted following CCBS requirements on former monitoring periods. However, for this monitoring period a gap validation for the climate section of CCBS was carried out in order to align with VCS PDD requirements and the applied VCS methodology.

For the Climate Impact monitoring, the Kariba REDD+ Project is following the requirements by the applied VCS methodology. The approach is further laid out in the project's validated VCS PDD.

The climate impact is monitored for every monitoring period and should take place at least once at every 5 years.

CM3

For community impact monitoring (CM3.1 and CM3.2), please refer to the same section of CCB PDD on pages 69 and 72.

In addition, the Standard Operating Procedure for Community Impact Monitoring used during the former monitoring period has been used for this monitoring period (refer to Supporting documents, SOPs, Social monitoring SOPs).

B3

For biodiversity impact monitoring (B3.1 and B3.2), please refer to the same section of CCB PDD on pages 78 and 79. A full monitoring plan for climate, community and biodiversity had been developed and published on the CCBS website[11]. Numerous copies of the monitoring plan were printed and made available to the RDC's and distributed to the communities, in particular the chiefs and ward councilors to share with the communities by the OGM Teams. The monitoring plan available at CCBS website was also used during this monitoring period.

The results of the monitoring are published in the monitoring reports (PIR), 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 PIR and the project (refer to section 2.7).

In addition, the Standard Operating Procedure for Biodiversity Impact Monitoring prepared in the past has been used (refer to Supporting documents, SOPs, Biodiversity monitoring SOPs).

For community and biodiversity monitoring and reporting frequency, please refer to the Monitoring Plan for CCB (refer to Supporting documents, CCB monitoring, Monitoring plan CCB).

[11] http://www.climate-standards.org/?s=kariba

5.2 Data and Parameters Available at Validation (CL3)

The allometric equations and densities of tree species used on MOVERS (web-based Monitoring and Verification System) were validated (for allometric equations, please refer to Supporting documents, MOVERS, file "Allometric eqns"). The auditor have 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 (m^3) to biomass in case the allometric equation only provides results in m^3. A description of the functions of MOVERS are described in an accompanying document in the supporting documents (refer to Supporting documents, MOVERS, file "MOVERS Kariba"). 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 Unit / 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".[12] The **Rs** given on page 426 represent a mean below-ground ratio (t d.m./t d.m.) and is obtained of a similar ecoregion as the project area
Value applied:	0.42
Purpose of the data:	Calculate below-ground small and large tree biomass (BGLT)
Any comment:	

Data Unit / 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.
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".[13]

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

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

	The **Rs** given on page 426 represent a mean below-ground ratio (t d.m./t d.m.) and is obtained of a similar ecoregion as the project area.
Value applied:	0.42
Purpose of the data:	Calculate Below-ground non tree biomass (BGNT)
Any comment:	

5.3 Data and Parameters Monitored (CL3, CM3 & B3)

Please, refer to the tables below for data and parameters monitored under VCS. For CCB data and parameters monitored, please refer to CCBS monitoring plan which is available under the Kariba REDD+ Project on CCBS webpage[14] or under Supporting documents, CCB monitoring, Monitoring plan CCB.

Data Unit / 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 CO2e (tCO_2) 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 CTO of CGI. Before starting the fieldwork, the forestry engineers meet

[14] http://www.climate-standards.org/?s=kariba

	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.
Calculation method:	Allometric relationships
Any comment:	

Data Unit / 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_2e (tCO_2e) 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.

Calculation method:	Size class, standard weight stem / shrub
Any comment:	

Data Unit / Parameter:	Leakage
Data unit:	Biomass / CO_2e
Description:	Represented by forest degradation and deforestation
Source of data:	2.1 ha (145m x 145m) leakage plots monitored using walking transects
Description of measurement methods and procedures to be applied:	2 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.
Calculation method:	Leakage period, leakage model
Any comment:	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 Unit / 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 categorized 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_2e (tCO_2e) 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.
Calculation method:	Using equation 51 and 52 of the methodology.
Any comment:	

Data Unit / 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" and supporting document from the lab "KRP_Bulk Density Letter from lab" under Supporting document, ER estimations, Soil, Laboratory analysis, Bulk density.
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 are ensured because the field team received training on the procedures to perform the sampling of the soil samples. Also, a SOP was developed to be used by the field team during field work to guarantee quality data. In addition, the samples were sent to a third party laboratory to perform the analysis.
Calculation method:	Calculated using equation 60 of the methodology.
Any comment:	

Data Unit / 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" and supporting document from the lab "SOC Lab Procedure official" under Supporting documents, ER estimations, Soil, Laboratory analysis, SOC.

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 sample collected are guarantee with 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 field work to guarantee quality data to the lab. In addition, the samples were sent to a third party laboratory to perform the analysis.
Calculation method:	Calculated from laboratory analysis
Any comment:	

6 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS (CLIMATE)

6.1 Baseline Emissions (G2)

According to VCS PDD, page 57, the cumulative deforestation model of the Kariba REDD+ Project predicted for the end of the 3rd monitoring period (June 30th 2016) a cumulative forest carbon stock loss of 15.94%. Subtracting the loss predicted for the previous, concluded 2nd monitoring period, the loss of the 3rd monitoring period is 6.38% (refer to Supporting documents, ER Estimations, file “KARIBA ER MP 3”, worksheet “m-3 (tb verified)”).

Following the biomass sampling from second monitoring period, the Non-Forest stratum (37,186 ha) has no significant woody biomass and is conservatively taken has zero biomass. Therefore this stratum also has no baseline emissions.

The baseline emission are summarized in Table 1 below (refer to Supporting documents, ER estimations, file “KARIBA ER MP3”, worksheet “m-3”, section “Baseline emissions”).

Table 1. Overview of Baseline Emissions

Stratum	**Total baselines emissions [tCO_2e]**

Open Woodland	5,518,846
Woodland	3,586,809
Non-Forest	0
TOTAL	9,105,655

The confidence deduction for this monitoring has been calculated according to Equation 35 based on the average uncertainty (Equation 36) and accounts for 0 tCO_2e (refer to supporting documents, ER estimations, file "KARIBA ER MP3", worksheet "m-3", section "Confidence deduction-Uncertainty").

6.2 Project Emissions

Emissions from burning: No emissions from the burning of woody biomass as a result of project activities in the project area have occurred. The project activities do not encourage increased burning of woody biomass. Very much to the contrary, 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 should significant forest fires occur during the project crediting period. No major forest fires were detected in the monitoring period.

Event number	**Date**	**Woody biomass consumed in tonnes**
N/A	N/A	N/A
	TOTAL	0

6.3 Leakage

Quantify leakage emissions.

The project monitored 50 leakage plots and resolved equation 33 to calculate the leakage factor (refer to Supporting documents, Leakage monitoring, file "Leakage_MP3"). 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 unrelated, baseline activities in the leakage area not increased by activities in the project area and forest degradation due to natural causes such as elephant damage, induced by increased population levels in the region due to the anti-poaching activities of the project proponents.

Still, in order to formally comply with the calculation approach of VM0009 v1.1 we estimate a leakage factor of ~0.00497 or ~0.497%. Therefore the calculated leakage emissions amount to 45,260 tCO_2e (Equation 22) and are deduced from Net Emission Reductions (NERs) calculated in equation 34 (refer to Supporting documents, ER estimations, file "KARIBA ER MP3", worksheet "m-3", section "Leakage)".

We re-iterate that this reduction is over-conservative in our view as we see no evidence for actual displacement of baseline activities from populations affected by project activities, but rather unrelated forest use by different populations and natural causes.

6.4 Summary of GHG Emission Reductions and Removals (CL1 & CL2)

Net GHG Emission Reductions and Removals (NERs) are calculated using Equation 34. The below table summarizes all components of Equation 34 (refer to Supporting documents, ER estimations, file "KARIBA ER MP3", worksheet "m-3", section "Net Emission Reductions"). The total amount of VCUs is separated by 25% into vintage year 2014, 50% into vintage year 2015 and 25% into vintage year 2016. Vintage year 2014 consist of the period of July 1st to December 31st 2014, vintage year 2015 consist of the period of January 1st to December 31st 2015 and vintage year 2016 consist of the period of January 1st to June 30th 2016 (refer to Supporting documents, ER estimations, file "KARIBA ER MP3", worksheet "m-3", section "Vintage packages of VCUs").

Table 2. Calculation of NERs

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Buffer credits (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
Vintage 2014	2,276,414	0	11,315	317,114	2,265,099
Vintage 2015	4,552,828	0	22,630	634,228	4,530,198
Vintage 2016	2,276,414	0	11,315	317,114	2,265,099
Total	**9,105,655**	**0**	**45,260**	**1,268,455**	**9,060,395**

The calculated total AFOLU Non-Permanence Risk Assessment is 14% (refer to Supporting documents, Non permanence risk for further details on the calculation).

Net GHG emission reductions or removals are calculated by solving equation 34 of VM0009 v1.1.

9,060,395 tCO_2e ($C^{[m]}$) = 9,105,655 tCO_2e ($C^{[m]}_{BE}$) – 0 tCO_2e ($C^{[m]}_{U}$) – 0 tCO_2e ($C^{[m]}_{PE}$) – 45,260 tCO_2e ($C^{[m]}_{LE}$)

All equations leading up to equation 34 are solved in the provided supporting documents "KARIBA ER MP 3" and "Kariba SOC ER" located under Supporting documents, ER estimations.

As per clarification of the VCSA equation 34 represents also the net carbon stock change for the basis of the buffer tool.

$$C^{[m]} = C^{[m]}_{BE} - C^{[m]}_{U} - C^{[m]}_{PE} - C^{[m]}_{LE}$$	[34]
Variables	$C^{[m]}$ = net GHG Emission Reductions and Removals (NERs) for monitoring period $[m]$ $C^{[m]}_{BE}$ = estimated baseline emissions for monitoring period $[m]$ $C^{[m]}_{U}$ = confidence deduction for monitoring period $[m]$ $C^{[m]}_{PE}$ = estimated project emissions for monitoring period $[m]$ $C^{[m]}_{LE}$ = 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 $[m]$

Net VCUs to which the project is eligible after deduction of the buffer credits are shown in the table below.

Table 3.Eligible VCUs

Total net VCUs to project proponent in tCO_2e	**7,791,985**
Net VCUs to project proponent in tCO_2e, vintage 2014	1,947,985
Net VCUs to project proponent in tCO_2e, vintage 2015	3,895,970
Net VCUs to project proponent in tCO_2e, vintage 2016	1,947,985

6.5 Climate Change Adaptation Benefits (GL1)

For GL1.1, please refer to the CCB PDD, page 80.

As lined out in the CCB PDD, section GL1.2, page 80, risks emerging from ongoing climate change are covered in the project's adaptive management process. No new risks have been identified in the adaptive management meeting in January 2015 and February 2016. The full minutes of the meetings are provided in the Supporting documents, Adaptive management plan, Adaptive management meeting.

For GL1.3, please refer to the CCB PDD, page 81.

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. Through the project's activities, the communities are assisted to adapt to these impacts of climate change and particularly also reduced productivity of crops. Namely, 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 a changing climate. These activities increase the income of local communities; diversify income sources and thus making communities less dependent on crops susceptible to climate-change; and increase the yield of field crops, thereby counteracting the effects of climate change.

Please refer to section 2.2 of this document for a more detailed description of the current status of the mentioned project activities.

7 COMMUNITY

7.1 Net Positive Community Impacts (CM1)

The Kariba REDD+ Project's direct and indirect impacts on the local communities have been monitored according to the project's monitoring plan and Standard operation procedure available under the Supporting documents, SOPs, Social monitoring SOP.

With regards to the project's direct effects, 36 workshops in improved agriculture and community gardens have been conducted, reaching a total of 2,822 participants. 24 community gardens have been supported. A total of 287 participants benefited from our 16 beekeeping workshops. 13 beekeeping starter sets were provided. Also, schools and clinics have been supported. The results of all indicators for the project's direct effects are provided separately in the Supporting documents, CCB monitoring, Social monitoring, Direct effects, file "Social monitoring direct effects". In addition, more detailed information on the net positive community impacts for each project activity are provided under section 2.2.

To monitor the project's indirect social effects, an extensive survey campaign has been implemented in April, May and June 2016. All results are provided in the Supporting documents, CCB monitoring, Social monitoring, Indirect effects, file "Social monitoring surveys". A total of

380 local community members, direct project beneficiaries and employees have been reached. Interviews where necessary were conducted in the local language Shona and participants were selected randomly.

Most interview partners expressed their satisfaction with the project, as shown in Table 4. 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 5, Table 6, Table 7 and Table 8. This shows the project's positive impacts in community aspects.

Table 4. Satisfaction with the Kariba REDD+ Project

	Community Members (%)	Beneficiaries (%)	Employees (%)
Very unsatisfied	1.1	0.0	0.0
Unsatisfied	0.0	2.4	0.0
Indifferent	7.5	1.2	0.0
Satisfied	54.9	38.8	30.8
Very satisfied	36.6	57.6	69.2

Table 5. Reported project impact on livelihoods by beneficiaries and employees

	Beneficiaries (%)	Employees (%)
Very negatively	0.0	0.0
Negatively	0.0	0.0
No impact	5.9	0.0
Positively	51.8	69.2
Very positively	42.4	30.8

Table 6. 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	4.7	0.0
Positively	57.6	76.9
Very positively	37.6	23.1

Table 7. 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	4.7	0.0
Positively	65.9	76.9

Very positively	29.4	23.1

Table 8. Reported project impact on healthcare by beneficiaries and employees

	Beneficiaries (%)	Employees (%)
Very negatively	0.0	0.0
Negatively	0.0	0.0
No impact	2.4	0.0
Positively	57.6	84.6
Very positively	40.0	15.4

The project area is identified as being of the community-related High Conservation Values (HCVs) 5 (fundamental basic needs) and 6 (cultural identity).

In order to assess the project's impact on these HCVs, four specific questions have been included in the project's social impact survey.

In order to assess projects impacts on HCV 5, the following questions have been asked:

- "Through the project, are you, or members of your household, restricted in collecting the following forest products?" (for building material, 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 well-being were not negatively affected. Please refer to the results of the social impact survey provided separately for further reference.

7.2 Negative Offsite Stakeholder impacts (CM2)

The *Kariba REDD+ Project* focuses on providing to communities 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. In addition, the large

project size and the limited mobility of local communities further reduce potential negative impacts.

The only identified potentially affected stakeholders include the population of wards within participating RDCs, which do not form part of the project. In order 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. 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, have been received.

CM2.2 and CM2.3 are not applicable. Please, refer to the CCB PDD, page 69.

7.3 Exceptional Community Benefits (GL2)

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.

8 BIODIVERSITY

8.1 Net Positive Biodiversity Impacts (B1)

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

The results of the project's biodiversity impact monitoring are given in Table 9. It shows a significant presence of wildlife in the area, including several threatened species. Namely elephants, buffalos and hippos are very commonly seen in the project area (Photo 10). The number of sightings of threaten species per team-day shows a higher value in 2016 when comparing to previous years. Evidence of biodiversity monitoring and anti-poaching activities are given under the Supporting documents, CCB monitoring, Biodiversity monitoring, Supporting documents.

Photo 10. Fauna spotted in the project area during patrols (elephants, impalas, common hippos and lion)

Tree diversity was assessed during a monitoring campaign from September 2015 until June 2016. The monitoring campaign was fully integrated into the carbon stock assessment implemented for VCS on 119 Permanent Sampling Plots (PSPs) of 254 m^2 each. During the campaign, a total of 131 tree species was identified. Of the about 4,820 living trees measured, the ten most common identify species are shown below in Table 10. The complete analysis is provided in the Supporting documents, CCB monitoring, Tree biodiversity.

Table 9. Sightings and tracks of wildlife in the project from 1st February 2014 until 30th June 2016

Year		**2014**	**2015**	**2016**
Team-days spent monitoring		685	949	483
Species	Status	0		
Lion	VU	37	43	46
Elephant	VU	1,447	1,878	1,049
Black Rhino	CR	0	0	0
Common Hippo	VU	16	329	33
Cheetah	VU	0	0	0
Southern Ground hornbill	VU	27	70	64
Hooded Vulture	VU	1	28	7
Egyptian Vulture	EN	0	0	1
Cape Vulture	VU	0	0	1
Lappet-faced vulture	VU	0	0	0

White-headed vulture	VU	3	4	0
White-backed Vulture	VU	112	52	56
Martial Eagle	VU	11	6	1
Crowned Eagle	NT	1	0	3
Bateleur	NT	7	4	1
Lilian's Lovebird	NT	3	0	0
Painted Dog	EN	0	0	0
Leopard	NT	34	45	10
Buffalo		998	807	321
Zebra		45	22	22
Other spp.		1,083	2,133	702
Total threatened spp.		1,665	2,414	1,257
Total all spp.		3,823	5,421	2,414
Threatened spp. / team day		2.43	2.54	2.60
All spp. / team day		5.58	5.71	5.00

Table 10. Ten most common tree species during field campaign from September 2015 to June 2016

Tree species	Abundance (%)
Colophospermum mopane	15.93
Combretum celastroides	7.12
Combretum apiculatum	6.76
Julbernardia globiflora	6.43
Diospyros quiloensis	5.64
Combretum elaeagnoides	5.21
Brachystegia boehmii	3.92
Diplorhynchus condylocarpon	3.30
Croton longipedicellatus	2.74
Combretum mossambicense	1.93
Total	**58.98**

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 (Photo 11). 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 11 below gives an overview over the project's anti-poaching activities for the second monitoring period. During a total of over 3,500 team-days spent patrolling, over 3,400 snares could be removed from the field and over 200 poachers were arrested, which means a substantial relief of pressure on the local wildlife. Nevertheless, poached wildlife was still recorded including of poaching of threatened species,

particular elephants. 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 also be illegal without the project.

Photo 11. Snares removed from the project area

The project is working on further reducing the pressure of poaching on the local wildlife, as a necessary complementary activity to habitat conversation, in order to further increase the project's positive impact on the local biodiversity. For further information on wildlife monitoring and anti-poaching, please refer to the Supporting documents, CCB monitoring, Biodiversity monitoring, file "Kariba_biodiversity_wildlife_datasheet".

Table 11. Overview of project's anti-poaching activities from 1st February 2014 until 30th June 2016

Year		**2014**	**2015**	**2016**
Team-days spent patrolling		1,346	1,707	618
No of snares removed		1,066	1,483	862
No of poachers arrested		75	131	30
Poached species	Status	0		
Lion	VU	0	1	0
Elephant	VU	15	27	4

Black Rhino	CR	0	0	0
Common Hippo	VU	2	6	3
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		13	6	6
Leopard		1	1	0
Impala		21	11	5
Other spp.		34	29	9
Total threatened spp.		17	34	7
Total all spp.		86	81	27

The identified HCV1 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.

The project will use species during 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 & E. tereticornis*; fire wood. tobacco curing)

Soy Bean (*Glycine max*)

Jatropha (*Jatropha curcas*; oil. life fences)

Cassava (*Manihotes culenta*)

Moringa (*Moringa oleifera*; vegetable. fodder)

Sugar Bean (*Phaseolus lunatus*)

Sorghum (*Sorghum bicolor*)

Cowpea (*Vigna unguiculata*)

Maize (*Zea mays*)

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 as a result of the project.

For section B1.4, please refer to the CCB PDD, page 76. In addition, no GMO are used in any project activities.

8.2 Negative Offsite Biodiversity Impacts (B2)

No negative offsite biodiversity impacts have been identified. Rather, by providing a corridor for wildlife in three adjacent national parks, the project have 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 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 far-away locations.

Although no negative impacts are envisioned, any negative impact will be addressed by active adaptive management. In addition to that, biodiversity is monitored and the effect of the project on biodiversity is positive.

8.3 Exceptional Biodiversity Benefits (GL3)

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. For detailed information, please refer to section 8.1 of this document.

9 ADDITIONAL INFORMATION

9.1 Soil organic carbon

Soil carbon has the longer monitoring period and is monitored at least once at every 5 years. This is the first time soil carbon is monitored, therefore the soil carbon will be presented in this section. Soil carbon has longer monitoring periods because this carbon pool is more constant and stable over time than other pools that are monitored with higher frequency as above-ground

biomass and below-ground biomass. A description of loss of carbon was provided on VCS PDD, section 2.4.5.5, page 59.

9.1.1 Sampling soil carbon loss

Soil carbon is an important pool for this project and has been measure using purposive soil samples (Photo 12) from farms of a known age in the reference region and from forest areas in the project area. Samples collected in the reference region were taken from similar strata in the project area.

Photo 12. Soil sampling in the project area

The forest area and reference area were stratified for soil sampling. The project area was stratified based on the dominant soil types (AR, CM, LP, LV and SN) and forest type (woodland and open woodland). The soil plots were randomly selected by generating a string of numbers from 1 to 235 aiming to include all permanent biomass plots from the project area without duplicate in a random order. The first 34 random numbers where reviewed and we selected at least 2 samples when possible for each stratum combination (between dominant soil type and

forest type). If some of the combination between forest type and soil type were not selected, the numbers subsequent to 34 would be consulted and the plots selected until the combination includes at least two plots for soil sampling (refer to Supporting documents, ER estimations, Soil, file "SOIL SAMPLING PLAN", worksheet "Biomass_Plots_235_WGS84_Stratum").

The reference area was stratified based on the age class in years since conversion from forest to agriculture or fallow fields (0-5, 6-10, 11-15, 16-20, >20), soil type (AR, CM, LP, LV and SN) and land use cover (fallow fields and agriculture fields). All five dominant soil types that occurred in the project area were included in the stratification. The soil plot selection was based on an initial large indication of areas by indicating areas in the reference region with 5 different dominant soil types in a map. Based on the areas indicated, the field team went to the areas indicated in order to identify fallow fields and agriculture fields in each dominant soil type. Then, the field team interviewed the farmers in order to place the soil plots in areas with different age classes since conversion from forest (0-5, 6-10, 11-15, 16-20, >20) and to only include areas with low input or low depth family agriculture (subsistence agriculture). 34 plots were sampled in the forested area within the project area, 15 plots located in woodland and 19 in open woodlands. 28 plots were located in non forest area in the reference area, 23 plots sampled in agricultural fields and 5 plots sampled in fallow fields with diverse age since conversion from forest to non-forest. For location of soil plots in the project area and reference area, refer to Map 13 and Map 14 below.

Further information on soil sampling, please refer to soil section of "SOPs Tree and soil collection" located in the Supporting documents, SOPs, Tree and soil SOPs, file "SOPs Tree and soil collection".

The soil carbon loss is 0.206 and was calculated using equation 18 of the methodology. Please, see Table 12 below for bulk density, soil carbon for each plot on forest and non forest areas, and length of time since conversion for non forest areas. Refer to the Supporting documents, ER estimations, Soil, file "Kariba SOC ER" for further information.

Table 12. Bulk density, soil carbon, land use and length of time since conversion for soil plots sampled

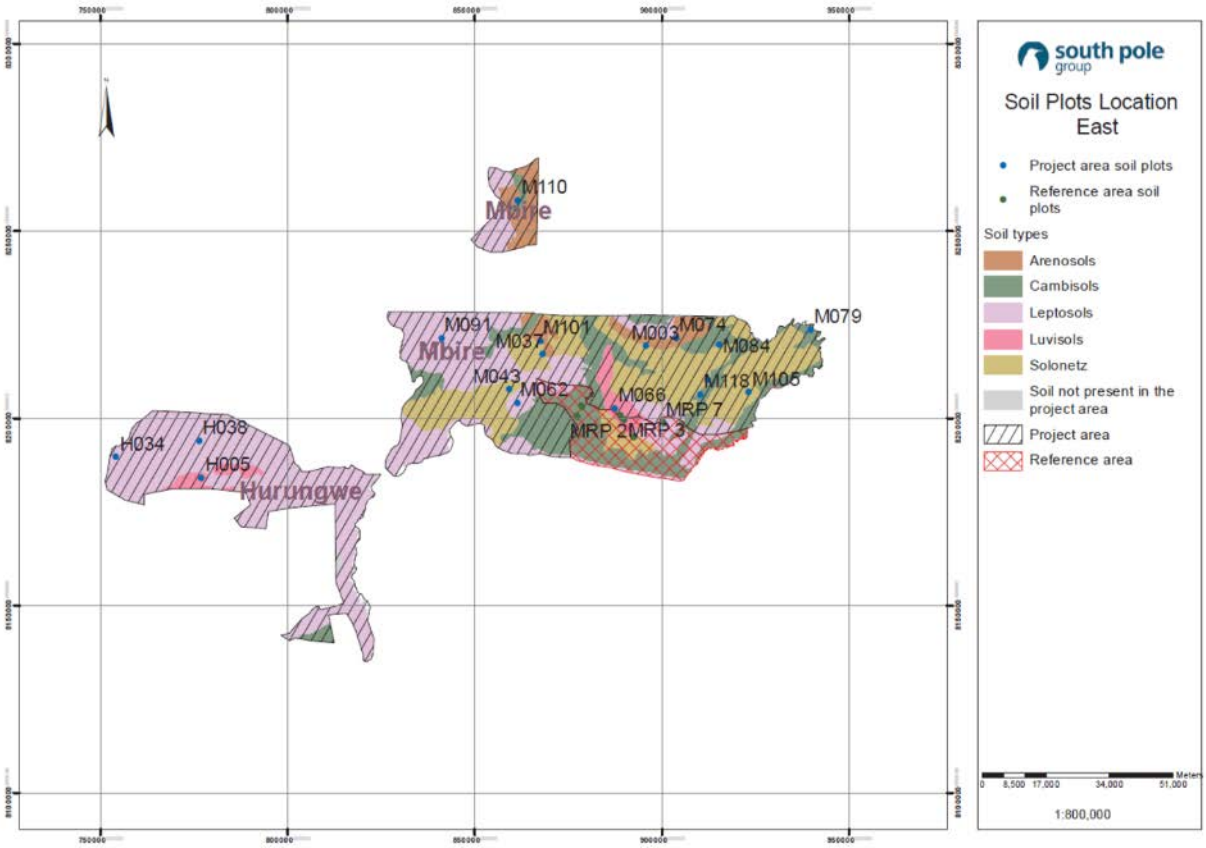
Sample	*Bulk density (0-10 cm) (g/cm3)*	*Bulk density (10-30 cm) (g/cm3)*	*Soil Carbon (0-10cm) (%)*	*Soil Carbon (10-30 cm) (%)*	*Land use*	*Length of time since conversion (years)*
M037	1103.91	1015.62	0.56	0.38	Wood land	
M091	1574.82	1512.72	0.69	0.59	Wood land	
M101	1314.19	1433.19	0.54	0.34	Wood land	
M111	1095.87	874.57	0.76	0.65	Wood land	
M105	1194.67	1066.64	0.95	0.73	Wood land	
M118	1844.52	1538.64	1.09	0.93	Wood land	
M110	1322.78	1318.78	1.34	0.54	Wood land	
H038	618.83	533.38	2.59	1.14	Wood land	
B041	1830.68	1643.73	0.86	0.38	Wood land	
B040	1332.54	1692.01	0.61	0.43	Wood land	

Sample	*Bulk density (0-10 cm) (g/cm3)*	*Bulk density (10-30 cm) (g/cm3)*	*Soil Carbon (0-10cm) (%)*	*Soil Carbon (10-30 cm) (%)*	*Land use*	*Length of time since conversion (years)*
NY005	1055.50	1157.13	1.91	1.51	Wood land	
NY090	1472.27	977.99	1.95	1.82	Wood land	
NY075	1411.47	37630.99	0.48	0.22	Wood land	
NY094	1139.82	1488.38	1.73	1.09	Wood land	
NY002	1442.67	1509.49	0.40	2.09	Wood land	
NY001	1471.84	2303.12	0.42	0.42	Open Wood land	
NY003	1502.02	1765.03	0.38	0.30	Open Wood land	
NY066	1388.83	1553.98	0.29	0.39	Open Wood land	
NY006	1187.54	1589.20	1.49	0.61	Open Wood land	
NY058	945.26	1681.59	1.65	0.82	Open Wood land	
NY031	1564.81	605.88	1.25	0.57	Open Wood land	
M066	1439.61	1944.57	0.80	0.57	Open Wood land	
M043	1405.96	1844.96	1.08	0.59	Open Wood land	
M062	1797.79	1509.47	1.07	0.61	Open Wood land	
M084	1086.07	1657.06	0.95	0.68	Open Wood land	
M079	1277.48	1109.84	2.45	1.21	Open Wood land	
M003	1037.65	1174.69	0.86	0.54	Open Wood land	
M074	1534.44	859.30	0.72	0.38	Open Wood land	
H034	1205.90	1306.24	1.25	0.54	Open Wood land	
H005	1248.30	1242.16	1.12	0.57	Open Wood land	
B015	1382.71	1613.06	0.81	0.43	Open Wood land	
B002	1453.43	829.63	1.36	1.45	Open Wood land	
B017	1275.64	2067.95	1.28	0.62	Open Wood land	
NY012	1108.01	1776.72	0.86	0.41	Open Wood land	
MRP 10 soc	1292.85	1474.49	0.51	0.51	Agriculture	19
MRP 5 soc	1300.34	1391.89	0.78	0.44	Agriculture	9
MRP 6 soc	1195.67	1203.45	0.54	0.39	Agriculture	5
MRP 2	1478.36	915.63	0.34	1.60	Agriculture	12
MRP 1	1468.58	1519.45	0.36	0.35	Agriculture	20
MRP 7	1093.51	1822.36	0.73	0.58	Agriculture	>20
BIN 15	1548.52	1532.30	0.41	0.17	Agriculture	12
BIN 12	1369.86	1108.01	0.46	0.41	Agriculture	>20
BIN 14	1590.73	1609.39	0.54	0.28	Agriculture	15
BIN 20	1499.82	1050.49	0.92	0.84	Agriculture	5
BIN 25	1483.05	1521.90	0.50	0.42	Agriculture	18
BIN 16	1478.16	1486.72	0.53	0.33	Agriculture	>20
BIN 19	1286.66	1625.28	0.82	0.43	Agriculture	10

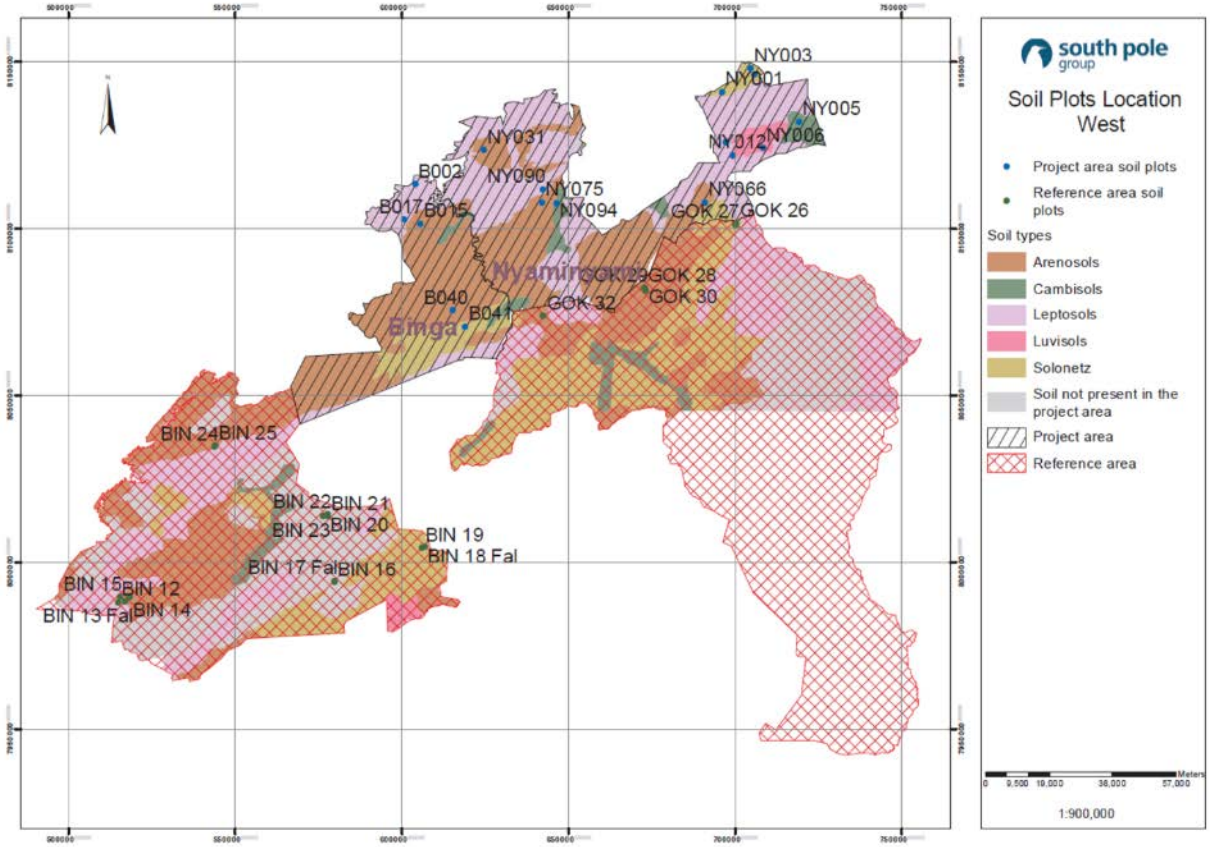
Sample	*Bulk density (0-10 cm) (g/cm3)*	*Bulk density (10-30 cm) (g/cm3)*	*Soil Carbon (0-10cm) (%)*	*Soil Carbon (10-30 cm) (%)*	*Land use*	*Length of time since conversion (years)*
BIN 21	1194.27	1911.58	1.23	0.77	Agriculture	12
BIN 22	1219.36	1280.23	1.22	0.92	Agriculture	15
BIN 23	1287.42	1340.19	0.93	0.80	Agriculture	>20
BIN 24	1422.48	1510.89	0.56	0.45	Agriculture	9
GOK 29	1384.55	1596.70	0.43	0.35	Agriculture	5
GOK 30	1388.22	1543.32	0.58	0.30	Agriculture	14
GOK 28	1539.95	1769.84	0.32	0.35	Agriculture	>20
GOK 27	1388.22	1791.56	0.44	0.31	Agriculture	>20
GOK 32	1394.46	1149.30	0.99	0.99	Agriculture	14
GOK 26	1320.92	1625.34	0.46	0.26	Agriculture	19
MRP 9 Fal.	1525.90	1526.80	0.63	0.64	Fallow fields	14
MRP 4 Fal.	1471.14	1578.54	0.85	0.55	Fallow fields	>20
BIN 13 Fal.	1524.04	1155.42	0.36	0.29	Fallow fields	5
BIN 17 Fal.	1443.89	1554.63	0.58	0.28	Fallow fields	10 years
BIN 18 Fal.	1440.84	1839.59	0.80	0.66	Fallow fields	15 years

9.1.2 Description of soil type and location of soil plots

Soil types in the reference area are similar to the soil types in the project area. The dominant soil types within the project area are Ferrali-Hypoluvic Arenosols (AR), Eutric Cambisols (CM), Eutric Leptosols (LP), Luvisols (LV) and Gleyic Solonetz (SN). Refer to maps below for location of the different soil types along the reference and project area and location of soil plots.



Map 13. Soil plots location and soil types – East



Map 14. Soil plots location and soil types – West

9.1.3 Minimizing uncertainty

A Standard Operation Procedure (SOP) has been developed and updated, which is to be followed while working in the field. The soil organic carbon is estimated in the laboratory ICRISAT using the Walkley-Black titration method. In addition, extensive training on soil sampling was carried out by Black Crystal in the project area (refer to Supporting documents, Training, Biomass and Soil, file "Black Crystal Letter re training july13" for further evidence of training on soil). The team trained have not changed since last training, therefore no additional training was necessary. In addition to that, an initial soil sampling was carried out in 2015 before the actual soil sampling in order to update the SOPs accordingly and estimate initial soil organic carbon values for soil in the project area. For further information on minimizing uncertainty, please refer to section 2.4.5.3 of validated VCS PDD.

9.1.4 Soil carbon loss model fitting

The soil carbon loss model was fit by estimating the maximum proportion of the soil carbon lost over time using equation 12 of the methodology, where carbon stock in miombo woodlands for the project area average is 115.85 tCO_2e/ha and the carbon stock for non-forest land use (agriculture and fallow lands) average is 78.02 tCO_2e/ha. The maximum proportion of soil carbon

lost over time correspond to lmax = 0.33 (refer to Supporting documents, ER estimations, Soils, file “Kariba SOC ER”, worksheet “Data analysis” for such calculations).

We apply the conservative default value for the carbon loss rate of λ = 0.2. The final soil carbon loss model is estimated using the equation 18 of the methodology and is equal 0.21 (please refer to Supporting documents, ER estimations, Soil, file “Kariba SOC ER”, worksheet “Data analysis” for calculations of the soil carbon loss model).

9.1.5 Predict soil carbon loss

The final carbon loss model was estimating using the equation 13 of the methodology and is presented in the Figure 2 below. The soil carbon loss which was prevented reducing deforestation and forest degradation for this monitoring period (baseline emissions in soil for current monitoring period) is estimated using the equation 29 of the methodology (please refer to Supporting documents, ER estimations, file “KARIBA ER MP 3”, worksheet “m-3 (tb verified)” for calculations of the soil carbon loss for the current monitoring period).

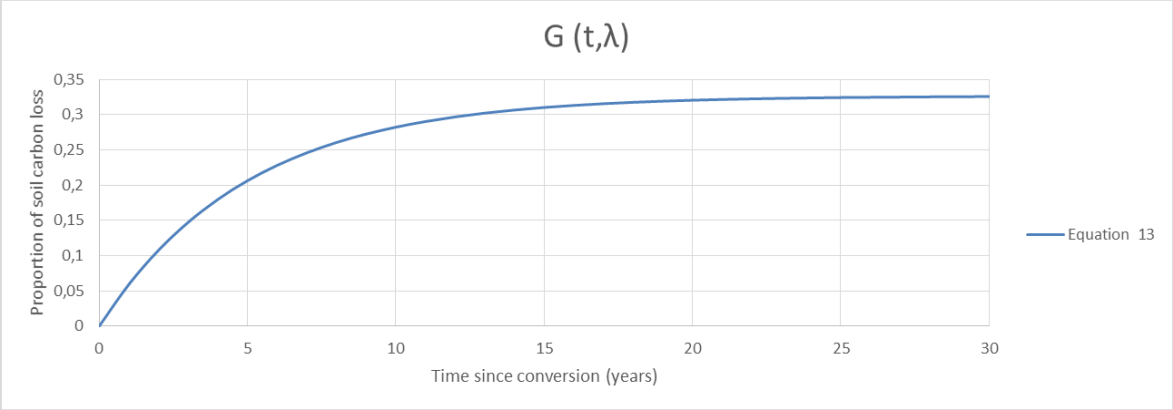


Figure 2. Soil carbon loss model

9.1.6 Estimating uncertainty in the soil carbon loss

Equation 19 of the methodology is used to estimate uncertainty of the soil carbon loss model. Please, refer to the Supporting documents, ER estimations, Soil, file “Kariba SOC ER”, worksheet “Uncertainty” for uncertainty calculation of the soil carbon loss model.

9.1.7 Identifying outliers in the agricultural areas

The field team was trained to set the plots on agriculture fields only in areas where there was no use of inorganic fertilizer, manure, mulch or compost as recommended by the methodology as could lead to an increase in the soil organic carbon content. Therefore, the data would not represent the soil carbon loss accordingly as carbon would be incorporated to the system. The field team did any possible effort to ask the farmers and exclude from sampling those areas that use fertilizers, manure, compost or mulch. John Tukey’s method of leveraging the Interquartile Range was used to identify potential outliers for the non-forest area because the field team think some of the farmers might not be transparent and could omit information on their practices as

the famers believe that if they state that they don't adopt management practices that could increase the carbon content (fertilizers, compost, manure or mulch), they could receive more help/support as subsidies or fertilizers in the future. Otherwise, farmers wouldn't receive any help/support. For this reason, John Tukey's method was used and 3 outliers were identified in the agricultural fields and were not considered for the analysis. Please, refer to Supporting documents, ER estimations, Soil, file "Kariba SOC ER", worksheet "Identify non-forest outliers" for calculations on outlier identification.

9.2 Supporting documents

Please, see below information available under supporting documents:

- ER Estimations (including emission reduction calculation documents for soil and biomass)
- CCB monitoring on biodiversity and community
- Leakage monitoring
- Non permanence risk report and calculation tool
- Standard Operation Procedures (SOPs) for Biodiversity monitoring, Leakage, Social monitoring and Tree and soil
- MOVERS functions description and allometric equations
- Data storage, allometric equations and calculations on MOVERS (access is provided to the auditors)
- Newsletter
- Training