

LOWER ZAMBEZI REDD+ PROJECT



Document Prepared By BioCarbon Partners

Contact Information www.biocarbonpartners.com

Project Title	Lower Zambezi REDD+ Project
Version	1.2
Date of Issue	2014-02-19
Prepared By	BioCarbon Partners
Contact	5th Floor, Barkly Wharf, Le Caudan Waterfront, Port Louis, Republic of Mauritius info@biocarbonpartners.com , www.biocarbonpartners.com

Table of Contents

1. PROJECT DETAILS	11
1.1 Summary Description of the Project	11
1.2 Sectoral Scope and Project Type	12
1.3 Project Proponent	12
1.4 Other Entities Involved in the Project	12
1.5 Project Start Date	13
1.6 Project Crediting Period	14
1.7 Project Scale and Estimated GHG Emission Reductions or Removals	16
1.8 Description of the Project Activity	17
1.9 Project Location	37
1.9.1 Delineating the Spatial Boundaries	37
1.10 Conditions Prior to Project Initiation	40
1.10.1 Climate	40
1.10.2 Geology	41
1.10.3 Soils	41
1.10.4 Topography	41
1.10.5 The types and conditions of vegetation within the project area	42
1.10.6 Resource extraction	42
1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks	43
1.12 Ownership and Other Programs	47
1.12.1 Right of Use	47
1.12.2 Emissions Trading Programs and Other Binding Limits	48
1.12.3 Other Forms of Environmental Credit	48
1.12.4 Participation under Other GHG Programs	48
1.12.5 Projects Rejected by Other GHG Programs	48
1.13 Additional Information Relevant to the Project	49
1.13.1 Eligibility Criteria	49
1.13.2 Leakage Management	49

1.13.3	Commercially Sensitive Information	53
1.13.4	Further Information	53
2	APPLICATION OF METHODOLOGY	53
2.1	Title and Reference of Methodology	53
2.2	Applicability of Methodology	54
2.3	Project Boundary	58
2.3.1	Gases	58
2.3.2	Selected Carbon Pools	59
2.4	Baseline Scenario	60
2.4.1	Identifying the Agents and Drivers	60
2.5	Additionality	74
2.6	Methodology Deviations	80
3	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	80
3.1	Baseline Emissions	80
3.1.1	Estimating Baseline Emissions from Biomass	80
3.1.2	Estimating Baseline Emissions from SOC	80
3.1.3	Estimating Carbon Not Decayed in BGB	80
3.1.4	Estimating Carbon Not Decayed in SOC	80
3.2	Project Emissions	81
3.2.1	Project Crediting Period	81
3.2.2	Delineating the Project Accounting Areas	81
3.2.3	Baseline Types	85
3.2.4	Delineating Proxy Areas	86
3.2.5	The Baseline Emissions Models	88
3.2.6	Determining R_u	101
3.2.7	The Soil Emissions Model	103
3.2.8	Baseline Scenarios for Selected Carbon Pools	104
3.2.9	Calculating Emissions from Changes in Project Stocks	104
3.2.10	Calculating Emissions from Burning	105
3.3	Leakage	105
3.3.1	Estimating Emissions from Activity-Shifting Leakage	105

3.3.2	Determining Emissions from Market-Effects Leakage	109
3.4	Net GHG Emission Reductions and Removals	110
3.4.1	Quantifying Net Emissions Reductions for a PAA	110
3.4.2	Quantifying Net Emissions Reductions across PAAs	122
3.4.3	Ex-Ante Estimation of NERs	122
4	MONITORING	122
4.1	Data and Parameters Available at Validation	122
4.2	Data and Parameters Monitored	122
4.3	Monitoring Plan	123
5	ENVIRONMENTAL IMPACT	124
6	STAKEHOLDER COMMENTS	125
6.1	Stakeholder Comments	125
6.2	Systems for Ongoing Communication	125
7	REFERENCES	127

Annexes

Annex A	Farm 1080 (Rufunsa Conservancy) Title Deed. Confidential
Annex B	Carbon Rights Covenant between BioCarbon Partners and Land Owner. Confidential
Annex C	Mineral prospecting applications. Confidential
Annex D	Environmental Impact Assessment exemption letter from Zambian Environmental Management Agency. Confidential.
Annex E	Central and local government letters of support. Confidential
Annex F	Lower Zambezi REDD+ Project CCB Project Design Document. Public
Annex G	Social Monitoring Programme. Confidential
Annex H	Socio-Economic Baseline Survey. Confidential
Annex I	Carbon Inventory. Confidential
Annex J	Emissions Reductions Calculations. Confidential
Annex K	Allometry validation data. Confidential
Annex L	Biomass and soil monitoring protocol. Confidential
Annex M	Leakage monitoring protocol. Confidential
Annex N	Allometry validation and development protocol. Confidential
Annex O	Protocol for interpreting forest state from imagery. Confidential.
Annex P	Data and parameters available at validation. Confidential
Annex Q	Data and parameters monitored. Confidential
Annex R	Cumulative Deforestation Model Data. Confidential
Annex S	VCS Non-permanence risk assessment. Confidential
Annex T	Geospatial Data. Confidential
Annex U	Quantification of parameter q
Annex V	Eco-Charcoal production plan and Strategy. Confidential
Annex W	Eco-Charcoal value chain assessment. Confidential
Annex X	Soil Organic Carbon decay model. Confidential
Annex Y	Rufunsa Conservancy Management Plan
Annex Z	Sustainable Eco-Charcoal Harvesting Plan. Confidential
Annex AA	Sustainable Eco-Charcoal Monitoring Plan. Confidential
Annex BB	Additionality Supporting Information. Confidential

Table of PD Requirements

PDR #	Requirement	Applicability
PDR.1	For each applicability condition, a statement of whether it applies to the project. If the applicability condition does not apply to the project, justification for this conclusion.	Applicable
PDR.2	Where applicability conditions apply, credible evidence in the forms of analysis, documentation or third-party reports to satisfy the condition.	Applicable
PDR.3	Definition of forest used by the project proponent and its source.	Applicable
PDR.4	A digital (GIS-based) map of the project area with at least the above minimum requirements for delineation of the geographic boundaries.	Applicable
PDR.5	Credible documentation demonstrating control of the project area, or documentation that the provisos listed in the case of less than 80% project control at the time of validation delineated in this methodology are met.	Applicable
PDR.6	The project start date.	Applicable
PDR.7	The project crediting period start date and length.	Applicable
PDR.8	The dates for mandatory baseline re-evaluation after the project start date.	Applicable
PDR.9	A timeline including the first anticipated monitoring period showing when project activities will be implemented.	Applicable
PDR.10	A timeline for anticipated subsequent monitoring periods.	Applicable
PDR.11	A list of the greenhouse gases considered.	Applicable
PDR.12	A list of the selected carbon pools.	Applicable
PDR.13	The definition and evidence to support the definition of a merchantable tree if the baseline scenario or project activities include logging.	Not applicable
PDR.14	A list and descriptions of all instances in the group.	Not applicable. Not a grouped project.
PDR.15	A map of the locations or boundaries of all instances in the group indicating that all instances are in the same region.	Not applicable. Not a grouped project.
PDR.16	A map of the common reference area, proxy area, activity-shifting leakage area and market-effects leakage area.	Not applicable. Not a grouped project.
PDR.17	A list of the agents and drivers of deforestation, including quantitative descriptions of agent mobilities.	Applicable
PDR.18	A narrative describing the agents and drivers of deforestation.	Applicable
PDR.19	Descriptions of agents and drivers including any useful statistics and their sources.	Applicable
PDR.20	A list of external drivers (covariates) of deforestation used in the model, if any, that may be identified as part of a PRA, expert knowledge or literature (e.g. median household income, road density, rainfall).	Not applicable. No covariates were used.
PDR.21	A digital (GIS-based) map of the accounting areas, including aerial or satellite imagery showing that they are completely forested as of the project start date and 10 years prior to the project start date.	Applicable
PDR.22	Justification and area of the selected accounting areas.	Applicable
PDR.23	If Type P1 or Type P2 are selected, justification for meeting the definition of APD in the current VCS-approved AFOLU requirements.	Not applicable. Project is Type U3.
PDR.24	If Type P1 is selected, evidence of legally-sanctioned commercial harvest in the baseline scenario.	Not applicable. Project is Type U3.
PDR.25	If Type U1 is selected, a spatial analysis of the project accounting area showing that at least 25% of the perimeter is within 120 meters of deforestation that occurred within 10 years prior to the project start date and showing that the reference area is adjacent to at least 25% of the project accounting area	Not applicable. Project is Type U3.
PDR.26	If Type U2 is selected, a spatial analysis of the project accounting area showing that 25% of the perimeter is within 120 meters of deforestation that occurred within 10 years of the project start date.	Not Applicable
PDR.27	If Types U1, U2 or U3 is selected, a spatial analysis of the	Applicable

PDR #	Requirement	Applicability
	project accounting area showing that it is within 120 meters of deforestation that occurred within 10 years prior to the project start date.	
PDR.28	A map of the delineated boundaries.	Applicable
PDR.29	Maps of the landscape configuration, including: a. Topography (elevation, slope, aspect); b. Recent land use and land cover (either a thematic map created by the project proponent or publically available map);c. Access points; d. Soil class maps (if available); e. Locations of important markets; f. Locations of important resources like waterways or roads; and g. Land ownership/tenure boundaries.	Applicable
PDR.30	A narrative describing the rationale for selection of proxy area boundaries.	Applicable
PDR.31	Results of a spatial analysis to demonstrate the proxy area is not forested, on average, as of the project start date.	Applicable
PDR.36	A map of the delineated boundaries, demonstrating that the reference area is held by the identified baseline agent or agents and does not include the project area.	Applicable
PDR.37	Maps of the landscape configuration, including: a. Topography (elevation, slope, aspect); b. Recent land use and land cover (either a thematic map created by the project proponent or publically available map);c. Access points; d. Soil class maps (if available); e. Locations of important markets; f. Locations of important resources like waterways or roads; and g. Land ownership/tenure boundaries.	Applicable
PDR.38	A description of the rationale for selection of reference area boundaries.	Applicable
PDR.39	Results of a spatial analysis to demonstrate the reference area had as much forest as the project accounting area at some point in time during the historic reference period.	Applicable
PDR.42	Established reference period boundaries.	Applicable
PDR.43	A list of available historic imagery for the reference area.	Applicable
PDR.44	A timeline of important events as they relate to the agents and drivers of deforestation.	Applicable
PDR.45	Narrative rationale for the selection of the reference period.	Applicable
PDR.46	A map of the reference area showing the area of "double-coverage."	Applicable
PDR.47	Quantification of "double coverage"(greater than 90%).	Applicable
PDR.48	A line plot of the historic image dates to confirm stationarity.	Applicable
PDR.49	Evidence that all image pixels are not more than 30m x 30m.	Applicable
PDR.50	Empirical evidence that imagery is registered to within 10% RMSE, on average.	Applicable
PDR.51	The sample size of deforestation sampling.	Applicable
PDR.52	A map of the reference area showing the sample point locations.	Applicable
PDR.53	The covariates that were considered and their data sources.	Not applicable. No covariates were used.
PDR.54	The parameters in θ that were evaluated during model selection.	Not applicable. No covariates were used.
PDR.55	The parameters in $\hat{\theta}$ of the selected model.	Not applicable. No covariates were used.
PDR.56	The rationale used for selecting $\hat{\theta}$ including comparisons of AIC.	Not applicable. No covariates were used.
PDR.57	A protocol for interpreting forest state from imagery.	Applicable
PDR.58	The results of an independent check of the interpretation.	Applicable
PDR.59	Evidence that systematic errors, if any, from the independent check of the interpretation were corrected.	Applicable
PDR.60	The parameter t_{SA} as the number of days after the primary agent begins commercial logging until when the secondary agent of deforestation is likely to begin degrading the project accounting area.	Not Applicable
PDR.61	A description of how $\hat{t}_{SA}t_{SA}$ was obtained	Not Applicable
PDR.62	Harvest plans for the project accounting area under the baseline scenario, results from the PRA or analysis of the reference area	Not Applicable

PDR #	Requirement	Applicability
	to determine the parameter.	
PDR.63	The parameter $\hat{t}_{PA}$ as the number of days relative to the project start date when the primary agent began or would have begun legally-sanctioned commercial logging in the project accounting area.	Not Applicable
PDR.64	A description of how $\hat{t}_{PA}$ was obtained	Not Applicable
PDR.65	Harvest plans for the project accounting area under the baseline scenario or public records to support the determination of the parameter.	Not Applicable
PDR.66	A table of covariate values as of the project start dates and a description of how the values were determined including any interpolation or extrapolation methods.	Not applicable. No covariates were used.
PDR.67	The parameter $\hat{m}$ as the average carbon in merchantable trees cut each day as a result of legally-sanctioned commercial logging.	Not Applicable
PDR.68	Documentation of how was determined. This may include an analysis of carbon stocks in merchantable trees in the project accounting area, timber harvest plans for the project accounting area or reference to a publication containing the maximum allowable cut applicable to the project accounting area. The parameter shall be greater than zero.	Not Applicable
PDR.69	The project shift parameter γ as the number of days between the beginning of the historical reference period and the project start date.	Not Applicable
PDR.70	The parameter q as the number of days between the onset of degradation and the beginning of deforestation.	Applicable
PDR.71	If the default of zero is not selected for q , then a justification for the determination of q .	Applicable
PDR.72	The parameter $\hat{A}_T$ as the area of non-forest in the project area as of the project start date that was forest ten years prior to the project start date.	Applicable
PDR.73	Description of how $\hat{A}_T$ was obtained.	Applicable
PDR.74	Results of GIS analysis to determine or measure $\hat{A}_T$ in the project area including the dates of images used to identify deforestation.	Applicable
PDR.75	Description of how samples from the reference area were selected including stratification, if any.	Not applicable. Default value used.
PDR.76	A map of sample locations in the reference area.	Not applicable. Default value used.
PDR.77	A table showing the conversion time for each area (farm or otherwise) from which samples were taken.	Not applicable. Default value used.
PDR.78	Description of and statistics for the method applied to estimate λ_{SOC} .	Not applicable. Default value used.
PDR.79	Graph of projected decay model over project lifetime.	Not applicable. Default value used.
PDR.80	Inclusion of decay model on which parameter is based	Not applicable. Default value used.
PDR.81	Explicit description of referenced literature, including project location, sampling methodology, included species, sample size, and decay parameter upon which decay is based.	Not applicable. Default value used.
PDR.82	Graph of projected decay model over project lifetime	Not applicable. Default value used.
PDR.83	If decay model is based on any other element besides carbon, defence of ability to predict carbon decay must be provided.	Not applicable. Default value used.
PDR.84	A qualitative description of the baseline scenario for each selected carbon pool.	Applicable
PDR.85	All required documentation as specified in section 3.1 for the project prior to the baseline reevaluation.	Not applicable. No baseline reevaluation.
PDR.86	All required documentation as specified in section 3.1 for the project after the baseline reevaluation including the reevaluation period.	Not applicable. No baseline reevaluation.
PDR.87	A narrative of the reevaluation including any obstacles and how	Not applicable. No baseline

PDR #	Requirement	Applicability
	they were overcome.	reevaluation.
PDR.88	A map of the new reference area.	Not applicable. No baseline reevaluation.
PDR.89	Summary of new data observed in the new reference area.	Not applicable. No baseline reevaluation.
PDR.90	The re-parameterized values $\hat{\alpha}$, $\hat{\beta}$ and $\hat{\theta}$.	Not applicable. No baseline reevaluation.
PDR.91	A list of alternative land use scenarios to the project.	Applicable
PDR.92	Justification for the selected baseline scenario. This justification can include expert knowledge, results from the participatory rural appraisal and ex-ante estimates of avoided emissions.	Applicable
PDR.93	An investment or barriers analysis proving that the project is not the most economical option	Applicable
PDR.94	A common practice analysis including a list of project activities and the drivers of deforestation that they address.	Applicable
PDR.95	Evident compliance with the minimum requirements of the aforementioned VCS tool. This evidence may be the same as the evidence provided to meet reporting requirements listed in section 4.	Applicable
PDR.96	A list of project activities designed to mitigate leakage.	Applicable
PDR.97	A map of the delineated boundaries.	Applicable
PDR.98	Maps of the landscape configuration, including: a. Topography (elevation, slope, aspect); b. Recent land use and land cover (either a thematic map created by the project proponent or publically available map); c. Access points; d. Soil class maps (if available); e. Locations of important markets; f. Locations of important resources like waterways or roads; and g. Land ownership/tenure boundaries.	Applicable
PDR.99	A narrative describing the rationale for selection of activity-shifting leakage area boundaries.	Applicable
PDR.100	Results of a spatial analysis to demonstrate the activity-shifting leakage area is entirely forested as of the project start date.	Applicable
PDR.101	Results of a spatial analysis to demonstrate the activity-shifting leakage area is no larger than the project accounting area.	Applicable
PDR.102	The selected discount factor p_{LME}	Not applicable. No market effects leakage.
PDR.103	Calculations of C_{LAGMT} in the market-effects leakage area, including references to literature if cited.	Not applicable. No market effects leakage.
PDR.104	If the lowest discount factor (0.1) is selected from Table 6 of the methodology or is not determined using a market-effects leakage area, the project description shall include the following: Justification for the selection of the discount factor.	Not applicable. No market effects leakage.
PDR.105	A map of the delineated boundaries.	Not applicable. No market effects leakage.
PDR.106	Maps of the landscape configuration, including: a) topography (elevation, slope, aspect); b) recent land use and land cover (either a thematic map created by the project proponent or publicly available map; c) access points; d) soil class maps (if available); e) locations of important markets; f) locations of important resources like waterways or roads; and g) land ownership/tenure boundaries.	Not applicable. No market effects leakage.
PDR.107	A narrative describing the rationale of selection of market-effects leakage area boundaries.	Not applicable. No market effects leakage.
PDR.108	Results of a spatial analysis to demonstrate the market-effects leakage area is entirely forested as of the project start date.	Not applicable. No market effects leakage.
PDR.109	Results of a spatial analysis to demonstrate the market-effects leakage area is as large or larger than the project start date.	Not applicable. No market effects leakage.
PDR.110	The projected avoided baseline emissions, project emissions and leakage for each monitoring period over the lifetime of the project.	Applicable
PDR.111	A narrative description of sources used to estimate the leakage rate and demonstration that the estimated rate is conservative.	Applicable
PDR.112	If included in project activities, a description of procedures used	Applicable

PDR #	Requirement	Applicability
	to estimate the rate of biomass burning and charcoal production and demonstration that these estimates are conservative.	
PDR.113	The value for each variable in Appendix G.	Applicable
PDR.114	Summary of sampling procedures for the project accounting areas, with a copy of a sampling protocol used to carry out measurements.	Applicable
PDR.115	Summary of sampling procedures for the proxy areas, with a copy of a sampling protocol used to carry out measurements.	Applicable
PDR.116	Summary of sampling procedures for the activity-shifting leakage areas, with a copy of a sampling protocol used to carry out measurements.	Applicable

1. PROJECT DETAILS

1.1 Summary Description of the Project

The Lower Zambezi REDD+ Project (Project) is a reducing emissions from deforestation and degradation (REDD+) project on 40,126 ha (ha) of privately-owned land in Rufunsa District, Zambia (See Figure 2). The Project Area is known as 'Rufunsa Conservancy' (Conservancy), and is owned by a Zambian company named Sable Transport Limited. The Conservancy is one of the last intact areas of forest within Lusaka Province (named after the nearby capital city), and provides a 60-kilometer buffer to Lower Zambezi National Park (NP), a strategic protected area in Zambia in a globally significant trans-frontier conservation area. Lower Zambezi NP is adjacent to Mana Pools National Park in Zimbabwe which is a UNESCO designated World Heritage Site. The population of the Project Zone is approximately 8,300 people living in 28 villages spread within 4 community zones.

The Project Proponent is BioCarbon Partners, which is responsible for getting the Project certified and for early-stage Project finance.

The core project climate accounting activities undertaken include forest carbon inventorying, modelling cumulative deforestation patterns, and soil carbon assessments. Core community project activities include up to eighteen different types of community-based deforestation mitigation initiatives designed to create sustainable, scalable alternatives to deforestation, and strategic, meaningful incentives that comprise part of pay for performance programs that support forest conservation. Core biodiversity project activities include forest conservation systems, biodiversity monitoring and management, and fire management.

The Project has been certified triple gold under the Climate, Community and Biodiversity Standard (CCBS, Second Edition, Project No. VO12079, <http://www.climate-standards.org/2013/03/13/lower-zambezi-redd-project/>). CCBS validation was achieved on 21 June 2013 and the project is one of the few to achieve certification for gold level community, biodiversity and climate benefits in Africa (Annex F). Furthermore, the Project is aligned with the Government of the Republic of Zambia's (GRZ) National REDD+ Program, implemented through the Forestry Department.

The project start and implementation date is 1 October 2009 and will be operational until 1 October 2039. The total estimated Gross Emissions Reductions over the project lifespan are 7,164,240 tCO₂e averaging 238,808 tCO₂e/yr.

1.2 Sectoral Scope and Project Type

VCS Sectoral Scope 14 - Agriculture, Forestry, and Other Land Uses (AFOLU), project activities Reduced Emissions from Deforestation and Degradation (REDD), using Methodology for Avoided Deforestation, VM0009 V2.1 and qualifies as baseline type U3. This project is not grouped.

1.3 Project Proponent

BioCarbon Partners is the project proponent. It is a Mauritian registered company with the explicit aim of implementing REDD+ projects in African dryland forests.

Organization name	BioCarbon Partners
Contact person	Dr. Hassan Sachedina
Title	Managing Director
Address	5th Floor, Barkly Wharf, Le Caudan Waterfront, Port Louis, Republic of Mauritius
Telephone	+260971729034
Email	hassan@biocarbonpartners.com

1.4 Other Entities Involved in the Project

BioCarbon Partners Limited, a Zambian registered limited company, provides employment for the project in Zambia.

Community-based deforestation mitigation projects connected to the Lower Zambezi REDD+ Project (LZRP) are launched and supported through the BCP Trust, a Zambia-registered not-for-profit affiliate of BCP Ltd. BCP has partnered with Musika Development Initiatives Ltd., a local Zambian not-for-profit company that specializes in agricultural value chain development. Musika has seconded a full-time agricultural extension officer to BCP. The Conservation Farming Unit is assisting BCP in the development of conservation agriculture projects. The United Nations Development Programme's African Training and Management Services Project is supporting this project with specific financial resources for staff training. This funding is being utilized according to a training plan that specifically targets building REDD+ project capacity for Zambian staff, in particular local community members.

Table 1 Other entities involved in the project

Organisation	Capacity	Contact	Address
Musika Development Initiatives Ltd	Technical Partner	Mr. Rob Munro	6 Tukuluho Rd. Longacres Post Net No. 481 Private Bag E891 Lusaka, Zambia
Conservation Farming Unit	Technical Partner	Mr. Peter Aagaard & Mr. Collins Nkatiko	23 B Twin Palm Rd Kabulonga Lusaka, Zambia 10101 Tel: 260-11-265455 Fax: 260-211-264781 cfu@zamnet.zm
BioCarbon Partners Trust	Implementing Partner	Ms. Molly Crystal	6 Tukuluho Rd. Longacres Post Net No. 481 Private Bag E891 Lusaka, Zambia

1.5 Project Start Date

PDR.6 The project start date.

1 October 2009

Sable Transport Ltd. has protected Rufunsa Conservancy since receiving title to this area in 2001. However, the Conservancy has been run on an annual loss-making basis since 2001. Sable Transport was approached by entities interested in generating carbon finance from Sable Transport owned properties in the mid 2000s. However, at this time, there was no clear mechanism for forests to generate carbon finance from avoided deforestation. As set out in the VCS AFOLU Requirements (Version 3.3, 2012): “...the project start date of an AFOLU project shall be the date on which activities that lead to the generation of GHG emission reductions or removals are implemented. Such activities may include preparing land for seeding, planting, changing agricultural or forestry practices, rewetting, restoring hydrological functions, or implementing management or protection plans”.

Following a period of uncertainty surrounding the title cancellation in 2007, a period of limited activity followed while the *de jure* status of Rufunsa Conservancy was resolved.

However, following the Consent Order being clearly resolved in favour of the landowner in 2009 increased and concerted efforts to mitigate GHG activities were initiated in 2009 by the landowner which included fire management and forest patrols. The project start date is thus 1st October 2009.

1.6 Project Crediting Period

PDR.7 The project crediting period start date and length.

The project crediting period starts on the project start date - 1 October 2009 and ends on 1 October 2039, but the carbon rights covenant does provide the option of renewing the project. The project crediting period is renewable.

PDR.8 The dates for mandatory baseline re-evaluation after the project start date.

1 October 2019

1 October 2029

PDR.9 A timeline including the first anticipated monitoring period showing when project activities will be implemented.

Table 2: Timeline of project activities

Date	Project Activity or Event
2001	Introduced Property titled in favour of Sable Transport Ltd.
2004	World Bank approaches Sable Transport Ltd. with carbon finance proposal for Kafue Sugar
2007	Title to Rufunsa Conservancy threatened with cancellation
2009	Title reinstated in full to Sable Transport. Activities mitigating GHG activities implemented.
2009-2011	Sable Transport seeks alternate sources of finance for conservation management, including carbon
July 2011	Sable Transport signs MoU for REDD+ viability on Luangwa land unit
December 2011	Sable signs non-disclosure agreement with BCP for Rufunsa property
January 2012	MoU between BCP and Sable Transport for Rufunsa Conservancy signed
February 2012	Project Activities Start
March 2012	Viability field work - Report written
February 2012	Project Activities Start

Date	Project Activity or Event
March 2012	Viability field work - Report written
August 2012	Carbon Rights Covenant signed between BCP and Sable Transport (Annex B)
June 2013	Climate Community and Biodiversity Alliance Validation (Triple Gold)
December 2013	First VCS Verification Event
November 2014	Second VCS Verification Event

PDR.10 A timeline for anticipated subsequent monitoring periods.

From 2014 onwards monitoring will take place annually as per Table 3.

Table 3. Timeline of project milestones.

Milestone	Date
Project start date	1 October 2009
Project crediting period	30 years
Length of project	30 years
First carbon stock monitoring	February 2012
First assessment and quantification of socio-economic indicators	March 2012
Start date of community projects	February 2012
CCB Validation	June 2013
CCB Verification	June 2015 or as required
VCS Validation and 1st Verification	December 2013
VCS verification interval	Annual from 2014 onwards or as required
Periodicity of baseline re-evaluation	10 years after start date, 2019, 2029
Community impact monitoring	Every five years, 2013, 2018, 2023, 2028, 2033, 2038
Carbon Stock Monitoring	Annually, 20% of permanent plots per annum.
Leakage monitoring	Annually, all 30 plots
Charcoal production	Monthly
Disturbance monitoring	Monthly in fire season

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project	x
Large project	

Table 4. Estimated project emissions reductions (net = GER – Buffer Account) (Annex J).

Years	Estimated GHG emission reductions or removals (tCO ₂ e)
2009	30,756
2010	122,020
2011	122,020
2012	122,355
2013	129,866
2014	158,412
2015	173,552
2016	187,627
2017	207,517
2018	212,656
2019	227,946
2020	235,764
2021	249,967
2022	273,756
2023	265,137
2024	260,782
2025	273,047
2026	286,282
2027	289,486
2028	266,296
2029	258,911
2030	247,001
2031	248,042
2032	272,905
2033	226,053
2034	225,854

Years	Estimated GHG emission reductions or removals (tCO ₂ e)
2035	201,467
2036	208,766
2037	200,717
2038	124,510
Total estimated ERs	6,309,472
Total number of crediting years	30
Average annual ERs	210,316

1.8 Description of the Project Activity

The specific objectives of the Lower Zambezi REDD project are as follows:

- The long-term conservation of the Miombo woodlands on Rufunsa Conservancy by means of income generated through REDD+ activities focussed on avoiding deforestation of Rufunsa Conservancy and in the process, avoidance of CO₂e emissions from land use change.
- Enhancement of biodiversity on Rufunsa Conservancy through efficient conservation practices such as forest patrol and controlled burning practices (Table 5 and Annex Y).
- Manage Rufunsa Conservancy as a buffer zone for Lower Zambezi National Park and Chiawa GMA and as a wildlife corridor.
- Manage Rufunsa Conservancy to contribute to a potential corridor between Lower Zambezi NP and South Luangwa National Park.
- Improve and expand the habitat of key large mammal HCV species such as elephant, African wild dog, leopard, sable antelope, roan antelope and lion.
- Manage Rufunsa Conservancy as a potential source pool of threatened or depleted populations in LZNP.
- Watershed management to ensure year round flows of water in the Chongwe and Mwambashi Rivers as key dry season water sources for Lower Zambezi NP (Annex Y).
- The creation of employment opportunities for people living in the project zone in sustainable industries, thus mitigating deforestation.
- Fire management – implementation of an ecologically sound fire management system that is aimed at preventing potentially catastrophic late season fires through a firebreak system, early and cool season burns.
- Alleviation of poverty in neighbouring communities within the project zone through establishment of a suite of sustainably managed economic activities that will reduce deforestation, including sustainable charcoal production and conservation agriculture initiatives.
- Support towards the delivery of critical social services, particularly education, health, sanitation and access to water.

- Assisting rural farmers in the project zone to gain access to markets and improved agricultural value chains.
- Training rural farmers in conservation farming techniques that allow them to be more efficient on small areas of land, reducing their need to clear new areas of forest to expand fields or engage in charcoal production for additional income.
- Assisting rural farmers with their expansion of produce including non-timber forest products such as honey production.
- Piloting the use of “community covenants” as a tool to link community activities to mitigate deforestation and biodiversity threats.

These core objectives will be achieved through three main activity types, which are specifically described and outlined in further detail in the table below. Key project activities include: Community Sensitization, Education and Consultation, to ensure that stakeholders understand and support the objectives of BCP’s project activities, and are meaningfully involved in decision-making processes so as to ensure local legitimacy and buy-in to the project. Community-Based Deforestation Mitigation Projects, which address (reduce) local drivers of deforestation by improving local livelihoods and by providing meaningful alternatives to deforestation-dependent livelihood activities. Protection, Enforcement and Monitoring activities additionally ensure that project boundaries are known and respected by all parties, and that on-going carbon stock monitoring activities take place. All project activities are designed to run the length of the project.

Key project activities with a description of how they will achieve GHG emissions reductions are listed in Table 5 below. All of these project activities are anticipated to continue throughout the lifetime of the project.

At the time of preparing this PD, the Zambian government was yet to establish any Jurisdictional REDD+ programs in Zambia. As such this project makes use of a project level baseline whose characteristics are described in this document and is therefore not located within a Jurisdictional REDD+ program.

Table 5: GHG Mitigation Activities of LZRP

Project Activity	Project Description	Project Start Date
Community Sensitization, Education and Consultation: stakeholders understand and support the objectives of BCP's project activities, and are meaningfully involved in decision-making processes so as to ensure local legitimacy and buy-in to the project.		
Community Sensitization, Education and Consultation	BCP works closely with local representatives and traditional community leaders to identify local causes and drivers of deforestation, and to design projects that are anticipated to meaningfully and sustainably address them. BCP's community-based approach allows project activities to benefit from local knowledge, legitimacy and support. Since February 2012, BCP representatives have engaged with local communities through a robust and extensive "community consultation and sensitization" process, which adheres to the principles of obtaining Free, Prior and Informed Consent (FPIC) from local stakeholder communities. We have thus far consulted over 86% of community stakeholders, and benefit from a 96% approval rating among stakeholders surveyed at community meetings.	February 2012

School Environmental Education Program	BCP aims to reach out to youths to raise awareness about forests and the environment. By teaching youths about the dangers of deforestation, and raising awareness about alternative activities, BCP hopes to change attitudes and actions, and to promote “better practices” and improved awareness among future generations. Beginning in 2013, BCP coordinated for the instruction of short “environmental awareness” programs at community schools. In November 2013, BCP will launch an intensified Environmental Education Program, which includes intensive teacher training and the provision of specific training materials and course handbooks for students, which fits within the national curriculum. This program will be a robust way of consistently engaging with youth in a meaningful way, to raise awareness about environmental protection.	February / November 2013
Scholarship Program	Designed to facilitate access to high quality education services for youth with demonstrated academic ability and interest in environmental issues. This program will promote education, youth involvement in and enthusiasm for environmental protection, and will support and develop young leaders as activists and ambassadors who can help to spread messages about forest protection and promote involvement in alternative activities.	January 2015 (Planned)
Forest Football and Environmental Education Program	The Forest Football programme specifically targets youth for involvement in environmentally conscious activities, as well as promoting a healthy lifestyle that emphasizes alternatives to engaging in deforestation (as well as other less-desirable activities, that similar programs are generally designed to steer youths away from).	January 2014

Governance: Institution Building	BCP has worked with local communities to develop and support 'hybridized' community decision-making institutions, called Zone Development Committees (ZDCs). ZDCs address (avoid) problems of elite capture by combining local, democratically elected representatives from each village with local traditional leaders, to allow decisions about project activities to simultaneously benefit from local knowledge and support, as well as legitimacy maintained through the inclusion of traditional leaders. BCP meets regularly with ZDCs in each of the 4 community zones for the Lower Zambezi REDD+ Project, to promote local sensitization and understanding of project activities, solicit feedback, and discuss upcoming project activities (including: project identification, project design, and project implementation).	January 2013
Community-Based Deforestation Mitigation Projects: address (reduce) local drivers of deforestation by improving local livelihoods and by providing meaningful alternatives to deforestation-dependent livelihood activities.		
Agro-forestry	Promotes tree-planting and reforestation projects, particularly those with a commercial or food security improvement aspect (such as agro-forestry activities in combination with vegetable gardens or conservation farming plots).	November 2012

Conservation Farming	BCP's Conservation Farming Training Program (CFTP) is led in partnership with the Zambian Conservation Farming Unit (CFU) and Musika Development Initiatives. The CFTP is designed to teach farmers how to become more efficient and productive on their farms, with an aim to improving local food security and reducing two of the strongest local drivers of deforestation: clearing for agricultural expansion, and clearing for charcoal production (to earn income to supplement incomes from agriculture). There are six main 'interventions' promoted by the CFTP: 1. Early Planting – helps farmers to take advantage of "natural fertilizer" from first rains 2. No burning of crop residue – improves soil health, reduces emissions 3. Minimum-tillage basins – allows farmers to plant without needing animals to plow (less labour, less expensive, and allows for early planting that allows for "natural fertilizer" from first rains) 4. Precision farming – higher efficiency; maximum yields from minimum inputs 5. Agro-forestry – helps to minimize inputs (fertilizer) over time; <i>Faidherbia albida</i> trees provide natural fertilizer 6. Inter-cropping, crop rotation, diversification – help farmers to remain productive on the same area of field/farm over time (reduces need to clear new areas of fields)	November 2012
Eco-Tourism	The involvement of local community stakeholders in Eco-Tourism activities is designed to achieve two main aims: 1) To provide local stakeholders with income through employment created through the tourism activities, and 2) To help local stakeholders to perceive and receive tangible benefits from their (protected) forest environment.	August 2013

Improved Small Livestock Production	Throughout BCP's extensive first round of the community "Project Identification and Design Process," which was designed to solicit detailed community feedback concerning priority project activities, Small Livestock Projects were consistently and frequently identified as a top-priority project activity. BCP's small livestock projects are designed to simultaneously improve local food security and help participants to develop small-scale community-owned livestock businesses that can generate income for participants. Participation in livestock project activities is linked to deforestation mitigation through the use of Community Covenants, which restrict participation to those members who agree not to engage in deforestation or poaching activities inside the project area of Rufunsa Conservancy. In February 2013, BCP launched a "pilot" round of 23 Village Chicken projects taking place throughout the Project Zone. On-going "success and compliance" monitoring activities are taking place, and there is much reported enthusiasm for the project. By December 2013, the project is anticipated to "intensify" through the provision of improved business training to project groups. In 2014, groups will begin to receive focused "small business development" training. Additional goat, duck, pig and cattle projects are currently under consideration, as well as fish farming activities.	February 2013
--	--	----------------------

Community Livestock Worker Program: Improved Animal Care	The Community Livestock Worker (CLW) Program is designed to train representatives from each village in the improved care of livestock, and facilitate their access to necessary training, information and resources that will help to improve local care for livestock animals. This program is designed to provide support to BCP livestock projects, as well as to improve health of livestock living within the project zone, overall. In so doing, BCP hopes to help rural stakeholders to develop livestock rearing activities as sources of food and income for their families, reducing their current 'need' to engage in deforestation-related activities to access income. As such, the CLW project supports and is part of other efforts to develop viable alternatives to deforestation within the project zone.	June 2013
Solar Technology Extension Project	This project is designed to reduce local practices of using firewood for lighting, to help promote the availability of alternative solar technologies, and to empower local "extension agents" as operators of their own small-scale solar businesses. Increased access to solar technology also promotes other forms of development, for example, by facilitating children to study for school at night.	June 2013
Miombo Mushroom Business	Promotes the collection and growing of mushrooms as forest-compatible activities that promote forest protection and the sustainable use of natural resources, with the aims of improving food security and developing an alternative source of income for local families who wish to participate in the commercial sale of mushroom products.	October 2013

Seasonal Thatch Business	Facilitate local, traditional practices of collecting thatch, by linking participants to transportation 'at cost' and access to markets for their thatch products. In so doing, the project is designed to develop a small business opportunity that additionally reduces fuel-loads for hot late-season fires.	June 2014 (Planned)
Social Services (ex: school, borehole, clinic)	BCP's social service projects are intended to improve quality of life for residents within the project zone, and to ensure that our project activities are designed to target and involve the "poorest of the poor", defined, for example, as those who cannot otherwise access decent educational facilities, medical care or clean water supplies. - In October 2012, BCP refurbished the borehole for central Ndubulula Zone (Kantiantya village). - In February 2013, BCP collaborated with Forestry Department to assist with the planting of 2 School Fruit Orchards, in Mweeshang'ombe and Chilimba Zones. - In April 2013, BCP provided solar lighting to the Namanongo Clinic. - In June and August 2013, BCP provided support (locks, desks) to classrooms at Chilimba School Additional project activities are planned, and will continue to be scheduled according to newly prioritized needs.	October 2012

Sustainable Eco-Charcoal Production	BCP's flagship Sustainable Eco-Charcoal project combines sustainable harvesting practices taking place on protected areas of (degraded) community forest, improved higher-efficiency kiln technologies, and critical value chain interventions (such as access to transportation "at cost" for sustainably produced products), with the aim of creating strong incentives for rural producers to switch from current unsustainable charcoal production practices to sustainable charcoal production practices. The project is designed to replace unsustainable harvesting practices with sustainable practices that allow for the regeneration of forests, promote community-based forest protection, and improve rural producer livelihoods through the development of a commercially viable sustainably harvested charcoal product.	August 2012
Sustainable Honey Production	BCP aims to promote honey production as an alternative source of food and income among rural stakeholders. Since honey production is reliant on the protection of forest areas, the project will also create an incentive for participants and beneficiaries from the project to protect areas of forest where the production is taking place. BCP will help to connect participants to markets for locally produced honey. We have already formed a strategic partnership with a large-scale honey seller in Zambia.	March 2014 (Planned)

Sustainable Hydra-Form Brick Making	Hydra-form bricks require less cement and do not require wood-firing. BCP has purchased a hydra-form brick-making machine, which will be used for the construction of BCP facilities and can be loaned to community projects (such as classroom construction). In the long-term, a hydra-form brick making 'business' involving employees from the local community will simultaneously create local employment and reduce the high prevalence of deforestation for wood-burning kilns for 'traditional' bricks.	July 2013
Tree Planting (woodlots), Tree Nurseries, Orchards	BCP's tree planting and afforestation projects are the result of a strong partnership and collaboration with the Zambian Forestry Department. In February and March 2013, over 500 trees were planted in 2 School Fruit Orchards, as part of a community 'nursery' project, as well as a forest rehabilitation project connected to the Sustainable Eco-Charcoal Project. Tree planting will be promoted as a means of afforestation and improved forest management, which can additionally support the health of forest-compatible projects that promote the sustainable management of forest resources, as well as commercial opportunities for communities that wish to develop and manage local nurseries.	February 2013

Crop Diversification	As a key element to the Conservation Farming Training Program (CFTP), crop diversification will be promoted through BCP's strategic partnership with Musika Development Initiatives, an organization committed to connecting rural producers to urban markets. Crop diversification will promote long-term field health, increase yields, and improve household resilience in the face of climactic changes or other unexpected phenomena, reducing the likelihood of total poverty or livelihood destruction, especially among the 'poorest of the poor', as a result of such unfortunate events.	June 2013
Vegetable Production	BCP will promote rural stakeholders interested in forming vegetable gardens, either as family food sources or commercial business opportunities, by facilitating their access to training and inputs through partner organizations such as Musika. Vegetable production projects are designed to improve food security and to provide alternative sources of income, reducing the need that many households currently face to engage in deforestation to access food or income.	March 2014 (Planned)
Sewing Project	BCP works with interested participants (especially women's groups) to develop commercially viable sewing projects, which are ultimately intended to turn into locally-owned small businesses. BCP has already begun employing local women with sewing training to assist with the completion of items for the Rufunsa Conservancy Headquarters.	April 2013

Edible Insect Project	This forest-compatible edible insect harvesting project is designed to simultaneously: 1) improve food security among participants and beneficiaries, 2) increase income/provide an alternative source of income among participants who wish to sell locally, sustainably harvested edible insects as part of a small-scale community-owned business, and 3) to promote protection of community forests where edible insects can be harvested. As such, this project is designed to promote forest protection, address/reduce local drivers of deforestation (including poverty and lack of access to alternatives) and improve local livelihoods.	2015 (Planned)
Savings and loans groups	BCP facilitates community access to training and support/resources for community Savings and Loans groups. This project will be administered through a strategic partnership with a local organization. Savings and Loans groups will be designed to help rural stakeholders to develop their own alternatives to deforestation, and improve access to financial resources for household wellbeing.	2015 (Planned)
Employment	BCP views meaningful job creation as one of the strongest and most sustainable ways of providing an alternative livelihood opportunity to local stakeholders. By providing community stakeholders with regular alternative sources of income, BCP hopes to drastically reduce the pressures they otherwise face to engage in deforestation-dependent activities, such as charcoal production, to earn income.	March 2012
Protection, Enforcement and Monitoring: project boundaries are known and respected by all parties, and on-going carbon stock monitoring activities take place.		

Forest Monitors and Scouts	Trained security teams comprised of local community members patrol and secure the project area, reporting any acts of deforestation or wildlife poaching that take place. Particular emphasis is placed on protecting the perimeter of the property, especially the boundary adjacent to community lands, with an aim to preventing further encroachment of the project area. Security activities will be undertaken through close collaboration with the Forestry Department, Zambian Police and the Zambia Wildlife Agency (ZAWA). Security teams will also be trained in effective conflict resolution practices, for example, effective communication styles for pursuing non-confrontational discussions with local community stakeholders. BCP's Forest Monitors are also engaged in on-going comprehensive biodiversity monitoring programs, which are designed to track the ongoing impacts of BCP's REDD+ activities on local wildlife.	2005
----------------------------	---	------

Boundary Demarcation	In October 2012, BCP undertook a “boundary demarcation” activity along the Northern boundary of the property, which separates the project area from community lands. The purpose of this activity was to ensure local community stakeholder awareness and acceptance of project area boundaries, in the interest of reducing the potential of conflict stemming from confusion about the boundary location. This activity was undertaken in cooperation with the Principal Surveyor from the GRZ Ministry of Lands, to ensure correctness and legitimacy of the demarcation in the eyes of all stakeholders, including local government authorities. In the demarcation process, local traditional leaders, BCP representatives, and the GRZ Surveyor walked along the demarcated boundary, following the GPS points listed on the original Title Deed and beacons that had been placed on the ground to mark the boundary. BCP representatives painted trees along the boundary, to provide a more visual demarcation than the beacons had originally provided. Demarcation activities are expected to continue in 2014, as BCP would like to provide a more ‘permanent’ and visually clear demarcation than simply painting trees, and in order to extend the length of boundary that was reviewed by community stakeholders and the GRZ Surveyor, to reduce the potential for confusion or conflict.	October 2012
----------------------	--	--------------

Community-Based Forest Biomass and Carbon Stock Monitoring	BCP's "Plot Team," comprised of local community members, has pioneered the use of innovative digital biomass data collection systems, using Smartphone devices, in order to collect important data concerning forest carbon stocks in Rufunsa Conservancy. Members of BCP's community-based Plot Teams have received intensive training in tree and soil sampling, and the use of Smartphone technology to collect data used for carbon accounting. BCP's community-based Plot Team serve an important dual-function of promoting community involvement and ownership of local forest resources, and ensuring high quality data collection for the purposes of our carbon accounting.	March 2012
Social Monitoring Program	BCP's robust Social Monitoring Team Standard Operating Procedure (SOP) calls for the on-going monitoring and evaluation of the impacts of project activities on local stakeholder livelihoods. This will allow BCP to ensure that it's project activities are effectively designed (and re-designed, as necessary) to achieve their aims of positively impacting local communities and effectively addressing (reducing) local drivers of deforestation. In 2012, BCP completed a robust and representative Baseline Survey of community stakeholders living within the project zone for the Lower Zambezi REDD+ Project. Throughout 2013, as BCP has continued to implement a variety of project activities, BCP representatives have collected data through project-specific surveys that are specially designed to track the impacts of each project.	August 2012

Community Covenants	BCP has pioneered the use of innovative “Community Covenants,” which are written contracts between BCP and project participants that explicitly link participation in BCP-supported projects to achievable forest protection aims. For example, all BCP employees from local communities are required to sign a Community Covenant, written into their employment contract, which specifies the conditionality of their on-going employment on their agreement to stop any deforestation activities taking place in the project zone. The purpose of the Community Covenants is two-fold: first, Community Covenants provide a direct and explicit link between BCP’s activities and reductions in deforestation activities taking place within the project zone. Second, Community Covenants prevent/reduce the risk of adverse effects from project activities or benefits, for example, BCP does not want community stakeholders to use their incomes from employment with BCP in order to fund charcoal production or poaching activities that threaten the project.	August 2012
---------------------	--	-------------

Table 5 outlines the comprehensive suite of project activities promoted by the Lower Zambezi REDD+ Project, which are collectively designed to mitigate GHG emissions by meaningfully addressing (and reducing) local drivers of deforestation and providing robust monitoring and enforcement systems for measuring and ensuring GHG emissions reductions. Critically, BCP’s community-based deforestation mitigation projects are also designed to mitigate leakage, by sustainably and holistically addressing local drivers of deforestation, rather than merely displacing them. These projects are taking place in the project zone, which is directly adjacent to the LZRP project area of Rufunsa Conservancy.

Key GHG emissions and leakage mitigation activities promoted by these projects include:

The Lower Zambezi REDD+ project will mitigate GHG emissions from several angles:

1. *Sustainable eco-charcoal*: A sustainable eco-charcoal pilot programme, situated outside of the project accounting area, has been launched that is designed to:
 - a. Absorb unsustainable charcoal producers (agents) into sustainable charcoal production, and to enhance their livelihoods from sustainable forest management;
 - b. Scale up so that more agents and sustainably managed community forests are involved in a recognized eco-charcoal scheme overseen by a body like the Zambian Forestry Department.
 - c. Enhance forest cover and integrity in eco-charcoal producing forests compared with adjacent unmanaged community forests through sustainable forest management. Our aim is to enhance carbon stocks in eco-charcoal forests (even while sustainably harvesting).
 - d. Currently, communities participating in the project's eco-charcoal pilot project are receiving between 20-50% more in payment for eco-charcoal than they would normally in the absence of this mitigation activity. The charcoal is produced in kilns that return up to 38% efficiency (rather than 8-10% under traditional systems), and use canopy branches that are normally burned as waste under traditional charcoal production. The production of more fuel from the same tree will contribute to reduced leakage. Increased financial benefits, lower labour inputs, and higher efficiency have already resulted in Headmen offering to include more community forest, and more households wanting to join the project. These interventions also create incentives for charcoal producers to join the program and adopt sustainable harvesting techniques in place of unsustainable production practices.

The eco-charcoal project is taking place outside of the project accounting area and reference area (but in the proxy area) (Figure 1). This forest would have been charcoaled in an unsustainable manner in the baseline scenario and converted to subsistence agriculture in areas of suitable slope. Emissions from this activity does thus not have to be accounted for as they would have taken place regardless, although to an even greater extent, in the absence of this project activity.

Eco-charcoal production is implemented according to well developed plans and protocols (see Annex Z and Annex AA).

2. *Subsistence Agriculture*: this is the final land use that follows charcoal production. Inefficient dry land agriculture results in reduced soil fertility within a few years and creates a need to expand the field, or open up a new one. The conservation farming training program aims to grow into a project zone level effort that reduces leakage by:
 - a. Increasing food production from already cleared areas to target self-sufficiency and market surpluses;
 - b. Providing crop diversification alternatives that are drought tolerant and are cash crops that have demand (i.e. pigeon peas);
 - c. Access to transport at cost to farmers who sign 'community covenants' to reduce charcoal production, poaching and field clearing.
 - d. This program is working in collaboration with a regional pioneering leader in Conservation Farming training techniques (Conservation Farming Unit¹). We feel that this program has the potential to scale up significantly and reduce the incentive to shift fields to outside the project area.
3. *Mitigation Activities and Community Covenants*: The implementation of community projects that improve livelihoods (reduce poverty) and provide meaningful alternatives to local drivers of deforestation (including charcoal production and the expansion of farmlands), through the introduction of diversified biodiversity-enterprises such as forest-compatible harvesting and production projects (mushroom production, dried fruit production, small livestock projects, Income Generating Activities, etc). Prior to project implementation, and following a lengthy stakeholder consultation process, participants in these deforestation-mitigation projects must sign Community Covenants. Community Covenants are clear written agreements between BCP and project participants, which document understanding that project investment is linked to the achievement of REDD+ targets such as reducing commercial charcoal production dependency and illegal wildlife poaching. Community Covenants demonstrate compliance with the principles of FPIC and formalize a pay-for-performance arrangement. These mitigation projects (other than CF and eco-charcoal) reduce the likelihood of activity-shifting leakage.
4. *Community Institution Building*: The project is focusing on building community governance structures to better manage community forests and natural resources. Through the formation of project related associations, and the Zone Development Committees, BCP is elevating decision making and transparency to a new level, while, most importantly, enhancing the value of forests as a collective resource. Prior to his passing, the local traditional leader, Chief Unda Unda publicly decried the negative impacts of charcoal production on his people and Chiefdom. The Lower Zambezi REDD+ Project has elevated the issue of communal forest allocations and accountability to a more vigorous debate stimulated, in part, through the higher value these forests can generate through this project.

¹ <http://conservationagriculture.org/>

A possible net result is that traditional leaders, due to increased community-led accountability and transparency, curb rampant charcoal forest allocations, and advocate for agents of deforestation to farm (using more sustainable, efficient conservation farming techniques) rather than produce charcoal. Traditional leaders and strong community social pressure can also be used to support social programmes designed to promote family planning and 'zoning' to control the responsible allocation of lands related to household expansion and/or immigration into the project zone.

5. **Employment:** Activity shifting could occur if the project reduces employment in the area and lowers income to the local population. The project, however, will have the opposite impact: agricultural intensification, eco-charcoal production, bio-enterprises and social services investment are designed to improve rural livelihoods, while the LZRP offers a direct employment opportunity for local community stakeholders. There are few, if any, sources for formal employment in the project zone and local employment is already being created by the project, directly improving the income of households in the project zone.

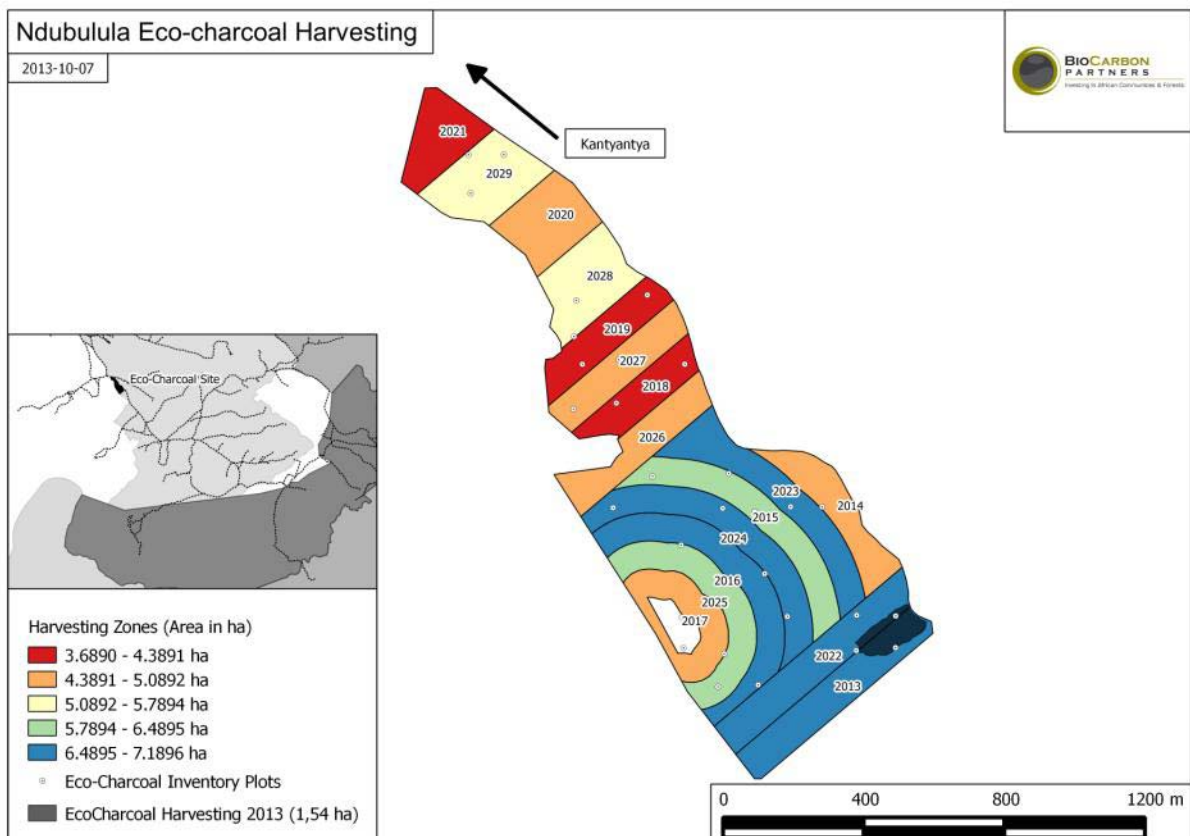


Figure 1. Map showing eco-charcoal forest with harvesting strips and its location in relation to the project area.

1.9 Project Location

The Lower Zambezi REDD+ project is located approximately 120 km southeast of Lusaka and falls within the miombo eco-region which is host to a plethora of endemic species. It falls within the recently declared Rufunsa district and borders the Lower Zambezi National Park to the east and south, Chiawa Game Management Area (GMA) to the west and the Soli Shamifwi Royal Establishment (Chief Unda Unda's Chieftdom) to the north (Figure 2).

1.9.1 Delineating the Spatial Boundaries

The project area is accessible by road via the small towns of Chinyunyu and Sinjela on all-weather dirt roads. The project area is the Rufunsa Conservancy, privately owned by Sable Transport Ltd, a local Zambian company. The project area consists primarily of intact, primary miombo woodland that has never been logged with some open grassland and deep ravines with dense Acacia woodland. The project area is 40,126 ha in size. A portion of Rufunsa Conservancy has been encroached by illegal charcoal producers and this area has been excluded from the project area (labelled Encroachment, Figure 2).

The activity shifting leakage area borders the project area in the south-west. There are access roads that reach the boundary of the leakage area (Figure 2)

There are an estimated 8,300 people living in the project zone (see Annex F for a detailed description and map of the zone) which falls in the Rufunsa district which is further divided into four zones and 28 villages. The project zone is bound between -15° 16' 57.72"S - 28° 58' 25.68"E (NW Corner) -15° 16' 57.72"S - 29° 23' 43.4394"E (NE Corner), -15° 35' 51.3594"S - 29° 23' 43.4394"E (SE Corner), and -15° 35' 51.3594"S - 28° 58' 25.68"E (SW corner).

PDR.4 A digital (GIS-based) map of the project area with at least the above minimum requirements for delineation of the geographic boundaries.

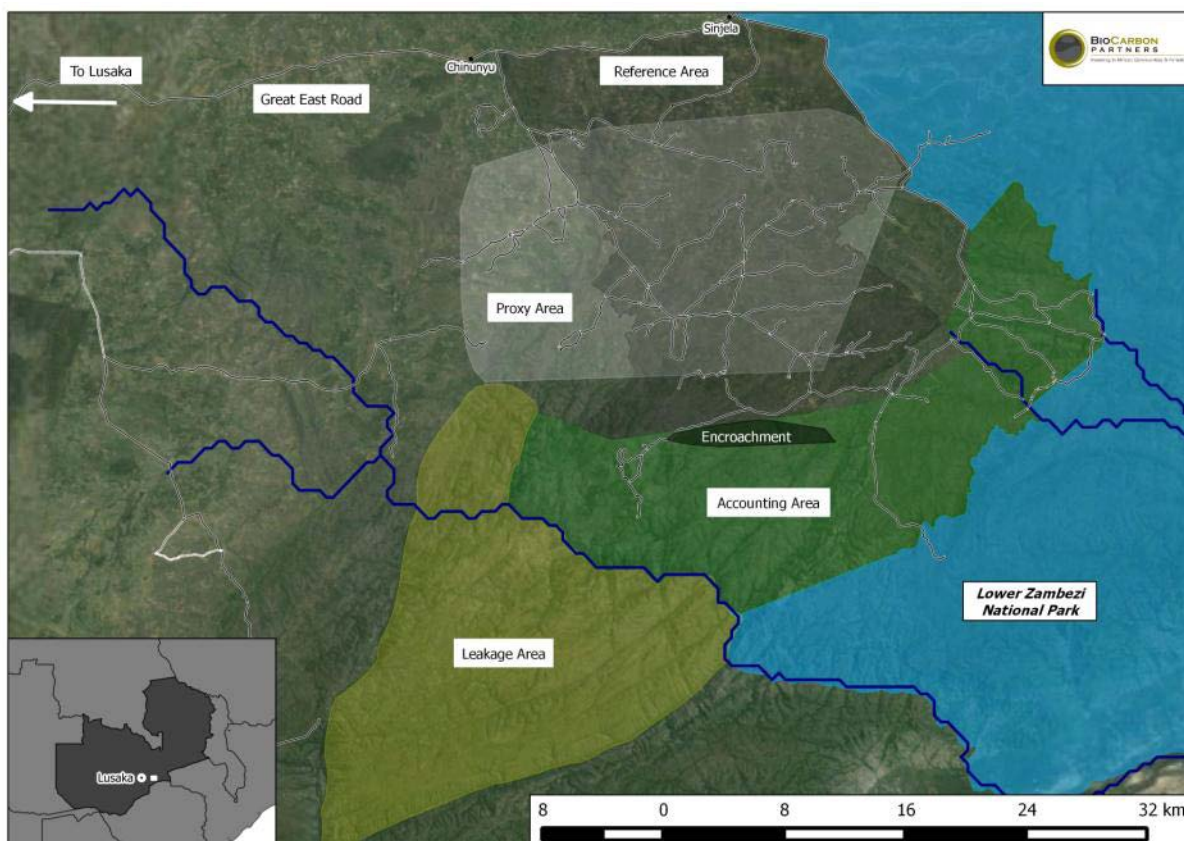


Figure 2. Location map for the Lower Zambezi REDD+ Project. Grey lines indicate the road network, note that there are roads leading to the leakage area.

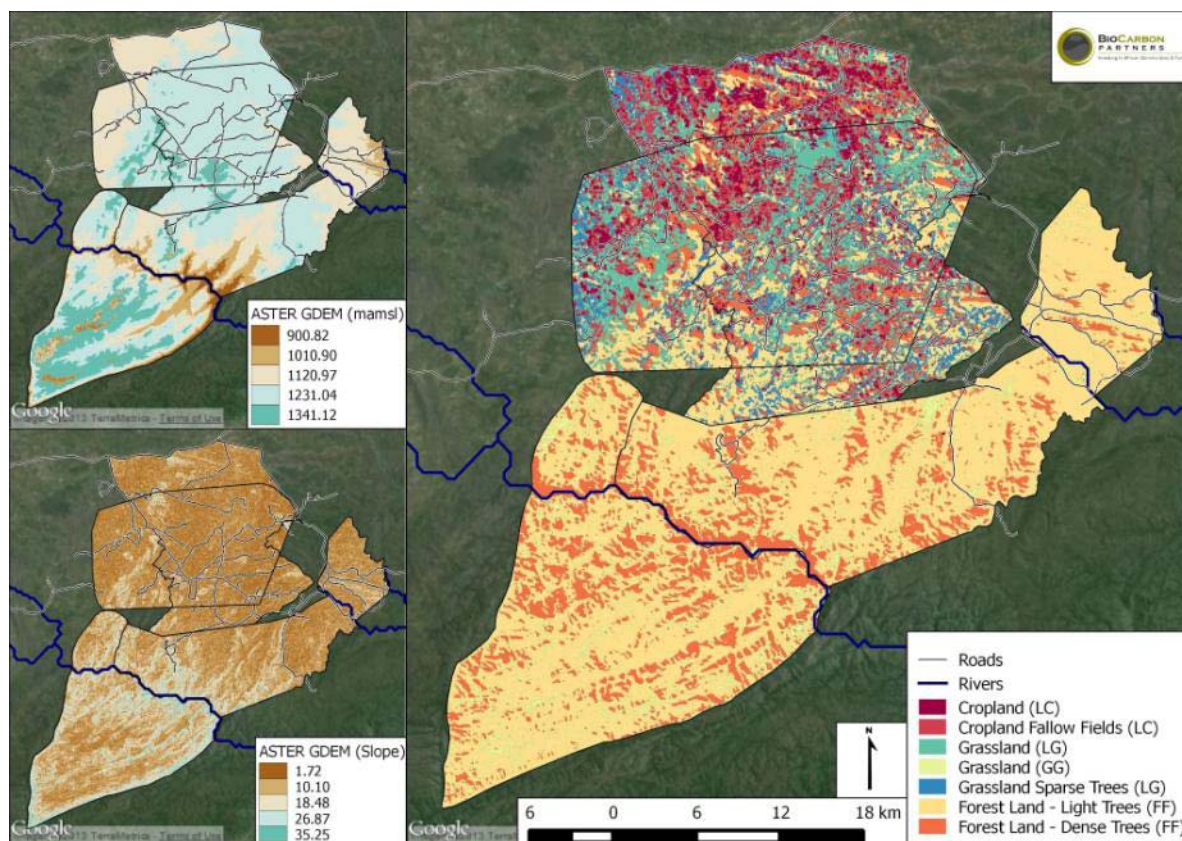


Figure 3. Land cover and topographical features of the Lower Zambezi REDD+ Project.

PDR.5 Credible documentation demonstrating control of the project area, or documentation that the provisos listed in the case of less than 80% project control at the time of validation delineated in this methodology are met.

The Lower Zambezi REDD+ Project is taking place on private property, namely Farm 1080 (Rufunsa Conservancy, see Annex A for Title Deed) with the full consent of the owner. There is a legally binding “Carbon Rights Covenant” between the landowners and BCP (Annex B) which gives the project proponent full access to the entire property. This easement agreement transfers the carbon and conservation rights of the project area to BCP. The landowner is a key beneficiary of this project, it is highly unlikely that this easement agreement will be challenged by the landowners. All necessary documentation regarding the landowner’s free, prior and informed consent for the project to take place on the project area is in place and will be provided to the Validator.

The Lands and Deeds Act, Cap 185 of the Laws of Zambia does permit the registration of easements over land. In particular, Section 50 of the Lands and Deeds Act generally provides that whenever any easement in or over land comprised in a provisional certificate or certificate of title is created, for the purpose of being annexed to, or used and enjoyed together with other land, the Registrar shall enter a memorial of the instrument creating such easement upon such Provisional Certificate or Certificate of Title and such memorial shall as from the date of entry thereof have the effect of including such easement in such provisions certificate or Certificate of Title of such other land as appurtenant to the land therein described.

The project accounting area further meets the definition of forest for the host country 10 years prior to project start date:

"land with tree crown cover of more than 10%, an area of more than 0.5ha and the trees must be able to reach a minimum height of 5m at maturity" (FAO 2000).

All areas of non-forest have been excluded from the accounting area. Please see Figure 8 and Figure 9 and Figure 10

1.10 Conditions Prior to Project Initiation

The aim of the project is the long term conservation of the forests on Rufunsa Conservancy. There is no intention to remove or harvest these forests. From the outside, the title holder acquired the project to manage it as a game ranch which ultimately relies on the forests for its existence.

1.10.1 Climate

The nearest meteorological station to Rufunsa Conservancy, run by the Zambian Meteorological Department,² is located in Lusaka and data from this station was used to describe the climate of the project area. Annual precipitation varies between 800-1100mm and falls primarily in the summer months from November to May. Zambia is well known for its annual variance in precipitation, placing even more significance on water catchments and the headwaters of rivers such as those found in the project area. Rainfall is strongly influenced by the movement of the Inter-Tropical Convergence Zone (ITCZ) as well as the El Niño/Southern Oscillation (ENSO) phenomenon. The climate is subtropical with three distinct seasons: the cool dry season from May to August, the hot and dry season from August to November, and the hot and wet season from November to April. The wet season is characterised by rainfall and thunderstorms, which occasionally are severe and sometimes contains hail. The regular pattern for movements of air masses generates a dominating wind direction from east-south-east during most parts of the year.

² <http://www.zmd.gov.zm/>

Temperatures in the region vary from above 30 degrees Celsius during the hottest month (October) to average daily temperatures of between 20 to 25 degrees Celsius at other times of the year.

1.10.2 Geology

The Rufunsa Conservancy geology is dominated by the Karoo supergroup, which covers almost two thirds of the present land surface of southern Africa. Rufunsa Conservancy formations contain significant amounts of carbonate rocks (Limestone and Dolomite) which are sedimentary in nature; quartzite and laterite. The geology results in a complex stepped landscape where higher lying areas are underlain by Kangaluwe and Rufunsa formations and lower-lying regions are made up of older basement rock formations. The topography is characterized as rolling hills with deep river valleys (Pettersen *et al.* 2012).

1.10.3 Soils

Within the project area the majority of the upland soils are orthic and are almost all sandy in nature, with little clay or organic component resulting in a low nutrient status. Their colour ranges from light-brown (sand-rich) to medium or slightly dark-brown where the organic component increases. Soils with a higher organic component are generally only found at a few locations in the main valley tracts. Locally, where the soils are iron-rich, which is where they overlay iron formation rocks, they are red-brown. Plateau soils derived from the basement complex geology result in the generally poor soils. This suggests that agriculture on these soils will be marginal due to acidity and lower fertility such that agents of deforestation will farm low quality maize in areas of the conservancy in a baseline scenario for 3-4 years following which, the process of slash and burn will be repeated in adjacent pristine Miombo woodlands. In addition, the poor quality of the soils results in highly erodible landscapes especially susceptible to gully type erosion (Pettersen *et al.* 2012).

1.10.4 Topography

Figure 3 shows topography of the Lower Zambezi REDD+ project area. The digital elevation model indicates that the topography of the reference area, project area and leakage area share common characteristics. The project area is characterised by gentle, undulating hills, interspersed by

This map was used to derive the project accounting area. The digital elevation data were derived from the ASTER GDEM Version 2 (NASA and Japan ASTER Program, 2011).

1.10.5 The types and conditions of vegetation within the project area

The Lower Zambezi REDD+ Project falls within the miombo ecoregion. Floristically, the miombo ecoregion forms a swathe of woodland that stretches from Tanzania to Angola, including Zambia, Zimbabwe, Mozambique and parts of Malawi. The miombo woodlands of this area are closely linked to the largest of White's (1983) Regional Centers of Endemism within Africa. Miombo plant communities are dominated by trees belonging to the family Caesalpiniaceae, characterized by *Brachystegia* and *Julbernardia* species (White 1983).

Historically, miombo forests had relatively low populations, partially due to poor soils, which made them less desirable for cultivation (Chenje and Johnson 1994). The human population of the miombo ecoregion is now relatively high, and growing.

The majority of the Rufunsa Conservancy consists of intact miombo woodland ranging from light to dense canopy cover (Figure 12).

Some of the common tree species found on Rufunsa Conservancy were *Brachystegia spiciformis*, *Brachystegia manga*, *Isobertinia angolensis*, *Julbernardia globiflora*, *Diplorynchus condylocarpon* and *Pseudolachnostylis maprouneifolia*. Other sub-dominant species included the important fruit tree *Uapaca kirkiana*, as well as *Syzygium guineense*, *Burkea africana*, *Lannea discolor*, *Piliostigma thonningii* and *Bobgunnia madagascariensis*. *Azelia quanzensis* is one of the few, sought after commercial timber species found on the property, albeit at very low densities.

Miombo is interspersed with some Munga woodland, dominated by *Acacia* species, which covers the bottoms of the less severe ravines. The most diverse vegetation type in the Lower Zambezi escarpment area is riverine forest in deep, protected ravines. These ravines are especially prominent along the courses of the Mwambashi, Chongwe and Musangashi rivers which traverse the project area.

1.10.6 Resource extraction

Rufunsa Conservancy has been under considerable threat of illegal charcoal production and subsistence agriculture, threats that could not be adequately addressed due to lack of funds and capacity. The deforestation threat is due to the reliance on unsustainable land use practices in the area surrounding the Conservancy. Communities living along the boundary are typically living below the poverty line and their only income source is from charcoal (mostly illegally produced) sales, these trends are demonstrated in the Baseline Survey data that BCP collected in 2012 (Annex H).

There have not been sufficient financial resources available to intervene in these unsustainable practices and offer neighbouring people an alternative to charcoal production followed by subsistence agriculture.

As a result, these practices have spread into Rufunsa Conservancy, whose staff at the time did not have the capacity and financial resources to assist people to implement sustainable farming and charcoal production to reduce the rapid rate of land use transformation.

The aim of the project is the long term conservation of forests on Rufunsa Conservancy and there is no intention to remove these forests. Aside from the extension of local land-use practices of clearing for charcoal production and/or subsistence agriculture, there is no other history of extraction of forest resources from the project area.

The area surrounding the project area (villages affected by the Lower Zambezi REDD+ Project) is in designated customary land which is occupied by rural villagers, headed by a Chief. Resources on communal land are public, and are held by the President on behalf of the people. Under the customary system, Headmen or Headwomen of villages carry out land allocation, although the State still retains de jure land ownership (Chidumayo et al., 2001; Forestry Department & FAO, 2010 and FAO, 2011). The current and past land use in the surrounding area is primarily unsustainable charcoal production and subsistence agriculture which is now being turned around by BCP activities. This unsustainable resource extraction started post 1984 as indicated by historic imagery.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

Environmental Management Act No. 12 of 2011

This Act was passed in the year 2011 and is the Principal Act governing and regulating environmental issues in Zambia. The Act provides for the establishment of the Zambia Environment Management Agency (ZEMA) whose main functions constitutes the protection of the environment and control of pollution in particular so as to provide for the health and welfare of persons, animals, plants and the environment in general.

The Act conforms with the philosophies set out in the Rio and Stockholm Declarations i.e. precautionary principles, polluter-pays principles and transparency and dissemination of information to the general public and public participation (the Act states that the public has the right to participate in decisions concerning the formulation of environmental policies, strategies and plans and to participate in the preparation of laws and regulations on the environment). It states that the Minister shall strive to attain the conservation of biological diversity and fair and equitable sharing of the benefits arising from utilisation of biological diversity.

The Government commits itself to cooperating with other governments and local and international organisations in order to protect the regional and global environment. The Agency has various obligations which include *inter alia* conducting surveys on the state of the environment and researching and forecasting environmental changes and undertaking other studies which might contribute to the formulation of policies and preparation of action plans and strategies. In addition, the Agency shall create and maintain an environmental information registry and an environmental fund. The Act provides that forestry resources will be managed in accordance with the Forests Act.

Note SI No. 28 of 1997 relating to the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, 1997 which sets out in which circumstances an EIA or a Project Brief will be required and how these are to be conducted.

The Zambian Environmental Management Agency has no objection against the implementation of the Lower Zambezi REDD+ Project and has exempted it from any EIAs (Annex D)

Mines and Minerals Development Act (No. 7 of 2008)

The legal framework for mining and mineral resources development in Zambia is the Mines and Minerals Act of 2008. The Act stipulates regulations in acquiring prospecting licences and mining and mineral rights.

The Act provides for the Director of Mines to give consideration to the need to conserve and protect the air, water, soil, flora, fauna, fish, fisheries and scenic attractions and features of cultural, architectural, archaeological, historical or geological interests when deciding whether or not to grant any mining right. In the event that a mining right is granted it shall be granted under such conditions as may be prescribed by the Minister in relation to the conservation and protection of air, water, soil, flora, fauna, fish, fisheries and scenic attractions and features of cultural, architectural, archaeological, historical or geological interests. The Act provides for the creation of an Environmental Protection Fund. It further provides that a holder of a license shall be strictly liable for any harm or damage caused by mining operations and shall compensate any person to whom the harm or damage is caused. Where damage is caused to the environment or biological diversity, compensation shall include the cost of reinstatement, rehabilitation or clean-up measures which are incurred and where applicable the costs of preventative measures. Note too that any person, group of persons or any private or state organisation may bring a claim and seek redress in respect of a breach or threatened breach of any provision relating to damage to the environment, biological diversity.

Note that a holder of a licence who requires the exclusive or other use of the whole or any portion of the prospecting or mining area for the purpose of the licence, in accordance with the laws relating to such acquisition, may acquire a lease or other right to use the same upon such terms as may be agreed between the holder and owner/ occupier of the land.

A holder of a licence shall on demand made by the owner or lawful occupier of the any land subject to a mining right, promptly pay the owner fair and reasonable compensation for any damage done to the surface of the land by the operations. Where compensation is not paid or the owner of the land is dissatisfied with the compensation offered, the dispute shall be determined by arbitration.

It also deals with environmental issues pertaining to prospecting and mining. Reference is made to the Statutory Instrument No. 29 of 1997, a subsidiary legislation of the 2008 Mines and Minerals Act that specifically addresses environmental issues.

The act is relevant to the project due to that activities related to large scale mining will take place within the license area. The act provides for regulations concerning environmental protection during construction, operation and closure of mine sites.

This law is applicable to the project as there are prospecting licenses that overlap part of Rufunsa Conservancy (Annex C) and if mining does get approved then this may impact negatively on carbon pools in places where mining takes place.

Zambia Wildlife Act No. 12 of 1998

Passed in 1998, the Act provides a legal framework for the Zambia Wildlife Authority to establish, control and manage National Parks, conserve and protect wildlife and objects of interest in National Parks, establish Game Management Areas, licensing of hunting, control of possession of trophies and to control bushfires.

Water Resources Management Act

The Act came into force in 2011 and repealed the Water Act of 1949 and provides for the control, ownership and use of water. The Act defines the functions and powers; provide for the management, development, conservation, protection and prevention of pollution of water resources and its ecosystem. It provides for the issuance of water licences and permits and rules relating to the construction of dams on existing rivers. In addition it provides for a right of easement over land under specified circumstances, which shall include the right of access to any piece of land contiguous to the water which is the subject of a permit. Note there is a difference between public and private water. As Rufunsa Conservancy is an important catchment, the act applies to the project.

Forests Act, 1999

Enacted in 1973 and repealed by the Forest Act No. 7 of 1999 (CAP 199) of the laws of Zambia. It provides for the establishment and management of National and Local forest conservation and protection of forests and trees, and licensing and sale of forest. It also provides for the establishment of the Forestry Commission and provides for participation of local communities, NGO's and traditional institutions for sustainable management of forest ecosystems and biodiversity.

The Act also provides for the implementation of various international conventions relating to the environment. Note the President can declare any land a National Forest and may by compulsory acquisition acquire any land for the purpose of a National Forest. The Act also provides for the declaration of local forests, forest plantations or open areas to be a Joint Forest Management Area. This law is applicable as the core activity of the project is the protection of forests within the project area.

Zambia Tourism and Hospitality Act No. 24 of 2007

Enacted in 2007, the Act provides for the control of tourism enterprises. The Act, though making no direct reference to environmental protection, does provide for appeals against authorization of tourism projects which are deemed to negatively affect Zambian tourism. As BCP is busy implementing tourism activities on Rufunsa Conservancy, this law is applicable.

Labour and Social Security

There are various legislations that have been enacted to protect the workers in Zambia. Some of these laws are:

The Employment Act (CAP. 268)

Establishes guidelines on employment of an employee in Zambia to be read together with the Minimum Wages and Conditions of Employment (General) Orders. It provides for dismissal of employees and the grievance procedures to be followed as well as basic employment rights relating to leave, working hours, maternity leave, minimum contents to be included in written contracts of service; retirement and redundancy benefits. BCP employs staff to implement the LZRP and this law is thus applicable.

Minimum Wages and Conditions of Employment Act (CAP. 276) (Statutory Instruments (SI) No. 2 & 3) SI No. 46 of 2012 and the General Order, 2011

Establishes minimum guidelines for remuneration and conditions of service for employees in Zambia setting out a minimum wage for specific sectors and basic rights and conditions of service. BCP employs staff to implement the LZRP and this law is thus applicable.

Industrial and Labour Relations Act (CAP. 269)

Establishes guidelines on employee and employer organisations and on the process of collective bargaining and dispute resolution. It provides for the formation of trade unions and employers representative organisations and recognises the right to strike under specified circumstances. It provides for the settlement of disputes, strikes and lockouts as well as for the use of the Industrial Relations court at which employees can have their grievances and cases heard and determined. BCP employs staff to implement the LZRP and this law is thus applicable.

The Lands Act, Chapter 184 of the Laws of Zambia

This Act provides for the continuation of leasehold tenure and the continued vesting of land in the President and the statutory recognition and continuation of customary tenure and it provides for the conversion of customary tenure to leasehold tenure. The Act also provides that a person shall not without lawful authority, continue to occupy vacant land and any person who does shall be evicted.

Note that customary land existed in Zambia before the advent of colonialism – under the unwritten indigenous law of tribes. Customary law can be resorted to in the settlement of disputes involving members of tribes and is vital in the settlement of land disputes that may arise in respect of land held under customary tenure. The Lands Act provides protections for private land and thus this law is applicable.

The project will fully comply with these aforementioned laws.

1.12 Ownership and Other Programs

1.12.1 Right of Use

Farm 10800 (Rufunsa Conservancy) is titled to be 39,951 ha in extent, however our GIS indicates that the property is closer to 40,126 ha. The discrepancy between the two is the result of the digitising process along the river boundaries. The project proponent was not able to acquire the digital boundaries of the property, as such the boundaries were drawn in a separate GIS. While every effort was made to replicate the title deed, this is simply not possible along the boundaries demarcated by rivers. As such, the resulting areal area of the property is approximately 175 ha larger than the title deed which is a negligible amount. Further the size of the property does not affect the accounting area as the two are calculated separately, moreover, areas along the river boundary have largely been removed owing to the slope criteria used. Sable Transport Limited, a Zambian registered and 100 percent Zambian citizen owned company, privately owns Rufunsa Conservancy under leasehold from the Government of the Republic of Zambia (Annex A). This area was originally registered as a game ranch for wildlife tourism operations. Due to a lack of resources and wildlife poaching pressure, the area has not been used or promoted for eco-tourism or hunting and has been operated as a *conservancy*. The project area boundaries are clearly defined in a Government of Zambia issued title deed (Annex A).

Zambia does not have specific laws dealing with carbon rights. The landowner does, however, have the rights to above and below ground biomass. Furthermore, the Forests Act, 1999, enacted in 1973 and repealed by the Forest Act No. 7 of 1999 (CAP 199) of the laws of Zambia, provides for the establishment and management of National and Local forest conservation and protection of forests and trees, and licensing and sale of forest. It also provides for the establishment of the Forestry Commission and provides for participation of local communities, NGO's and traditional institutions for

sustainable management of forest ecosystems and biodiversity. The Act also provides for the implementation of various international conventions relating to the environment. Easements are also permitted within Zambian statutory law.

BioCarbon Partners, the project proponent, has full consent from the landowner to implement the project. The project proponent has clear, uncontested title to the carbon rights (Annex B).

The project complies with paragraphs 4) and 6) of Section 3.11.1 of the VCS Standard:

4) A right of use arising by virtue of a statutory, property or contractual right in the land, vegetation or conservational or management process that generates GHG emission reductions and/or removals (where such right includes the right of use of such reductions or

6) An enforceable and irrevocable agreement with the holder of the statutory, property or contractual right in the land, vegetation or conservational or management process that generates GHG emission reductions or removals which vests the right of use in the project proponent.

1.12.2 Emissions Trading Programs and Other Binding Limits

The Lower Zambezi REDD+ Project is not subject to binding emissions limits or emissions trading programmes.

1.12.3 Other Forms of Environmental Credit

The project has not applied to any other GHG programmes.

1.12.4 Participation under Other GHG Programs

The project was validated under the Climate, Community and Biodiversity Standards (Second Edition - Gold Level) on 21 June 2013 by Environmental Services Incorporated (CCBS, Second Edition, Project No. VO12079, <http://www.climate-standards.org/2013/03/13/lower-zambezi-redd-project/>).

1.12.5 Projects Rejected by Other GHG Programs

The Lower Zambezi REDD+ Project has not been rejected by any other GHG programmes nor applied to any other than the VCS.

1.13 Additional Information Relevant to the Project

1.13.1 Eligibility Criteria

Not Applicable, the project is not a grouped project.

1.13.2 Leakage Management

Activity shifting leakage in the Rufunsa Conservancy project area may result from a displacement of the agents of deforestation due to the activities of this project. The main project leakage risks are charcoal production and agricultural conversion shifting elsewhere. Miombo woodland is harvested and used in the production of charcoal, which is then sold in Lusaka (primary market) and Chongwe (secondary market). The Charcoal value chain for this region has been documented in a BCP commissioned report which will be made available to the Validator (Annex V).

Local agents typically exploit woodland resources adjacent to their homesteads or within walking distance. Woodlands are primarily cleared for charcoal production and then followed by subsistence agriculture, completing the deforestation process. Once the area around a homestead has been cleared, agents usually approach the village Headman for advice on where they can clear next. Village Headmen then direct the agents to an area where raw materials are available.

PDR.96 A list of project activities designed to mitigate leakage.

All of BCP's community-based deforestation mitigation activities, as outlined in Table 5 above, are designed to meaningfully and sustainably address local drivers of deforestation. These projects will be implemented through BCP's robust overall Community Engagement Strategy (see Annex F), which relies on pursuing extensive stakeholder consultation, engagement, understanding and support for project activities. BCP's Leakage Mitigation Strategy relies on our ability to meaningfully address local drivers of deforestation, including poverty and lack of access to alternatives, and to simultaneously create a tangible 'link' between community benefits and support for REDD+ project activities, which is perceived and understood by local communities. In so doing, BCP's Leakage Mitigation efforts are designed to effectively change local incentive structures, so as to shift the nature of activities away from unsustainable deforestation towards sustainable, forest-compatible activities. To do this, BCP will be careful to ensure that our activities encourage a shift in the nature of activities by promoting the adoption of alternative technologies, practices or activities, as opposed to merely shifting the location of current (deforestation-dependent) activities that are undertaken by local stakeholders. In this way, the Leakage Mitigation Strategy can be summarized as follows: BCP intends to support the

development of community project activities that meaningfully replace deforestation-dependent activities, as opposed to simply prohibiting deforestation-dependent activities.

To do this, BCP's Leakage Mitigation Strategy has three main components, as outlined in Figure 4 below:

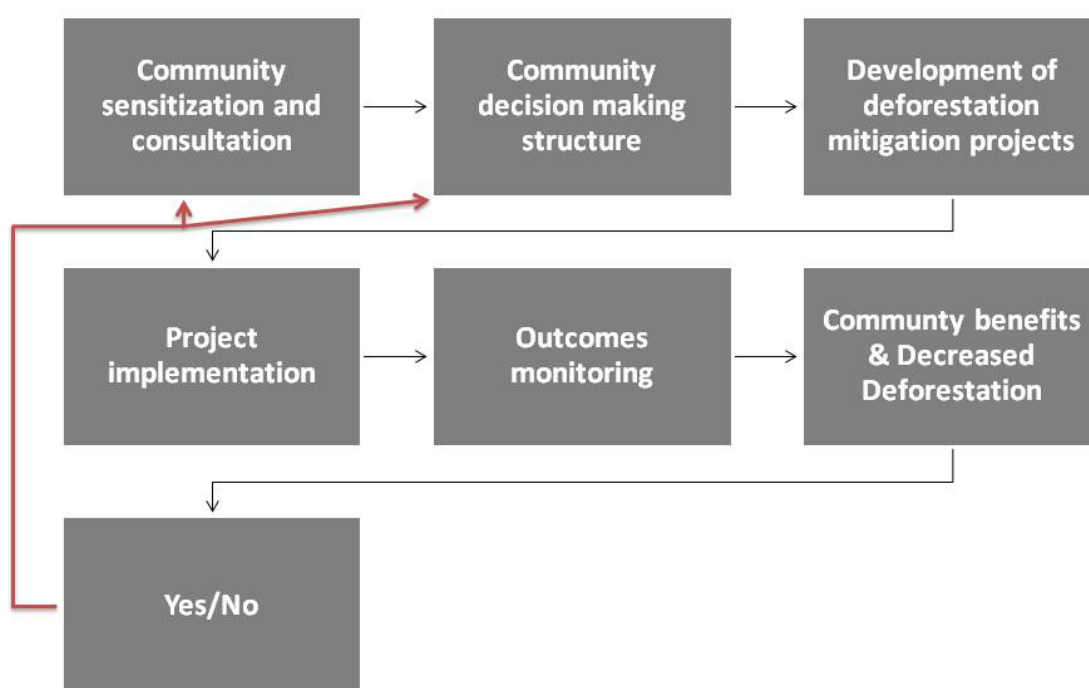


Figure 4. LZR leakage mitigation strategy LZR.

In the first 'step' of the Leakage Mitigation Strategy, BCP pursues extensive community stakeholder sensitization and consultation, to raise awareness, understanding and support for REDD+ project activities. Ensuring stakeholder understanding is critical to our ability to involve and engage with community stakeholders. BCP has supported the development of innovative "Zone Development Committees (ZDCs)," which are hybridized decision-making bodies comprised of local traditional leaders and democratically elected representatives. Local institutions such as ZDCs play a central role in the "Project Identification and Design Process," which aims to involve local stakeholders in

decision-making concerning BCP-supported project activities. In order for this process to be successful, it is essential that stakeholders understand the aims of project activities which include:

- the meaningful reduction of poverty,
- improvement of local livelihoods,
- development of alternative sources of income,
- and reductions in deforestation.

Only if stakeholders understand these aims can they provide useful feedback concerning priority project activities that will help to achieve all of these aims, and to benefit local communities. As such, achieving community stakeholder understanding is a necessary “step” towards the project’s ability to identify and design effective community projects, as stakeholders can only provide valuable and useful feedback to inform decisions if they are fully aware of the context in which these decisions must be made.

Second, as a result of effective stakeholder consultation and involvement in the Project Identification and Design Process, BCP will be able to launch and support the development of project activities that meaningfully address local drivers of deforestation. Decisions about project activities will benefit from local knowledge, legitimacy and support, and will be supported by BCP’s overall and on-going Community Engagement Strategy, which calls for ongoing oversight, monitoring and support to ensure the success of project activities. For a more complete (but not exhaustive) list of the sorts of community-based deforestation mitigation activities that BCP is currently pursuing, please see Table 5 of this document. It should additionally be noted that once established, these project activities, such as Village Chicken Projects, Sustainable-Eco Charcoal Harvesting, Conservation Farming and Small-Scale Commercial Agriculture projects, and more, are all designed to promote community-owned practices or businesses, which communities will be able to continue, support and manage with minimal on-going inputs from BCP. BCP will provide on-going support and oversight to these projects, and will facilitate the expansion or intensification of projects as additional funds become available, but for the most part it is our aim to develop community-based deforestation mitigation projects that are self-sustaining. All of these project activities are designed and intended to effectively reduce poverty and provide alternative sources of income, therefore meaningfully addressing the strongest local drivers of deforestation.

As a result of the successful design and implementation of community-based deforestation mitigation activities, community stakeholders will perceive and receive tangible benefits from REDD+ related activities. This will further help to encourage community understanding and buy-in for the REDD+ process, which will further support the development and success of additional community-based deforestation mitigation activities. This third step will also help to promote community “compliance” with avoided deforestation policies promoted by REDD+, however, our approach will reflect a model of positive reinforcement for cooperative and supportive behaviours, as opposed to negative reinforcement or an enforcement-based approach. Without stakeholder understanding or consent, BCP would face an on-going ‘struggle’ competing against current drivers of deforestation. However, with a model that promotes solid community understanding and buy-in to project activities, BCP’s role becomes more that of a “supporter” than an enforcer, and this is a critical step towards ensuring the long-term sustainability and success of our project activities to achieve their overall aims, including the avoidance of leakage.

Finally, as a result of BCP's effective implementation of our Community Engagement Strategy, which is designed to meaningfully involve stakeholders in the design, implementation and ownership of community-based deforestation mitigation activities that meaningfully address local drivers of deforestation, BCP anticipates that we will be able to avoid and/or mitigate leakage as a result of our project activities.

1.13.3 Commercially Sensitive Information

Certain technical and scientific information relating to important forest metrics acquired by the proponents monitoring activities are commercially sensitive and considered confidential and could result in a material financial loss if made public. Similarly company financial statements are of a sensitive and confidential nature and will not be made publicly available, but have been submitted to the VVB

Some of the supporting information is confidential such as contracts and lease agreements as they could prejudice the outcome of contractual agreements or other future negotiations. Such confidential documents, have, however been made available to the VVB.

1.13.4 Further Information

There is no further relevant information.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

VCS Methodology VM0009

Version 2.1, 13 December 2012

Sectoral Scope 14,

Methodology for Avoided Deforestation

Other tools include AFOLU Non-Permanence Risk Tool v3.2 and VT0001 Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities, v3.0.

2.2 Applicability of Methodology

PDR.1 For each applicability condition, a statement of whether it applies to the project. If the applicability condition does not apply to the project, justification for this conclusion.

PDR.2 Where applicability conditions apply, credible evidence in the forms of analysis, documentation or third-party reports to satisfy the condition

The decision tree provided in VM0009 (Figure 5) was used to determine the applicability conditions and are further expanded on below.

1. Forest land is converted to non-forest land and the drivers and agents of deforestation in the baseline scenario are consistent with those described in section 6 of the methodology and the end land use in the baseline scenario is non-forest.

The project activity is Avoided Unplanned Deforestation and Degradation (AUDD). The agents of deforestation are not known and the deforestation activity is not planned.

2. Land in all project accounting areas has qualified as forest on average across the project accounting areas as defined by FAO 2010 or as defined by the residing Designated National Authority (DNA).

Figure 8, Figure 9, Figure 10 and Figure 14 are maps showing that forest, as defined by the host country, on average dominates the accounting area and has been confirmed by in situ sampling. Canopy cover within the conservancy averages 30-40% and the canopy is in excess of 5m, often above 15m. The following outlines the definition of forest land in Zambia "land with tree crown cover of more than 10%, an area of more than 0.5ha and the trees must be able to reach a minimum height of 5m at maturity" (FAO 2000).

3. Deforestation exists at some point within 120 meters of the perimeter of the project accounting area such that without the implementation of the project activity the project accounting area would be immediately threatened by the agent of deforestation as of the project start date.

At the project start date, 4 km of the perimeter of the project was within 120m of deforestation. See Figure 19 and Annex T.

4. In the case of baseline type U1, at least 25% of the project area boundary is within 120 meters of deforestation and at least 25% of the project area is adjacent to the reference area.

The project does not satisfy this criteria.

5. In the case of baseline type U2, at least 25% of the project area boundary is within 120 meters of deforestation.

The baseline type for the Lower Zambezi REDD+ Project is U3 – Avoided Unplanned Deforestation and Degradation Frontier or Mosaic. The length of the perimeter within 120m of deforestation is less than 25% of the total perimeter. Please see Section 2.4.7 for a narrative on how the baseline type was quantified.

6. If foreign agents have been identified as an agent of deforestation, they are unlikely to shift their activities outside the activity-shifting leakage area.

A Participatory Rural Appraisal has identified local residents as the primary agents of deforestation. The local resident population includes a high volume of long-term or permanent immigrants, particularly Tonga people from Southern Province, who have settled ‘permanently’ into the project zone in search of an area with sufficient natural resources to support their families. These local residents, including in-migrants are active farmers that often farm wholly for subsistence reasons, and partially on a commercial scale.

The sedentary nature of these foreign agents (in-migrants) by default indicates that they are unlikely to shift due to the significant investment they make into their farming activities, and since the project zone (described in Annex F) is one of the last remaining areas within the Province with sufficient natural resources available to support their growing families, who are dependent on farming activities. It is critical to note that these agents are not transitory, in fact, high volumes of in-migration into the project zone is a cause of local deforestation in and of itself, as new households require cleared land for agriculture, and these cleared areas must expand as these resident immigrant families grow. Many of these immigrants into the area report that they left Southern Province as a result of depleted natural resources which made farm expansion impossible. As such, they migrated into the project zone, where sufficient natural resources (land, water, forest) were available.

7. The project accounting area shall not contain peat soil.

Soils in the project accounting area are all derived from parent material and do not contain peat soils. This was determined using data derived from the GlobCover Land Cover v2 2008 database (GlobCover, 2008) as well as expert knowledge of the study area.

8. A reference area has been delineated for the project accounting area based on the minimum area criteria.

Figure 14 shows the reference area that at the start of the historic reference period had more forest cover (42 217 ha) than the project accounting area (33 338 ha). Also see PDR.99 for a narrative on the leakage area and Section 3.3 Leakage.

9. As of the project start date, historic imagery of the reference area exists with sufficient coverage to meet the requirements of section 6.7.4 of this methodology.

Both Landsat (5) Thematic Mapper and (7) Enhanced Thematic Mapper data sets were employed to cover the reference area and period. The GLOVIS (<http://glovis.usgs.gov/>) tool was used to select and download the imagery. Landsat TM and ETM+ data are distributed as level 1 T (Standard Terrain Correction) whereby radiometric and more importantly, geometric corrections are applied to the imagery. Details regarding the size of the pixels as well as the registration accuracy of the imagery are presented in PDR 48 and PDR 49. The imagery employed fulfils the criteria stipulated. In addition the point data set used to develop the cumulative deforestation model had 100% double coverage. Figure 15 provides a graphic supporting this statement.

10. Project activities are planned or implemented to mitigate deforestation by addressing the agents and drivers of deforestation as described in section 8.3.1 of the methodology.

A summary of project activities designed to mitigate deforestation can be found in Table 5

11. The project proponent has access to the activity-shifting leakage area and proxy area to implement monitoring.

There are no access issues, the project proponent has access to both areas.

12. If logging is included in the baseline scenario and a market-effects leakage area is required per section 8.3, then the project proponent has access to or monitoring data from the market-effects leakage area for every monitoring event (see section 8.3.3).

There are no logging activities in the baseline scenario, merchantable timber trees occur in insignificant densities in the project area.

13. This methodology is applicable to all geographies, however if SOC is a selected carbon pool and the default value from section 6.18.1.1 is selected then the project must be located in a tropical ecosystem.

Soil Organic Carbon is selected as a carbon pool. The project falls within a tropical area, and is thus eligible for using the default value for SOC decay from section 6.18.1.1.

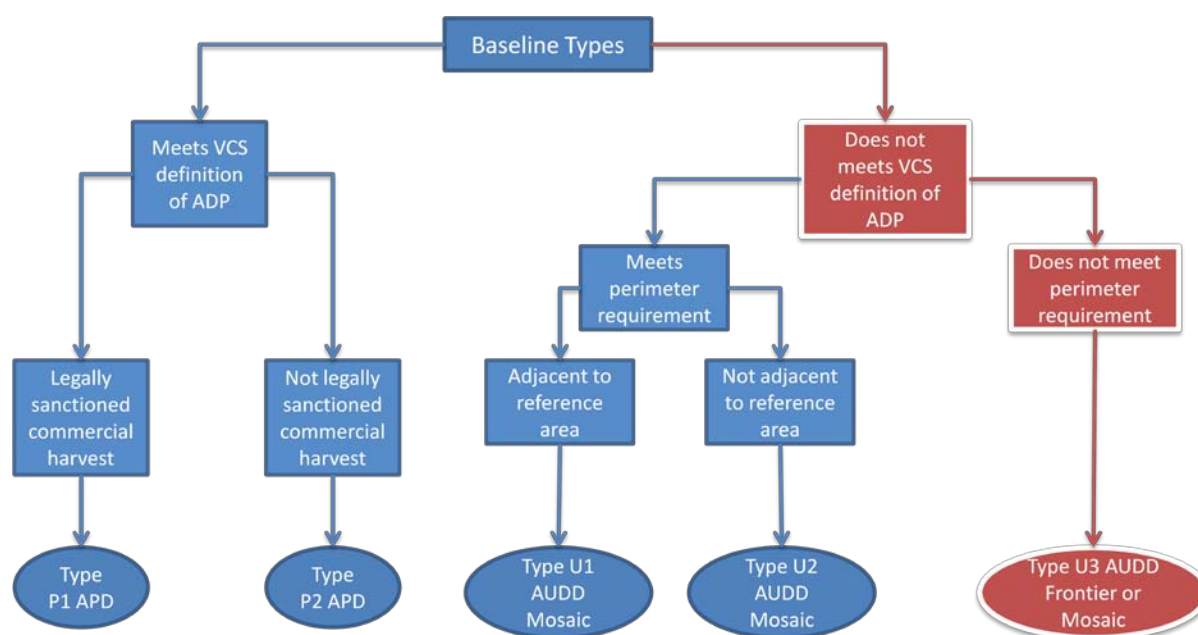


Figure 5: Selecting the project type

Section 3.1 contains more information regarding the delineation of project boundaries as well as the spatial data required for determining the project type. Figure 5 shows in red the path the project proponents used to determine the project type. Briefly, the project area is not subject to any legally sanctioned commercial harvesting. As illustrated above, the agents and drivers of deforestation are local communities engaging in ad-hoc harvesting of Miombo trees for the purposes of charcoal production followed by subsistence agriculture. The project therefore does not meet the criteria for Avoided Planned Deforestation and is thus Avoided Unplanned Deforestation and forest Degradation. Further, the spatial configuration of the project accounting area boundary is such that deforestation within 120 m of the boundary is only found along 4.2 km of the boundary. This value is significantly less (3.3%) than the required 25%. As such the project does fulfil the requirements for type U1 or type U2. the project is therefore of protect type U3.

PDR.3 Definition of forest used by the project proponent and its source.

The project proponent uses the forest definition of the Republic of Zambia which is as follows:

"land with tree crown cover of more than 10%, an area of more than 0.5ha and the trees must be able to reach a minimum height of 5m at maturity" (FAO 2000).

2.3 Project Boundary

2.3.1 Gases

PDR.11 A list of the greenhouse gases considered.

Table 6: List of greenhouse gases considered

Gas	Sources	Inclusion	Justification
CO₂ (Carbon Dioxide)	Flux in carbon pools	Yes	Major pool considered in the project scenario
CH₄ (Methane)	Burning of biomass	No	Conservatively excluded
N₂O (Nitrous Oxide)	Burning of biomass	No	Conservatively excluded

2.3.2 Selected Carbon Pools

PDR.12 A list of the selected carbon pools.

Table 7. List of selected carbon pools

Pool	Required?	Justification
AGMT (Above-ground merchantable tree)	No, Harvesting of long lived wood products not part of the baseline	Baseline scenario does not include harvesting of AGMT
AGOT (Above-ground other (non-merchantable) tree)	Yes	Major pool considered
AGNT (Above-ground non-tree)	No	Initially quantified in first monitoring period but conservatively excluded, insignificant pool and baseline scenario does not include perennial tree crops
BGMT (Below-ground merchantable tree)	No	AGMT not selected, baseline scenario does not include harvesting of AGMT
BGOT (Below-ground other (non-merchantable) tree)	Included	May be conservatively excluded
BGNT (Below-ground non-tree)	No	Conservatively excluded, insignificant pool and baseline scenario does not include perennial tree crops
LTR (Litter)	No	Always conservatively excluded
DW (Dead wood)	No	AGMT not selected, baseline scenario does not include harvesting of AGMT
SD (Standing dead wood)	No	Conservatively excluded, insignificant pool

Pool	Required?	Justification
LD (Lying dead wood)	No	Conservatively excluded, insignificant pool
SOC (Soil organic carbon)	Included	Major pool
WP (Long-lived wood products)	No	AGMT not selected, baseline scenario does not include harvesting of AGMT

The geographic boundaries of the project can be found in Figure 2.

2.4 Baseline Scenario

2.4.1 Identifying the Agents and Drivers

PDR.17 A list of the agents and drivers of deforestation, including quantitative descriptions of agent mobilities.

The following agents and drivers of deforestation were identified throughout numerous stakeholder consultations and interviews taking place across the project zone, beginning in March 2013. These identifications were further supported by the results of the Baseline Survey, which was completed in September 2012, and by additional “project specific” surveys undertaken as part of the on-going Social Monitoring Programme (Annex G).

Table 8. Agents and Drivers of Deforestation, and mobility of agents

Agent	Driver	Mobility
Charcoal Producers	Uncontrolled, unsustainable charcoal Production	Access to community forest areas at a small fee ("token") paid to local Headmen.
Farmers	Subsistence and small-scale agriculture	Access to community forest areas granted by local traditional leaders.
New/expanding households	Household construction/expansion	Local residents and long-term immigrants relocate and/or expand their fields/households with consent from local leaders.

PDR.18 A narrative describing the agents and drivers of deforestation.

Charcoal Production: Uncontrolled, unsustainable commercial charcoal production followed by conversion to agriculture has been identified by both qualitative and quantitative studies as *the* most significant drivers of deforestation in the baseline (GRZ & UN-REDD 2010; The REDD Desk 2013) and supported by BCP's Baseline Survey Data, which is presented in Annex H.

Importantly, it is the uncontrolled or unregulated aspects of local charcoal production dynamics that are responsible for this high rate of deforestation (Chidumayo and Gumbo 2013), charcoal has the potential to be a renewable energy resource, but is unfortunately linked to deforestation in Zambia when charcoal production is undertaken in uncontrolled processes that are often followed by final conversion of harvested areas to agricultural farmlands (Chidumayo and Gumbo 2013).

Within the project zone for the LZRP, the high rate of unsustainable charcoal production is the result of a serious lack of oversight or enforcement capacity from local authorities, including both traditional leaders and local government agencies who are technically responsible for the responsible management and protection of community forests.

According to the results of BCP's Baseline Survey and subsequent consultative and social monitoring processes, charcoal production is undertaken by two types of agents: first, local residents that produce charcoal commercially as a means of income, often with the intention of using income from charcoal production to purchase agricultural inputs such as fertilizer.

Local residents may also produce charcoal when they clear new areas for farming, as an additional source of income to pay for farming inputs. However, in addition to longer-term local residents, qualitative and quantitative evidence also demonstrate that there have been high levels of immigration in recent years, and that this high level of immigration is driven largely by the lure of accessing farmland and producing charcoal in one of the last remaining easily accessible areas of forest in Lusaka Province. These dynamics are illustrated by the data collected through BCP's Baseline Survey, and are discussed in greater in BCP's Baseline Survey Report (Annex H).

Through numerous interviews with local stakeholders and government agencies, it has been ascertained that community land allocation is the responsibility and prerogative of local traditional leaders, such as Headmen. This is backed by the Lands Act (Chapter 184) as listed above, and supported by Chidumayo *et al.* (2001) Forestry Department & FAO (2010) and FAO (2011). Unfortunately, numerous reports have indicated that traditional leaders have begun to accept "tokens" (payments) for land allocation, including allocations to migrant charcoal producers. In some cases, traditional authorities will accept payment (a certain percentage of income) from charcoal production, creating an on-going incentive for indiscriminate land allocations for charcoal production to continue. As a result, traditional and historic "rules" concerning the protection of forests have recently been disobeyed or forgotten, as traditional leaders, the historic "protectors" of community forests, find incentives to allocate forest areas, and turn a blind eye to the behaviour of incoming migrants who feel minimal ownership or responsibility towards them. It is a local custom that fruit and other culturally valuable trees should not be cut down for charcoal production. Nevertheless, numerous instances have been observed where such trees have been cut down for charcoal production.

Additionally, charcoal production is technically supposed to be overseen and regulated by the Zambian Government authorities (notably, Forestry Department). However, although robust legislation exists requiring the purchase of production and conveyance (transportation) licenses, in nearly two years of daily interactions with charcoal producers and transporters, BCP has never once met anyone who is involved in the legal production of charcoal. Producers and transporters both appear to prefer paying bribes to corrupt officials on an as-needed basis, as opposed to facing the prospect of regularly paying prohibitively steep levies that would make their product legal.

As such, a prevailing lack of oversight and enforcement capacity from both traditional leaders and local government agencies has led to the development of a current pattern of deforestation that is characterized by practices of indiscriminate land allocation and uncontrolled, unsustainable cutting of trees for charcoal. The production of charcoal is further encouraged by strong market forces, which have been shaped by a lack of access to alternative sources of energy, and a lack of access to alternative sources of income for producers.

Small-Scale Subsistence Agriculture: As listed above, quantitative and qualitative evidence additionally identify small-scale and subsistence agriculture practices as important drivers of local deforestation (Annex H). As the section below describes in greater detail, due to high rates of poverty and the relative inaccessibility (due to poor roads and long distances) of many areas in the baseline, the costs of engaging in commercial activities, which would require the transportation of goods and products, are often prohibitively high for rural residents. As a result, and in the absence of alternative sources of employment, many households in the project zone rely on subsistence agriculture practices as a means of survival.

The baseline scenario, which has been developed through a combination of historical satellite/GIS imagery analysis and Participatory Rural Appraisal methods, identifies conversion caused by charcoal production followed by small-scale agriculture as the most likely “without project” land-use scenario. Local residents clear areas of forest for farming, and resourcefully produce charcoal from the trees that were cut, often with the aim of selling the charcoal in order to receive income that would allow them to purchase farming inputs. Additionally, local residents often follow behind transient charcoal producers, profiting from the areas that have already been cleared, and converting abandoned charcoal fields into agricultural fields. Both of these processes indicate that there is a clear link between land cleared for charcoal production and land cleared for agriculture, and that charcoal production often precedes subsistence or small-scale commercial agriculture. This dynamic is further identified by GRZ & UN-REDD (2010), MTENR (2002), The REDD Desk (2013) and supported by BCP’s Baseline Survey Data, which is presented in Annex H.

PDR.19 Descriptions of agents and drivers including any useful statistics and their sources.

BCP has gathered information concerning local agents and drivers of deforestation through the following methods:

1. Analysis of satellite and GIS imagery, to view historical patterns of deforestation
2. Participatory Rural Appraisal (PRA) methods: stakeholder consultations and discussions, including Meetings documented in official “meeting minutes” (20 months; from February 2012)
3. Baseline Survey – As part of BCP’s Community Engagement Strategy, which includes a rigorous Social Monitoring Program, BCP conducted a Baseline Survey of a representative sample of 90 households living within the project zone. The survey was conducted in August/September 2012, and included numerous questions designed to identify local drivers of deforestation and to assess the socio-economic wellbeing of community stakeholder households. Please see Annex H.
4. Encroachment Baseline Survey – specific baseline survey of 44 households living on the boundary or within the project area of the Lower Zambezi REDD+ project

5. Project Specific Surveys – As part of the Social Monitoring Program, information from participants in supported projects is collected, which is designed to allow BCP to specifically assess the impacts of particular project activities over time. Relevant information includes survey data that was gathered from participants in the Conservation Farming Training Program (CFTP), Village Chicken Project (VCP), and Sustainable Eco-Charcoal Project.
6. Charcoal Studies: BCP has facilitated 6 formal studies and reports about charcoal production taking place in the project zone, with the intention of better understanding this major driver of deforestation. Studies include:
 - a. Chongwe Charcoal Study – assessed the amount of charcoal travelling through Chongwe town in a 24 hour period (August 2012)
 - b. Value Chain Analysis of Charcoal Production in Lusaka Province (August 2012)
 - c. Eco-Charcoal Project Business Plan – assessed production practices, producer payments, charcoal markets and pricing systems for charcoal in Lusaka Province (September 2012)
 - d. One day Intensive study of Charcoal Production within the (encroachment) project area (January 2013)
 - e. Eco-Charcoal project participant surveys – collected basic information about past involvement in and profit from charcoal production (March 2013)
 - f. Rural Producer Study – assessed charcoal production practices and pricing strategies for seventeen rural producers in Ndubulula Zone (August 2013)
 - g. Urban Charcoal Market Study – assessed charcoal pricing in six Lusaka markets (August 2013)
7. External studies and research: including USAID charcoal study for Eastern Province, and supported by GRZ & UN-REDD (2010), MTENR (2002), The REDD Desk (2013) and Vinya *et al.* (2011).

Charcoal Production:

As the section above describes, commercial charcoal production has been identified by quantitative and qualitative studies as the major driver of deforestation in the project zone.

The extreme threat posed to the project area by charcoal production can be explained by two main causes: lack of access to affordable alternative sources of energy, and poverty. High levels of poverty in Zambia drive both the demand for charcoal, as consumers cannot afford alternative sources of energy, and supply, since rural producers lack access to alternative sources of income and are desperate for the income available through charcoal production (studies).

To illustrate the levels of poverty and lack of access to alternatives that producers in the project area face, according to the Baseline Survey (Annex H), approximately 88% of stakeholders are estimated to live below the international poverty line of US \$1.25 per day.

This statistic compares negatively even to estimates that approximately 68.5% of Zambia's population of nearly 14 million people live in poverty (CIA World Factbook; World Bank, 2006). Recent United Nations figures estimate that approximately 78% of the rural population lives in poverty compared to 53% of the urban population (UN Statistics Division 2012).

In addition to poverty, households in the project zone reported extreme dependency on charcoal production as a source of income. As Table 9 below demonstrates, according to the results of the Baseline Survey, approximately 70% of rural stakeholders living within the project zone reported income from charcoal production. Among producers, average income dependency on charcoal production was 55 percent. As Figure 6 and Figure 7 below reveal, at 37% average income dependency among surveyed households overall, charcoal production was the most “significant” source of income reported by stakeholders in the project zone and charcoal production was even more significant than agriculture, which accounted for 32% percent of income, on average.

To put these statistics into perspective: a seven-year landmark study by CIFOR (2011) found that forest income (wood, wildlife, plants and other resources harvested from forests) constitutes about 20% of total household income of communities living in or near forests in different countries. Environmental income (defined as forest and non-forest income) contributed about 25% of total household incomes (CIFOR 2011). What is therefore significant about communities living in the project zone is that forest income is almost double that of the CIFOR study illustrating the high dependence on charcoal production for urban markets.

This high dependency on charcoal production is likely explained by a lack of access to alternative sources of income: only 7% of household respondents for the Baseline Survey (Annex H) reported any income from formal employment, and although “small business” was the third most significant source of income reported among households (after charcoal production and agriculture) households reported an average of only 7% of income from small business.

As these statistics demonstrate, in the absence of alternative sources of income for producers, and/or in the absence of alternative methods for charcoal production, such as the sustainable harvesting techniques promoted by the Eco-Charcoal Project, high rates of unsustainable commercial charcoal production are reasonably anticipated to continue, due to the high levels of demand from urban markets and high levels of income dependency among rural producers, and lack of alternative livelihood activities.

Table 9. Charcoal Dependency Among Project Stakeholders

Zone	Charcoalers (%)	Average Charcoal Income (Producers)	Average Income Dependency (Producers)
Chilimba	70%	ZMK 1,889	50%
Mweenshan'gombe	90%	ZMK 2,690	66%
Namanongo	61%	ZMK 1,935	64%
Ndubulula	53%	ZMK 2,396	29%
Overall	68% (n=61)	ZMK 2,038	55%

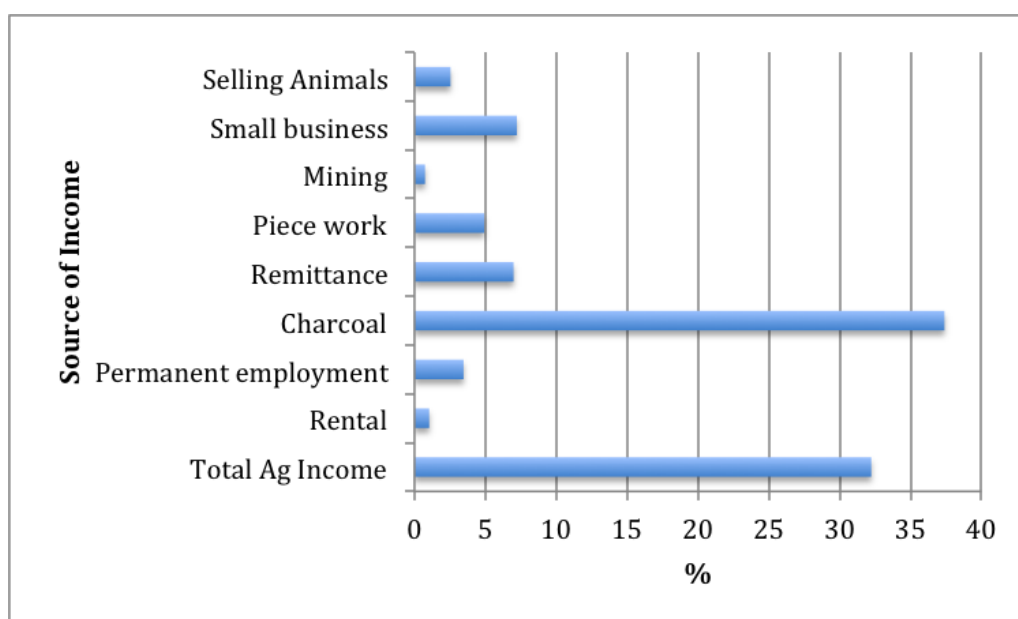


Figure 6. Average % of Incomes across survey respondents

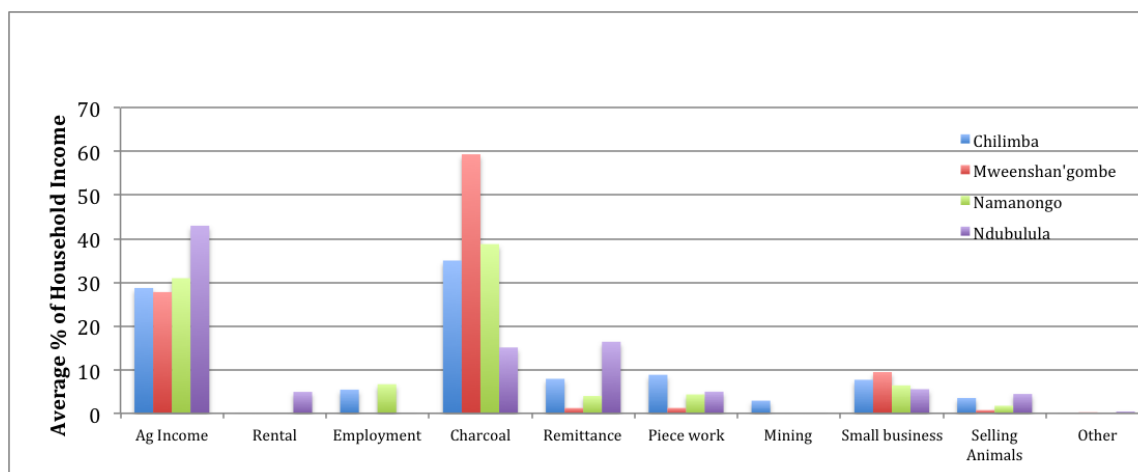


Figure 7. Significance of Income Sources Across Zones (Average % of Household Income by Source, by Zone)

Small Scale or Subsistence Agriculture:

As section 2.4.1 mentions above, the Baseline Survey identified that many households in the greater project area are dependent, in whole or in part, on small-scale or subsistence agriculture. At an average income-dependency of 32% per household, agriculture was the second-most significant source of income among households living in the project zone (Figure 7).

The average field size per household is 3 ha (Annex H). Interestingly, households uniformly reported farming approximately 3 ha at the time of interview, this is consistent with testimony we have heard that households engaging in subsistence agriculture farm just enough land to feed their families and do not farm larger areas since to do so would not be 'profitable' to them and would only require more work than is necessary for survival. BCP has identified that this reluctance to expand farms or to engage in commercial agriculture is largely the result of prohibitive entry costs (notably transportation, but also inputs such as fertilizer or ploughing equipment) for accessing agricultural markets. Labour is also a major constraint to farming activities.

However, when asked how many new ha farmers anticipated they would need to clear for farming by 2015, nearly all households reported that they would clear new areas, often doubling, the amount of land they reported working on in 2012. Interested to hear that farm sizes were apparently expected to double, or more, by 2015, follow-up discussions were held with farmers at public meetings and specific meetings or training events related to the Conservation Farming Training Program (CFTP). It transpired that new or anticipated clearing does not represent planned farm expansion, but rather, reflects that highly inefficient farming practices employed by farmers across the project zone cause rapid soil depletion, such that farmers must consistently clear new areas or shift to new areas in order to maintain a farm large enough to support their household. It must be noted, however, that some fields are ploughed for up to 20 years (Annex X).

Presumably, a consistent 3 ha or so are needed, depending on family size. As such, although the amount of land cleared for farming between 2012 and 2015 appears to reflect a doubling in size of farms, this *more likely* reflects that within the next 3 years farmers anticipate they will have to clear an equivalent area of land for farming in order to maintain the same size farm to feed their families.

It should be noted that this rate of change reflects only the amount of change predicted by households within this 3 year period, it does not reflect additional deforestation caused by new or in-migrating households within this period of time and it does not reflect the amount of deforestation which preceded this period of time; presumably, if traditional farming practices require households to clear new areas of field for farming every few years, then a significant amount of deforestation preceded the current reported amounts of 3 ha currently being farmed.

Additionally, the Baseline Survey asked respondents to list the number of hectares they 'own,' as opposed to the number they are farming. Interestingly, households in Ndubulula, on average, reported owning smaller tracts of land, whereas in Mweeshang'ombe respondents reported owning larger tracts of land. When this data is viewed in combination with information collected about immigration into the project zone (described in the section to follow), it is possible that these land ownership patterns further illustrate and support apparent governance patterns that reflect greater levels of oversight and organization in Ndubulula, which is the oldest community in the project zone and also closest to the tarmac road leading to Lusaka, compared to newer communities comprised of more recent immigrants into the project zone, in areas farther away from the tarmac road, and therefore farther from the oversight of local traditional leaders (such as the Chief) and local government authorities (such as Forestry Department).

Immigration and Population Growth:

Zambia's national average population growth rate of 2.89% is 12th highest in the world, and the country's national average birth rate of 42.79 births/1 000 population is the 5th highest in the world (CIA World Factbook). Given that our calculated average household size in the project zone of 7.48 individuals is higher than the average household size for Chongwe District of 7.2 individuals, according to the 2010 Census information, it is anticipated that population growth in the project zone will be a major contributor to deforestation, even before factoring in new migration into the area.

Additionally, data collected through the Baseline Survey indicate that approximately 58% of the population living within the project zone are youths under the age of 15, this is higher concentration of youths than Zambia's national average of 46% (CIA World Factbook). Critically, nearly 70% of Mweeshang'ombe's population according to our data are youths; this is especially concerning given that many households from Mweeshang'ombe Zone are located right along the boundary of the project area.

Table 10. Population in the project zone

Zone	Households	Total	Avg. Hh size (2010 census)	Avg. Hh size (BCP Survey 2012)	% Adults	% Youths
Chilimba	238	1,811	7.61	7.61	45%	55%
Mweeshang'ombe	247	1,911	7.74	9.7/8.53	32%	68%
Namanongo	338	2,400	7.1	6.04	53%	47%
Ndubulula	344	2,187	6.36	7.11	34%	66%
Overall	1167	8,309	7.25	7.48	42%	58%

In all, demographic data collected through the Baseline Survey from households living within the project zone, along with national census and demographic data for Zambia, indicate that the project zone for the Lower Zambezi REDD+ Project is likely to face a very high rate of population growth over time.

However, in addition to pressure from a growing existing population, BCP anticipates that in-migration into the project zone will also pose a significant threat to the project area over time. The results of the Baseline Survey show that 74% of residents within the project zone are likely immigrants and there is reason to believe that the rate of immigration into the project zone is increasing over time. It appears that there has been a wave of recent immigration into the project zone over the last 20 years. This wave appears to have begun in Ndubulula Zone, which is the closest to the tarmac road that leads to Lusaka and has continued to move farther in towards the boundary of the project area. Table 11 summarises this wave of immigration. Ndubulula presented the highest volume of long-term immigration, which can be compared to Chilimba Zone, the farthest zone from Ndubulula, where a high volume of more recent immigration has taken place, especially within the past 8 years. 60% of the people whom have encroached into the project area arrived in the last two years and 100% were immigrants from other districts.

Table 11: Percentage of immigrants within the project zone and encroachment exclusion within the project area.

Zone	% Migrated into Project Zone	Average years in Project Zone
Chilimba	65%	8
Mweeshang'ombe	72%	15
Namanongo	73%	14
Ndubulula	89%	20
Total	74%	14
Encroachment	100%	7

BCP conducted a survey of these households that have encroached onto the conservancy. Interestingly, of over ten individuals and households that were interviewed, only one household was engaged in active farming. All other respondents were engaged in commercial charcoal production and the most basic of farming. In many instances, the dwellings were temporary structures and with the exception of two respondents, inhabitants of these households were single males who had left their families behind in other locations. Individuals reported that they had been granted access to land within the project area after paying a small token to local traditional leaders.

Taken as a whole, the data therefore show a strong link between charcoal production and in-migration as co-indicators of the significant threat of deforestation to the project area. Additionally, as was mentioned in the section above, it should be noted that household land ownership amounts increase as proximity to the project area increases and these areas near to the project area are anticipated to face the highest rates of new immigration, particularly immigration driven by charcoal production, currently and in upcoming years, especially as population pressure in more distant locations nearer to the tarmac road (such as Ndubulula) limit land ownership amounts and community forest resources become scarce. New households in the project zone, whether the result of immigration or population growth from existing communities, will result in new deforestation, as new areas must be cleared for homes, farming, and potentially income-generating activities such as charcoal production.

Addressing Agents and Drivers of Deforestation:

As has been discussed in the sections above, in the baseline scenario, the agents of deforestation have been identified as local residents, including long-term in-migrants, and the drivers of deforestation have been identified as unsustainable, uncontrolled, and unregulated charcoal production that is linked to and/or followed by conversion to agricultural lands, especially on which inefficient farming techniques take place.

BCP's Community Engagement Strategy is designed to address local drivers of deforestation in three main ways:

- 1) By providing current and potential agents with alternatives to deforestation-dependent livelihoods
- 2) By improving local livelihoods, by reducing poverty and improving food security, thereby reducing the “desperation” that often drives agents (households, individuals) to engage in charcoal production
- 3) By ensuring that local stakeholders perceive tangible benefits from this REDD+ project, so as to change local attitudes about the value of forest protection, such that local stakeholders are incentivized to address the context in which current charcoal production activities are taking place.

PDR.44 A timeline of important events as they relate to the agents and drivers of deforestation. Applicable

Table 12 below outlines important events in the history of the LZRP that impact the agents and drivers of deforestation:

Table 12. Important dates and corresponding events that have had impacts on deforestation.

Date	Event
1970s	The project zone and the greater surrounding area of Chongwe District has been identified as an important source of charcoal for Lusaka Province, from the 1970s onwards (Chidumayo et al. 2001).
1973	The Forests Act (1973) is enacted, marking the beginning of Zambian national legal framework for governing the forestry sector.
1980s	Changes within the Zambian Forestry Department result in decreased efficiency towards achieving forest protection (Makano 2008). Notably, the “coupe and shelterbelt” sustainable forest management system that had previously been supported is abandoned, causing an unmanaged transition to unsustainable forest management practices.

1984	National Conservation Strategy developed in Zambia, designed to promote the sustainable use of Zambia's renewable natural resources, including forests. Unfortunately, this Strategy suffered from a top-down approach, failed to be integrated into national policies, and failed to abate the depletion of natural resources which "continued at a faster rate than had been anticipated" (Vinya et al. 2011, with reference to Chabala 2004).
1990s	Project Zone identified as one of the last areas of miombo forest left within the miombo eco-region that has not suffered some form of degradation (Chenje and Johnson 1994).
1990s	Wave of immigration, especially from Southern Province, into the project zone begins (as identified through BCP Baseline Survey, "approximately 20 years ago" from survey completion in 2012). Long-term immigration is caused by natural (forest) resource depletion in Southern Province and results in long-term settlement in the project zone due to availability of land and other resources. As described above, settlement is long-term as this is one of the last remaining areas with available natural (forest) resources in the province, and agents (stakeholders) are dependent upon clearing for charcoal production and agriculture. The sedentary nature of local stakeholder (agent) farming practices requires them to remain where such resources are available (i.e.: immigration is restricted to the project zone).
1992	Removal of agricultural subsidies and liberalization of agricultural marketing in 1992 is linked to a decline in income from the sale of agricultural produce (Chidumayo et al. 2001). This decline can arguably be linked to an increase in engagement in charcoal production as an additional (supplementary) means of securing income to replace income lost.
1994	Chief Unda-Unda attempts to "ban" charcoal production in the Bunda-Bunda Chiefdom.
1998	Zambia Forestry Action Plan (ZFAP) launched by the Ministry of Environment and Natural Resources, but failed to be incorporated into national policies and similarly failed to achieve or promote forest conservation practices at a local level (Vinya et al., 2011).
2000	Fertilizer Support Programme launched, which is associated with rapid rise in the areas of land under cultivation (Vinya et al., 2011).
2001	Sable Transport Ltd. acquires the project area, Rufunsa Conservancy (then Rufunsa Ranch). Property is intended to be used for hunting-based tourism, however, it becomes apparent that systematic poaching has left the property devoid of wildlife and therefore it is not feasible to develop a hunting-based revenue stream to support maintenance of the property.

2006	Statutory Instrument No. 47 of 2006 is introduced, enabling the implementation of Joint Forest Management (JFM) in government reserves. Unfortunately, the success of JFM was undermined by lack of legal clarity which affected benefit-distribution among local communities. The new Forest Bill and Forestry Policy introduced in 2013 is anticipated to improve and facilitate the success of JFM (The REDD Desk, 2013; Vinya et al., 2011).
2007-2009	Title of Rufunsa Conservancy contested in court. Sable Transport wins case against the Government and title reinstated in 2009.
2009-2011	Sable assumes control of the land, and seeks alternate financing sources due to the failure of wildlife based hunting tourism to generate any returns
2010	Zambia selected as pilot country for UN-REDD.
2011	Initial business partnership documents signed between Sable and BCP
2011	Zambia identified as having one of the highest, and increasing, rates of deforestation in the world (Henry et al., 2011). Main drivers of deforestation identified in Zambia include charcoal production, expansion of small scale agriculture and unsustainable agricultural practices (GRZ & UN-REDD, 2010).
2012	Carbon Rights Easement signed between BCP and Sable Transport Ltd. for the Lower Zambezi REDD+ Project. Viability assessment conducted, community stakeholder consultation processes initiated, and launch of community-based deforestation mitigation projects begins.
2013	LZRP achieves “gold level” validation against the Climate, Community and Biodiversity Alliance (CCBA) Standards.

2.5 Additionality

The VCS Tool VT0001 “Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Projects” Version 3.0, was used to assess project additionality. The project complies with the following VCS AFOLU applicability conditions as per section 1.2 of VT0001:

a) AFOLU activities the same or similar to the proposed project activity on the land within the proposed project boundary performed with or without being registered as the VCS AFOLU project shall not lead to violation of any applicable law even if the law is not enforced;

and in compliance with Section 7 VM0009 V2.1:

- *Within the project area, project activities shall not lead to the violation of any law, even those laws which are not enforced.*

The current and proposed land use activity or not in violation of any law. Please see section 1.11 for further information.

and

b) The use of this tool to determine additionality requires the baseline methodology to provide for a stepwise approach justifying the determination of the most plausible baseline scenario. Project proponent(s) proposing new baseline methodologies shall ensure consistency between the determination of a baseline scenario and the determination of additionality of a project activity.

Steps below describe how the baseline was determined following the flowchart and steps in VT0001.

PDR.91 A list of alternative land use scenarios to the project. Sub-step 1a & b in VT0001.

Legally mandated, credible land use scenarios for the project activity that can be implemented by the title deed holder are:

- Forest land converted to cropland if the necessary permits are acquired. This is a credible land use scenario as this is not an illegal activity on private land in Zambia and the project area is suitable for dryland and irrigated crops.
- Forest land converted to other land through logging of trees and subsequent charcoal production if the necessary permits are acquired. This is a credible land use scenario as the title deed holder can apply for such a permit from the Department of Forestry and considering the demand for charcoal it will be a viable alternative.

- Forest land converted to other land through clear felling and converting to grassland and using the land for cattle ranching. This is a legal and credible activity. Clearing the forests will also destroy tsetse flies, allowing for cattle to be ranching. Cattle ranching is a highly successful land use in Zambia.
- Forest land remaining forest land by managing through managing the property as a game ranch, that is, the pre-project land use. This is a credible, legal land use.
- Protecting the forests in the project area through registering it as an AFOLU REDD activity under VCS. This is a credible land use scenario.

Other credible land use scenarios resulting from encroachment by neighbouring agents of deforestation that are not legally mandated but not enforced are:

- Forest land converted to cropland caused by unplanned, uncontrolled, unsustainable charcoal production, followed by conversion to agricultural fields and unmanaged late season fires. It is thus, generally a stepwise process where an area is cleared for charcoal to generate an income and it is then farmed to provide food. This is a credible scenario as this land use is already taking place within the boundary of the project area. This is the baseline scenario and justification for the selected baseline is provided below.

PDR.92 Justification for the selected baseline scenario. This justification can include expert knowledge, results from the participatory rural appraisal and ex-ante estimates of avoided emissions. Sub-step 1c VT0001.

The baseline scenario is deforestation due to charcoal production followed by subsistence agriculture. This is a conservative baseline scenario in compliance with Section 7 of VM0009 V2.1.

The Baseline Scenario was developed through a combination of Participatory Rural Appraisal (PRA) techniques and literature.

PRA techniques employed included: group dynamics (feedback sessions, interviews) and sampling (social mapping, survey data collection, analysis and reporting) to determine the most likely land-use scenario in the absence of the project. Agents of deforestation confirmed their expectation that in the absence of this project, high levels of deforestation in the project area would continue, and waves of immigration would continue to threaten the existing project area boundaries, as community forest resources would become increasingly constrained. Such sentiments were also documented in some of the public comments captured during CCBA validation.

To complement the participatory rural appraisal techniques, the Biomass Emissions Model of VM0009, based on point interpretation of historical imagery, was used to confirm the baseline scenario.

An analysis of Landsat imagery from 1984, 1992, 1999, 2002 and 2009 showed large scale, increasing permanent forest loss across the entire reference area, including inside Rufunsa Conservancy. It is thus clear that the residents of the reference area are dependent currently on land use practices that rely on the unsustainable clearing of intact forest for their livelihoods. From the socio-economic baseline survey it was found that the deforestation is caused by charcoal production and subsistence agriculture. The trend has been continuing since 1984 without any abating and is thus unquestionably the baseline scenario, particularly considering the national and local population growth rates.

In the absence of the Lower Zambezi REDD+ Project, illegal encroachment onto the private property of Rufunsa Conservancy is likely to continue. Encroachment into the project area of Rufunsa Conservancy for charcoal production has already begun, and vast tracts of the northwestern boundary of the adjacent Lower Zambezi National Park have already been deforested and converted into community settlements, marked by agricultural fields, households and 'permanent' structures such as churches, schools and stores. These are indicators that the predicted land-use pattern will continue, even without regard to the technically "protected" status of areas such as the National park, in the absence of enforcement presence and capability, and in the absence of alternative scenarios (such as alternative livelihood activities) becoming available.

The results of our Baseline Survey (Annex H) demonstrate that the overwhelming land use practices in the project zone are charcoal production and subsistence agriculture. Charcoal production is for the Lusaka charcoal market and subsistence agriculture is for local household use and limited sales to markets further afield.

Growing crops is a legal land use activity with permission from a traditional authority in the reference area, but not the project area as this is private land. The fact that it is illegal has not prevented encroachment in the project area and without the project activity registered under the VCS it will not be possible to finance the various deforestation mitigation activities. The inefficiency of current farming practices must be addressed if the current baseline scenario is to be avoided: otherwise, households will continue to need to clear new areas of field nearly every year to compensate for soil degradation and new farming areas will be cleared to account for increasing household sizes and in-migration.

Charcoal production is only legal with the necessary permits, but there are capacity constraints that prevent the issuance of charcoal production permits. Charcoal production is thus continuing, largely unregulated, on an unsustainable scale. Despite existing traditional and legal regulations, and even legislation, empowering local authorities and government agencies to protect and manage forest areas, as the sections above have described, there is little to no evidence that traditional leaders or government agencies are willing or even capable of doing so. Although Zambia's Forestry

Department has expressed great willingness and enthusiasm to address (reduce) deforestation and to encourage improved management of community forest areas, their capacity to regulate local land use is greatly hindered by significant resource constraints.

Until BCP paid for repairs to his motorbike, the local Forest Officer stationed at the Chinyunyu Forest Station reported that he had lacked any form of transportation for the past two years. Given that he is one of the sole officers responsible for a vast area stretching between Chongwe town and the Luangwa River, this demonstrates the extreme limits against Forestry Department capacity to protect or manage forest areas.

Similarly, the late Chief Bunda Bunda attempted to “ban” charcoal production in his Chieftdom, but his efforts were unsuccessful due to the strength of existing market forces and the lack of alternative sources of income for his constituents. For local leaders, such as the Chief and Headmen, the decision to ban production of a product that the majority of their constituents are reliant upon as a source of income is extremely politically unfavourable. This, combined with the fact that a lack of supervision has encouraged the development of a practice whereby local traditional leaders profit from local charcoal production and handing out land for agriculture (through the establishment of a sort of “tithe” system, in exchange for access to community forest), means that the chances for avoiding a total deforestation scenario are small in the absence of the development of comprehensive, robust activities that can replace local income from charcoal and poor subsistence agriculture and significantly improve local governance systems.

The project area is anticipated to face growing population pressure from one of the highest population growth rates in the world and a pattern of immigration that is related to charcoal production and seeking new agricultural land, as the project area constitutes some of the last remaining areas of intact forest in Lusaka Province, where demand for charcoal is high and the cost of transportation is relatively cheap compared to other more distant areas. As the sections above illustrated, a very high percentage of stakeholders living within the reference area are highly dependent upon charcoal production as a source of income and livelihood activity. As such, in the absence of comprehensive project activities, high rates of deforestation caused by charcoal production are expected to continue.

PDR.93 An investment or barriers analysis proving that the project is not the most economical option Step 2 VT0001.

Sub-step 2a. Determining investment analysis option

The owner of Rufunsa Conservancy has indicated that the property has not generated any income as a hunting ranch since ownership was assumed in 2001 (Annex BB). The owner has maintained the property using its own private funds over the years and has been unable to generate any income from sustainable hunting, or any other land use. This is due to the poaching pressure on large game populations and a lack of funding to effectively manage the land or engage with communities meaningfully.

The infrastructure in the project area simply does not allow for the generation of any significant income from photographic tourism in the near future and the low animal densities do not allow for tourism hunting. These are the only income activities that can feasibly take place in the project area

The project activity will thus only generate income through VCS related activities and thus qualifies for *Simple Cost Analysis*.

Sub-step 2b. Option 1 Simple Cost Analysis

The VVB has been provided with the necessary documentation (Annex BB) that the project area has not generated any past income through game ranching and thus forest protection activities and projected future financial documents showing that there are no future, viable income streams other than those generated through VCS registration.

PDR.94 A common practice analysis including a list of project activities and the drivers of deforestation that they address. Step 4 VT0001.**Common Practice Analysis**

Conservation projects on private and communal land are not common at all in the region. Rufunsa Conservancy is the only privately owned wildlife sanctuary in this upper escarpment portion of the Lower Zambezi ecosystem. The only other conservation activities in the area are found on state land, and the only relatively well maintained conservation areas with mentionable large game populations are found on the river valley floor of Lower Zambezi National Park and the Chiawa Game Management Area, both of which have some agents of deforestation present within the boundaries. The difference between these properties and Rufunsa Conservancy is that they are managed by the state and they benefit from state, donor and entry fee revenue sources.

Furthermore, Lower Zambezi National Park is comprised of essentially two separate geographical entities. The river valley floor is rich in wildlife and is a popular tourism destination. However, a significant portion of the park is miombo forest above the escarpment that has very little tourism and more threatened wildlife populations. Management of the national park is focused on the valley floor. In contrast, Rufunsa Conservancy is situated well above the escarpment away from the key tourism circuit and the management presence this draws.

Successful, profitable conservation projects on private land are rare in Zambia and are certainly not “the norm.” The vast majority of such projects are in existence due to the fact that their owners have generated income elsewhere, have foreign philanthropists underwriting loss-making entities, or have enough wildlife to support profitable tourism hunting operations (see Annex BB for reviews of the current status of game ranches and GMA’s in Zambia).

Privately owned game ranches in Zambia, with suitable game populations, in 2013 are experiencing a severe crisis as their main source of revenue, tourism hunting, has been banned in unfenced areas (the majority of game ranches are unfenced). This highlights the vulnerability of private game ranches, even those with healthy wildlife populations. Many game ranches are too remote from photographic tourism circuits to be able to benefit from this sector. Owners thus need to invest profits from other economic activities conducted in other geographic locations into these private game ranches in order to conserve them. Confidential evidence of similar properties with more game and established infrastructure that require ongoing outside funding has been provided to the validator.

It is thus clear that the conservation activities of the project will address at least two drivers of deforestation, namely charcoal production and subsistence agriculture that would have not been addressed had the project not been undertaken (also see PDR.92) as per Section 7 of VM0009 V2.1:

The common practice test shall demonstrate that project activities will address at least one driver of deforestation in such a way that the driver would not have been addressed had the project not been undertaken.

PDR.95 Evident compliance with the minimum requirements of the aforementioned VCS tool. This evidence may be the same as the evidence provided to meet reporting requirements listed in section 4.

In summary, the Lower Zambezi REDD+ Project satisfies the criteria for additionality. A credible baseline scenario is charcoal production followed by subsistence agriculture. There are no financial barriers preventing the baseline scenario and clearing land for subsistence agriculture is a legal activity in Zambia with the necessary permissions in place, so is the cutting down of trees for charcoal if the necessary permits have been acquired and taxes paid. There are substantial barriers preventing enforcing of illegal charcoal activities and deforesting of privately titled land. Activities undertaken by the Lower Zambezi REDD+ Project are unique and would not otherwise take place in the absence of the project.

The Government of Zambia has approved the Lower Zambezi REDD+ Project and particularly the deforestation mitigation activities, especially eco-charcoal production.

2.6 Methodology Deviations

There will be a minor deviation of the visual approach for leakage monitoring (Appendix B, VM0009). Instead of Forest Inventory Team members estimating degradation, they will be required to geo-reference every felled tree and the total number of felled trees were compared against the average density of trees/ha in the project accounting area. This value was then placed in a degradation category as per VM0009. This approach removed all potential bias and greatly improves the robustness and repeatability of degradation monitoring.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

The project fulfilled the requirements of baseline type U3 (frontier or mosaic deforestation) as less than 25% of the boundary is exposed to recent deforestation.

Ex ante baseline emissions for the first 10 years were calculated using equation F.15 of VM0009 and equate to 1,381,507 tCO₂e (Annex J).

3.1.1 Estimating Baseline Emissions from Biomass

Baseline emissions from biomass were calculated using equation F.4 from VM0009 and equates to 1,564,437 tCO₂e (Annex J).

3.1.2 Estimating Baseline Emissions from SOC

Baseline emissions from SOC were calculated using equation F.7 of VM0009 and equates to 856,870 tCO₂e (Annex J).

3.1.3 Estimating Carbon Not Decayed in BGB

Equation F.10 of VM0009 was used to quantify carbon not decayed in BGB and was calculated at 176,550 t CO₂e (Annex J).

3.1.4 Estimating Carbon Not Decayed in SOC

The amount of carbon not decayed in SOC is 556,342 tCO₂e calculated using equation F.9 of VM0009 (Annex J).

3.2 Project Emissions

3.2.1 Project Crediting Period

The project crediting period is 30 years. The start and end dates are as follows

Project Start Date: 2009/10/01

Project End Date: 2039/10/01

3.2.2 Delineating the Project Accounting Areas

PDR.21 A digital (GIS-based) map of the accounting areas, including aerial or satellite imagery showing that they are forested as of the project start date and 10 years prior to the project start date.

A number of satellite images collected by the Landsat series of satellites indicate that the accounting area is indeed forested 10 years prior to the project start date. Figure 8, Figure 9 and Figure 10 below supports this finding.

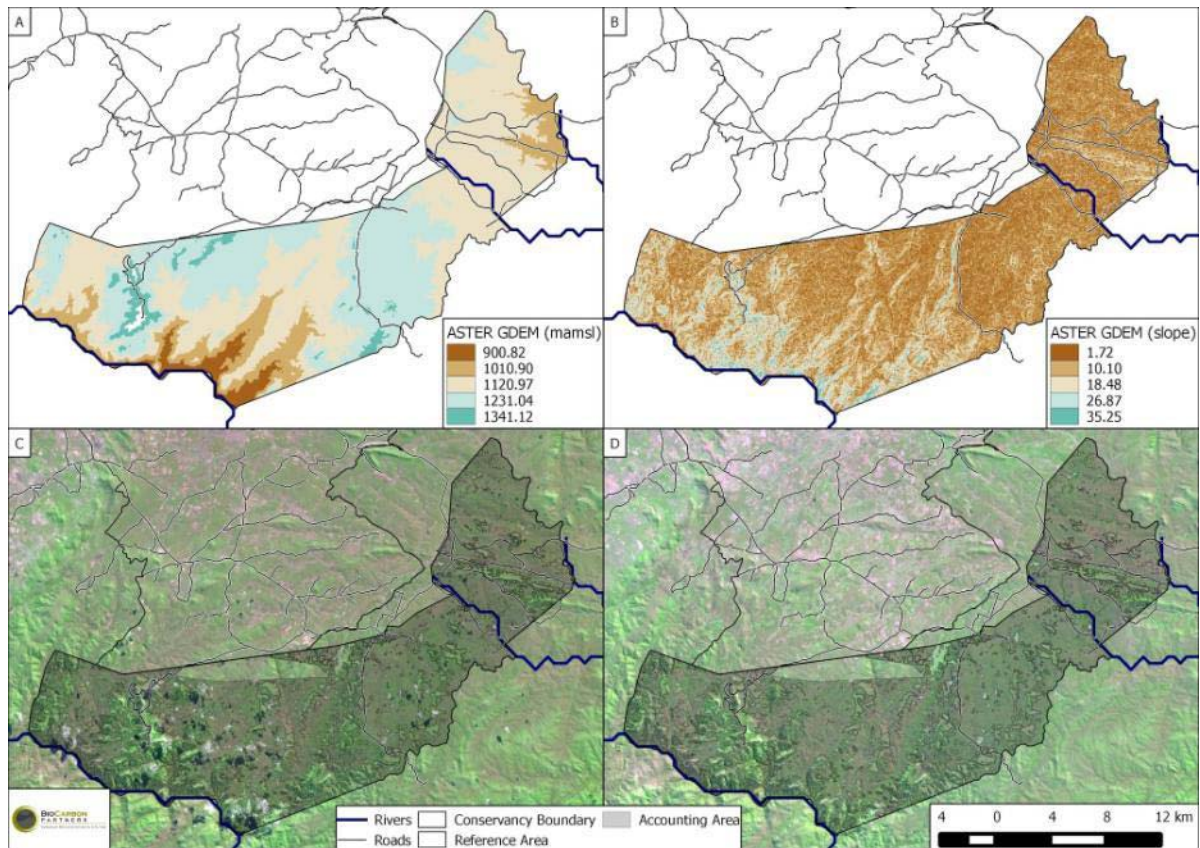


Figure 8. Graphic showing (A) Terrain in the project accounting area (B) Slope in the project accounting area (C) Landsat Image (1999/07/01) showing forest cover (D) Landsat Image (2009/06/02) showing forest cover at the project start date.

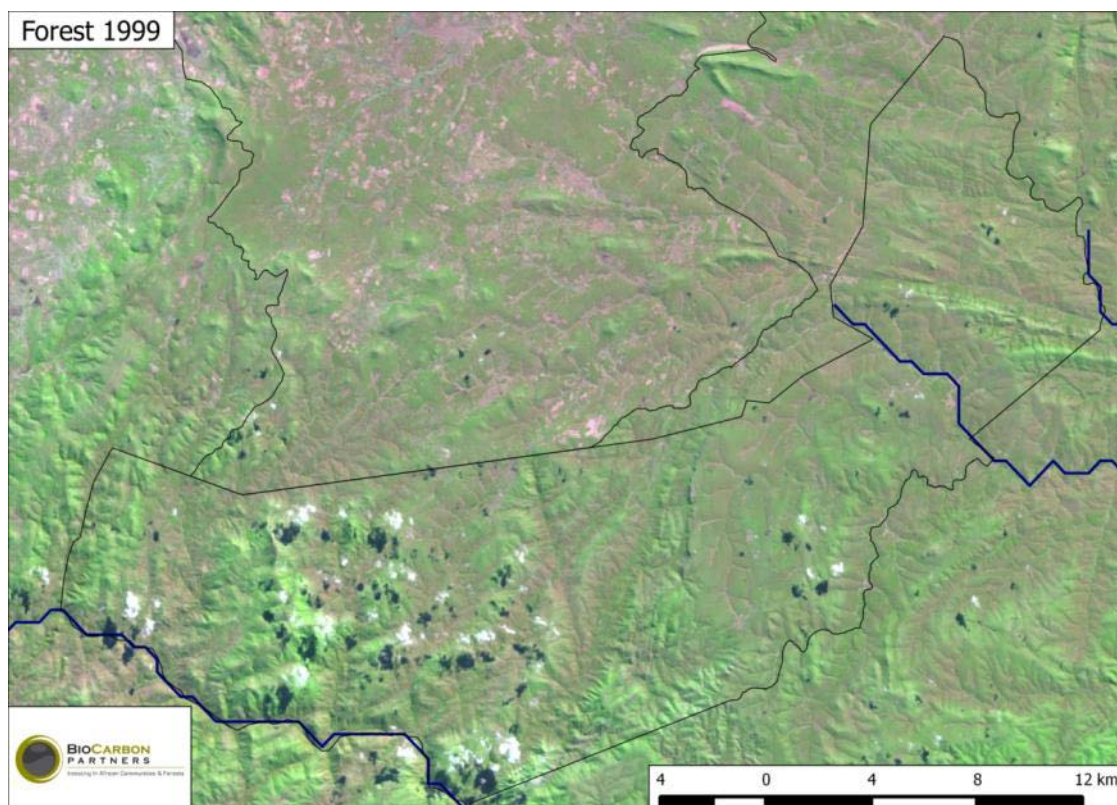


Figure 9. Forest Cover 1999 (C from Figure 6)

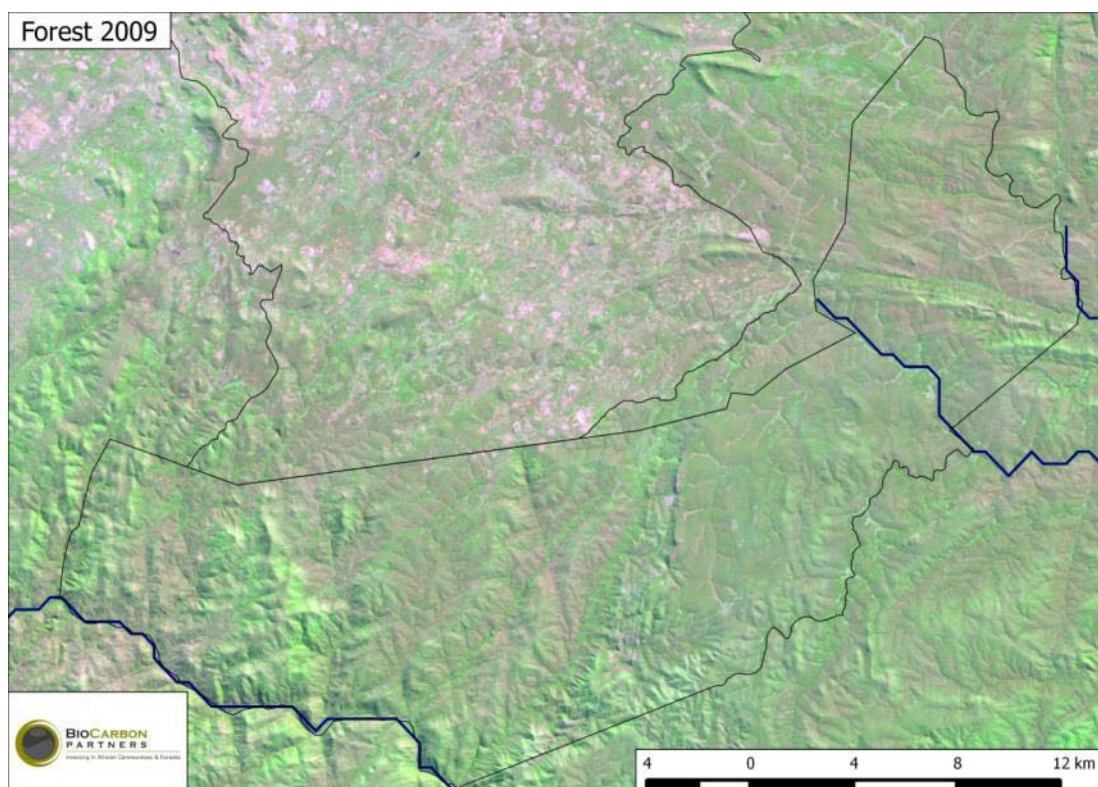


Figure 10. Forest Cover 2009 (D from Figure 6)

PDR.22 Justification and area of the selected accounting areas

The project accounting area is the boundary of Farm 10800, or Rufunsa Conservancy, as shown in Figure 2 above. Sable Transport Limited, a Zambian registered and 100 percent Zambian citizen owned company, privately owns Rufunsa Conservancy under leasehold from the Government of the Republic of Zambia. This area was originally registered as a game ranch for wildlife tourism operations. Due to a lack of resources and wildlife poaching pressure, the area has not been used or promoted for eco-tourism or hunting and has been operated as a *conservancy*. The project area boundaries are clearly defined in a Government of Zambia issued title deed (Annex A).

The accounting area was calculated by firstly excluding non-forested portions of the project area (bare earth and grassland). Then, all steeply sloped lands (greater than 20 degrees slope) which are inaccessible to agents of deforestation were excluded. The slope of 20 degrees was selected based on the assessment of the maximum slope of fields in the reference area. For clarity, steep slopes were excluded only if the size of the polygon to be excluded is greater than 0.4 ha, in which case a 15 m buffer was created around these polygons. The accounting area comprises 33,338 ha of the total project area of 40,126 ha. A 30m Digital Elevation Model (ASTER Global Digital Elevation Model Version 2) was used in the slope calculation.

For the project accounting area boundaries it is important to note that while the title deed outlines the boundaries of the conservancy, the reader will see that a portion of this area has been removed along the northern boundary (Figure 2 and Figure 8). This excluded area has been removed as this portion of the property has been encroached by illegal squatters currently undertaking charcoaling and subsistence agriculture activities. This illegal squatting resulted from confusion as to the exact location of the Northern boundary of the property. As a result of this confusion, a small number of households (approximately 19) had settled on private property within the boundaries of the Project Area. An additional 24 households live on communal land on or near to the boundary of the property. It is possible that some of these illegal squatters arrived prior to the project start date, but there certainly has been new occupation after the project start date. It has now been brought under control.

Due to the sensitive nature of land tenure in Zambia it was decided not to evict these people, but rather exclude this encroached area from the accounting area. It has been decided that the best option is to exclude the encroached area from carbon accounting as including it will most likely make it necessary to relocate the occupants which could lead to unnecessary conflict. Squatters are being continuously monitored and are not allowed to move further into the property. It is thus a conservative exclusion, the area has not been included in emissions reductions accounting.

The boundaries of the exclusion area are based on a survey undertaken by BioCarbon Partners. Each illegal squatting household was surveyed with additional location data also collected using a hand held Global Positioning System (GPS). A convex hull was then generated around these points and used to adjust the boundaries of the conservancy. BioCarbon Partners will not be including this area in the calculation of net emission reductions.

There will be no BCP eco-charcoal production in the Project Area (Rufunsa Conservancy- boundaries as per title deed) or the accounting area or the excluded encroached area.

3.2.3 Baseline Types

PDR.27 If Types U1, U2 or U3 is selected, a spatial analysis of the project area showing that it is within 120 meters of deforestation that occurred within 10 years prior to the project start date

Figure 11 below shows the project boundary as well as the perimeter which is within 120m of deforestation. According to the analyses the project falls within the U3 Baseline type (AUDD frontier or mosaic) whereby less than 25% of the entire project boundary is within 120m of deforestation that has occurred within 10 years of the project start date (see GIS data in Annex T).

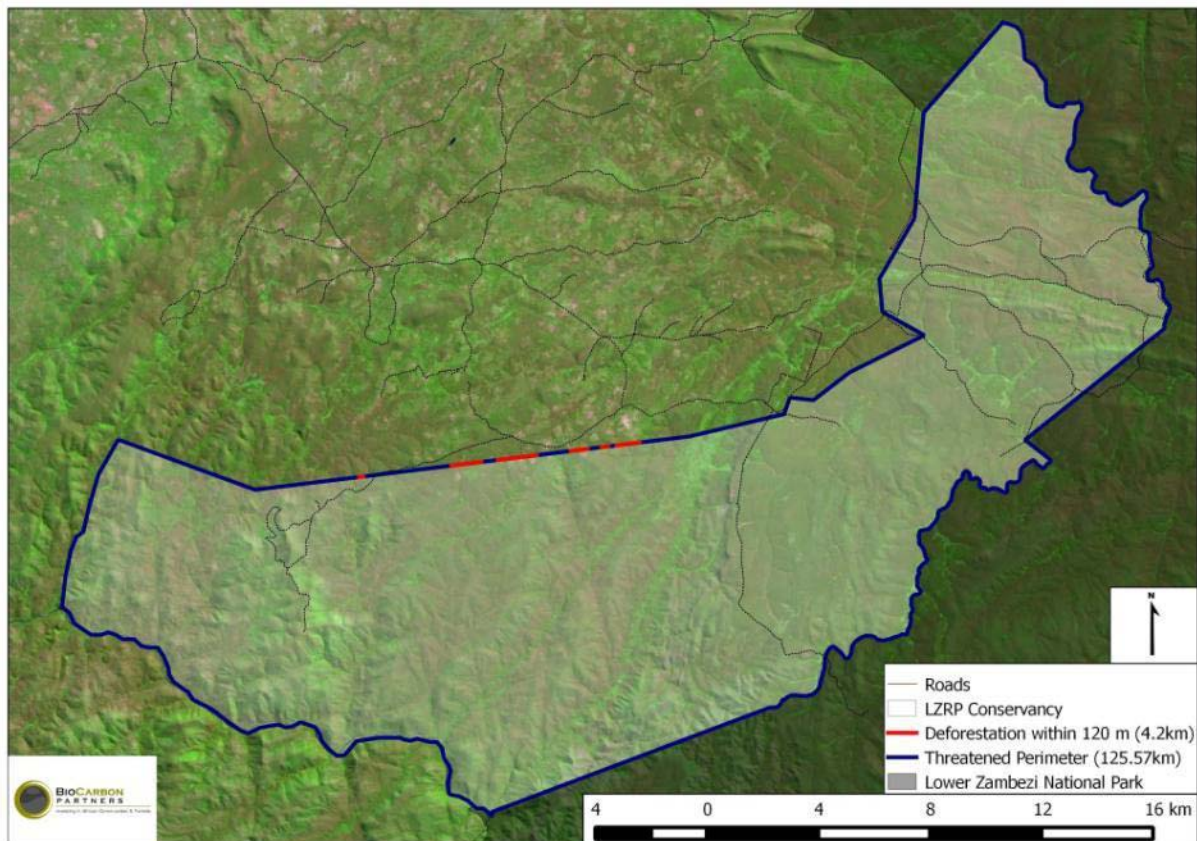


Figure 11: Graphic showing the threatened perimeter as well as the boundary within 120m of deforestation

3.2.4 Delineating Proxy Areas

PDR.28 A map of the delineated boundaries. (Includes PDR.29 Maps of the landscape configuration, including:)

Figure 12 shows the boundaries of the Proxy Area.

PDR.29 Maps of the landscape configuration

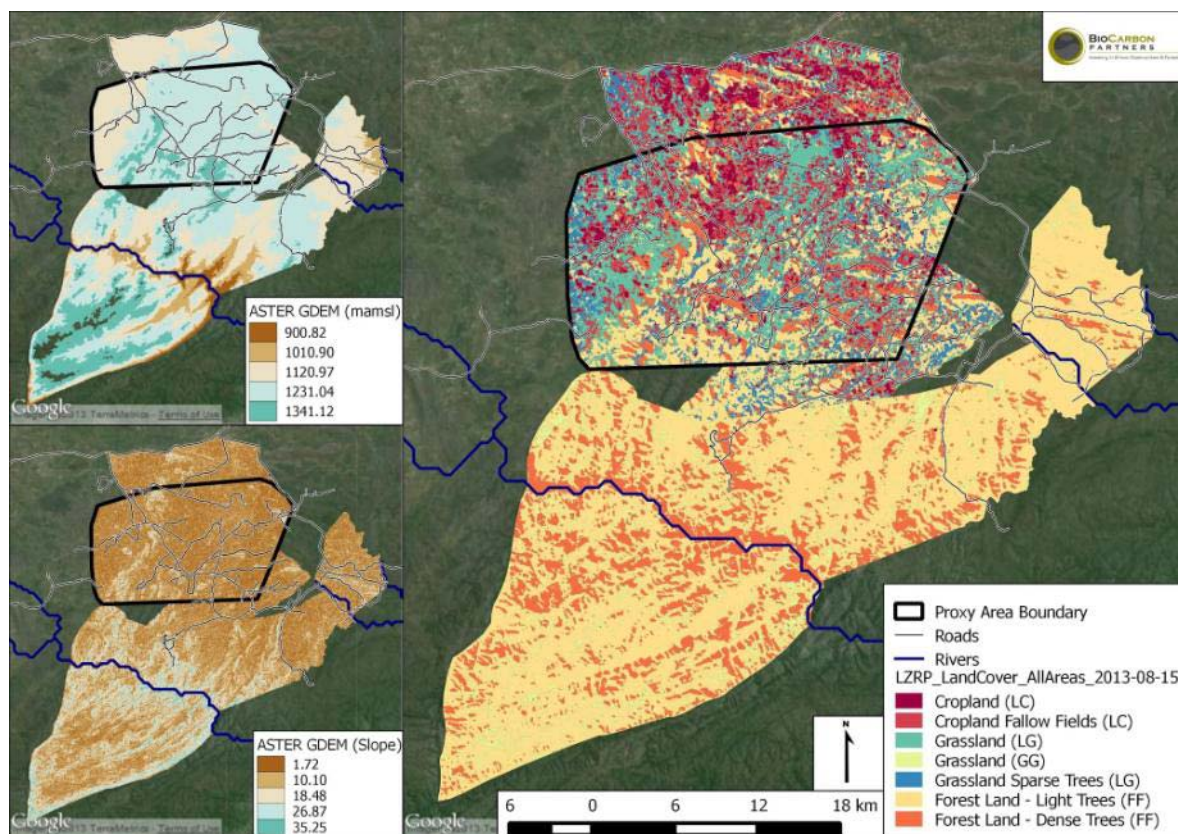


Figure 12. Land cover map of the project area with the proxy area highlighted (Dark black boundary shown)

PDR.30 A narrative describing the rationale for selection of proxy area boundaries

The purpose of the proxy area is to measure residual biomass and soil organic carbon in an area that is representative of the end land use described by the baseline scenario. In the present project the baseline scenario describes the end land use as being subsistence agriculture. The process to this land use involves the conversion of native dryland miombo forest for charcoal production following which the land is cleared of all shrubs and grasses and burnt prior to the commencement of subsistence agricultural activities. Figure 12 shows the boundary of the proxy area which was defined using the land cover classification in the project area, the boundaries were selected such that the defined proxy area represented the final land use as per the baseline scenario and is an area that the project proponent has expert knowledge of through various community engagement processes (see Annex F for more detail). The proxy area boundaries clearly show that the proxy area was on average, un-forested as of the project start date. This figure also confirms that the proxy area has a similar landscape configuration to both the reference and accounting areas. Given that only one project accounting area is present, only one proxy area was defined and sampled. The proxy area shares almost 60% of its areal area with the reference area and is thus accessible to agents of deforestation and the project proponent has full access to the proxy area.

PDR.31 Results of a spatial analysis to demonstrate the proxy area is not forested, on average, as of the project start date.

A spatial analysis making use of the land cover classification shown in Figure 12 returned the following information regarding the forest cover in the proxy area. The proxy area is 43 433.12 ha, of this forest (light and dense forest) makes up 13 517. 95 ha (31.12%). The land cover classification was undertaken using a Landsat TM image captured in 2009 and thus this is relevant to the project start date.

3.2.5 The Baseline Emissions Models

3.2.5.1 Delineating Reference Areas

PDR.36 A map of the delineated boundaries, demonstrating that the reference area is held by the identified baseline agent or agents and does not include the project area and PDR.37 Maps of the landscape configuration, including:

- a. Topography (elevation, slope, aspect);**
- b. Recent land use and land cover (either a thematic map created by the project proponent or publicly available map);**
- c. Access points;**
- d. Soil class maps (if available);**
- e. Locations of important markets;**
- f. Locations of important resources like waterways or roads; and**
- g. Land ownership/tenure boundaries)**

Figure 13 shows the boundaries of the reference area. in addition the map shows the topography found in the project area (slope and digital elevation model) as well as access points and land cover. Important resources including rivers, roads are also shown. Villages partaking in the project activities are also included. Tenure in the reference area is not available, tenure for the project accounting area is shown elsewhere on Figure 2.

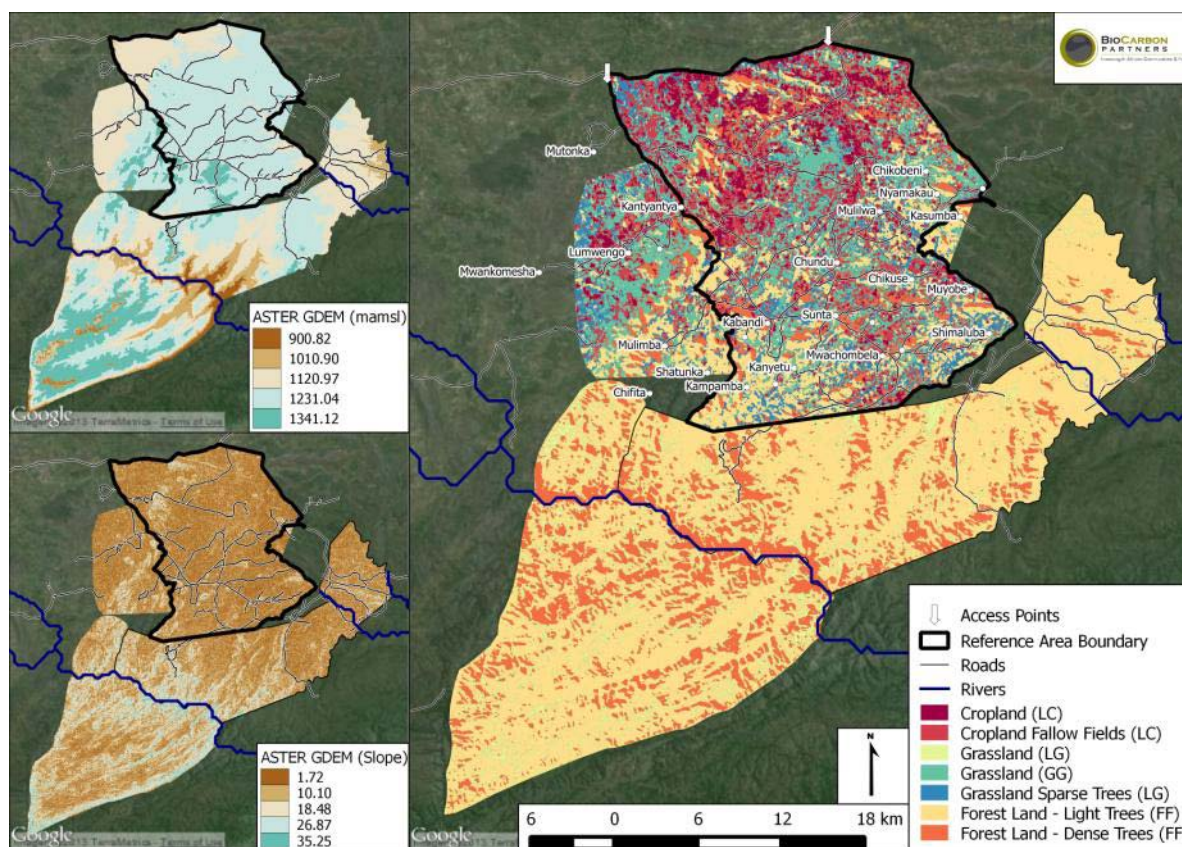


Figure 13. Land cover map of the project areas with the reference area highlighted (Dark black boundary shown) and arrows indicate access to the reference area.

PDR.38 A description of the rationale for selection of reference area boundaries.

The purpose of the reference area is to characterise historical deforestation close to the project accounting area. Both the reference area and the project accounting area are located in the same chiefdom (Late Chief Bunda Bunda) and district (Rufunsa district). The reference and project accounting areas share a common boundary along the northern edge of the project accounting area. The rationale for the selection of the reference area boundaries is a function of the location of the agents of deforestation as well as the location of the project accounting area relative to the Lower Zambezi National Park. The reference area was placed north of the project accounting area as this area is the source of the threat to the property and is where the agents of deforestation are located (Identified during the participatory rural appraisal, Annex F). The northern boundary of the reference area abuts the Great East road which is the main transport road to Lusaka. Visual interpretation of historical Landsat satellite imagery indicates that the source of deforestation in the area is this main road with deforestation moving south throughout the historical reference period. As such the northern boundary of the reference area was defined as being the Great East road. The eastern boundary of the reference area was defined to match a road which defines the western boundary of the Lower Zambezi National Park.

The western boundary of the reference area was also defined based on a road leading from the Great East road to the project accounting area. Wherever possible the boundaries for the reference area were defined so as to accurately capture the deforestation described in the baseline scenario. The final reference area therefore depicts land cover which is concomitant with the defined baseline scenario and provides an accurate depiction of what the accounting area would look like without the implementation of the Lower Zambezi REDD+ Project.

The geography of the reference area is very similar to that of the project area. Figure 13 clearly highlights the similarity between the two areas, the reference area is flat in most places with some topographically varied areas. Both slope and height were determined using a digital elevation model derived from the ASTER Global Digital Elevation Model (GDEM).

PDR.39 Results of a spatial analysis to demonstrate the reference area had as much forest as the project accounting area at some point in time during the historic reference period.

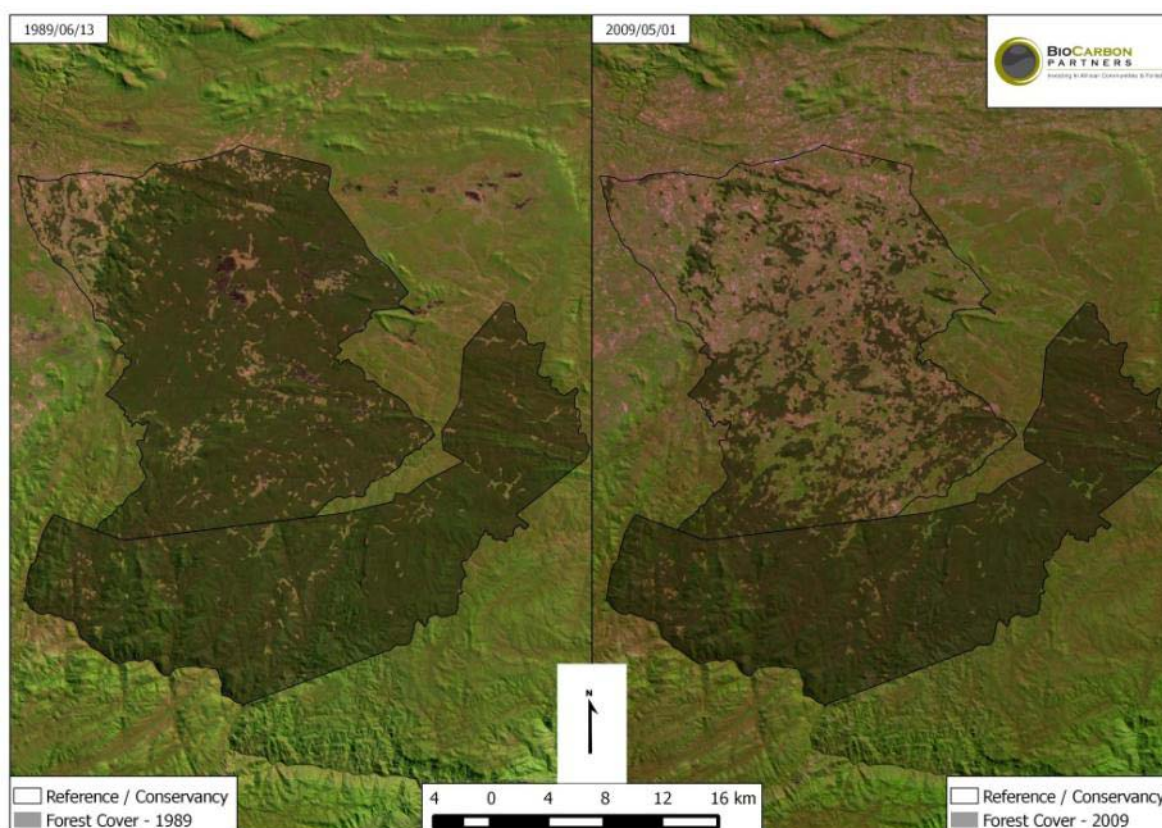


Figure 14. Forested area of the accounting and reference areas in 1989 and 2009

A spatial analysis was undertaken to determine if the reference area had as much forest as the project accounting area at any time during the historical reference period. The 1989 Landsat scene was chosen to determine the forest cover during the reference period.

An unsupervised segmentation and classification (K-Means classification) was applied to the reference area using the 1989 Landsat scene. The forested area for the 1989 scene returned a forested area of 42 217 ha for the reference area, while a supervised classification (discussed elsewhere) of the 2009 Landsat scene returned a forested area of approximately 33 338 ha for the project accounting area. These areas are presented graphically in Figure 14. As such the analysis shows that at some point in time during the historical reference period, the reference area contained at least as much forest as the accounting area.

3.2.5.2 Defining the Historic Reference Period

PDR.42 Established reference period boundaries.

Based on available cloud free Landsat imagery (<http://glovis.usgs.gov/>) the reference period selected was 1984 - 2009. In total six suitable scenes were identified and used. No suitable scenes were found before 1984.

PDR.43 A list of available historic imagery for the reference area.

Table 13. List of images used to develop the project Cumulative Deforestation Model

Image no.	Image Date	Image ID	Sensor
1	1984/06/29	LT51710711984181XXX04	Landsat 5 TM
2	1989/06/13	LT51710711989194JSA00	Landsat 5 TM
3	1992/06/19	LT51710711992171JSA01	Landsat 5 TM
4	1999/07/01	LE71710711999182EDC00	Landsat 7 ETM
5	2002/07/09	LE71710712002190SGS00	Landsat 7 ETM
6	2009/05/01	LT51710712009121JSA01	Landsat 5 TM

PDR.45 Narrative rationale for the selection of the reference period.

The reference period was defined to enable the determination of cumulative deforestation over time within the reference area. The reference period start date was set to 1984. This date was chosen for two reasons, the first being that the entire low lying flat areas of the reference area were forested at this stage. The second reason is that this is the first suitable available image in the Landsat archive. While this image does contain some cloud cover, this only partially occludes the reference area. CDM points falling on the clouds were removed from the population data set. The reference period was extended until 2009, which is the project start date.

Image dates are available in Table 13. Scenes were chosen such that all data used in the CDM were from the same season. Southern Zambia experiences heavy and persistent rains from November through to May. During this period it is difficult to capture cloud free scenes of the study area. As such imagery used in the reference period CDM analyses were selected from May to July, which facilitated easy comparison of forest states.

3.2.5.3 Selecting Historical Imagery**PDR.46 A map of the reference area showing the area of "double-coverage"**

Figure 15 shows the extent of double coverage. See Annex T for the spatial data associated with this map.

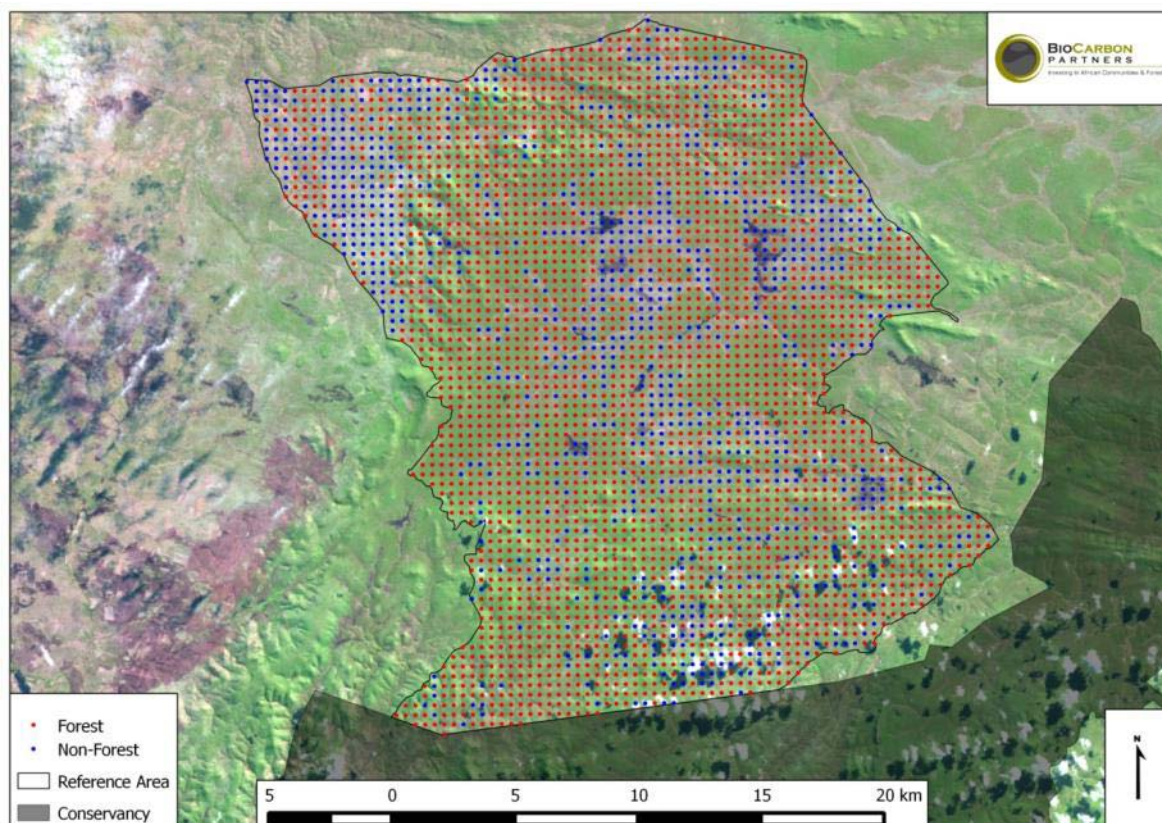


Figure 15. Map depicting the number of CDM points which fulfil the double coverage requirement

PDR.47 Quantification of "double coverage"(greater than 90%).

Double coverage was calculated using the tool made available as part of the Wildlife Works Toolbar used for the CDM forest state assessment. The imagery employed by the project proponent was entirely cloud free save for sparse clouds on the initial 1984 scene. Figure 15 (see above) shows a forest state classification of the entire reference area for the 1984 image. This is the only image which contained any cloud cover. The red points indicate the areas which were classified as forest in 1984 while the blue points indicate clouds and or non-forest. Points falling on the clouds and cloud shadows as well as non-forest points were removed from subsequent forest state analyses. Of the 2600 points (red points) employed as part of the CDM analysis, 100% of these points fulfilled the double coverage requirement. In addition, no Landsat 7 ETM+ scenes captured after 2003 were employed due to the scan line error, as such complete coverage of the reference area was attained. Figure 15 shows the map of points which fulfilled the double coverage requirement.

PDR.48 A line plot of the historic image dates to confirm stationarity.

Figure 16 below shows the temporal location of the images used to develop the CDM for the Lower Zambezi REDD+ Project. The temporal locations are, on average, located evenly across the reference period thereby fulfilling the stationarity requirement.

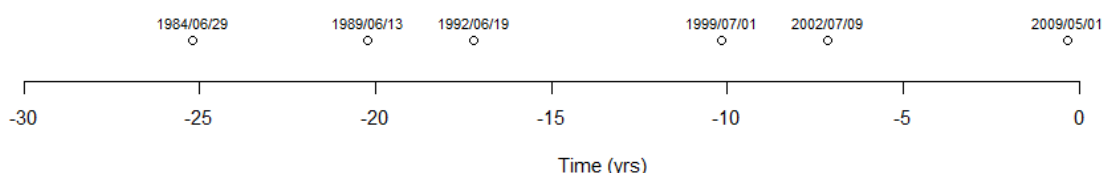


Figure 16. Line plot of CDM image dates

PDR.49 Evidence that all image pixels are not more than 30m x 30m.

Forest state point interpretation utilised both Landsat 5 TM and Landsat 7 ETM+ imagery. The spatial resolution of this imagery is 30m, as such the pixel size of the imagery used was not more than 30m x 30m.

PDR.50 Empirical evidence that imagery is registered to within 10% RMSE, on average.

All Landsat imagery were downloaded from the United States Geological Survey GLOVIS website (<http://glovis.usgs.gov/>). This data are pre-processed to Standard Terrain Correction (level 1T) which involves both geometric and radiometric corrections. Following downloading, the Landsat data were geo-referenced to the UTM 35 South projection with image control provided by the 2009 scene. Results from the image warping process will be made available to the validator. RMSE values returned are all less than 1%. Table 14 shows the RMSE values for each image matching process. The Root Mean Square Error was calculated based on the absolute difference between the greatest and smallest error. The errors are very small as the imagery were already geometrically corrected by the USGS.

Table 14. RMSE results from the Geo-referencing procedures

Date	Master	Slave	RMSE
1984-06-29	2009 Image	1984 Image	0.263668
1989-06-13	2009 Image	1989 Image	0.0429821
1992-06-19	2009 Image	1992 Image	0.256452
1999-07-01	2009 Image	1999 Image	0.248838
2002-07-09	2009 Image	2002 Image	0.034691
2009-05-01	2009 Image	NA	NA

3.2.5.4 Determining Sample Size

PDR.51 The sample size.

The cumulative deforestation modelling forest state observation sample size was selected using a pilot sample of 300 forest state points. The pilot sample of 300 points in each of the five years used for the assessment results in 1500 observations throughout the sample period. These data observations were used to compute an estimate of population variance as per equation F.12 of VM0009 version 2.1. The resulting analyses indicated that in order to accurately estimate deforestation parameters within +/- 15% on average, the forest state analysis required a sample of at least 2600 points / observations. The project described in this document utilised a stratified random grid of 2600 points observed and classified over six years of historical imagery. The resulting logistic function was therefore calculated using 15600 forest state observations during the historic reference period.

3.2.5.5 Sampling Deforestation

Table 15. Results of visual point interpretation

Date	Forest	Non-Forest	Total
1984	2600	0	2600
1989	2355	245	2600
1992	1873	727	2600
1999	1646	954	2600
2002	1564	1036	2600
2009	1000	1600	2600

PDR.52 A map of the reference area showing the sample point locations.

Table 17 below indicates sampling point locations.

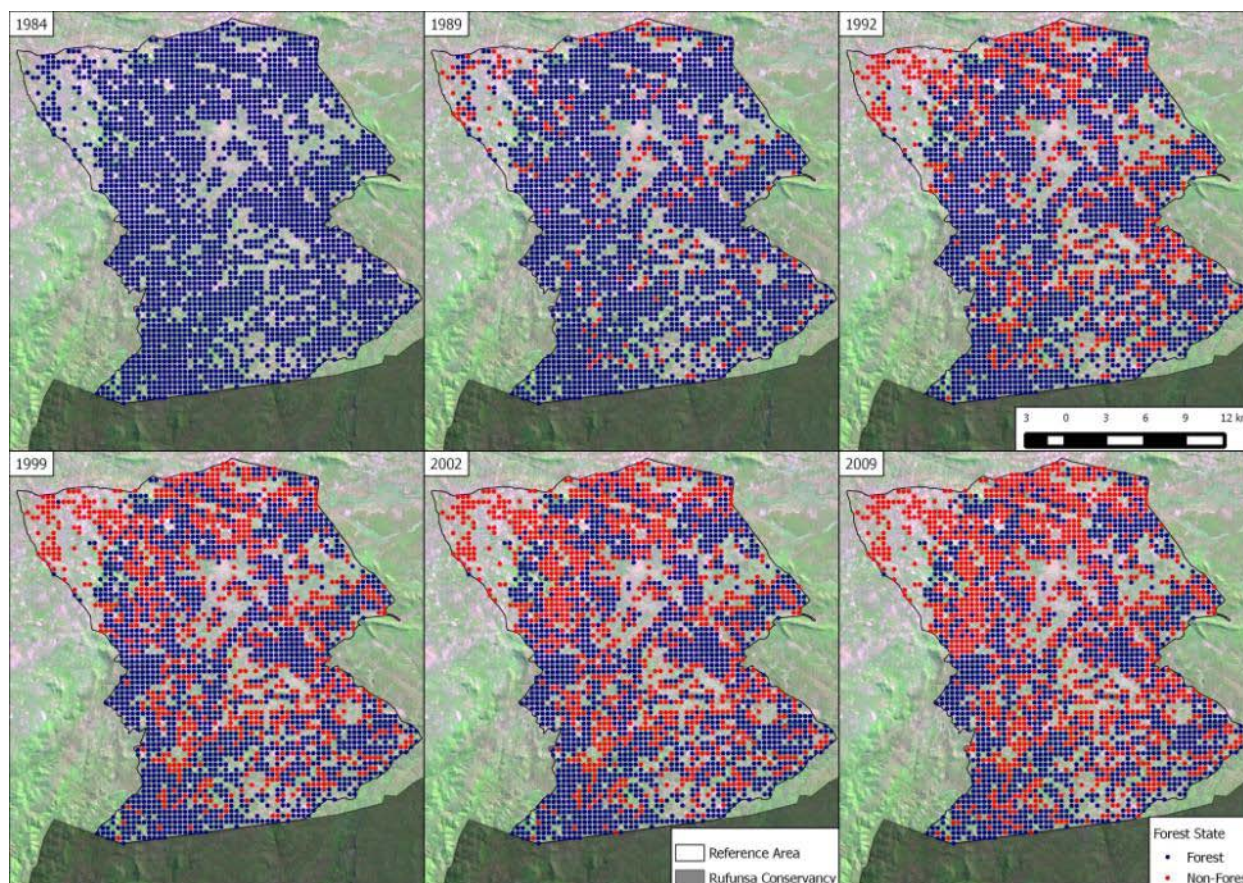


Figure 17. CDM sample point locations

3.2.5.6 Discarded Sample Points

No points were discarded during the forest state analysis, however, the initial forest state classification in 1984 did involve the removal of non-forest points from the original grid. Subsequent to this classification, no points were removed.

3.2.5.7 Parameterising α , β , and θ

α and β (θ was not used) were computed using the sample deforestation data described above. The results of a logistic function applied to the 15600 points are summarised in Table 16

Table 16. Results of applying a logistic equation to the point interpretation data.

Parameter	Value	Standard Error
α	0	0
β	0.0003653	0.0009137

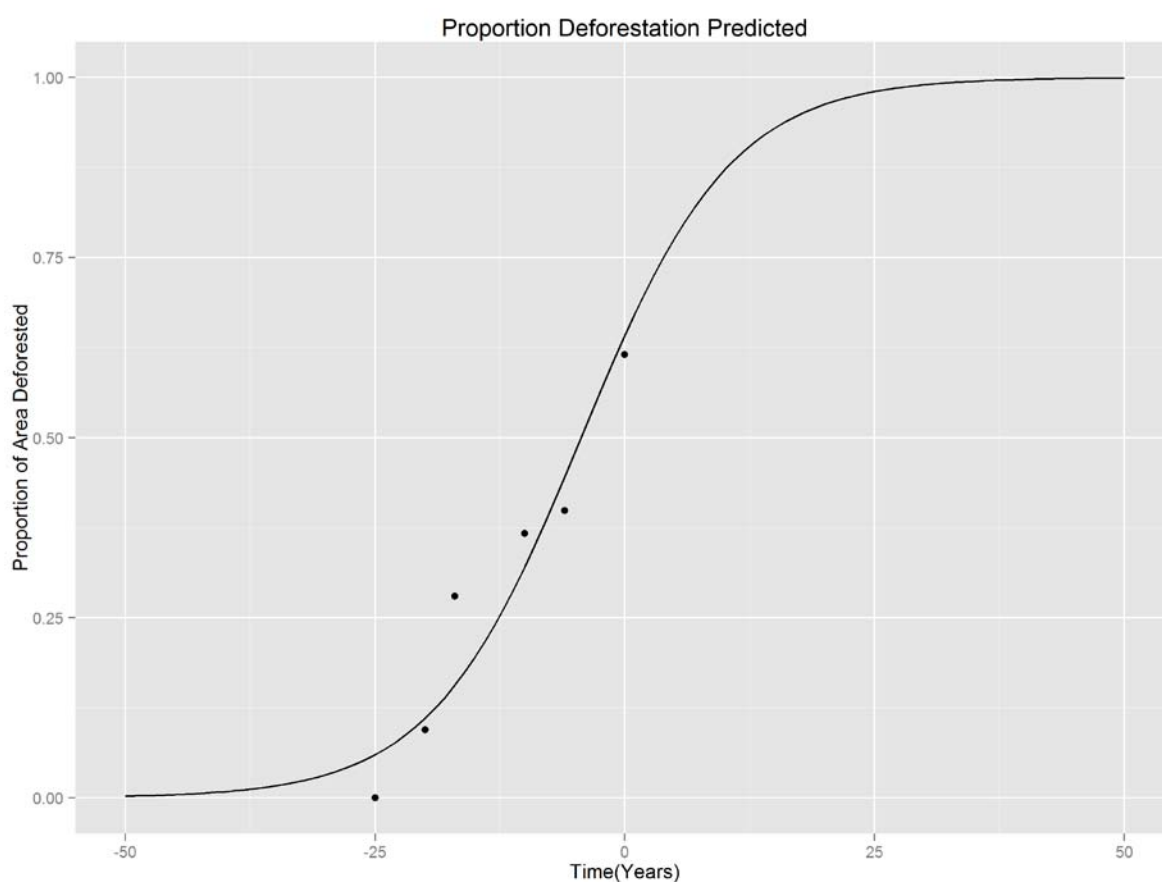


Figure 18. Logistic function used in CDM

Equation A.5 in the methodology Vers 2.1 states that η is the linear predictor of deforestation given time and covariates. No covariates were used as the model had a good fit without them. As such equation 5 returned the following result:

$$\eta = 0.582 + 0.0003653t$$

Given that no covariates were employed the final model is as follows:

$$F_{DF} = 1 / 1 + e^{(0.582 + 0.0003653 * t)}$$

3.2.5.8 Minimizing Uncertainty

PDR.57 A protocol for interpreting forest state from imagery.

Forest state interpretation document is available as a confidential addendum to this document (Annex O). Briefly, this document covers the following topics and provides a thorough outline of the process required to correctly classify the forest state of each of the CDM points.

1. Getting Imagery
2. Adding Imagery and Visualisations in ArcMap
3. Point interpretation
4. Examples of difficult point interpretations

Wherever possible screenshots of both the software and difficult point interpretations are used to clarify point interpretations. The forest state document was shared with associates from the Cape Peninsula University of Technology who made use of it during the forest state classification. In addition, the project proponent spent several afternoons with the associates discussing and clarifying difficult point interpretations.

PDR.58 The results of an independent check of the interpretation.

The CDM point interpretation was undertaken by two associates from the Cape Peninsula University of Technology. A 5% ($3500 \times 0.05 = 175$) sample was drawn from each of the forest state interpretations and compared to a forest state classification undertaken by an interpreter who is familiar with the study area. The independent interpretation was assumed to be correct, confusion matrices were then created for each image in the reference imagery data set (matrices are available in Annex R Table 17 reports the classification accuracy as well as the Kappa statistic for each of the image dates. The accuracies returned were suitable and well within the criteria stipulated by the methodology. The data used to determine the errors can be found in Annex T.

Table 17. Results of an independent CDM error assessment.

Year	Richard Burns				
	Accuracy	Kappa	SE	95% CI	
1984	97.14%	0.96	0.23	0.92	0.99
1989	96.57%	0.95	0.26	0.91	0.99
1992	90.86%	0.87	0.41	0.81	0.93
1999	95.43%	0.94	0.30	0.90	0.99
2002	96.00%	0.95	0.28	0.91	0.99
2009	97.71%	0.97	0.23	0.94	1.01

PDR.59 Evidence that systematic errors, if any, from the independent check of the interpretation were corrected.

Systematic errors in the CDM were checked and corrected using the CDM tool developed for ArcGIS by Wildlife Works. Systematic errors were mitigated during the image interpretation phase of the process by labelling points using the previous year's classification. Image interpreters were then presented with the point of interest including the previous images forest state classification. This aided the interpretation such that forest state points which were classified as non-forest in the previous image were not classified as forest in the present scene. Several systematic errors were identified and corrected, Shapefile data showing these systematic errors will be provided to the validator.

3.2.5.9 Estimating Uncertainty

Uncertainty (Standard Error) is reported in Table 16. Results of applying a logistic equation to the point interpretation data.

PDR.70 The parameter q as the number of days between the onset of degradation and the beginning of deforestation.

Determining q

$q = 620$ days

The lag period between forest degradation (charcoaling) and deforestation (subsistence agriculture).

PDR.71 Justification for the selection of a non-zero value for q

The parameter q was determined as part of the Participatory Rural appraisal. A total of 28 farmers were questioned how long they waited to cultivate after clearing and the reasons for doing so. The farm locations were recorded with a GPS and are reported in Annex U.

3.2.6 Determining R_u

PDR.72 The parameter R_u as the ratio of deforested perimeter to total threatened perimeter, or the ratio of deforested area to total project accounting area(s), as of the project start date.

The baseline type U3 was determined using the following geo-spatial procedure and is illustrated in **Figure 5** and **Figure 19**.

- a. The property boundary was converted from a polygon to a line file.
- b. Deforestation within 120m of the boundary was identified and digitised using a Landsat TM image captured on 2009-05-01.
- c. The property boundary was then clipped (Geo-processing Tools in QGIS) using the deforestation within 120m layer identified in step 2.
- d. The perimeter of the property was then calculated along with the length of the boundary within 120m of deforestation (Result from clip in step 3)
- e. Perimeter = 125.568 km
- f. Deforestation within 120m of boundary = 4.221 km
- g. Percentage of total boundary within 120m of deforestation is 3.362 %
- h. Spatial data associated with the above calculations has been provided to the validators and should confirm the values presented. The Landsat scene was chosen as it is the closest scene available to the project start date and thus provides the most accurate assessment of threat to the project boundary at the time of the project start date.

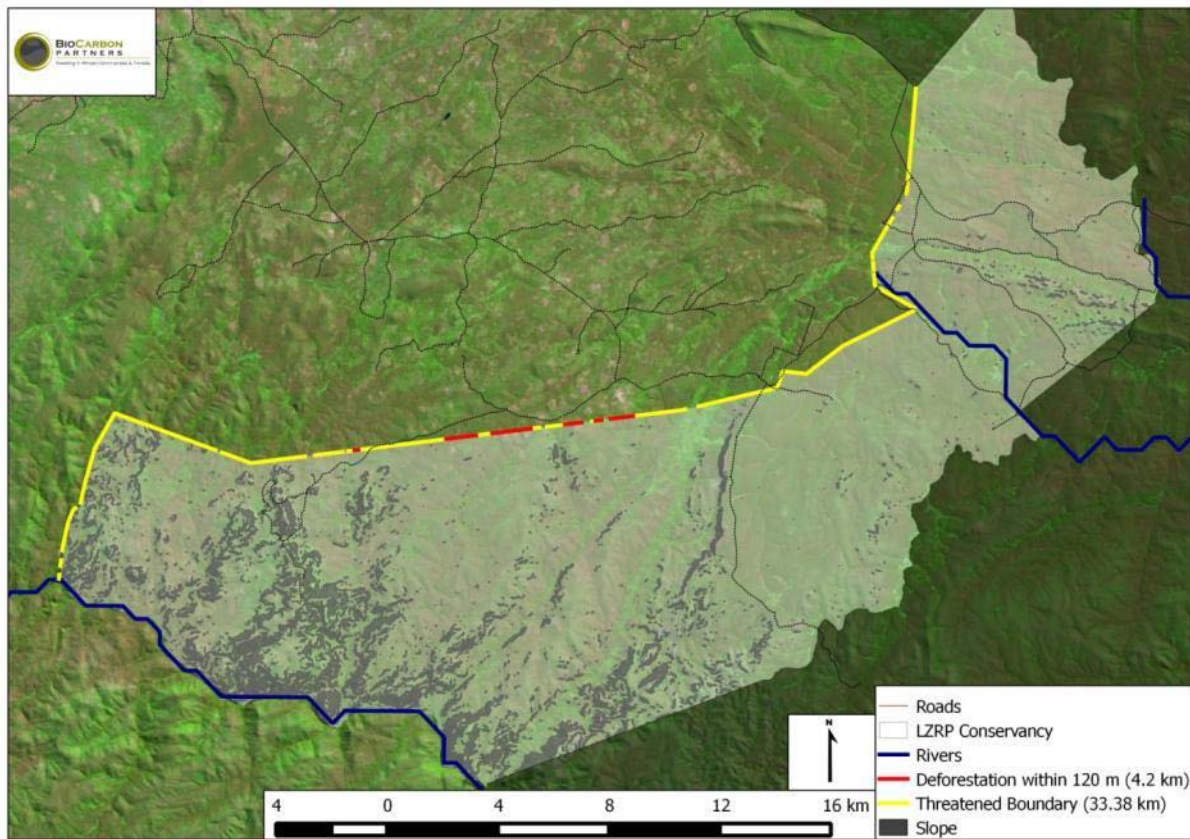


Figure 19. Map of exposed and threatened perimeter.

PDR.73 Description of how R_u was obtained.

R_u was calculated using the ratio of deforested perimeter to threatened perimeter of the project area. Deforestation was visually identified on a Landsat scene with the boundaries of the deforestation digitised as polygons and captured in a GIS. The deforestation polygons were then buffered by 120 m. The resulting polygons were used to clip the threatened perimeter. The length of the clipped boundary was then calculated to be 4.2 km.

PDR.74 Results of GIS analysis to determine or measure R_u in the project area including the dates of images used to identify deforestation.

Based on the analysis described above the R_u value was calculated as the ratio of deforested perimeter (4.22 km) to threatened perimeter (39.79 km). The threatened perimeter was calculated by removing all boundary areas with a slope of 20 or more (South West Area) as well as the project boundary which abuts the Lower Zambezi National Park (Figure 2). Slope was generated using the ASTER Global Digital Elevation Model (ASTER GDEM). The ratio of deforested to threatened perimeter is 0.126. The Landsat TM image used to undertake this analysis was captured on the 1st of May 2009 (01-05-2009).

3.2.7 The Soil Emissions Model

3.2.7.1.1 Default Values for λ_{SOC}

The default value of 0.2 was used for the λ_{SOC} parameter. The project falls within a tropical region and thus qualifies for using this value.

3.2.7.1.2 Empirical estimates of λ_{SOC}

Samples were collected and analysed to empirically estimate λ_{SOC} , however due to high variance it was not financially viable to collect the amount of samples to get a statistically significant decay model even though several samples were taken in the reference area and analysed.

PDR.75 Description of how samples from the reference area were selected including stratification, if any.

Samples in the reference area were selected based on a land cover classification of the reference area and expert local knowledge. The area was initially stratified to facilitate site selection.

PDR.76 A map of sample locations in the reference area.

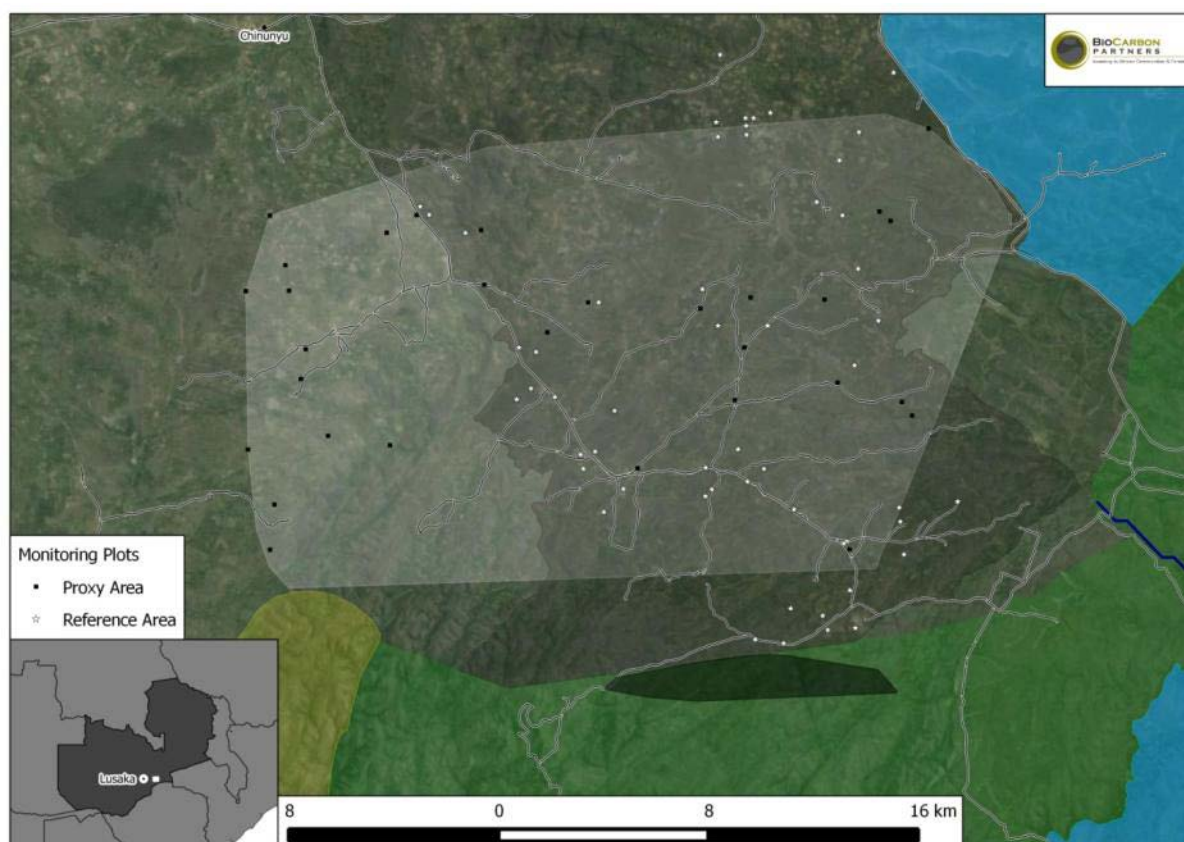


Figure 20. Location of soil sampling sites in the reference area.

PDR.77 A table showing the conversion time for each area (farm or otherwise) from which samples were taken.

Several sites were sampled listed in Annex X in an attempt to empirically determine λ_{SOC} but as stated above the results were not statistically significant and it was not financially feasible to sample more sites to hopefully generate a significant local project level λ_{SOC} .

PDR.78 Description of and statistics for the method applied to estimate λ_{SOC} .

The default VCS value was used.

3.2.8 Baseline Scenarios for Selected Carbon Pools

PDR.84 A qualitative description of the baseline scenario for each selected carbon pool.

Above Ground Other Trees (AGOT) are assumed to be removed, converted to charcoal and subsequently burnt in the baseline scenario. All AGOT that is not converted to charcoal is burnt on site. The residual AGOT that remains in the baseline scenario, as determined by plot samples, is 8.6 tCO₂e/ha. The BCP biomass and soil monitoring protocol (Annex L) was followed to quantify remaining AGOT.

Below-ground Other Tree (BGOT) was determined using a local peer reviewed root-shoot ratio of 0.54 (Chidumayo 2013).

Soil Organic Carbon (SOC) is 192.6 tCO₂e/ha (Annex X) and decays to 131.7 tCO₂e/ha in the proxy area following the BCP biomass and soil monitoring protocol (Annex L). Averages were calculated following the guidelines in Annex B and equation B.9 VM0009 V2.1. SOC was assumed to decay at the VCS default λ_{SOC} of 0.2.

Project emissions were calculated using equation F.41 of VM0009 and was 0.

3.2.9 Calculating Emissions from Changes in Project Stocks

This is the first monitoring period, there were no changes in project stocks.

3.2.10 Calculating Emissions from Burning

There were no emissions from burning of AGOT, even though there were several burning incidences in the project area. Fire is a natural phenomenon in all the higher rainfall African savannahs and is essential for the maintenance of the ecosystem. Please see Section 3.4.1.2 – Natural Risks for a discussion on the impacts of fire on the project area. Furthermore, AGNT, the carbon pool most affected by fire was conservatively excluded as a pool so emissions from this pool are therefore also excluded.

3.3 Leakage

Leakage was calculated using equation F.43 of VM0009 and was insignificant (Annex I).

3.3.1 Estimating Emissions from Activity-Shifting Leakage

Only minor degradation was recorded in the activity shifting leakage area.

3.3.1.1 Delineating the Activity-Shifting Leakage Area

PDR.97 A map of the delineated boundaries and PDR.98 Maps of the landscape configuration.

Figure 21 is a map of the delineated boundaries and landscape configuration.

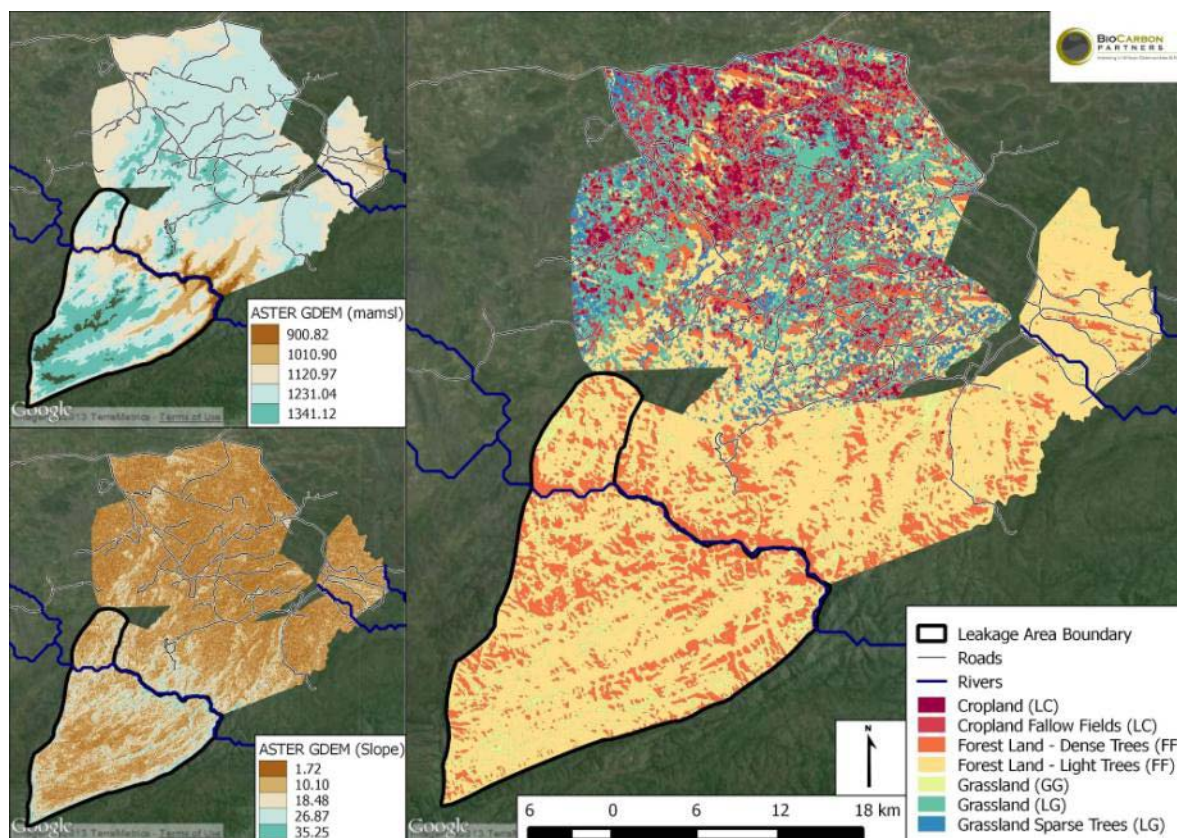


Figure 21. Land cover map of the project areas with the leakage area highlighted (Dark black boundary shown)

PDR.99 A narrative describing the rationale for selection of activity-shifting leakage area boundaries.

Forested areas adjacent to the project accounting site have been selected as the activity-shifting leakage area. Landsat imagery from a number of dates throughout the reference period were visually interpreted to determine if the leakage area has been forested for at least ten years prior to the project start date. To preserve the conservative nature of the project, only areas accessible to the agents of deforestation were selected. To maintain the conservative nature of the project, areas with steep slopes were removed from the leakage area. These included areas with a slope of greater than 20°.

In the present project, the leakage area abuts the project accounting area on its north western border and shares approximately 26 km of its perimeter with the accounting area. The leakage area also shares approximately 5 km of its boundary with the Lower Zambezi National Park. The rest of the perimeter allows free access to the leakage area. Free access to the leakage area was determined during sampling activities undertaken by the BioCarbon field sampling team. During these monitoring activities the team were able to easily access the entire leakage area as shown by the locations of monitoring plots, there were no issues with private landowners, rivers, rugged terrain or any security concerns.

PDR.100 Results of a spatial analysis to demonstrate the activity-shifting leakage area is entirely forested as of the project start date.

The activity-shifting leakage area was delineated using topographic features as well as a land cover classification undertaken on a Landsat image collected in 2009. Figure 22 shows the total extent of forest cover in the leakage area. See Figure 21 for additional graphic displays of forest cover in the leakage area.

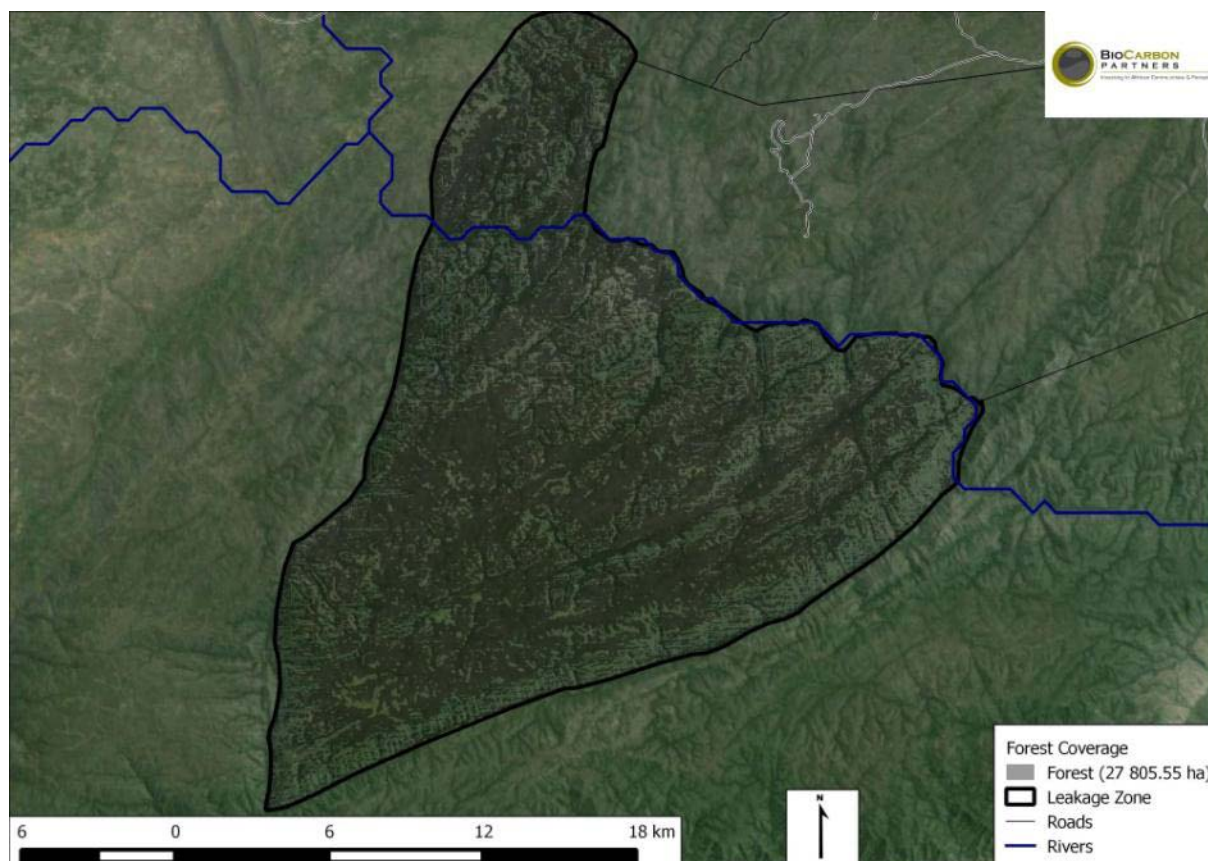


Figure 22. Forest Coverage in the leakage area (2009)

PDR.101 Results of a spatial analysis to demonstrate the activity-shifting leakage area is no larger than the project accounting area.

The leakage area contains approximately 27 805.55 ha of intact forest (excluding slopes greater than 20° and grassland) while the Lower Zambezi REDD+ Project conservancy contains 33 338.43 ha (excluding slopes and non-forest).

3.3.1.2 The Leakage Emissions Model

3.3.1.3 Estimating $P_{LDEG}^{[m]}$

Degradation in the activity shifting leakage area was assessed using visual inspection as per Appendix B, VM0009 with deviations as described in Annex N. The optimum number of plots were determined using equation B.29, VM0009 and came to 23, but it was decided to be on the safe side and 30 plots were randomly placed and sampled.

There was evidence of minor degradation in 13 of the 1 ha plots, mostly only a single tree that had been felled (Table 18) and $P_{LDEG}^{[m]}$ was estimated at 0.087 and is therefore insignificant.

Table 18. Results of activity shifting leakage monitoring.

Plot Labels	Stump count	Degradation Factor
Ruln11	1	0.2
Ruln13	1	0.2
Ruln23	2	0.2
Ruln31	2	0.2
Ruln32	1	0.2
Ruln33	1	0.2
Ruln35	3	0.2
Ruln41	1	0.2
Ruln44	1	0.2
Ruln48	53	0.2
Ruln59	1	0.2
Ruln60	11	0.2
Ruln9	1	0.2
Ruln8	0	0
Ruln6	0	0
Ruln36	0	0
Ruln12	0	0
Ruln38	0	0
Ruln34	0	0
Ruln50	0	0
Ruln7	0	0
Ruln26	0	0
Ruln45	0	0
Ruln10	0	0
Ruln56	0	0

Plot Labels	Stump count	Degradation Factor
Ruln19	0	0
Ruln28	0	0
Ruln5	0	0
Ruln29	0	0
Ruln22	0	0
Average		0.087

3.3.2 Determining Emissions from Market-Effects Leakage

There is no merchantable tree harvesting in the project or reference areas, although there is charcoal production which can be seen as a commodity, the risks of current production being severely reduced by the project are low plus the role out of the Eco-Charcoal project at scale will ensure that there is still substantial, sustainable production of charcoal thanks to the improved techniques employed.

The eco-charcoal project has already been piloted in one area and charcoal production is reported in the Monitoring Report of this project. The project has been accepted by local charcoal producers and the Department of Forestry.

In essence, market and activity shifting leakage are the same in the case of the Lower-Zambezi REDD+ project. Charcoal production is a degradation activity, but it is intrinsically tied to subsistence agriculture. The agents that would be responsible for activity-shifting and market-shifting leakage are the same, charcoal producers practice subsistence agriculture as well, unlike other scenarios there are different agents for market- and activity-shifting leakage.

The production of the commodity (charcoal) is undertaken by the primary drivers of deforestation. At present agents of deforestation are still actively producing charcoal in remaining woodlands in the reference area and it is the aim of BCP to bring the majority of this charcoal production into a sustainable production system to counter mitigate leakage. Any market-effects leakage will take place in the activity-shifting leakage area as this is the largest accessible remaining intact forest near the project area and during this monitoring period there is no evidence of any charcoal production in the activity-shifting leakage area.

3.3.2.1 Ensuring Consistency of Baseline Operator Management

Not applicable as this is unplanned deforestation.

3.3.2.2 Determining Market-Effects Leakage

There is no commercial logging in the project area and as discussed in section 3.3.2, market and activity shifting leakage are in essence the same and there is currently zero charcoal production in the leakage area. Trees that were removed were presumably by hunters using it for firewood to smoke meat.

3.4 Net GHG Emission Reductions and Removals

Table 19. Summary of ex ante emissions reductions for the first 10 years of the project (for calculations see Annex J, years 2009-2013 were allocated as per Section 8.4.5 of VM0009 V2.1 as the first monitoring period spans more than one year, subsequent periods will be one year.)

Year	Current Baseline Emissions (tCO ₂ e)	Current Project Emissions (tCO ₂ e)	Current Leakage (tCO ₂ e)	GERs (tCO ₂ e)	NERs (tCO ₂ e)
2009	35,763	0	0	35,763	30,756
2010	141,884	0	0	141,884	122,020
2011	141,884	0	0	141,884	122,020
2012	142,273	0	0	142,273	122,355
2013	105,733	0	0	105,733	90,930
2014	179,130	0	0	179,130	154,051
2015	199,191	0	0	199,191	171,304
2016	209,535	0	0	209,535	180,200
2017	230,467	0	0	230,467	207,902
2018	241,935	0	0	241,935	208,064
2019	263,060	0	0	263,060	226,231
Total	1,890,855	0	0	1,890,855	1,635,833

3.4.1 Quantifying Net Emissions Reductions for a PAA

Net emissions reductions are summarised in Table 19 using equation F.51 VM0009 V.2.1 and Annex J, but note there is only a single project area.

3.4.1.1 Determining Deductions for Uncertainty

Uncertainty deductions were calculated according to equations B.10, F.14 and F.52 of VM0009 (see Annex I for calculations) and equated to zero.

$U_B^{[m]}$ - Total uncertainty in proxy area carbon stock estimate = 60,520 tCO₂e

$U_{EM}^{[m]}$ - Total uncertainty in Baseline Emissions Models = 5,063 tCO₂e

$U_P^{[m]}$ - Total uncertainty in project accounting area carbon stock estimate = 897,654 tCO₂e

$E_d^{[m]}$ - Total uncertainty = - 44374 tCO₂e = 0

3.4.1.2 Determining Buffer Account Allocation

The buffer account allocation was determined using the VCS AFOLU non-permanence risk assessment tool and equated to 14%.

3.4.1.2.1 Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination

The overall buffer account allocation was assessed as 14% and detail of how this allocation was determined is described below and scores given in Table 20 to Table 23. The complete report and calculations are provided in Annex S.

Internal Risks

Project Management

BioCarbon Partners has its head office based in Lusaka, less than three hours drive from the project area and there are well trained, experienced staff based at the conservancy, responsible for day to day management plus a Community Engagement Team living within the neighbouring communities. BCP has management plans in place for Rufunsa Conservancy and important mitigation projects such as eco-charcoal production (see Annex V and Annex Y) and these plans are adapted and reviewed over time as can be seen from the deforestation and leakage mitigation strategy (Figure 4) which uses an active feedback system.

Financial Viability

With the risk that REDD+ market values are less than adequate to sustain the project financially in mind, project financials were modelled on very conservative REDD+ credit prices. However, this is a discrete project with potential high value in the marketplace given its climate, community and biodiversity benefits (Table 20). The project is establishing a partnership with an international financial institution to provide a 4 year financing facility to the project, as well as strong marketing support. The multi-year financing facility helps to insure the project against credit shock prices in the critical early years of a REDD+ project when cash flows are needed.

At an average price of \$5.9 per ton (as stated in the VCM 2012 Report by Ecosystem Marketplace), the project would hit break even within 4 years, or less. A key factor determining cash flows and breakeven point is a financing arrangement for a new project that absorbs project overhead costs, thus reducing the burden on this project to cover all costs. Copies of signed documentation related to these finances will be provided to the Validator.

The project proponent has established a not-for-profit organization (BioCarbon Partners Trust) to help counter the risk of low carbon prices affecting community benefits from the project. The Trust aims to leverage funds specifically to support and build upon community benefits. The Trust aims to leverage donor funds specifically to support and build upon community benefits. To date, the Trust has benefited from the support of local donors such as USAID, CSEF and Musika. The project is also exploring diversifying revenues into tourism to assist with conservation management costs on the Conservancy.

The project is also exploring diversifying revenues into tourism to mitigate the risk of low carbon prices. In addition, the project will invest in marketing the project and its strategic conservation and poverty reduction benefits in order to seek higher credit prices.

Opportunity Costs

BioCarbon Partners has consulted extensively with all community stakeholders in order to understand the drivers of deforestation within the project zone and to formulate the most efficient mitigation strategy. BCP has a highly qualified and experienced team that have worked on conservation and natural resource management projects in Zambia and across Africa. This team has already started implementing several pilot projects within a very short space of time (Table 5). Only projects that have written approval from local residents are implemented, and the link between interventions and deforestation mitigation efforts is further cemented through the signing of Community Covenants that oblige both BCP and participants to comply with project guidelines and connect community benefits to forest protection efforts.

Substantial and repeated crop failure in surrounding communities could lead to increased poaching and charcoal production for financial benefit. More erratic rainfall and pests make this likely, and all of our alternative economic development efforts are aimed at mitigating this risk. This is particularly true of the Sustainable Eco-Charcoal Project, which is based on a strong business model and designed to become a stand-alone, self-sufficient project. It is envisaged that conservation farming training program will be similarly successful, as will the village chicken project.

Although there are always (legitimate) concerns about corruption, in talking to local residents about the history of external involvement in their communities, BCP has learned that corruption is not the only risk that could potentially threaten projects: other difficult community dynamics (such as high alcoholism rates, internal jealousy and belief in witchcraft) have threatened or ruined other organizations' projects in the past.

However, BCP's extensive community engagement efforts and strong local presence have served as powerful tools against these problems. Local community members have explicitly told BCP representatives that we have already set ourselves apart from other organizations by conducting sensitization meetings and consulting local stakeholders prior to implementing our projects, and by closely involving the local community in our project activities. As a result, community members report that they feel greater ownership of the projects that we launch in partnership with them.

BCP has engaged in significant capacity-building efforts among our staff, local community members and local implementation partners, so that we can best avoid and respond to such problems. We are also managing the risk of corruption through the use of Zone Development Committees (ZDCs) and other BCP-supported community consultation and implementation structures. We have endeavoured to create tight systems that do not leave room for manipulation or abuse, and, most importantly, by ensuring that our projects bring tangible community benefits, we have worked hard to reduce any incentives that individuals might feel to engage in destructive or corrupt activities.

Another key risk mitigation strategy is the development of substantial community benefit projects and systems such as conservation community covenants.

Project longevity

The project is being implemented on private land with a 99 year lease, signed in 2001, and the project proponent has a long term carbon rights agreement in place with the title deed holder. The contractual agreement is for a 30 year project. Activities will be carried out initially for 30 years.

Table 20. Internal risks.

Project Management		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Species planted (where applicable) associated with more than 25% of the stocks on which GHG credits have previously been issued are not native or proven to be adapted to the same or similar agro-ecological zone(s) in which the project is located.	0
b)	Ongoing enforcement to prevent encroachment by outside actors is required to protect more than 50% of stocks on which GHG credits have previously been issued.	0
c)	Management team does not include individuals with significant experience in all skills necessary to successfully undertake all project activities (i.e., any area of required	0
d)	Management team does not maintain a presence in the country or is located more than a day of travel from the project site, considering all parcels or polygons in the project area.	0
e)	Mitigation: Management team includes individuals with significant experience in AFOLU project design and implementation, carbon accounting and reporting (e.g., individuals who have successfully managed projects through validation, verification and issuance of GHG credits) under the VCS Program or other approved GHG programs.	-2
f)	Mitigation: Adaptive management plan in place.	-2
Total Project Management (PM) [as applicable, (a + b + c + d + e + f)]		-4
Total may be less than zero.		
Financial Viability		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Project cash flow breakeven point is greater than 10 years from the current risk assessment	0
b)	Project cash flow breakeven point is between 7 and up to 10 years from the current risk assessment	0
c)	Project cash flow breakeven point between 4 and up to 7 years from the current risk assessment	0
d)	Project cash flow breakeven point is less than 4 years from the current risk assessment	0

e)	Project has secured less than 15% of funding needed to cover the total cash out before the project reaches breakeven	0
f)	Project has secured 15% to less than 40% of funding needed to cover the total cash out required before the project reaches breakeven	0
g)	Project has secured 40% to less than 80% of funding needed to cover the total cash out required before the project reaches breakeven	0
h)	Project has secured 80% or more of funding needed to cover the total cash out before the project reaches breakeven	0
i)	Mitigation: Project has available as callable financial resources at least 50% of total cash out before project reaches breakeven	0
Total Financial Viability (FV) [as applicable, ((a, b, c or d) + (e, f, g or h) + i)] Total may not be less than zero.		0
Opportunity Cost		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	NPV from the most profitable alternative land use activity is expected to be at least 100% more than that associated with project activities; or where baseline activities are subsistence-driven, net positive community impacts are not demonstrated	0
b)	NPV from the most profitable alternative land use activity is expected to be between 50% and up to 100% more than from project activities	0
c)	NPV from the most profitable alternative land use activity is expected to be between 20% and up to 50% more than from project activities	0
d)	NPV from the most profitable alternative land use activity is expected to be between 20% more than and up to 20% less than from project activities; or where baseline activities are subsistence-driven, net positive community impacts are demonstrated	0
e)	NPV from project activities is expected to be between 20% and up to 50% more profitable than the most profitable alternative land use activity	0
f)	NPV from project activities is expected to be at least 50% more profitable than the most profitable alternative land use activity	0
g)	Mitigation: Project proponent is a non-profit organization	0
h)	Mitigation: Project is protected by legally binding commitment (see Section 2.2.4) to continue management practices that protect the credited carbon stocks over the length of the project crediting period	-2
i)	Mitigation: Project is protected by legally binding commitment (see Section 2.2.4) to continue management practices that protect the credited carbon stocks over at least 100 years	0

Total Opportunity Cost (OC) [as applicable, (a, b, c, d, e or f) + (g + h or i)]		0
Total may not be less than 0.		
Project Longevity		
a)	Without legal agreement or requirement to continue the management practice	
b)	With legal agreement or requirement to continue the management practice	15
Total Project Longevity (PL)		15
May not be less than zero		
Internal Risk		
Total Internal Risk (PM + FV + OC + PL)		11
Total may not be less than zero.		

External Risks

Land Tenure and Resource Impacts (Table 21).

Although some people had settled on the property due to a confusion of the boundary position, the issue has been resolved and the area settled has been excluded from the project area.

The Rufunsa Conservancy has a free and clear title deed. The boundaries have been demarcated with full consultation with local leaders. Zambia has strong investment protection laws and the project proponent has been awarded an Investment Licence from the GRZ. This reduces the risk of expropriation. Rufunsa Conservancy has already been through a legal suit and the highest institutions of the Country upheld the integrity of this title. Through BCP, the property is also covered by BCP's Investment Protection Certificate which further reduces the risk of appropriation. It is highly unlikely that this land risks expropriation again. In addition, the project will invest in publicizing the project locally and internationally to ensure that the GRZ remains aware of the values that this project is providing the Nation as the country's first REDD+ project. The Project is building a positive, lasting relationship with neighbouring communities and the Government of Zambia to ensure that the land is productive and beneficial to the Nation.

Community Engagement

A very high proportion of households bordering the project area have been consulted (Annex H). None of the households are dependent on the project area, bar the few that have illegally settled within the boundary and have been consulted about the project. The project will certainly have positive socio-economic benefits and has been formerly certified under the CCB Standard (Annex F).

Political Risk

Zambia is a stable and peaceful country with a well-established democracy, although it does not get a high international governance score (Table 21). Human-induced political risks are therefore low and the project has the approval of central and local government, and traditional authorities. Zambia was one of the first nine UN-REDD Pilot Countries in the World and there is a high level of interest within government for REDD+ pilot projects. This project is significant in that it is the first REDD+ project in Zambia. It is therefore strategic as a sub-national project which aims to support and feed into the design of a national REDD+ program. The project benefits from solid government support and interest for learning reasons. The project proponent is investing significantly in ensuring that the GRZ is kept well informed of this project, and the project's goals to contribute to national development goals and the national REDD+ strategy.

It is thus reasonable to assume the longevity of the project from a political stability perspective. Zambia is a stable country and BCP has approval and support from all the relevant Zambian Government Departments to implement the project. It is thus reasonable to assume the longevity of the project from a political stability perspective. However, in order to mitigate political risks, BCP proactively consults, engages, coordinates and collaborates with various Government offices, in addition to keeping them regularly informed about the project to keep it in the spotlight.

Table 21. External risks.

Land Tenure and Resource Access/Impacts		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Ownership and resource access/use rights are held by same entity(s)	0
b)	Ownership and resource access/use rights are held by different entity(s) (e.g., land is government owned and the project proponent holds a lease or concession)	2
c)	In more than 5% of the project area, there exist disputes over land tenure or ownership	0
d)	There exist disputes over access/use rights (or overlapping rights)	0
e)	WRC projects unable to demonstrate that potential upstream and sea impacts that could undermine issued credits in the next 10 years are irrelevant or expected to be insignificant, or that there is a plan in place for effectively mitigating such impacts.	0

f)	Mitigation: Project area is protected by legally binding commitment (e.g., a conservation easement or protected area) to continue management practices that protect carbon stocks over the length of the project crediting period	-2
g)	Mitigation: Where disputes over land tenure, ownership or access/use rights exist, documented evidence is provided that projects have implemented activities to resolve the disputes or clarify overlapping claims	-2
Total Land Tenure (LT) [as applicable, ((a or b) + c + d + e + f + g)] Total may not be less than zero.		0
Community Engagement		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Less than 50 percent of households living within the project area who are reliant on the project area, have been consulted	0
b)	Less than 20 percent of households living within 20 km of the project boundary outside the project area, and who are reliant on the project area, have been consulted	0
c)	Mitigation: The project generates net positive impacts on the social and economic well-being of the local communities who derive livelihoods from the project area	-5
Total Community Engagement (CE) [where applicable, (a + b + c)] Total may be less than zero.		-5
Political Risk		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Governance score of less than -0.79	6
b)	Governance score of -0.79 to less than -0.32	
c)	Governance score of -0.32 to less than 0.19	
d)	Governance score of 0.19 to less than 0.82	
e)	Governance score of 0.82 or higher	
f)	Mitigation: Country is implementing REDD+ Readiness or other activities, as set out in this Section 2.3.3.	-2
Total Political (PC) [as applicable ((a, b, c, d or e) + f)] Total may not be less than zero.		4
External Risk		
Total External Risk (LT + CE + PC) Total may not be less than zero.		0

Natural Risks

The only significant natural risks to the project are fires, drought and a significant increase in elephant populations (Table 22).

Fire

Fire is a natural phenomenon in all the higher rainfall African savannahs and is essential for the maintenance of the ecosystem. Fire is a vital, accepted management tool in southern African savannahs (Bond & Archibald 2003) and is strongly controlled by environmental factors such as rainfall and grass fuel load, often more so than human influence (Archibald *et al.* 2009). In fact, in southern African savannahs with rainfall below 1000mm, such as is the case for the Lower Zambezi REDD+ project, rainfall limits tree cover and not fire (Staver *et al.* 2011a). It is only at higher rainfalls that fire differentiates between savannah and forest (Staver *et al.* 2011b). Fire does thus not significantly alter tree cover or above ground tree carbon stocks in southern African savannah (including miombo) ecosystems. A large-scale study spanning 40 years in four different savannah types (rainfall range 447-737mm/yr) found that fire frequency, season and complete fire exclusion did not influence tree density (Higgins *et al.* 2007). Similarly, in a miombo system in Zambia, Chidumayo (1988) found little structural response from the tree stratum after 29 years of fire exclusion.

To further put the impact (or lack thereof) of fire on the miombo woodland trees found in the project area, in an 8 year period (2001-2008), it is estimated that the area was burned somewhere between 4-8 times (Archibald *et al.* 2010). Most savannahs in a stable state such as those found on Rufunsa Conservancy are carbon neutral, regardless of the presence of annual fires (Kutsch *et al.* 2011). Furthermore fire management that aims to prevent hot, late season fires that potentially impact on the AGOT pool is one of the main project activities of the Lower Zambezi REDD+ project.

It can therefore be assumed that this high frequency of fires has been occurring for some time. In spite of the frequency of this fire regime, the woodlands on Rufunsa Conservancy have remained intact since at least 1984, as can be observed from Landsat images used in the CDM.

In addition, BCP will be implementing a fire management system on Rufunsa Conservancy, in partnership with neighbouring communities, with the specific aim of preventing potentially damaging, hot, late season fires. This will be done through introducing a system of firebreaks and controlled, rotational early burns. BCP will explore the potential for fuel-reducing seasonal bio-enterprises, such as the harvest of thatch or grass from within Rufunsa Conservancy by women's groups for urban markets. Access to these markets would be using BCP's 'community truck' that is used in the eco-charcoal and farming value chain businesses. Fire cannot be completely excluded from the conservancy as doing so would lead to the complete loss of the grass sward (Trapnell 1959), and would thus adversely impact the biodiversity through the loss of many grass species and large herbivores, as well as an entire suite of acridids (Prendini *et al.* 1996) and other insects.

In order to mitigate risks, BCP will be implementing a fire management system on Rufunsa Conservancy, in partnership with neighbouring communities, with the specific aim of preventing potentially damaging, hot, late season fires. This will be done through introducing a system of firebreaks and controlled, rotational early burns to mitigate potentially devastating late season fires.

Drought

Drought poses another potential natural risk to the ecosystem. However, just as with fires, the woody vegetation is adapted to drought as the region is exposed to periodic droughts. Droughts are thus not considered a serious natural risk to the project.

An early burning fire management program will mitigate the risks that drought poses in contributing to late season fires that are potentially very damaging to vegetation.

Elephant Damage

Although there are no elephants permanently present in the project zone, adequate conservation measures may well see the return of this large pachyderms in moderate numbers. The impact of elephants on woody vegetation is a hotly debated topic in African conservation.

If large numbers of elephants do start entering the project area, this risk will be mitigated by managing the population by introducing a rotational grazing system by opening and closing access to artificial water points.

It is difficult to determine at what density elephants will start having a significant impact on woody vegetation as the impact is site-specific, however, it is safe to say that elephants do have some impact (Guldemon & Van Aarde 2008) on woody species density. What needs to be kept in consideration is that large tracts of miombo woodland remain intact, despite the presence of elephants (Ribeiro *et al.* 2008). It is unlikely that elephants will increase to such high numbers as to actually threaten the existence of the project. In the event that elephants do return to the project area, their foraging will more than likely result in a minor loss of vegetation but would not jeopardise the project in its entirety.

Natural Disasters

The project area is geologically stable and there are thus no significant threats from seismic activities. Similarly, the risk of flooding is very low as the project area is situated on top of an escarpment and the soils are mostly sandy, thus drain easily.

With a view to mitigating the risk of natural disasters, BCP's community projects are designed to promote and build local stakeholder resilience to disasters, including the negative effects of climate change.

Projects such as crop diversification, income diversification, and our conservation farming training program—which is designed to introduce improved farming techniques—are intended to mitigate the negative effects that disasters, such as the army worm pest that was declared a national emergency in 2012, do not destroy local livelihoods, and to ensure that households are more resilient in the face of changing rainfall patterns, including drought.

Table 22. Natural risks.

Natural Risks					
Risk	Significance	Likelihood	Likelihood Significance Score	Mitigation	Score
Fire (F)		Every 50 to less than 100 years	2	0.5	1
Pest and Disease Outbreaks (PD)		Not applicable	0	1	0
Extreme Weather (W)		Drought	1	1	1
Geological Risk (G)		No risk	0	1	0
Other natural risk (ON)		Elephants	1	1	1
Total Natural Risk (as applicable, F + PD + W + G + ON)					3

Summary

Table 23. Total non-permanence risk score.

Risk Category	Rating
a) Internal Risk	11
b) External Risk	0
c) Natural Risk	3
Overall Risk Rating (a + b + c)	14%

3.4.2 Quantifying Net Emissions Reductions across PAAs

There is only one accounting area.

3.4.3 Ex-Ante Estimation of NERs

PDR.110 The projected avoided baseline emissions, project emissions and leakage for each monitoring period over the lifetime of the project.

Emissions reductions over the project lifespan are summarised Annex J.

PDR.111 A narrative description of sources used to estimate the leakage rate and demonstration that the estimated rate is conservative.

The leakage rate was determined using data sourced from the leakage area. Annex M contains all of the necessary information regarding the sampling procedures while Annex I and Table 18 contain the results of current leakage.

PDR.112 If included in project activities, a description of procedures used to estimate the rate of biomass burning and charcoal production and demonstration that these estimates are conservative.

Biomass available for charcoal production are assessed using the Biomass and Soil Monitoring Protocol (Annex L) and charcoal is produced according to the strategy developed (Annex V).

4 MONITORING

4.1 Data and Parameters Available at Validation

PDR.113 The value for each variable in Appendix G.

Please see Annex P.

4.2 Data and Parameters Monitored

Please see Annex Q.

4.3 Monitoring Plan

A detailed description of the monitoring plan can be found in the project's Monitoring Report submitted to the VCS, a public domain document available on the VCS website. This plan contains:

- The methods for measuring, recording, storing, aggregating, collating and reporting data and parameters. Where relevant, include the procedures for calibrating monitoring equipment.
- The organizational structure, responsibilities and competencies of the personnel that will be carrying out monitoring activities.
- The policies for oversight and accountability of monitoring activities.
- The procedures for internal auditing and QA/QC.
- The procedures for handling non-conformances with the validated monitoring plan.
- Sampling approaches used, including target precision levels, sample sizes, sample site locations, stratification, frequency of measurement and QA/QC procedures.

All permanent biomass monitoring plots will be measured at least every five years (Table 24). Monitoring of disturbances and leakage are ongoing. To avoid deforestation mitigation activities from interfering with proxy area measurements of residual carbon stocks, the project proponent will be keeping a geo-spatially referenced inventory of all deforestation mitigation activities and where these infringe on proxy area monitoring of carbon stocks, the necessary amendments will be made. For the first monitoring period no such infringements have occurred.

Table 24. Summary of monitoring activities.

Monitoring Activity	Description	Timing	Methods
Conservancy trespassing and boundary transgressions	Rufunsa Conservancy scouts patrol the conservancy and its boundary on an ongoing basis. Due to capacity constraints, there was only a low level of patrolling in the early stages of project implementation, but following improved management and capacity with the handover of management to BCP patrols have been dramatically stepped up. Subsequently it was discovered that there had been some boundary transgressions and the area was excluded.	Monthly patrols	Scouts patrol the conservancy on an ongoing basis, it is their core duty
Leakage monitoring	30 permanent 1 ha plots have been monitored in the activity shifting	Annually	Forest Inventory team following VM0009

Monitoring Activity	Description	Timing	Methods
	leakage area and this will continue on an ongoing basis.		
Plot measurements	There is a dedicated forest inventory team that monitors all permanent biomass plots across the project accounting area and proxy area. The team was first trained in February 2012	Annually	Forest Inventory Team following VM0009, re-sample 20% of plots in project accounting and proxy areas
Disturbance monitoring	Forest Inventory Team and scouts will record all instances of fires (deliberate or accidental) to supplement remote sensing data and severity estimated to determine if there are any significant biomass losses.	Monthly in the fire season	Remote sensing followed by ground based inspections
Charcoal production	Area harvested and charcoal production monitoring ongoing by BCP staff.	Monthly	Charcoal operations managers records all charcoal production on an ongoing basis.

PDR.114 Summary of sampling procedures for the project accounting areas, with a copy of a sampling protocol used to carry out measurements.

Please see Annex L for a summary of procedures.

PDR.115 Summary of sampling procedures for the proxy areas, with a copy of a sampling protocol used to carry out measurements.

Please see Annex L for monitoring protocols.

PDR.116 Summary of sampling procedures for the activity-shifting leakage areas, with a copy of a sampling protocol used to carry out measurements.

Please see Annex M, leakage monitoring protocol.

5 ENVIRONMENTAL IMPACT

The project was exempted from an Environmental Impact Assessment by the Zambian Environmental Management Agency (Annex D).

6 STAKEHOLDER COMMENTS

6.1 Stakeholder Comments

At the end of 2013, our sensitization efforts had allowed us to reach and consult approximately 86% of the nearly 8,000 stakeholders living within the project reference and proxy areas (project zone in CCBA terms and hereafter referred to as such). Furthermore, BCP benefits from a 96% “Approval Rating” from consulted stakeholders, as counted from formal votes taken at the end of each Sensitization Meeting, allowing stakeholders the opportunity to “accept” or “reject” BCP’s REDD+ activities, in compliance with the principles of FPIC. Throughout the sensitization process there is thus ongoing opportunity for stakeholders to make comments in a formal environment.

Stakeholder comments can be found in the project’s CCBA Project Design Document (Annex F and also available on the CCBA website).

6.2 Systems for Ongoing Communication

Consulting with local stakeholder communities living within the project zone for the Lower Zambezi REDD+ project began in February 2012, and stakeholder consultations have continued ever since. After nearly two years of consultations, by February 2014, 79 formal stakeholder consultation and sensitization meetings within the project zone were held and approximately 100 formal consultation meetings within the wider area (including local District office headquarters). BCP has four local Community Mobilizers and a full-time Sensitization Officer, who are based in local communities and who are responsible for facilitating and promoting ongoing sensitization activities, on both a formal and informal basis, on a daily basis. BCP has held multiple consultation and sensitization meetings *in every village in every zone* within the project zone for the Lower Zambezi REDD+ Project.

From these meetings a total of 1047 individuals have been sensitized within the project zone at least once through formal Stakeholder Consultation and Sensitization Meetings. Our documentation procedures for recording attendance at sensitization meetings are designed to avoid double-counting of individuals who attend multiple meetings. However, not distinguishing between first time and repeated attendance at sensitization meetings, a total of 2,858 individuals have been recorded in attendance at BCP’s formal sensitization meetings within the project zone – although this number includes double counting, it also demonstrates that the sensitization efforts go beyond merely informing stakeholders about our activities on a one-time basis, and demonstrates that BCP additionally invests in deepening existing relationships with local stakeholders, by ensuring that stakeholders are consulted and can comment on multiple occasions, thereby deepening their connection and understanding of our activities.

In order to maintain and guarantee the quality of information provided by BCP in these formal Stakeholder Consultation and Sensitization Meetings, there is a formal Sensitization SOP, which outlines rigorous standards for the content and presentation of information at formal Sensitization Meetings. The purpose of the SOP is to ensure that the content presented at each formal meeting is in compliance with the principles of ensuring Free, Prior and Informed Consent (FPIC), and also achieves the aims of raising stakeholder awareness, engagement and interest in project activities.

The content of all Sensitization Meetings is documented in formal Meeting Minutes, which are signed by witnesses present at the meeting to guarantee accuracy. All Sensitization Meeting Minutes are accompanied by signed attendance sheets. BCP maintains all meeting minutes and attendance sheets on file (hard copy) in our office, so as to ensure that we have an ongoing record of Sensitization Activities, in compliance with FPIC standards. We also maintain an online Sensitization Database that tracks and summarizes our ongoing sensitization activities.

BCP plans to continue engaging with local stakeholders through an ongoing process that combines the following elements:

1. On-going formal sensitization meetings, led by the Sensitization Officer and supported by other Community Engagement Team (CET) members, including full-time Community Mobilizers based in community zones.
 - a. Sensitization Meetings must comply with BCP's rigorous Sensitization SOP, which will be improved on an ongoing basis, through consistent feedback from community members and CET representatives.
 - b. Sensitization Meetings must be documented through formal, written "Meeting Minutes" and signed Attendance Sheets, which are kept on file in the BCP office and recorded in our ongoing Sensitization Database.
 - c. BCP aims to sensitize at least 95% of households within the project zone by 2015
 - d. BCP aims to target minority and/or disadvantaged groups to ensure their ongoing consultation and engagement in BCP activities.
2. Will continue to promote on-going and intensified consultation of key community leaders and representatives, through Zone Development Committees (ZDCs) – hybridized decision-making and consultation bodies, comprised of local traditional leaders and elected representatives. By thoroughly and regularly consulting with local leaders and key representatives and aims to promote a more decentralized and locally-appropriate model of sensitization, which is lead through community-based institutions.
3. Development of sensitization materials to promote awareness among youths, such as a Environmental Education Programme (EEP), which aims to educate and empower youths as "Environmental Ambassadors" within their communities.
4. Diversification and Intensification of materials: By 2014, BCP has now widely consulted with the majority of the stakeholder population living within the project zone – the majority of

community stakeholders are aware of and support our activities. Moving forward, it is our aim to develop new and interesting ways of presenting information about our REDD+ activities, and engaging stakeholders in new projects and processes for providing feedback. In 2013, we developed an innovative illustrated comic, to provide information about REDD+ activities to younger and/or illiterate sections of the population. In the same year, we supported the development of ZDCs as a means for conveying information and soliciting feedback about project activities. In upcoming years, we plan to develop other media materials, such as an informational movie and/or active drama clubs, to raise awareness about project activities and to promote consultation and sensitization of community stakeholders. In the long term, BCP aims to develop innovative and robust means of communicating about REDD+ to stakeholders, as part of our ongoing commitment to project activities.

7 REFERENCES

Archibald, S., D. P. Roy, B. W. Van Wilgen, and R. J. Scholes. 2009. What limits fire? An examination of drivers of burnt area in Southern Africa. *Global Change Biology* 15:613-630.

Archibald, S., R. J. Scholes, D. P. Roy, G. Roberts, and L. Boschetti. 2010. Southern African fire regimes as revealed by remote sensing. *International Journal of Wildland Fire* 19:861-878. Available: <http://www.unicef.org/infobycountry/>.

Alajarvi, P. 1996. Forest Management Planning and Inventory. ZFAP, MENR. Lusaka, Zambia.

Bond, W. J. and S. Archibald. 2003. Confronting complexity: fire policy choices in South African savannah parks. *International Journal of Wildland Fire* 12:381-389.

Chabala, C. 2004. Forest management in Zambia: A focus on women's access to forest resources management in Chief Chiwala's area, Masaiti district. Submitted in partial fulfilment of the Master's Degree in Women's law, 26 March, 2004. Southern African Regional Centre for Women's Law, University of Zimbabwe. Food and Agriculture Organization, 2005. Global Forest Resources Assessment. Progress towards sustainable forest management. FAO forestry paper 147.

Chenje, M, and P. Johnson., editors. 1994. State of the Environment in Southern Africa. Southern African Research and Documentation Centre, Harare, Zimbabwe.

Chidumayo, E. N. 1988. A re-assessment of effects of fire on miombo regeneration in the Zambian Copperbelt. *Journal of Tropical Ecology* 4:361-372.

Chidumayo, E. N. and D. J. Gumbo. 2013. The environmental impacts of charcoal production in tropical ecosystems of the world: A synthesis. *Energy for Sustainable Development* 17:86-94.

Chidumayo, E.N., Masialeli, I., Ntalasha, H., Kalumiana, O.S. 2001. CHAPOSA- Charcoal Potential in Southern Africa: Final Report for Zambia, covering the period from December 1998 to December 2001. INCO-DC: International Cooperation with Developing Countries (1998-2001) . Contract Number : ERBIC18CT980278.

Food and Agriculture Organization of the United Nations (FAO). 2011. *State of the World's Forests*. FAO, Rome, Italy.

Forestry Department, Ministry of Tourism, Environment and Natural Resources and Food and Agricultural Organization of the United Nations. 2010. *Integrated Land Use Assessment 2005-2008*. Lusaka, Zambia.

GlobCover Land Cover v2 2008 database. European Space Agency, European Space Agency GlobCover Project, led by MEDIAS-France. 2008. <http://ionia1.esrin.esa.int/index.asp>

Government of the Republic of Zambia (GRZ). 1973. *Forests Act 1973 of the Laws of Zambia*. Government Printers, Lusaka, Zambia.

Government of the Republic of Zambia (GRZ). 1995. *Lands Act 1995 Vol. 12 chapter 184 of the Laws of Zambia*. Government Printers, Lusaka, Zambia.

Government of the Republic of Zambia (GRZ) & UN-REDD. 2010. *UN Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries National Joint Programme Document* [online]. Available here Accessed: Feb 12, 2013

Henry, M., Maniatis, D., Gitz, V., Huberman, D. & Valentini, R. 2011. Implementation of REDD+ in sub-Saharan Africa: state of knowledge, challenges and opportunities. *Environment and Development Economics*, 16: 381-404.

Higgins, S. I., W. J. Bond, E. C. February, A. Bronn, D. I. W. Euston-Brown, B. Enslin, N. Govender, L. Rademan, S. O'Regan, A. L. F. Potgieter, S. Scheiter, R. Sowry, L. Trollope, and W. S. W. Trollope. 2007. Effects of four decades of fire manipulation on woody vegetation structure in savannah. *Ecology* 88:1119-1125.

Kalumba, J. 1997. Human Encroachment in Lower Zambezi National Park: Resolving the Conflict. EDF/NPWS Project, Lusaka. In: Larsen, T. & Lungu, F.B. (Eds), Preparation Report for Luangwa Integrated Resource Development Project. NORAD, Lusaka, Zambia.

Kutsch, W. L., L. Merbold, W. Ziegler, M. M. Mukelabai, M. Muchinda, O. Kolle, and R. J. Scholes. 2011. The charcoal trap: Miombo forests and the energy needs of people. *Carbon Balance and Management* 6:5.

Makano, R.F.. 2008. Does Institutional Capacity Matter? A Case Study of the Zambian Forestry Department. Dissertation Submitted to Graduate School at University of Missouri-St. Louis. ProQuest, Ann Arbor, MI.

Ministry of Tourism, Environment and Natural Resources (MTENR). 2002. Zambia National Action Programme for combating Desertification & Mitigating serious effects of Drought in the Context of the United Nations Convention to combat Desertification. Ministry of Science, Technology and Vocational Training, Lusaka, Zambia

Petterson, U., M. Chifunda, A. Shikwe, M. Bingham, K. Chanda, R. Ferguson, A. Gardiner, S. Kapembwa, J. Loveridge, V. Nyirenda, M. Shaw, and R. Stjernstedt. 2012. Environmental Impact Statement For Large Scale Mining Activities Under License Number 15547-Hq-Lml, Owned By: Mwembeshi Resources Limited. Located In: Luangwa District. Page 319. GeoQuest Limited, Lusaka.

Prendini, L., Theron. L-J., Van der Merwe, K. and Owen-Smith, N. 1996. Abundance and guild structure of grasshoppers (Orthoptera: Acridoidea) in communally grazed and protected savanna. *South African Journal of Zoology* 31(3): 120–130.

Staver, A. C., S. Archibald, and S. A. Levin. 2011b. The global extent and determinants of savannah and forest as alternative biome states. *Science* 334:230-232.

Staver, A. C., S. Archibald, and S. Levin. 2011a. Tree cover in sub-Saharan Africa: Rainfall and fire constrain forest and savannah as alternative stable states. *Ecology* 92:1063-1072.

Vinya, R., Syampungani, S., Kasumu, E.C., Monde, C. & Kasubika, R. 2011. Preliminary Study on the Drivers of Deforestation and Potential for REDD+ in Zambia. A consultancy report prepared for Forestry Department and FAO under the national UN-REDD+ Programme Ministry of Lands & Natural Resources. Lusaka, Zambia.

Walker, S. M. and P. V. Desanker. 2004. The impact of land use on soil carbon in Miombo Woodlands of Malawi. *Forest Ecology and Management* 203:345-360.

White, F. 1983. The vegetation of Africa. United Nations, Paris.