# EVALUATION, RESEARCH AND COMMUNICATION (ERC) PROJECT

Community-Based Forest Management Program (CFP) Impact

Evaluation Design Report

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**DISCLAIMER**

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# CONTENTS

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| BCP | BioCarbon Partners |
| CET | Community Engagement Team |
| CFP | Community-based Forest Management Program |
| CIFOR | Center for International Forestry Research |
| CLR | Cluster Level Reliability |
| CO | Contracts Officer |
| COP | Chief of Party |
| COR | Contracts Officer's Representative |
| DD | Difference-in-Differences |
| DEC | Development Experience Clearinghouse |
| ERC | Evaluation, Research, and Communication |
| FPIC | Free, Prior, and Informed Consultation |
| GCC | Global Climate Change |
| GCCO | Global Climate Change Office |
| GHG | Greenhouse Gas |
| GMA | Game Management Area |
| H | Hypothesis |
| ha | Hectares |
| ICC | Intra-Class Correlation |
| IE | Impact Evaluation |
| IQC | Indefinite Quantity Contract |
| IRB | Institutional Review Board |
| LTPR | Land Tenure and Property Rights |
| LTRM | Land Tenure and Resource Management |
| LZRP | Lower Zambezi REDD+ Project |

| | |
|---|---|
| M&E | Monitoring & Evaluation |
| MDES | Minimum Detectable Effect Size |
| N | Number of Households |
| NER | Net Emissions Reductions |
| NTFP | Non-Timber Forest Products |
| ODK | Open Data Kit |
| PES | Payment for Ecological Services |
| PFMP | Participatory Forest Management Plan |
| RCT | Randomized Control Trial |
| REDD+ | REDD and Contributions to Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks |
| R-PP | REDD Preparation Proposals |
| S | Research Question |
| STARR | Strengthening Tenure and Resource Rights |
| UNDRIP | United Nations Declaration on the Rights of Indigenous Peoples |
| USAID | United States Agency for International Development |
| USG | United States Government |
| VCS | Verified Carbon Standard |
| ZAWA | Zambian Wildlife Authority |

# 1.0 INTRODUCTION

This document describes the research methodology for an impact evaluation (IE) of the USAID/Zambia-funded Community-based Forest Management Program (CFP) in Zambia. The CFP is a central initiative under USAID/Zambia's Global Climate Change (GCC) portfolio. USAID/Zambia has awarded a Cooperative Agreement to BioCarbon Partners (BCP) to implement the CFP to initiate the largest Reducing Emissions from Deforestation and Degradation (REDD+)[1] program in Zambia by supplying $14 million over five years, of what is projected to be an approximately $19 million undertaking within the same period.

REDD+ is designed to reduce greenhouse gas (GHG) emissions by creating financial incentives for countries and communities to conserve indigenous forests, sustainably manage forests, and enhance forest carbon stocks, thereby protecting the carbon stored in forests. As a REDD+ project, CFP objectives include improved livelihoods, income generation, and poverty reduction, as well as an increase in the number of hectares (ha) of forestland under improved management. CFP will cover at least 700,000 ha of forested areas in Zambia's Muchinga and Eastern Provinces and will be implemented in neighboring communities from Fiscal Years 2014–2019.

The CFP is of interest to USAID as a vehicle for learning about best practices in implementing REDD+ programming. An evaluation of CFP will provide USAID with better information on climate change and land tenure and property rights (LTPR) within the context of REDD+ and will inform project design and influence policy.

USAID's Land Tenure and Resource Management (LTRM) Office and the Global Climate Change (GCC) Office, through the Evaluation, Research, and Communications (ERC) Task Order (under the Strengthening Tenure and Resource Rights [STARR] Indefinite Quantity Contract [IQC]), have engaged The Cloudburst Consulting Group to conduct an impact evaluation (IE) of CFP. USAID's primary learning objectives for the CFP IE are:

1. To understand how REDD+ programs impact LTPR and related livelihoods, either positively or negatively.
2. To learn about what aspects of REDD+ programming are most effective in incentivizing long-term carbon sequestration and reduced GHG emissions from forests and landscapes.

The data collection for the CFP IE will include large sample size (N) probability household and wives surveys, a headperson survey, structured interviews with key informants and community leaders, as well as focus group discussions and participatory mapping exercises in Zambia's Eastern Province. Potential impacts to be considered include reduced forest degradation and deforestation, improved tenure security, enhanced livelihoods, reduced land and natural resource conflict, changes in environmental and livelihood practices, as well as differential treatment effects for women and other vulnerable groups.

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[1] "REDD+" goes beyond REDD (Reducing Emissions from Deforestation and Forest Degradation) to include sustainable forest management, conservation, and increasing forest carbon stocks.

This document outlines a potential Difference-in-Differences (DD) design and data collection plan for the CFP IE. It highlights the threats and opportunities of the research. Given the dearth of rigorous evaluation work on REDD+ programming, the opportunity to evaluate CFP through a quasi-experimental approach represents a significant opportunity to build the REDD+ evidence base.

# 2.0 BACKGROUND

Tropical deforestation accounts for about 10% of global GHG emissions (Baccini et al. 2012, Harris et al. 2012).  From 2000–2010, the global deforestation rate was estimated at roughly 13 million ha per year (FAO, 2010). This represents a global reduction from 16 million ha of forest lost per year in the 1990s. Preserving forest cover is a key strategy for reducing emissions and slowing the impacts of climate change. Nevertheless, incentivizing developing countries and communities to reduce deforestation by forgoing income from timber, charcoal production, and agricultural production represents a significant challenge.

With approximately 50 million ha of forest, Zambia has the 4th highest percentage of forest cover in Africa, and these forests are under significant threat due to high demand for charcoal and unsustainable agricultural methods. The country's forests are disappearing at an estimated annual deforestation rate of 250,000–300,000 ha per year; this translates into a top-5 global deforestation rate and a top-10 global per capita deforestation emissions rate (UN-REDD, 2009).  As the country continues to urbanize and industrialize, the nation is at risk of depleting its forest resources in fifteen years if the deforestation rate does not decrease (USAID/Zambia, 2013).

To address these challenges, the CFP has been designed to reduce deforestation and carbon emissions in Zambia by improving livelihoods, income generation, and poverty reduction, as well as by increasing the number of hectares of forest land under improved management. CFP community-level activities will be implemented in at least 700,000 ha of forested areas in Zambia's Muchinga, Lusaka and Eastern Provinces from 2015–2019. CFP activities at the community level (more information in Section 3) will begin in Nyimba, Mambwe, and Lundazi Districts of Eastern Province by July 2015. The IE will focus on these Eastern Province sites, since sites in Lusaka Province represent extensions of a BCP pilot project and site selection for Muchinga Province is not expected to begin until late 2015, which would make it difficult to measure significant changes in development outcomes over the remaining life of the project (i.e., between 2016–2018).

This section provides background information on the study areas and an overview of REDD+. The following section describes the CFP program and research questions guiding the evaluation.

## EASTERN PROVINCE

As shown below in Figure 2.1, Eastern Province is located in the eastern region of Zambia, bordering Malawi. It represents a globally significant biodiverse landscape with large areas of intact forest. The climate is semi-tropical, with a single rainy season between November and April. Rainfall varies between 500–1400 mm each year. There is significant temperature variation—average temperatures range from 6–26 degrees in the cold season (April–August) and 17–35 degrees in the hot season (September–October).

The primary tribes in Eastern province are the Ngoni and Chewa. There are peaceful relations between these two tribal groups, and intermarriage is prevalent. The most common language is Chinyanja, which shares similarities to Chichewa, the language spoken in Malawi (Tembo & Sitko, 2013).
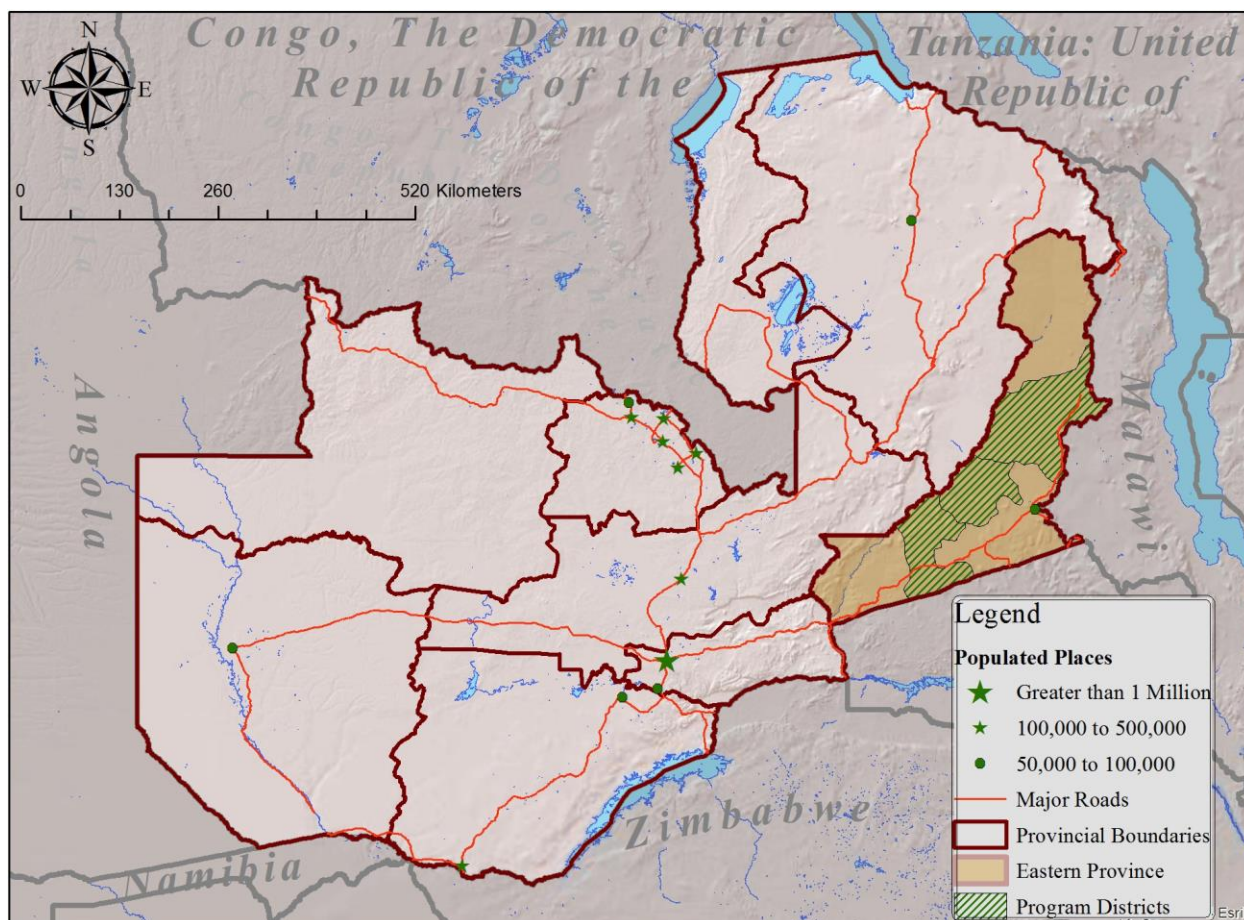
**FIGURE 2.1** EASTERN REGION OF ZAMBIA

Approximately 1.5 million people live in Eastern Province, and 87.4% reside in rural areas. The majority of households live without electricity or public water or sanitation services and are primarily reliant on charcoal production and subsistence agricultural activities. The average household landholding is 2.54 ha, with1.86 ha under cultivation. The main subsistence crops include maize, cotton, and groundnuts, where harvested crops make up 64% of total household income. Other sources of income include off-farm income (21.9%), fruit and vegetable production (10.5%), and livestock sale (2.5%) (Tembo & Sitko, 2013). More than 75% of households are poor, living on less than $1.25 a day, and roughly 60% of the population is classified as living in extreme poverty (Tembo & Sitko, 2013).

The primary drivers of deforestation and forest degradation in the project area include wood extraction, agricultural expansion, and fires. Wood extraction encompasses logging, collection of fuel wood, and charcoal production. Charcoal production is a significant driver of deforestation, providing livelihoods for producers in rural areas and low-cost energy for consumers in urban areas. It is estimated that the production, distribution, and marketing of charcoal provides livelihood benefits and income for over a half a million people across Eastern Province (Kalinda, Bwalya, Mulolwa, & Haantuba, 2008). Rural households often use charcoal to diversify their household income as a risk avoidance strategy for periods of poor agricultural production. At the same time, the increase in urban populations—

particularly low-income urban populations—ensures the demand for charcoal will continue to rise (Vinya, Kasumu, Syampungani, Monde, & Kasubika, 2011).

Agricultural expansion—or the clearing of land—is the second most frequent driver of deforestation in Zambia. Subsistence agriculture is the main source of food and income for the majority of Zambians (Ministry of Tourism, Environment and Natural Resources , 2002). The use of unsustainable cultivation practices, such as slash-and-burn and overgrazing, increase the time needed for deforested land to regenerate. Overgrazing by wildlife, including elephants and hippos, is a particular problem in the wildlife corridors of Eastern Province, where the CFP IE will take place. Furthermore, growth in Zambia's population creates an additional demand for increased agricultural productivity to meet the nation's food needs.

Fires are frequently used in Zambia to hunt wild game, clear fields for cultivation, control brush, and manage pastures. These fires are often not well managed and represent a driving factor behind forest degradation in Eastern Province. Wild fires, particularly late in the dry season, can be devastating to forest cover, as they slow the regeneration and survival of young plants.

The fundamental cause of deforestation is attributed to extremely high rural poverty. Poverty leads to a high dependence on natural resources for day-to-day survival. This is exacerbated by high demand for charcoal from urban areas due to the lack of affordable alternative energy sources.

# REDD+

In an effort to reduce deforestation in Zambia and mitigate carbon emissions, the United Nations (UN-REDD program) and the United States Government (USG) (through its GCC program), are supporting the development of a national REDD+ strategy in Zambia, as well as preparation for its participation in pay-for-performance programs. Reducing Emissions from Deforestation and Forest Degradation (REDD) is a local, national, and global initiative to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. REDD+ goes beyond deforestation and forest degradation and includes the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks (USAID/Zambia, 2013).

REDD+ programs constitute a form of payments for ecosystem services (PES)—a rapidly proliferating set of market-based or fund-based, incentive-oriented interventions in which individuals or communities are paid by a specified buyer, via a contract mechanism, for land use activities that maintain the flow of a clearly-defined environmental service relative to a pre-determined baseline (Jack et al., 2008; Engel et al., 2008).

REDD+ is potentially promising as a tool for GHG mitigation and forest conservation, in which developing country governments and organizations are compensated for verified reductions in emissions from forest loss and degradation activities. In this sense, REDD+ seeks to incentivize conservation by giving standing forests an economic value that more closely rivals that which accrues from forest exploitation and conversion.

REDD+ strategies offer great promise for synergy in achieving diverse carbon emission mitigation, forest conservation, and poverty reduction goals (Campbell 2009). However, there are also many concerns around its implementation. These include the assumption of effective governance and equitable property-rights in recipient countries that is often lacking in real world contexts. REDD+ also has the

potential to generate unintended negative impacts on social equity and livelihoods. The approach has also faced challenges regarding inaccurate environmental service valuation and its capacity to create sustainable and effective markets (Corbera 2012; Corbera and Schroeder 2011; Mahanty, Suich, & Tacconi, 2013). Other critics have drawn attention to the continuing dearth of evidence about the impacts of PES interventions more broadly (Pattanayak et al., 2010).

REDD+ requires developing country governments to devise a national approach to planning for REDD projects and to develop a country-wide strategy that includes, among other issues, land-use planning, clarifying tenure rights to forest lands and carbon amongst different national stakeholders, establishing a carbon accounting system, and developing mechanisms for benefit-sharing among individuals and organizations from local levels to the national scale. Governance issues have remained a central focus for scrutiny—particularly given the involvement of a number of international and national actors with divergent and competing interests (Corbera and Schroder 2011). The need for clearer articulation of security over land tenure has been increasingly recognized as an essential pre-condition for REDD+ implementation to be successful (Larson A. M., et al., 2013).

In many countries, the existence of overlapping formal and informal tenure arrangements complicates this process, and, as such, REDD+ activities have highlighted a need to address long-standing tenure insecurities, especially with regard to customary claims to land and forest resources on the part of local communities. In this sense, REDD+ may also provide a window of opportunity for wider tenure reforms to take place, while also serving as a vehicle for increased safeguards over community rights (Larson A. M., et al., 2013). However, while the links between tenure security and forest carbon outcomes are viewed as critically important, the processes by which REDD+ projects might effectively address tenure concerns and safeguard local communities' rights to access and benefit from forest resources are not currently well-articulated (Naughton-Treves & Wendland, 2014).

Zambia's large area of intact forest—50 million hectares—and its high deforestation rate—estimated at 250,000–300,000 ha per year—are factors that have made the country a good candidate for REDD+ (FAO 2010). Development partners see REDD+ as an important opportunity to mitigate carbon emissions by reducing deforestation. A prospective evaluation of CFP and its impacts on tenure security and livelihoods will contribute to the policy discussion surrounding the challenges and benefits of REDD+ by providing the necessary data to address the questions and concerns outlined above.

# 3.0 CFP INTERVENTIONS AND THEORETICAL FRAMEWORK

This section describes the CFP activities in Zambia. It highlights several interventions that are expected to be researched through the IE. Given the design and implementation of CFP (explained further below), the evaluation will measure the impact of CFP's "package of solutions" rather than a specific intervention.

CFP aims to establish the largest REDD+ program in Zambia, covering 700,000 ha of forests in Eastern, Lusaka, and Muchinga Provinces. The project is designed to reduce deforestation on customary and reserved lands and is defined by four primary objectives:

- Empower and equip communities to lessen the drivers of deforestation;
- Establish and improve forest and natural resource management plans;
- Promote alternative livelihoods to unsustainable charcoal and timber production; and
- Implement pay-for-performance and/or revenue-sharing programs for forest conservation and carbon sequestration.

BCP is a private firm responsible for the development and implementation of the CFP REDD+ project in Zambia. The stated mission of BCP is to "reduce poverty and to enhance conservation through the forest carbon markets."

BCP uses a hybrid business model for the implementation of REDD+. This involves the integration of a commercial structure to sell and market carbon credits with a grassroots model that involves working with local communities on forest conservation and management. As part of CFP, BCP will enter into partnerships with landowners, local communities, and government officials to protect forested landscapes in areas of conservation importance order to reduce deforestation. In Zambia, BCPs' REDD+ project represents a long-term investment, involving working with communities for a minimum of 30 years.[2]

BCPs' model for CFP builds off the firm's previous work in the Lower Zambezi REDD+ Project (LZRP). LZRP is Zambia's first pilot REDD+ demonstration project; it was implemented on 38,781 ha of privately owned land in Rufunsa District. BCP expects learning from the CFP project model to feed into Zambia's national planning for REDD+ and forest management.

Over the course of CFP, BCP plans to work in multiple project areas along Zambia's Eastern Province Game Management Area (GMA) Corridor. The selection of these project areas is staggered across the life of the project. The IE will focus on project areas selected in 2014, which include sites in Nyimba, Mambwe and Lundazi districts (Figure 3.1).

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[2] Thirty years is the minimum number of years that a project must be in operation in order to show "permanence" for carbon credits.

**FIGURE 3.1** DISTRICTS INCLUDED IN THE IMPACT EVALUATION.

## BCP'S REDD+ PROJECT MODEL

BCP's REDD+ Project Model is comprised of six main components: Stakeholder Consultation, Livelihood Improvement, Forest Management, Forest Carbon Science, Carbon Market Creation, and Policy and Engagement with the Government of Zambia.

### COMPONENT 1. STAKEHOLDER CONSULTATION

As a standard requirement for REDD+ projects, CFP requires a significant knowledge and outreach component. This includes promoting outreach and awareness about the project in accordance with the principles of obtaining free, prior and informed consent (FPIC), and by identifying community needs and drivers of deforestation, as well as raising awareness about REDD+ and climate change.

The principles of FPIC recognize the rights held by indigenous peoples under international law, and the incorporation of processes that uphold the principles of FPIC is emerging as a standard of best practice in sustainable development and conservation programming, particularly since the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) was adopted in 2007.

FPIC includes the conditions under which people implement their fundamental right to negotiate the terms of policies, programs, projects and activities that are imposed externally and that directly impact their livelihoods and welfare, by granting or denying approval. The principle requires that communities

are informed in a timely manner when they approve or reject decisions linked to development or conservation projects. Consensus should be reached in accordance with indigenous peoples' customary laws and practices and free from any external manipulation or coercion. The principles of non-discrimination and respect of human rights apply in the FPIC context.

## COMPONENT 2. LIVELIHOOD IMPROVEMENT

Following stakeholder sensitization in accordance with the principles of FPIC, in the event that a viable REDD+ project has been identified through a collaborative process—involving the assessment of forest viability criteria, financial viability of proposed project designs, as well as stakeholder consent—BCP will enter into REDD+ implementation agreements with relevant stakeholders to the project. A key element of the REDD+ implementation agreement will be the collaborative development of a Livelihoods Interventions Plan (or Strategy), as part of the REDD+ implementation / management plan, to be approved by the Government and implemented in partnership between BCP and key local stakeholders. This Livelihoods Interventions Plan will promote strategic investments in wellbeing, as well as promote a business-minded approach to support the development of sustainable enterprises that simultaneously reduce poverty and reduce pressures that contribute to deforestation.

Livelihoods Interventions will not begin until a viable REDD+ project has been identified, and terms of implementation agreed between key stakeholders (BCP, GRZ, communities). The FPIC will lead to the identification of a forest area that stakeholders are willing to protect, and the development of a "management" and/or "implementation plan" articulating land-use plans for the project area/zone (since zoning of activities will be key). Once this plan is developed, it will need to be assessed for viability (forest viability against REDD+ criteria for verification, stakeholder consent, financial viability). GRZ has confirmed that the Government must approve any implementation / management plans for REDD before they can be recognized. Livelihoods Interventions into a site can begin once the viable site is identified, and once key stakeholders have agreed to the proposed terms of implementation (developed collectively) for the project.

To incentivize communities to conserve forested areas, BCP invests in land management, livelihood, and community development projects. In particular, CFP initiates local livelihood and community development projects to promote the adoption of alternative livelihoods and energy sources. The aim is to provide the community with tangible benefits that replace the income and/or livelihood benefits received from deforestation or forest degradation.

### COMMUNITY COVENANTS

Community Covenants are a key component of BCPs' strategy for engaging with communities. According to a BCP project document for the LZRP demonstration project:

> "A Community Covenant is a signed agreement between BCP and community representatives, whereby community participants commit themselves to reducing their non-REDD compatible activities in exchange for project investment, support, or employment. In this way, Community Covenants explicitly link BCPs' community support to the project's overall deforestation mitigation activities, by documenting that BCP support is conditional upon tangible progress towards reducing deforestation. BCPs' Community Covenants are designed to serve as mutually binding 'contracts' that link project activities and community interventions with deforestation mitigation and

biodiversity enhancement efforts, including reducing the risk of 'leakage' as a result of these projects. BCP will monitor these covenants to ensure compliance through a decentralized Community Engagement Team (CET)." (BCP 67, 2013)

Based on work completed through LZRP, there are a number of potential community-based mitigation and pay-for-performance initiatives that may be implemented as part of CFP, including eco charcoaling, conservation farming, eco-tourism, etc. Table 3 below describes several possible CFP implementation initiatives to promote forest conservation. Livelihood activities are selected by each community on a community-by-community basis, and this process will not occur until summer 2015 in the study area.

| TABLE 3.1 INITIATIVES TO PROMOTE FOREST CONSERVATION | |
|---|---|
| Eco charcoaling | This involves clear-cutting alternate strips of a designated forest area so that remaining forest strips can serve as biodiversity and seed bank refuges. It also involves the use of higher energy efficiency kilns, replanting of trees in degraded areas, and implementation of an early burn regime in areas under recovery. Community members involved in eco-charcoaling receive reduced transportation and tax costs to promote the sale of sustainably-produced charcoal. |
| Conservation farming | This intervention aims to introduce more productive agriculture and value chain systems to help farmers increase their food production per unit of land already cleared and to reduce emissions from crop residue burning and poor soil management. Particular activities include the introduction of minimum tillage maize production and planting of nitrogen-fixing tree and shrub species that naturally fertilize the soil. |
| Eco-tourism | This includes minimum-impact eco-tourism activities, such as tented safaris, self- drive camping, game walks, and mountain biking, in order to supplement income from carbon markets. |
| Social services | Potential social services provided by the project include school, borehole, and health clinic refurbishment. |
| Small business opportunities | These include the collection of non-timber forest products (NTFP), such as sustainable honey production, mushroom collection, seasonal thatch business, and sustainable brick making. |
| Others | Additional reforestation and livelihood development activities may include tree nursery and fruit orchard projects, vegetable production, crop diversification, and planting wood lots or tree farms. |

## COMPONENT 3. FOREST MANAGEMENT

Forest management involves job creation and community capacity building for forest and fire monitoring and management. Illustrative activities include:

- Increasing and improving the number of forest scout outposts
- Hiring and increasing the number of well-trained community scouts
- Establishing a communications network
- Increasing forest scout mobility
- Design and implementation of a professional security system
- Implementing controlled, early burns and fire breaks

## COMPONENT 4. FOREST CARBON SCIENCE

The core climate science activities will include inventorying forest carbon, modeling cumulative deforestation patterns, and assessing soil carbon. BCP uses Geographic Information Systems/Remote Sensing (GIS/RS) to show the rate of historical deforestation and to track deforestation in project sites for the sale of future carbon credits. Community-based biomass and soil measurements are also collected throughout the life of the project to assess the health of the forest.

## COMPONENT 5. CARBON MARKET CREATION

CFP is currently being designed to comply with the Verified Carbon Standard (VCS), although on-going policy discussions at the national level may require CFP to comply with additional standards. The VCS methodology will be followed for the quantification of carbon stocks and Net Emissions Reductions (NERs). VCS verification will not occur until several years into the project. Benefit distribution through the sale of carbon credits is expected to take place after the proposed 2018 midline data collection (additional data collection will be subject to available funding and subsequent USAID approval).

## COMPONENT 6. POLICY AND ENGAGEMENT WITH THE GOVERNMENT OF ZAMBIA

The project will be aligned with the objectives of the Government of the Republic of Zambia's National REDD+ Program, implemented through the Forestry Department.

# USAID'S LAND TENURE AND RESOURCE MANAGEMENT LEARNING AGENDA

To better inform USAID REDD+ programming and broader policy discussions, this IE provides an opportunity to better understand the impacts of CFP's REDD+ interventions on LTPR and livelihood outcomes to ensure that local LTPR are adequately recognized and (if relevant) compensated.

The lack of formal recognition of local LTPR is often a notable driver of conflict in forested areas, and the lack of secure tenure for local populations is recognized as a principal driver of deforestation in many developing countries (Angelsen 2008; Araujo, et al, 2013, Larson et al.). The clarification and formalization of rights to forest lands and resources (including, but not limited to, carbon) is therefore widely seen as the first step toward REDD+ readiness. For example, the Cancun Agreements specify that developing country parties address "land tenure issues, forest governance issues, gender considerations" and ensure "the full and effective participation of relevant stakeholders" when developing and implementing national strategies or action plans (UNFCCC COP 16, 2010: para. 72).

Even in cases where rights are clear, however, REDD+ activities will by design change the way that individuals and communities access and use forest (and possibly also non-forest) resources (Sunderlin, et al., 2014). For instance, activities that promote afforestation and reforestation will likely require a change in the current land use in the targeted areas, such as the replacement of agricultural activities with tree seeding, natural or assisted regeneration, and/or forest management. Likewise, activities that aim to avoid deforestation will typically reduce local access to and use of forest resources.

To the extent that REDD+ projects identify the groups and individuals benefitting from the existing tenure situation and compensate them through carbon-based payments, REDD+ has the potential to help individuals and communities transition to more sustainable long-term livelihood strategies (Sunderlin, et al., 2014). However, if REDD+ projects do not adequately identify the complex LTPR (and related livelihoods) systems early in the planning process, it is possible that some REDD+ activities could

negatively impact the rights (and livelihoods) of certain individuals or groups—particularly the poor, women, migrants, and others whose rights are often less secure—and fail to provide these groups with adequate compensation. While many REDD+ initiatives are explicitly designed to benefit local communities, the limited formal sector recognition and enforcement of local LTPR, particularly in forested areas, complicates even the best-intentioned efforts to identify and compensate land and resource users whose rights may be affected by a REDD+ project (Angelson et al. 2009).

Moreover, by introducing a new benefit stream associated with forested areas, REDD+ activities will create new pressures on land tenure and resource governance (Sunderlin, et al., 2014). This new benefit stream has the potential to displace a variety of poor and vulnerable groups, including women, whose rights to own and use these assets may not be recognized or upheld by either formal or informal tenure systems. Crucially, although most national REDD Preparation Proposals (R-PP) acknowledge the importance of clarifying and securing land tenure and property rights, few specify strategies to achieve these goals (Davis, 2010).

While the importance of LTPR issues in the context of REDD+ is widely discussed in the literature and features in national REDD+ Readiness discussions, limited evidence is available on how individual projects are addressing—and potentially impacting (positively and/or negatively)—LTPR on the ground. Recent REDD+ research by Sunderlin and colleagues indicates that while project proponents have begun to address tenure issues at the project level, significant tenure challenges remain. These tenure-related challenges include the limited extent of national level clarification of land, forest, and carbon rights; ineffective enforcement of local property rights, particularly rights of exclusion, and inadequate local understanding of REDD+ activities and their potential implications for their property rights and livelihoods because of the lack of training on specific elements of REDD+ projects (Sunderlin, et al., 2014).

The evaluation will examine the extent to which REDD+ projects address LTPR, the extent to which and how REDD+ programming changes LTPR systems, and the implications of any LTPR changes for communities and individuals whose livelihoods are derived from forest resources. The following LTPR questions from USAID's LTRM Office will be used to guide the development of survey instruments for this evaluation.

### LAND TENURE RESEARCH QUESTIONS[3]
**Overarching Question:** How does (individual and communal) tenure over tree resources and forests change as a result of a REDD+ project, and do any tenure changes result in net livelihood changes?

#### TENURE SECURITY:
- How do REDD+ programs affect land tenure and property rights in forested areas?

  - How do individual and communal property rights (e.g., to access, use, manage, extract, or transfer land/resources) to trees and forests change as a result of a REDD+ project?
  - How does REDD+ affect local governance and decision-making processes related to forest land and resources?

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[3] Drawn primarily from the Draft LTRM Office Research Agenda and Tacconi et al. (2010).)

- Do REDD+ projects help to secure LTPR, including decision making and governance of forests and related resources, for the treatment communities, including for women and other vulnerable populations?

- In what ways (if at all) were tenure arrangements taken into consideration in the design and implementation of the REDD+ project?

  - Are property rights a factor in REDD+ eligibility/participation by local resource users?
  - How can we avoid disenfranchising local resource users with unrecognized and/or customary rights to forested areas targeted by REDD+?

### LIVELIHOODS/REDD+ BENEFIT SHARING/CO-BENEFITS:
- How (if at all) does tenure affect the distribution of benefits (including co-benefits) from REDD+ projects?

  - Do individuals or groups with stronger property rights obtain greater benefits from REDD+?
  - Do individuals or groups with weaker property rights benefit less from REDD+ programs?

- How do any *changes* in tenure as a result of the REDD+ program affect livelihood outcomes within communities and within households?

  - If individuals or groups lose access to land and/or resources as a result of the REDD+ program, does the REDD+ program adequately compensate (in kind or otherwise) the lost income or subsistence benefits associated with the lost resources? (i.e., does the REDD+ program address the opportunity costs of foregoing existing activities, appropriately discounted, where tenure changes result in a change in access to forest resources important for local livelihoods?)

### STRENGTHENING LOCAL GOVERNANCE:
- How (if at all) have any changes in tenure arrangements affected the participation of stakeholders in REDD+ processes/activities within communities and within households?

  - If individuals or groups lose property rights (e.g., access to forest land and/or resources) as a result of the REDD+ program, how (if at all) is their ability to participate in decision-making about REDD+ and forest governance more broadly affected?

# USAID'S GLOBAL CLIMATE CHANGE AND DEVELOPMENT STRATEGY

USAID's Climate Change and Development Strategy (2012) identifies three strategic objectives that motivate the Agency's GCC programming efforts: 1) accelerate the transition to low-emission development through investments in clean energy and sustainable landscapes; 2) increase resilience of people, places, and livelihoods through investments in adaptation, and 3) strengthen development outcomes by integrating climate change in Agency programming, learning, policy dialogues and operations. Sub-Intermediate Results and Intermediate Results should, under the articulated results framework, contribute to the achievement of the three Strategic Objectives.

The CFP is focused on strengthening the national REDD+ process by piloting innovative approaches to participatory forest management. The program seeks to identify strategies that reduce the drivers of

deforestation, including inadequate participation of, and benefits to, communities involved in REDD+ activities. It aims to empower communities to lessen deforestation; establish and improve joint forest and natural resource management participatory forest management plans; promote and enable sustainable livelihoods that provide forest-dependent communities alternatives to the charcoal trade and to unsustainable timber harvesting; create pay-for-performance and/or revenue sharing programs based on measuring, reporting and verification of forest conservation and carbon sequestering; provide households with information, technologies and tools that help them achieve more sustainable livelihoods; and raise awareness, promote action and dispel misconceptions that limit Zambia's REDD+ potential.

## GLOBAL CLIMATE CHANGE RESEARCH QUESTIONS

The following seven research questions will be used to guide the development of survey instruments focused on climate change and reduced deforestation for this evaluation.

1. Does receipt of benefits to community members through CFP result in reduced deforestation, degradation, and GHG emissions from the landscape?
2. Which benefits do community members cite as effective incentives for the adoption of behaviors that reduce deforestation, degradation, and GHG emissions from the landscape?
3. How have community members' perceptions of the value of the forest changed due to CFP?
4. Are the benefits provided through CFP equitable?  Do they benefit those who are most adversely impacted by the loss of access to forest resources?
5. Was CFP successful in building the capacity of communities and local institutions to manage their forests sustainably and to reduce forest emissions?
6. What differential impacts or unintended consequences appear to have resulted from CFP? And
7. Have increased knowledge and awareness of deforestation and climate change resulted from CFP?

The questions posed through this IE will support an analysis of the Climate Change and Development Strategy's results framework. These questions also align with GCC Evaluation Agenda hypotheses III–VIII. Please refer to Appendix I for USAID's Global Climate Change and Development Strategy and Sustainable Landscapes Results Framework.

GCC Questions 1 and 2 are concerned with the strategies to address the first element of the CFP program: drivers of deforestation. The questions ask if communities that receive benefits as a result of CFP programming also reduce deforestation, degradation and GHG emissions and if so, which benefits are most effective at creating positive incentives. These two questions test whether or not economic incentives for land use practices that reduce GHG emissions established as benefits may create needed economic incentives to reduce emissions.[4]

As the perception of the value of forests change, community members may be more likely to invest in land use practices that stop, slow, or reverse emissions from deforestation and degradation of forests. Question 3 measures if perceptions have changed as a result of the CFP. Question 4 tests the extent to which benefits provided are equitable, which may lead to more sustained behavior change and may shed

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4 This corresponds to Sub IR 1.2.2.6 under USAID's Sustainable Landscapes and Results Framework.

light on CFP's ability to create sustainable livelihood alternatives for communities. To the extent that benefits provided are equitable, this may create lead to more sustained behavior change.[5]

Question 5 analyzes the impact of CFP on community and local institutional capacity to manage forests and reduce forest emissions. This promotes an evaluation of the effectiveness of USAID-funded projects to increase the capacity in partner countries to implement low-emission development strategies in the land use sector.[6]

Question 6 sheds light on the CFP activities that, for unanticipated reasons or because of a differential impact on livelihoods may not encourage land use practices that stop, slow or reverse emissions.

Finally, Question 7 addresses the final element of the CFP program, which is to provide households with knowledge of the benefits of REDD+ in order to support the program and broader climate change goals in the country and beyond. This question will help gauge the extent to which knowledge and awareness of deforestation and climate change has changed as a result of the CFP.

In line with USAID's Climate Change and Development Strategy conducting this IE will allow the Agency to assess the success, scalability and replicability of CFP programming.

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[5] This corresponds to a Sub IR 1.2 under USAID's Sustainable Landscapes and Results Framework.

[6] This corresponds to a test of Sub IR 1.2.2. under USAID's Sustainable Landscapes and Results Framework.

# 4.0 HYPOTHESES, DATA SOURCES, & INDICATORS

This IE tests a number of research hypotheses that follow from USAID's research questions described in Section 3. The proposed evaluation design has the scope to rigorously assess the program's impact on indicators measured at the household and community level.

This section outlines the hypotheses, indicators and data sources used in the research.

## RESEARCH HYPOTHESES (H)

Specific hypotheses in this IE include the following.

**At the community level:**

- H1. Communities receiving the CFP intervention will have lower community-wide incidence of conflicts.
- H2. Communities receiving the CFP intervention will have improved capacity to sustainably manage forests and to reduce forest emissions.
- H3. Communities receiving the CFP intervention will have improved natural resource conditions, including reduced levels of deforestation, degradation, and GHG emissions from the landscape.
- H4. Communities receiving the CFP intervention will perceive greater tenure security and protection of their community land and natural resources.
- H5. Community leaders receiving the CFP intervention will perceive greater value of forests and forest resources.
- H6. Communities receiving the CFP intervention will have equitable benefit sharing and distribution across different subgroups.

**At the household level:**

- H7. Households receiving the CFP intervention will perceive improved transparency, accountability, and representativeness of legal and customary governance institutions.
- H8. Households in communities receiving the CFP intervention will perceive greater tenure security and protection of their household's land.
- H9. Households in communities receiving the CFP intervention will have increased knowledge and awareness of deforestation and climate change.
- H10. Households in communities receiving the CFP intervention will perceive greater value of forests and forest resources.
- H11. Households in communities receiving the CFP intervention will have improved livelihood and welfare outcomes.

## ADDITIONAL RESEARCH QUESTION (S)

An additional research question that will be explored by this evaluation:

- Which benefits do community members cite as effective incentives for the adoption of behaviors that reduce deforestation, degradation, and GHG emissions from the landscape?

## DATA SOURCES

To test these hypotheses, the evaluation will utilize nine sources of community and household level data to investigate customary land governance, tenure security, rangeland conditions, land-use conflict, livelihood outcomes, etc. All of the original survey instruments described below will be pre-tested and piloted prior to the baseline data collection. These data sources include:

1. **Household survey data**—The household survey will be stratified to target female-headed households, youth, and landless groups. The CFP IE Household survey will be approximately 60 minutes in length[7] and is based on the Rural Agricultural and Livelihood Survey (RALS), which is implemented by the Central Statistics Office (CSO) with support from IAPRI. The evaluation team aims to conduct the household survey as a panel survey; this involves tracking the same respondents over time between the baseline and endline data collection;
2. **Wives survey –** The wives survey will be administered to wives in male-headed households and will be approximately 45 minutes in length. The Wives survey instrument will collect much of the same information as the Household survey to help document differences and similarities between women and men and their responses. The evaluation team aims to conduct the wives survey as a panel survey; this involves tracking the same respondents over time between the baseline and endline data collection;
3. **Headperson survey**—A 60 minute close-ended survey interview will be conducted with the headperson of each village in the study area. The headperson is a traditional leader;
4. **Focus group discussions**—The evaluation will collect data from focus group discussions with women, youth and landless groups in a subset of the villages involved in the evaluation. The focus group discussions will be 90 -120 minutes in length and implemented in 30 treatment villages and 30 control villages.
5. **Participatory mapping**—As part of the qualitative data collection effort, the evaluation will conduct a participator mapping exercise in 10 treatment village and 10 control villages with a representative group of men and women in each village.
6. **Village Forest key informant interviews** – a 45 minute close-ended survey will be conducted with a Village Forest Key Informant. The Forest Key informants of interest include members of a Community Resource Board, forest guard, members of a village action committee focused on forest issues, or village elders. The key informants will be identified on a case-by-case basis.
7. **District key informant interviews**—The evaluation will collect data through a 45 minute structured interview from key district officials across Lundazi, Mambwe and Nyimba Districts. The key informants of interest include District officials from the Forest Office and Zambian Wildlife Authority (ZAWA), The key informants will be identified on a case-by-case basis.
8. **Chief key informant interviews-** The evaluation will conduct a 45 minute structured interview with chiefs from the treatment and control areas across Nyimba, Mambwe and Lundazi District.

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[7] Based on the previous survey research for USAID's Tenure and Global Climate Change impact evaluation in Zambia's Chipata District, the evaluation team has found surveys of roughly 60 minutes are suitable in the Zambian context. Respondents are provided with a small in-kind gift for their time.

9. **Secondary materials**— Data, surveys and reports from outside sources, as well as participatory management plans, M&E data, community covenants, maps, and studies commissioned and created as part of CFP. Secondary materials will be used to better understand the background, context, and mechanisms linking the project to the outcomes of interest. Survey materials will help guide the creation of the CFP survey instruments. Remote sensing and GIS mapping data will provide a key data source for evaluating indicators of interest to USAID.

## INDICATORS

The tables following detail suggested indicators to test the eleven hypotheses listed above. The tables provide specifics on outcome indicators plus corresponding details on data sources, measurement, and other considerations. Note that these outcome indicators will continue to be refined as the IE design process moves forward.

## COMMUNITY IMPACTS

### H-1. COMMUNITIES RECEIVING THE CFP INTERVENTION WILL HAVE LOWER COMMUNITY-WIDE INCIDENCE OF CONFLICTS.

**Indicators**

A. Prevalence of conflicts (external or internal) and their causes
B. Number of previously existing land and natural resource conflicts
C. Number of existing land and natural resource-based conflicts
D. Change in protection of vulnerable populations through conflict resolution
E. Level of satisfaction regarding resolution of conflicts

**Data Sources**

A. Household survey
B. Wives survey
C. Headperson survey
D. Focus group discussions
E. Key informant interviews

### H-2. COMMUNITIES RECEIVING THE CFP INTERVENTION WILL HAVE IMPROVED CAPACITY TO SUSTAINABLY MANAGE FORESTS AND TO REDUCE FOREST EMISSIONS

**Indicators**

A. Community based resource management groups established or strengthened.
B. Knowledge and clarity of rules on land/forest use and management
C. Knowledge and clarity of forest management revenues and expenditures
D. Level of monitoring, enforcement, and sanctions for land/forest resources.
E. Accountability of community leaders and decision makers
F. Level of adherence to local rules and customs related to reducing deforestation or degradation
G. Level of adherence to participatory forest management plans (PFMPs) and other local agreements related to reducing forest loss and GHG emissions
H. Changes in level of local access to equitable and affordable grievance mechanisms
I. Capacity to enforce exclusion rights (in principle and in practice)
J. Change in capacity of headmen/women and other local leaders to manage their forests sustainably and to reduce forest emissions
K. Knowledge of agro-forestry, sustainable agriculture, and/or wildlife management (from training or practice)
L. Access to technical extension services

**Data Sources**

A. Household survey
B. Wives survey
C. Headperson survey
D. Focus Group Discussions
E. Participatory Mapping
F. Key informant interviews
G. Secondary material (PFMPs, covenants, etc.) that document baseline conditions and trends.
H. CFP project Monitoring and Evaluation (M&E)

## H-3. COMMUNITIES RECEIVING THE CFP INTERVENTION WILL HAVE IMPROVED NATURAL RESOURCE CONDITIONS—INCLUDING REDUCED LEVELS OF DEFORESTATION, DEGRADATION, AND GREENHOUSE GAS EMISSIONS FROM THE LANDSCAPE.

**Indicators**

A. Change in perceptions of availability/access to forest resources, including timber, fuel wood, NTFP, animals, etc.
B. Change in perceptions of forest conditions and degradation
C. Rate of deforestation*
D. Level of fish and wild game stock*
E. Quality of soil and water*
F. Change in erosion and siltation*
G. Changes in tree/forest cover*
H. Number of ha of degraded soil*
I. GHG emissions*
J. GHG sequestration*

**Data Sources**

A. Household survey
B. Wives survey
C. Headperson survey
D. Focus group discussions
E. Participatory mapping
F. Key informant interviews
G. Remote sensing data
H. GIS satellite imagery

## H-4. COMMUNITIES RECEIVING THE CFP INTERVENTION WILL PERCEIVE GREATER TENURE SECURITY AND PROTECTION OF THEIR COMMUNITY LAND AND NATURAL RESOURCES.

**Indicators**

A. Instances of inappropriate land grabbing of forest land by outsiders or powerful insiders
B. Instances of loss of local user rights to use and access forest resources and forest land
C. Perceived likelihood of land (or resource) grabbing and forest use by outsiders
D. Perceived risk of loss of local user rights to forest resources and forest land
E. Change in informal/customary rights over forest resources or land
F. Legal recognition of land and resource tenure rights (communal titles)
G. Change in perceived level of land tenure security as a result of inclusion of land in carbon scheme
H. Community access to forest resources for extraction/harvest (timber, NTFPs, wild game, etc.)
I. Strength of exclusion rights, in principle and in practice
J. Outsider use of forest land and resources

| Data Sources | A. Household survey |
| | B. Wives survey |
| | C. Headperson survey |
| | D. Focus group discussions |
| | E. Participatory mapping |
| | F. Key informant interviews |
| | G. Secondary material (PFMPs, covenants, etc.) that document baseline conditions and trends. |

## H-5. COMMUNITY LEADERS RECEIVING THE CFP INTERVENTION WILL PERCEIVE GREATER VALUE OF FORESTS AND FOREST RESOURCES

| | |
|---|---|
| Indicators | A. Change in subjective valuation (long term/short term) for intact forest/reduced deforestation and degradation of forest resources<br>B. Change in level of subjective valuation (long term/short term) of timber and NTFP<br>C. Change in percentage of respondents who value reduced GHG emissions<br>D. Change in level of interest in accessing forest resources in ways that increase forest loss and/or GHG emissions<br>E. Level of conservation activities and sustainable harvest practices<br>F. Change in behaviors that increase forest loss and/or GHG emissions<br>G. Level of forest and resource conservation |
| Data Sources | A. Headperson survey<br>B. Key informant interviews |

## H-6. COMMUNITIES RECEIVING THE CFP INTERVENTION WILL HAVE EQUITABLE BENEFIT SHARING AND DISTRIBUTION ACROSS DIFFERENT SUB-GROUPS.

| | |
|---|---|
| Indicators | A. Change in access to land and forest resources, with a particular focus on vulnerable groups within the community (e.g. women, poor, youth, landless, migrants/strangers) and groups with different livelihood interests (e.g., herders, NTFP gathers, etc.)<br>B. Change in household socio-economic status, income, and/or asset holdings<br>C. Development of benefit sharing rules targeting the most vulnerable community members (for instance, women, the landless, ethnic minorities) |
| Data Sources | A. Household survey<br>B. Wives survey<br>C. Headperson survey<br>D. Focus group discussions<br>E. Participatory mapping<br>F. Key informant interviews |

NOTE: Indicators A-E of H-1 will be disaggregated by type of conflict/dispute.

NOTE: Indicators and methods that require remote sensing data for more rigorous/accurate measures are noted with an asterisk (*).

NOTE: Where appropriate, indicators listed above will be disaggregated by key sub-groups of interest, including women, minorities, poor households, youth, and landless households.

**HOUSEHOLD IMPACTS**

| | **H-7. HOUSEHOLDS RECEIVING THE CFP INTERVENTION WILL PERCEIVE IMPROVED TRANSPARENCY, ACCOUNTABILITY, AND REPRESENTATIVENESS OF CUSTOMARY LAND GOVERNANCE INSTITUTIONS.** |
|---|---|
| Indicators | A. Change in levels of household voice and participation in forest management, local planning, and decision-making (including changes in percentage of youth, women, and minorities involved) <br> B. Changes in equity in decision-making processes, including decisions with broad local understanding and agreement <br> C. Knowledge and greater clarity of rules on land/forest use and management <br> D. Knowledge and greater clarity of forest management revenues and expenditures <br> E. Change in accountability measures of community leaders and decision makers <br> F. Level of satisfaction regarding forest and resource management |
| Data Sources | A. Household survey <br> B. Wives survey <br> C. Focus Group Discussions |

| | **H-8. HOUSEHOLDS RECEIVING THE CFP INTERVENTION WILL PERCEIVE GREATER TENURE SECURITY AND PROTECTION OF THEIR HOUSEHOLD LAND.** |
|---|---|
| Indicators | A. Household awareness and perceptions of bundle of land rights, including exclusion rights, land access, and land management <br> B. Confidence in use of current land and resource assets (as measured by reported perceptions and productive investments in land and natural resources) <br> C. Instances of inappropriate loss of local user rights to forest resources and forest land <br> D. Perceived risk of loss of local user rights to forest resources and forest land <br> E. Change in informal/customary rights over forest resources or land <br> F. Formal recognition of land and resource tenure rights of local inhabitants <br> G. Availability of land and resources for poor landless due to access restrictions |
| Data Sources | A. Household survey <br> B. Wives survey <br> C. Focus Group Discussions <br> D. Participatory mapping |

## H-9. HOUSEHOLDS IN COMMUNITIES RECEIVING THE CFP INTERVENTION WILL HAVE INCREASED KNOWLEDGE AND AWARENESS OF DEFORESTATION AND CLIMATE CHANGE

| | |
|---|---|
| Indicators | A. Change in percentage of respondents who know which activities are most damaging to the environment<br>B. Change in percentage of respondents who recognize a link between an individual's behaviors and reduced forest loss<br>C. Household understanding of the relationship between deforestation/degradation and climate change |
| Data Sources | A. Household survey<br>B. Wives survey |

## H-10. HOUSEHOLDS IN COMMUNITIES RECEIVING THE CFP INTERVENTION WILL PERCEIVE GREATER VALUE OF FORESTS AND FOREST RESOURCES

| | |
|---|---|
| Indicators | A. Change in valuation (long term/short term) for intact forest/reduced deforestation and degradation of forest resources<br>B. Change in level of valuation (long term/short term) of timber and NTFP<br>C. Change in percentage of respondents who value reduced GHG emissions<br>D. Change in level of interest in accessing forest resources in ways that increase forest loss and/or GHG emissions<br>E. Level of conservation activities and sustainable harvest practices<br>F. Change in behaviors that increase forest loss and/or GHG emissions and/or level of forest and resource conservation |
| Data Sources | A. Household survey<br>B. Wives survey<br>C. Focus group discussions<br>D. Participatory mapping |

## H-11. HOUSEHOLDS IN COMMUNITIES RECEIVING THE CFP INTERVENTION WILL HAVE IMPROVED LIVELIHOOD AND WELFARE OUTCOMES.

**Indicators**

A. Assets
B. Size of household farmland
   - Livestock holding (# and value)
   - Consumer durables and agricultural assets
C. Health
   - Clean and safe drinking water
   - Clean air (as measured by perception and used of improved cookstoves, for example)
   - Availability and quality of health care
D. Food security and nutrition
   - Changes in food sources
   - Changes to household expenditures on food
   - Adequate food and nutrition as measured by reported food consumption patterns
   - Prevalence of hunger
E. Income/prevalence of poverty
   - Crop cultivation
   - Livestock income
   - Sale of fuel wood, NTFPs
   - Off-farm income from trade/wage labor
   - Amount of cash income from carbon payments to individuals
   - Employment and incomes from restricted or substitute economic activities (agriculture, charcoal production, NTFP harvesting, logging, etc)
   - Level of stability of income flow
F. New or more sustainable livelihood strategies
   - Level of employment/demand for labor in tree planting, thinning, harvesting, or monitoring
   - Access to wage labor
   - Employment from tourism, local estates, plantations
   - Income from the sale of fruit and/or NTFPs
   - Income or new income from the sale of timber
   - Subsidies to the household for tree planting
   - New micro-enterprise development
   - Access to energy (both timber and non-timber)
G. Access to credit, debt, and savings
   - Access to and cost of formal credit/microfinance
   - Access to and cost of informal credit
   - Level of household income and savings
   - Ability or capacity to access credit
   - Debt cancellation due to lump sum carbon payments to households
H. Education
   - Household literacy
   - Educational attainment

| | A. Household survey |
|---|---|
| **Data Sources** | B. Wives survey |
| | C. Focus group discussions |

NOTE: Where appropriate, indicators listed above will be disaggregated by key sub-groups of interest, including women, minorities, poor households, youth, and landless households.

## CONTROL VARIABLES

| | A. Ecological zone[8] |
|---|---|
| **Indicators** | - Areas with large, contiguous forest blocks<br>- Forests with high carbon densities (potentially mixed forest types)<br>- Other similar characteristics<br>- Biophysical risks (fires, pests, diseases)<br>- Biodiversity value (presence of threatened or endemic species or habitats)<br>- Type of current protection regime<br>- Strength/quality of management of current protection regime |
| | B. Drivers of deforestation<br>- Land's agricultural productivity<br>- Slope<br>- High profit versus low profit land<br>- Access/distance to markets<br>- Charcoal market drivers (e.g., intensive export to Lusaka or Tanzania vs. more localized use)<br>- Incomplete markets<br>- Reliance on local markets<br>- Distance to cities<br>- Access to roads/road density (market integration)<br>- Transport costs (from forest to village; from forest to nearest road or market) |

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[8] The evaluation team will primarily rely on CFP's M&E data for ecological data in the treatment area. In the control area,

| | |
|---|---|
| | C. Community and demographics<br>- Land-tenure regimes<br>- Size of available community land<br>- Proximity to forest<br>- Chiefdom<br>- Chief's approach to land tenure<br>- Chief's approach to forest management<br>- Ethnicity<br>- Organizations<br>- Strength of community organization<br>- Strength of local governance structures<br>- Capacity of current forest management organization/structure<br>- Household size<br>- Educational attainment<br>- Income<br>- Population density<br>- Poverty Levels<br>- Livelihood systems<br>- Cropping systems<br>- Level of dependence on nearby forests<br>- Level of dependence on charcoal |
| | D. Other project influences<br>- Presence of strong implementing partners (e.g., COMACO)<br>- History of similar projects in the communities<br>- Overlap with other similar or competing projects (e.g., COMACO's World Bank carbon project) |
| Data Sources | A. Household survey<br>B. Wives survey<br>C. Headperson survey<br>D. CFP M&E data<br>E. Secondary and administrative data |

# 5.0 RESEARCH & SURVEY METHODOLOGY

Given BCP's implementation model and the current lack of available pretreatment data, the evaluation team recommends using a Difference-in-Differences (DD) design that compares CFP treatment sites in Nyimba, Mambwe, and Lundazi Districts to control areas in these same districts. In particular, a randomized control trial design was eliminated from potential design scenarios because USAID/Zambia and BCP stressed the need for an evaluation design that did not interfere with or disrupt the program implementation. Additionally, there is a lack of pretreatment data that eliminates the use of an evaluation design based on matching methods.

The strengths and limitations of the research methodology are discussed below.

DD is a strategy that uses data with a time and control group dimension to control for unobserved and observed fixed confounding factors. DD is one of the most frequently used methods for IE. In the context of the CFP IE, a DD method will compare the changes in outcomes over time between chiefdoms in Eastern Province involved in the CFP and chiefdoms in Eastern Province that are not involved in CFP. Given the lack of pretreatment data and the inability to randomize the CFP implementation across these sites, a randomized control trial (RCT) or experimental design is not feasible for the evaluation. The DD approach represents the next best evaluation technique for analyzing the impact of the program.

The DD method is a quasi-experimental design. Although there is an underlying design behind the data collection, DD relies on statistical corrections to ensure that the evaluation design is valid. Thus, DD ultimately represents a data-driven method for evaluating the causal effect of a program; a large-scale data collection effort and econometric methods must be employed to ensure that selection bias between treatment (CFP) and comparison (counterfactual) groups is minimized. In theory, a well-designed DD method can be a powerful statistical tool to minimize selection bias between treatment and control groups.

As the name implies, we are examining two differences in a DD design. The first difference controls for factors that are constant over time (fixed effects) in each group, since we are comparing that group to itself. Put differently, we are differencing out time-invariant observable and unobservable traits. The second difference captures outside time *varying* factors by measuring the before-and-after change in outcomes for a group that was not involved in CFP but *was exposed to the same set of environmental conditions.* As a result, the counterfactual being estimated here is the change in outcomes for the control group.

For the CFP IE, the DD method will be implemented as follows. The "first difference" in the DD method represents the before and after effect in the treatment group; this controls for factors that are constant over time for the CFP treatment areas. The "second difference" represents the before and after difference in the control group to control for outside time-varying factors. Finally, the first difference is subtracted from the second difference to generate the estimate of the treatment effect.

DD will allow us to take into account any differences between treatment and control groups that are constant over time. The strength of the method is that it controls time invariant observable and unobservable differences between treatment and control groups. This is a critical point. The implication is that the treatment and comparison groups do not necessarily need to have the same pretreatment conditions. For DD to be valid, the control group must have been subject to changes in outcomes of interest that would have been experienced by CFP sites in the absence of the program. This is called the "equal trends assumption" and is discussed in more detail below.

## FINDING A GOOD COUNTERFACTUAL

The strength of the evaluation ultimately depends on the validity of the control group or counterfactual. With the exception of the CFP program, the counterfactual areas should be as similar to the CFP treatment areas as possible. It is especially important for the counterfactual and CFP treatment sites to share key characteristics that might influence the outcomes of interest, including tenure security, livelihood security, and economic growth.

The control areas will be identified in collaboration with BCP prior to the data collection launch in January. A set of priority matching characteristics will be used to guide the selection of control chiefdoms. These criteria represent variables that could have an impact on our outcomes of interest, besides the CFP program. The aim is to 'control' for as many of these as possible by selecting counterfactual sites that resemble treatment sites on as many of these key criteria as possible. Priority matching variables include:

### ECOLOGICAL ZONE
- Characteristics that match what CFP priority areas, including:

  - Areas with large, contiguous forest blocks
  - Forests with high carbon densities (potentially mixed forest types)

- Biophysical risks (fires, pests, diseases)
- Biodiversity value (presence of threatened or endemic species or habitats)
- Type of current protection regime
- Strength/quality of management of current protection regime

### DRIVERS OF DEFORESTATION
- Land's agricultural productivity
- Charcoal market drivers (e.g., intensive export to Lusaka, Malawi or Tanzania vs. more localized use)
- Reliance on local markets
- Travel time (distance) to cities
- Access to roads/road density (market integration)

### COMMUNITY AND DEMOGRAPHICS
- Chiefdom tenure status
- Size of available community land
- Proximity to forest
- Population density and average household size

- Poverty levels
- Ethnicity
- Livelihood systems

  - Cropping systems
  - Level of dependence on nearby forests
  - Energy options
  - Level of dependence on charcoal for livelihoods

## CHIEFDOM
- Chief's approach to land tenure and forest management
- Type and capacity of current forest management organization/structure

## INFLUENCES FROM OTHER PROJECTS
- Presence of strong implementing partners (i.e., COMACO)
- History of similar projects in the communities
- Overlap with other similar or competing projects (e.g., COMACO's World Bank carbon project)

| CFP IE TREATMENT AREAS | |
|---|---|
| **Chiefdom** | **District** |
| Luembe | Nyimba |
| Msoro | Mambwe |
| Malamya | Mambwe |

| CFP IE CONTROL AREAS | |
|---|---|
| **Chiefdom** | **District** |
| Nyalungwe | Nyimba |
| Mwanya | Southern Lundazi |
| Masemphangwe | Southern Lundazi |

The DD design will enable the control of time-invariant observable and unobservable differences between the treatment and control areas. To control for time varying differences, we will need to collect data on observable characteristics that may differ between the two groups. The primary survey instruments are designed to collect this data, and the study hopes to complement this with the use of remote sensing and GIS data across treatment and control sites. Moreover, ERC expects to collaborate with BCP regarding data sharing for CFP's M&E data in treatment communities. The M&E data will improve our capacity to address research questions regarding differential program effects and the mechanisms linking tenure rights to improved livelihood outcomes, particularly at the community level.

## LIMITATIONS OF DIFFERENCE-IN-DIFFERENCES

DD requires stronger assumptions than randomized selection. It is based on the assumption that the most important omitted variables are time invariant. The key identifying assumption for DD is the equal or common trends assumption, which states that the counterfactual trend behavior will be the same in the Nyimba/Mambwe treatment and control areas in the absence of the CFP intervention. This is a strong assumption and represents the key limitation of DD—it cannot control for time-*variant* differences between the treatment and control groups. For example, if another organization initiated a forest management project in a control chiefdom —or a large scale forest fire affected one area disproportionately in 2016—the DD would not be able to account or control for these events. For DD to produce a valid counterfactual, we must assume that no time varying differences exist between the treatment and control groups.

Thus, the DD strategy is valid if the CFP treatment is the only factor that induces a deviation from common trends for tenure security, livelihoods, and deforestation—including other factors of interest to the evaluation. Although the treatment and control areas can differ before the implementation of the CFP program, this difference must not be reflected in different time trends for key indicators. Therefore, the risk to the validity of this DD design is that it will not be able to effectively compensate for or eliminate differences between treatment and control that change over time (Abadie 2000).[9]

Several techniques are used to test the validity of the equal trends assumption. These include comparing changes in outcome in treatment and control units before program implementation and/or performing a placebo test with a placebo or "fake" control group. Unfortunately, due to budget considerations, this study will not have access to data from additional control groups or multiple time periods beyond baseline, midline, and end line. Although these data limitations constrain our ability to use preferred techniques to check the equal trends assumption, the evaluation will be able to perform a placebo test with *false outcomes* to assess the viability of the common trends assumption. In particular, the team will estimate the impact of CFP in the control group on knowledge indicators about REDD+ and climate change that we expect CFP to change, in order to verify whether the assumption holds.

In summary, we may not be able to identify an ideal counterfactual group. The treatment and counterfactual groups do not need to be identical on pretreatment characteristics, but they need to be subject to the same time varying factors during the course of the program implementation. We are currently working with BCP to identify a shortlist of chiefdoms in Nyimba and Mambwe that provide good matches to the treatment chiefdoms. The greater the differences between the treatment and counterfactual at baseline, the more likely that there will be an unbalanced unobservable or observable time variant factor that influences the outcomes of interest. This will pose a threat the validity of the evaluation design.

## MATCHED DIFFERENCE-IN-DIFFERENCES

To help mitigate these weaknesses in the design, the estimation strategy will combine matching with DD and will include covariates to control for factors that may influence the trajectory of the treatment

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9 Discussions of DD limitations in the literature include: endogeneity of interventions (Besley and Case 2000); isolation of specific behavioral parameters (Heckman 2000, Blundell and MaCurdy 1999); linearity assumption (Athey and Imbens 2002); and large standard errors (Bertrand et al. 2004).

groups over time. Moreover, supplementing end line DD regression analysis with time-varying geo-spatial information (i.e., on roads, market access, etc.) can reduce bias and improve the quality of estimated impacts.[10]

The researchers will conduct the treatment analysis using matched DD estimation to improve comparability between the treatment and comparison groups. In addition to assessing CFP's overall treatment effect, the evaluation will also conduct the DD method in conjunction with matching to compare treatment households that are most similar to control households. This will reduce the total number of households involved in the study and will have implications for the power calculations. Nevertheless, if this method reduces variation in the measures of interest, it will generate more precise estimates of a local average treatment effect between a subset of treatment and control households.

The steps for this process are as follows. First, baseline data on observed characteristics will be used to match treatment and control households. Second, DD estimation will be used to estimate a change in the outcomes for the matched units. Finally, these double-difference estimates across the matched units will be averaged out after weighting for household size to determine the treatment effect.

## HOUSEHOLD SAMPLING METHODOLOGY

The indicators measured by the household survey are noted above in Section 4. We propose that a household survey will be a large-N survey involving approximately 4500 respondents. The total number of villages expected for the study is approximately 300 across the entire study area. Within each village, we will survey the head of household from 15 households. A census of each village will be conducted prior to the start of the data collection; this information will be used to generate sampling frames and weights.

The household, wives, headperson and forest key informant surveys will be collected through a cloud-based mobile data collection effort. This will promote data sharing and transfer between the evaluation team and implementing partners to ensure that the results of the data collection are communicated to communities as quickly and efficiently as possible. While there is additional up-front effort required to program the questionnaire and train staff and enumerators on the use of phones, an electronic data collection approach reduces data entry errors and improves the quality of the data (Caeyers, Chalmers, & de Weerdt, 2010).

## OPEN DATA KIT (ODK) BRIEFCASE

In survey areas without Internet access, the team will use Open Data Kit (ODK) Briefcase to transfer surveys from the Android devices to a laptop computer, and then upload data to Dropbox to share with the Cloudburst team. ODK Briefcase is a free java plug-in that was designed by Open Data Kit to transfer surveys from ODK Collect and export data into a CSV file in areas with no internet connection. The survey firm will be trained to use ODK Briefcase, and data will be pulled daily to the field manager's computer and uploaded Dropbox once a week for review by Cloudburst.

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10 Inconsistent standard errors due to serially correlated time series data is a prevalent criticism of DD (Bertrand et al. 2004). We are using a very basic DD set up of two groups and two periods which does not present the same threat from serial correlation that is found in multi-period data. In addition, through cluster level random effects, our model specification will explicitly take into account the inconsistent standard errors from grouped data.

Additional data protection measures will be taken during the rainy season to protect the mobile data collection devices and electronic data. To protect the mobile devices, enumerators will be provided with a waterproof bag to store the phones in when survey data is not being conducted. If the rains are too heavy to ensure the devices can be kept dry while surveying, data collection will be delayed until the rain abates.

As noted above, due to the remote nature of the survey sites, the survey team will use Open Data Kit Briefcase to transfer manually survey files from each mobile device to the field manager's laptop. As an additional precaution, the text files for each survey will be collected from each phone and saved on the Field Manager's laptop, as well. If any damage occurs to the CSV file containing the survey data, data can be re-entered from the text file, eliminating the need to re-survey respondents. The field manager will also be given an external hard drive and will save a copy of the text file and CSV file to the hard drive. This process will occur daily. Both the hard drive and the laptop will be password protected. As frequently as possible—ideally every 1–2 weeks—the field manager will find an internet connection and upload the data to a Dropbox folder to share with the evaluation team, creating a third backup of the data. This multi-layered data security process ensures the data will remain protected, even during the rainy season.

## QUALITATIVE METHODOLOGY

The IE includes a qualitative component to complement the quantitative data it will generate.  The qualitative strategy serves two primary purposes, 1) to add a social context within which to situate the statistics, and 2) to add depth to the overall study and the descriptive IE data.  The IE will produce data that answers "what" types of questions, the qualitative data addresses "how" and "why" types of questions from the *perspective of the participants* themselves.

The qualitative component emphasizes understanding behavior such as forest use and access, beliefs about forest use and decision-making, opinions about forest access and management, and the purpose of the Community Covenant "from the perspective of the study participants themselves" (Hennink, et al., 2011: 10). The qualitative component of the study will purposefully engage participants in a constructive, facilitator-guided discussion in order to understand *processes* such as how forest use and access decisions are made, elucidate *social interactions* among forest communities and users and the norms and values they share; and finally, understand the "social, cultural economic and physical *context*" in which forest use, access and decision making, and Community Covenant negotiation take place (ibid).

Emphasis on process within CFP also highlights social relationships between these stakeholder groups and their transformation in the process of participating in CFP, as community members, the private sector, traditional authorities, the state (as represented by district-level ZAWA and forestry officials) all work together towards improved forest management. The qualitative data will allow USAID and its partners to understand the multiplicity of perspectives about the CFP program at various levels, which ultimately improves implementation. Attention to different experiences and understandings of CFP planning and grid expansion by these actors simultaneously complemented and contradicted one another.

The qualitative research component will ask questions of respondents to understand the above dimensions of social, political, economic and cultural life as pertinent to the CFP activities, and allow respondents to answer these questions in their own words. Thus, the qualitative methodology will highlight *emic* perspectives, for example, what forest-based livelihoods and forest conservation <u>means</u> to

CFP participants, and as such help to explain the cultural logics behind behaviors as well as opinions and beliefs about the CFP activities (which to some extent influences the success of activities). As such the qualitative component adds a localized logic to the IE study enriching the learning from and understanding of social change.

The qualitative research strategy employs two data collection tools:  focus group discussions, and participatory mapping exercises. Because qualitative research focuses on what people say and how they say it, all FGDs and mapping exercises will be recorded, transcribed <u>verbatim</u> (not a summary of what was said and what it means in English, but an exact transcription of what was said using the same words uttered by respondents) and translated into English.

Despite some overlap in BCP's FPIC process and the evaluation's qualitative methodology, it would not be methodologically sound for the IE to be implemented jointly with the FPIC process. First, the overall volume of qualitative information collected by the IE is unlikely to significantly overlap with BCP's FPIC process across all treatment villages. The focus group discussions will cover 60 treatment villages and participatory mapping will be implemented in 20 villages, whereas BCP is expecting to implement CFP across several hundred villages. Second, it is important to preserve the independent nature of the IE data collection and to avoid creating unrealistic expectations in the control areas. To ensure a distinction between the evaluation and program activities, the evaluation team will develop communication protocols (to be cleared with USAID and CFP) for local authorities that introduce the IE as a USAID-supported research effort.

## FOCUS GROUP DISCUSSIONS (FGDS)

As noted above, the focus group discussions (FGD) will privilege the knowledge and experience of particular social groups including women engaged in forest-based livelihoods (especially widows engaged in forest-based livelihoods), youth (income-earning and unemployed), and landless men and women,

The FGDs will take place in 40 villages across 3 districts. In 40 each villages, the research team will conduct 2 FGDs (with appropriate social groups and attentive to gender dynamics within the context of the overall study) for a total of 80 FGDs. The type of FGD discussion conducted in each of these 40 villages will depend on its population and what types of FGDs need to be conducted in the overall context of the IE. Therefore, the qualitative research component will collect narrative data via 80 FGDs in 40 villages, and 40 maps in 20 villages.

Each group discussion will include 6 to 8 pre-selected participants.  In the selection of the 6 to 8 participants two aspects are important: homogeneity of participants and level of familiarity among participants.

## PARTICIPATORY MAPPING

The evaluation team will conduct participatory mapping exercises with respondents identified through purposive sampling. The two groups of interest for the participator mapping include a representative group of women and men from each village. In 20 villages, a set of enumerators will ask one group of male and one group of female participants to draw a map of their village using a blank pad of paper and a set of colored markers.  Even if participants have never drawn a map or are unfamiliar with the map-making process, enumerators will work with them to guide the process.  Participants will be asked to include infrastructure and basic services, existing resources, boundaries and neighboring communities, schools, key agricultural institutions, fields, forest land, and water supplies. In addition, participants will

be asked to identify what resources and/or spaces they think are important for the village economically, social, and culturally. This will not only identify the important resources and spaces of the village, but will also help determine how participants see and rank their environment and resources.  The goal of the participatory mapping exercise is not to accurately identify the boundaries of a village, or to locate the natural resources correctly, but rather to help participants articulate and communicate their spatial knowledge and understanding of their village. By conducting the exercise with men and women separately, the map will also help identify gendered differences in perceptions, needs, and access to resources. Facilitators will listen to and record these conversations, and ask participants about what they've drawn. Once the map is complete, the enumerators will take a photograph.  This photograph will be uploaded and saved along with the other information collected during the exercise.

In 20 villages (6 villages in one district, and 7 villages in the other 2 districts), the research team will complete 2 Participatory Mapping Exercises , including one with men and one with women. In total 40 maps will be createds, (20 by men and 20 by women) in order to understand how men and women view the forest and its use.  Each mapping exercise will include 6 to 8 pre-selected participants.  In the selection of the 6 to 8 participants heterogeneity of participants is important.

# 6.0 POWER CALCULATIONS

This section describes the statistical power calculations for the CFP IE. In this context, power refers to the probability of detecting an impact if one does exist. The associated power calculations indicate the minimum detectable effect size (MDES) of CFP that can be detected by this IE given the expected sample size. The MDES is the smallest measure of CFP's impact that can be identified by this evaluation.[11]

For the CFP IE, the research team will measure project impact at the community and household level. The power calculations in this section are focused on quantitative survey data collected through the household, headperson, and key informant interviews.

We do not have raw data from previous studies in the study areas to draw from to inform our power calculations for key variables related to this study. Given limited pre-baseline village level data, we will not be able to improve the precision and power of the study through pre-sampling matching on village characteristics across treatment and control areas. As a result, we conduct more conservative estimates of the power calculations by ignoring the panel nature of the data that will be collected and using more conservative estimates for the parameters included in the power calculations.

CFP's selection of treatment sites is not random. However, the evaluation's use of DD as the estimation strategy implicitly assumes that the interventions are as good as random, conditional on group fixed effects. By relying on DD, we are making the very strong assumption that our comparison chiefdoms represent an appropriate control group, such as one would find in an experimental study. On the basis of these assumptions, the power calculations were obtained using the Optimal Design software package (Raudenbush et al. 2011; Spybrook et al. 2011). The factors that determine the power of a study do not differ between an experimental and a non-experimental design.

The discussion that follows assumes a power of 0.80 and estimates what will be the MDES of CFP's interventions under alternative scenarios for the number of villages and households included in the sample.

## HOUSEHOLD-LEVEL OUTCOMES

This design represents a two-level cluster design with outcomes measured at the person or household level. The first level is the community and the second level is the measurement level (households). The power calculations for this design do not assume a panel survey, or the taking of repeated measurements in which the same households are re-surveyed over the lifetime of the study. A panel survey increases the power of the study. In practice, we plan to use a panel study and to collect three rounds of data, but for the purposes of ensuring our calculations will be at least as precise as represented here, we have not made use of the panel data assumption.

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[11] In general, an increase in the sample size of an evaluation increases the power of the evaluation. A more powerful evaluation can detect a smaller MDES size.

## BOX 6.1 KEY POWER CALCULATION PARAMETERS

The following describes the key parameters used to conduct the power analysis and sample size requirements for this IE.

- **α (alpha)** is the type I error and is also referred to as the p-value in statistics. Generally speaking, this is the probability of concluding there was an impact when no impact actually exists. Typical values of α are 0.1, 0.05, and 0.01 with lower values indicating greater confidence in results (that is, less chance of concluding there is a program effect when there is none).
- **β (beta)** is the type II error. Generally speaking, this is the probability of not concluding there was an impact when in fact an impact does exist. The sample power is equal to (1- β). Typical values of β are 0.1 and 0.2. Lower values of β indicate greater confidence in the results. Stated differently, lower values of β are associated with greater power.
- **CLR (Cluster Level Reliability)** is an estimate of measurement error and is used to correct for the precision of outcomes measured at the community level.
- **$\sigma^2$** indicates that the evaluation is a fixed effect, versus a random effect, design. This means that we do not believe the communities in the study are necessarily representative of all communities in Zambia.
- **J** is the number of communities in each arm of the IE design. There are two arms in this IE—the treatment arm and control arm.
- **Minimum Detectable Effect Size (MDES)**—often represented by δ—is the magnitude of impact that can be detected for a given sample. The units of measure for δ are standard deviations from the mean. For example, if referring to household income and the average value is $1000 per household with a standard deviation of $100, then a value of δ=0.5 implies that incomes of $1050 or more are expected as a result of the intervention. In general, the smaller (larger) is δ the larger (smaller) will be the required sample size since a smaller (larger) impact will require a larger (smaller) sample size in order to detect.
- **Intraclass Correlation (ICC)**—often represented by p (rho)—measures how strongly units measured in the same group or cluster resemble one another.
- **η** is the number of households sampled per community.
- **Power** is the probability of detecting an impact if one has occurred. The power of a test is equal to 1 minus the probability of a *type II error*, ranging from 0 to 1. Popular levels of power are 0.8 and 0.9. High levels of power are more conservative and decrease the likelihood of a type II error. An *impact evaluation* has high power if there is a low risk of not detecting real program impacts, that is, of committing a type II error.

The power calculations are based on the following standard parameters:

- α = .05
- $\sigma^2 = 0$ (fixed effects)
- J=300, J=250, J=200

In addition to these parameters, to estimate the household-level MDES requires information on the degree of correlation between households within a community or the intra-class correlation (ICC). The assumption here is that units within a group are correlated, which means that we do not gain completely new information from each additional unit surveyed; or, alternatively, that calculations treating these

units as independent will overstate the precision resulting from the sample. This "loss" of information has to be taken into account in the power calculations through the ICC. A higher ICC indicates greater correlation between households and less new information from each additional household surveyed. Therefore, the MDES will increase with higher ICC values.

Table 6.1 provides the MDES under different assumptions about the sample size. While the standard parameters stay fixed, we alter (1) the number of households surveyed (N) from 10 to 20, (2) the ICC from .15 to .30, and (3) the number of communities per arm from 100 to 150. Figures 6.1–6.3 show the results of the power calculations used to complete Table 6.1.

### TABLE 6.1 SUMMARY OF MDES FOR AVERAGE TREATMENT EFFECTS UNDER VARIOUS ASSUMPTIONS

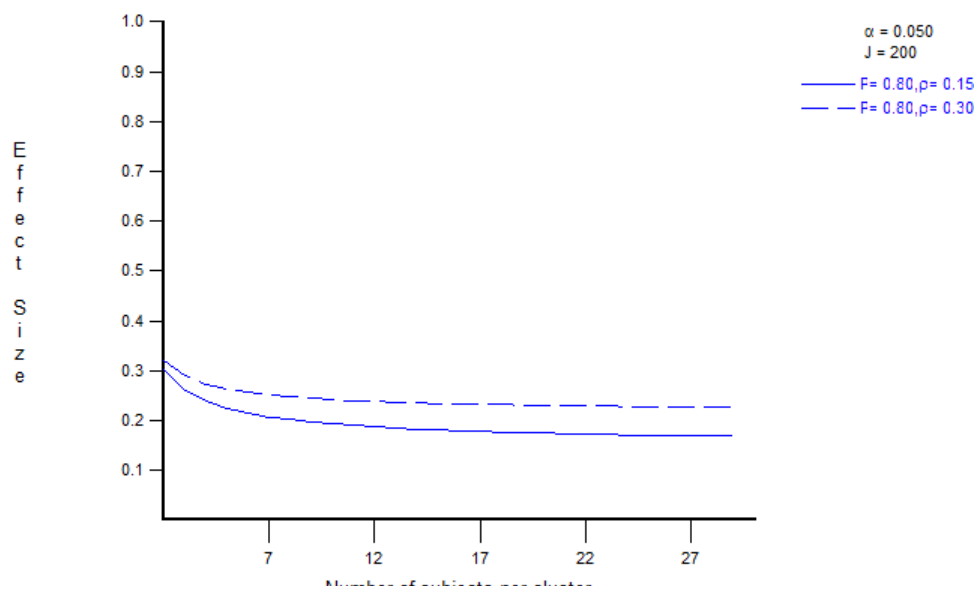| Communities per arm | Power | Alpha | N | ICC | MDES | ICC | MDES |
|---|---|---|---|---|---|---|---|
| 100 | .80 | .05 | 10 | .15 | .20 | .30 | .24 |
| 100 | .80 | .05 | 15 | .15 | .18 | .30 | .24 |
| 100 | .80 | .05 | 20 | .15 | .18 | .30 | .23 |
| 125 | .80 | .05 | 10 | .15 | .18 | .30 | .22 |
| 125 | .80 | .05 | 15 | .15 | .16 | .30 | .21 |
| 125 | .80 | .05 | 20 | .15 | .16 | .30 | .21 |
| 150 | .80 | .05 | 10 | .15 | .16 | .30 | .20 |
| 150 | .80 | .05 | 15 | .15 | .15 | .30 | .19 |
| 150 | .80 | .05 | 20 | .15 | .14 | .30 | .19 |

Source: Authors' calculations

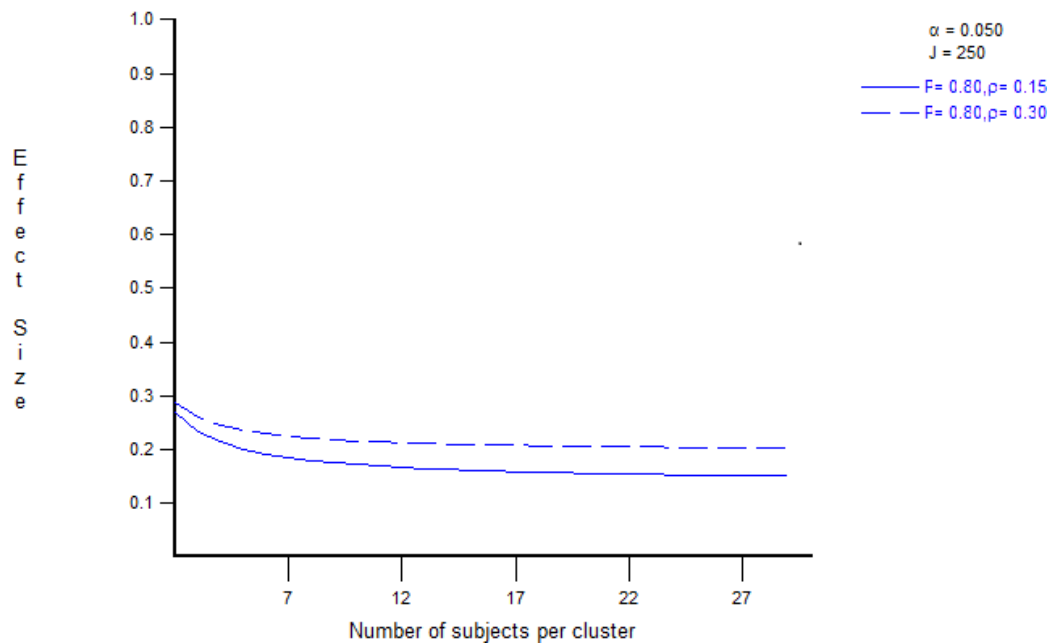**FIGURE 6.1** RELATIONSHIP BETWEEN MDES AND HH SAMPLE SIZE, TOTAL COMMUNITIES=200



**FIGURE 6.2** RELATIONSHIP BETWEEN MDES AND HH SAMPLE SIZE, TOTAL COMMUNITIES=250
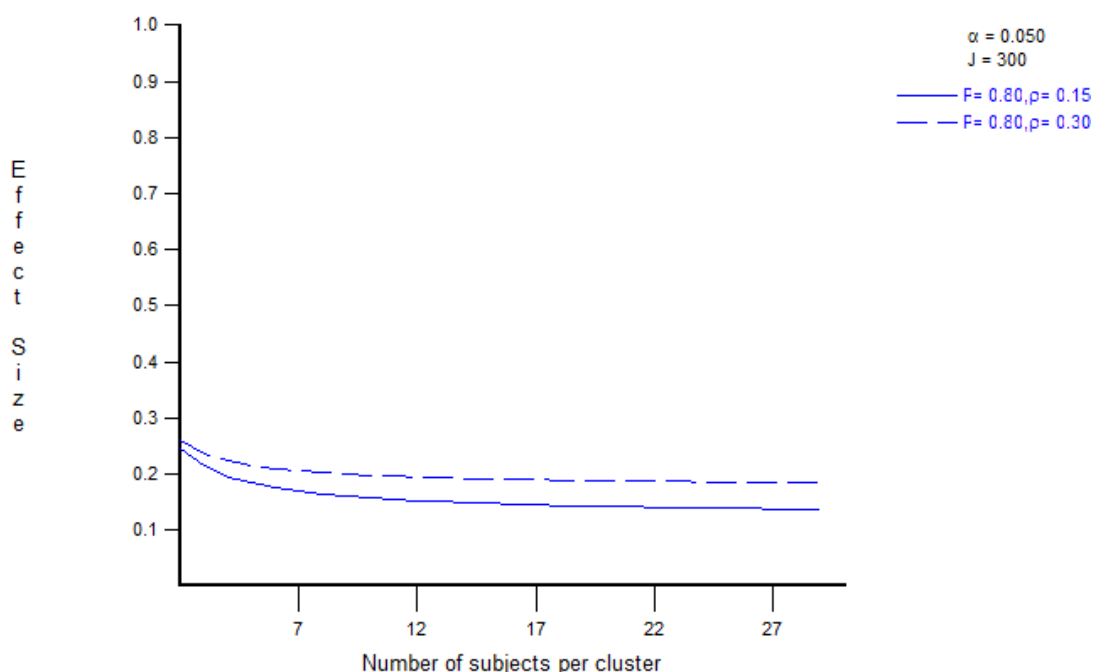
**FIGURE 6.3** RELATIONSHIP BETWEEN MDES AND HH SAMPLE SIZE, TOTAL COMMUNITIES=300

Table 6.2 summarizes the sample implications from the household-level analyses conducted above. It highlights the gains in power from adding villages to the survey versus households.

The IE proposes data collection from 4500 households across 300 communities; this will provide more power than sampling more households in a fewer number of communities.

A community and household census conducted prior to the launch will be used to inform the sampling methodology. Communities with fewer than 15 households will be removed from the sample, unless there are fewer than 300 communities in the study areas. If there are fewer than 300 communities in the study area, we will keep all of the communities in the sample.

| TABLE 6.2 SUMMARY OF HOUSEHOLD MDES UNDER ALTERNATIVE SCENARIOS | | | |
|---|---|---|---|
| **Villages** | **Households** | **MDES** | **Total household sample for two-arm design** |
| 200 | 10 | .20–.24 | 2000 |
| 200 | 15 | .18–.24 | 3000 |
| 200 | 20 | .18–.23 | 4000 |
| 250 | 10 | .18–.22 | 2500 |
| 250 | 15 | .16–.21 | 3750 |
| 250 | 20 | .16–.21 | 5000 |
| 300 | 10 | .16–.20 | 3000 |
| 300 | 15 | .15–.19 | 4500 |
| 300 | 20 | .14–.19 | 6000 |

Source: Authors' calculations

** Model and parameter assumptions: i) power =0.80 (=1- β), ii) α=.05, iii) CLR=0.7 (for village), iv) ICC=.30 (for HH calculations).

## WITHIN SITE TREATMENT EFFECTS

In addition to average treatment effects across all households in the study, the evaluation will investigate heterogeneous treatment effects between Nyimba District and Mambwe/Southern Lundazi[12] Districts. Nyimba District and Mambwe/Southern Lundazi Districts represent two discrete geographic, ecological and administrative sites. These two sites have distinct climates and forest systems and different histories of donor support and development projects. We expect BCP's project model to differ between these two sites because of these factors and the presence of diverse private companies and partners across the two sites.

Table 6.3 provides the MDES under different assumptions about the sample size. It assumes that the same number of communities will be sampled in each site, and 15 households will be sampled from each community. Assuming 100–150 communities sampled per site, we alter the ICC from .15 to .30, and the number of communities per arm from 50 to 75. Figure 6.4 shows the results of the power calculations used to complete Table 6.3.

Overall, the results show that the study will have moderate power to detect heterogeneous treatment effects of household level measures within each site.

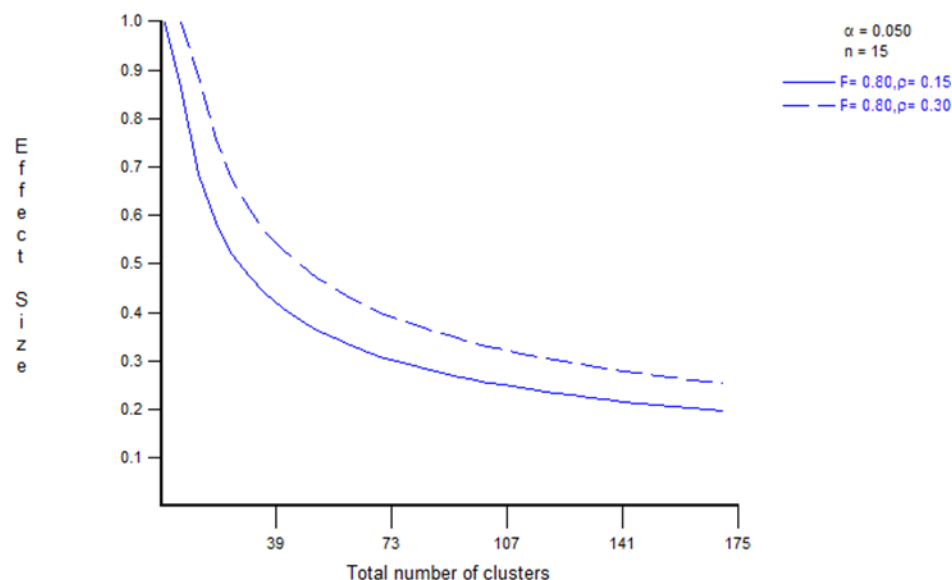| TABLE 6.3 SUMMARY OF MDES FOR HETEROGENOUS TREATMENT EFFECTS UNDER VARIOUS ASSUMPTIONS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Communities per arm | Power | Alpha | N | ICC | MDES | ICC | MDES |
| 50 | .80 | .05 | 15 | .15 | .26 | .30 | .33 |
| ~62 | .80 | .05 | 15 | .15 | .23 | .30 | .30 |
| 75 | .80 | .05 | 15 | .15 | .21 | .30 | .27 |



**FIGURE 6.4** RELATIONSHIP BETWEEN MDES AND CLUSTER SAMPLE SIZE, WITHIN DISTRICT EFFECTS

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[12] Mambwe and Southern Lundazi represent a contiguous zone.

# COMMUNITY OUTCOMES

This design represents a two-level community randomized trial of group level processes. In this case, the group level processes of interest are the community-level outcomes. The power calculations are based on the following standard assumptions:

- $\alpha = .05$
- $B = .05$ and $0.20$
- $\sigma2 = 0$ (fixed effects)
- J=200, J=250, J=300

In addition to these parameters (definitions given in Box 6.1), estimating the MDES at the community level also requires an assumption of the cluster level reliability (CLR). CLR reflects the imperfect measurement of group level outcomes. We have to take measurement error into consideration to look at community-level outcomes. The analysis assumes a value for CLR= 0.7, as this is the publishable standard. Figure 6.5 illustrates the relationship between MDES and the number of communities in each treatment arm of the CFP program. Table 6.4 summarizes the results of the power calculations.

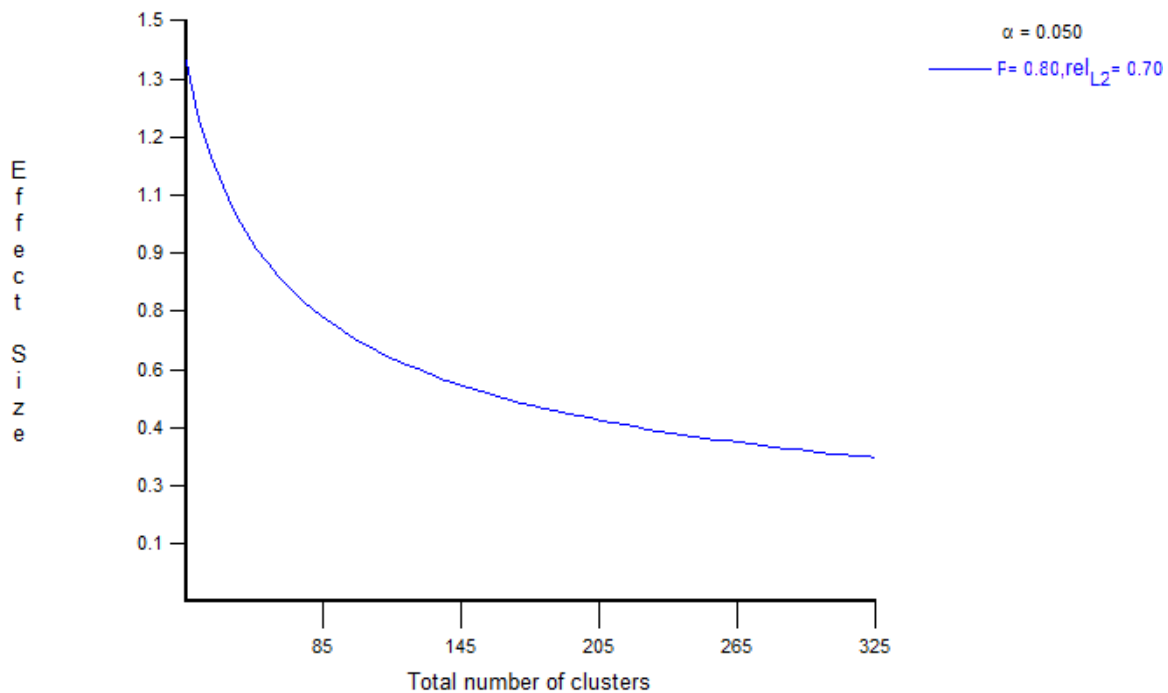| TABLE 6.4 SUMMARY OF MDES UNDER VARIOUS ASSUMPTIONS FOR DESIGN 1— AVERAGE TREATMENT EFFECTS | | | | |
| --- | --- | --- | --- | --- |
| Total Villages | Power | Alpha | CLR | MDES |
| 200 (100—treatment; 100—control) | .80 | .05 | .70 | .48 |
| 250 (125—treatment; 125—control) | .80 | .05 | .70 | .42 |
| 300 (150—treatment; 150—control) | .80 | .05 | .70 | .39 |

**FIGURE 6.5** RELATIONSHIP BETWEEN MDES AND THE NUMBER OF VILLAGES FOR THE LEVEL I VILLAGE DESIGN

## WITHIN DISTRICT TREATMENT EFFECTS

As described above, we are also interested in exploring heterogeneous treatment effects between the two sites for community level outcomes—Nyimba District versus Mambwe/Lundazi District.

Table 6.5 provides the MDES under different assumptions about the sample size for indicators measured at the community level, using the calculations from Figure 6.5. It assumes that an equal number of communities will be sampled from Nyimba and Mambwe/Southern Lundazi. Assuming 100–150 communities are sampled in each of these sites, we alter the number of communities per arm from 50 to 75 and use the standard parameters of CLR=.7, alpha = .05, and power =.80.

With MDES ranging from .58–.64, the study has very limited power to detect heterogeneous treatment effects of outcomes measured at the community level in each site.

**TABLE 6.5 SUMMARY OF MDES UNDER VARIOUS ASSUMPTIONS FOR DESIGN 1—HETEROGENEOUS TREATMENT EFFECTS WITHIN EACH DISTRICT**

| Total Villages | Power | Alpha | CLR | MDES |
| --- | --- | --- | --- | --- |
| 100 ( 50—treatment; 50 control) | .80 | .05 | .70 | .64 |
| 125 (~62—treatment; 62 control) | .80 | .05 | .70 | .61 |
| 150 ( 75—treatment; 75 control) | .80 | .05 | .70 | .58 |

# 7.0 OTHER CONCERNS & CONSIDERATIONS

This section describes factors that present risks to the validity of the research inferences and evaluation methodology, as well as additional concerns raised by the implementing partners regarding the sensitivity of the research.

## RAINY SEASON LAUNCH

December—April is Zambia's rainy season, and the heaviest rains come from January—March. The rains will render some villages impassable by 4x4 in the early weeks of data collection. The teams will survey the most difficult to access villages in mid-April, when the roads will be least affected by rain. If the villages are still impassable by 4x4 towards the end of data collection, the teams will need to use motorbikes, go on foot, and sometimes use community canoes to reach the survey site, which could result in delays.

Furthermore, the survey team is at greater risk for malaria and other illnesses during the rainy season, which could result in delays. Each enumerator will need to be insured. Each enumerator will also be provided a waterproof jacket, waterproof pants, and rainboots. The survey teams will have almost no mobile access throughout the survey and very limited Internet access and will need to bring their own petrol-powered generator for electricity.

If the rains are heavier or continue for more weeks then is typical, additional measures may need to be taken. These may include using motorbikes in place of 4x4s and establishing temporary camps in the villages for the survey team to sleep overnight. The Country Coordinator and the survey firm will monitor conditions carefully to determine if and when these actions are necessary.

## BUNDLED INTERVENTIONS

In terms of the causal analysis, this evaluation will only be able to speak to the impact of the "bundle" or "package" of CFP interventions, which includes specific sub-activities, such as support for income generation (e.g., through conservation agriculture, chickens, honey, "Eco-Charcoal," etc.); support to community institutions, such as schools; improved participatory forest management; and securing carbon credits. All of the potential sub-activities in the bundle will be available to be implemented in all communities. In addition, the bundle of CFP interventions will be implemented simultaneously across all of the communities in each set of communities that enters into collaboration with the CFP. The implication is that the evaluation cannot disentangle the causal effect of any one intervention or type of sub-activity. The evaluation will only be able to ascertain the average treatment effect for the project. Therefore, we will be able to evaluate the impact of the CFP on LTPR and GCC outcomes of interest, and we will be able to assess whether there are, for instance, correlations between tenure rights and livelihood outcomes. However, we cannot isolate the causal effect of, for example, conservation agriculture versus other CFP interventions on livelihood outcomes.

## MATURATION

Some of the impacts may take a much longer time period to materialize, and it will be several years before any benefits from carbon credits are distributed to communities. To capture longer-term effects that are key to the GCC and LTRM Offices' learning agendas, we propose a 2018 midline data collection and a 2022 endline data collection in the following section, subject to USAID funding and approval for the midline and endline data collection.

The 2018 survey will allow the team to assess anticipated changes for key proximate outcomes in cases where enough time will not have passed to measure a meaningful change in more distal development indicators, such as livelihood improvements.

## HUMAN SUBJECT PROTECTION

All data collection activities will adhere to professional and ethical standards for the treatment of human subjects. The evaluation team will submit the proposed IE to the Institutional Review Board (IRB) in Zambia and at Clark University. The IRB is an ethics body in charge of overseeing and monitoring research activities involving human subjects. The IRB's main role is to ensure that research procedures do not pose more than negligible risk to the participant subjects and to assess the adequacy of safeguards to protect subjects' rights, welfare, and dignity. Researchers are required by the IRB to: (1) inform the subjects about the purpose, risks and benefits of the study so that they can make an informed decision about whether or not to participate in the research; and (2) protect the anonymity of subjects and the confidentiality of the data.

Furthermore, the research team will provide training to all enumerators and qualitative researchers to ensure they understand these principles. Upon completion of research activities in the field, the data will be maintained in a way that adheres to general IRB principles. All analyses and publications will respect the anonymity of respondents; no identifying information will be used in reports or presentations. The mode of analysis will follow econometric standards for survey research, the aim of which is to make general claims about the participant and non-participant populations, not specific claims about identifiable individuals.

## SPATIAL SPILLOVER

There is a risk of spatial spillover between interventions and non-interventions in neighboring communities. The evaluation is aiming to select control communities that were deemed viable by BCP and expressed willingness to participate in CFP but were unable to do so for reasons beyond their control (e.g. could not find 100,000 ha of contiguous land for REDD implementation. These control communities may border treatment areas and experience positive or negative externalities from CFP implementation. The breadth and scope of the data collection effort should help the evaluation identify, monitor and mitigate inference problems due to spatial spillover.

# 8.0 IMPACT EVALUATION TIMELINE & TEAM COMPOSITION

The baseline data collection for the household and community survey will be implemented from mid-March 2015 through early May 2015. Given the long time horizon for REDD+ projects and delayed start of the CFP project, a midline data collection is proposed for the second quarter of 2018 and the end line data collection for the second quarter of 2022.[13] If funding is not available for a data collection in 2022, the 2018 data will default to the endline data for the impact evaluation. This will enable a longer maturation period for the treatment effects.

The midline and end line data collection will utilize the same set of instruments used during the baseline effort. During these three periods, data from focus groups and key informant interviews will also be collected. To avoid seasonal effects, the baseline, midline, and end line surveys are scheduled to occur at the same times each year.

Table 8, on the next page, provides a timeline for the CFP IE Baseline data collection.

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13 The livelihood activities for CFP are not scheduled to begin until July 2015, and ERC is schedule to end Q1 of 2018.

**TABLE 8.1 PRADD II IMPACT EVALUATION ACTIVITY TIMELINE**

| Activity | 2014 A | S | O | N | D | 2015 J | F | M | A | M | J | Q3 | Q4 | 2016–2017 | 2018 Q1 | Q2 | Q3 | Q4 | 2020–2021 | 2022 Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IE Design Document | | | ■ | ■ | | | | | | | | | | | | | | | | | | | |
| Survey instruments—development and translation | | | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | | |
| USAID and other external review (i.e., STARR) | | | | ■ | ■ | | | | | | | | | | | | | | | | | | |
| IRB/Ethical clearance submission—Clark University | | | | | ■ | ■ | | | | | | | | | | | | | | | | | |
| Formatting/Programming/Protocols/Manuals finalized | | | | | | ■ | ■ | | | | | | | | | | | | | | | | |
| **Baseline Data Collection** | | | | | | | | ■ | ■ | ■ | | | | | | | | | | | | | |
| Translation of qualitative information, data cleaning, produce baseline dataset | | | | | | | | | | ■ | ■ | | | | | | | | | | | | |
| Baseline data report | | | | | | | | | | | | ■ | | | | | | | | | | | |
| **Midline Data Collection** | | | | | | | | | | | | | | | | ■ | | | | | | | |
| Translation of qualitative information, data cleaning, produce midline dataset | | | | | | | | | | | | | | | | | ■ | | | | | | |
| Midline data report | | | | | | | | | | | | | | | | | | ■ | | | | | |
| **End line Data Collection** | | | | | | | | | | | | | | | | | | | | ■ | | | |
| Translation of qualitative information, data cleaning, produce end line dataset | | | | | | | | | | | | | | | | | | | | | ■ | | |
| End line data report | | | | | | | | | | | | | | | | | | | | | | | ■ |

# IMPACT EVALUATION TEAM

We propose the following composition of the Impact Evaluation Team:

**GCC Subject Matter Expert:** Vanessa Retana (Consultant, Cloudburst Group)

**Impact Evaluation Specialist:** Heather Huntington (Cloudburst Group)

**Baseline Field Manager:** Aleta Haflett (Consultant, Cloudburst Group)

**Research Analyst:** Stephanie Fenner (Cloudburst Group)

**Survey Firm:** RuralNet

# 9.0 DELIVERABLES

## BASELINE REPORT

We plan to submit a baseline report to USAID six months after the data collection is complete. The baseline report will provide rich descriptive data on communities in the study area and will flag any potential imbalances across treatment groups. The baseline report will also include a data analysis plan for the IE (created after examining the distribution of variables in the baseline survey); this will include a plan for creating indicators, scales and indexes from the individual questions and data sources.

## FULLY DOCUMENTED DATA SET AND CODEBOOK

Following each round of data collection, we will deposit a fully documented data set and codebook for the quantitative and qualitative data sources, with all identifiers removed, with USAID within three months after data collection is completed. This data set and codebook can then be made public.

## IMPACT EVALUATION REPORT

We will prepare IE reports within three months of the receipt of the midline and end-line survey results. The IE report will report the effects of the treatments versus controls on each of the outcomes of interest. In addition to investigating average treatment effects, the report will also include a discussion of heterogeneous treatment effects. The analysis in the IE report will follow the plan outlined in the baseline report.

## JOURNAL ARTICLES

The evaluation team expects to publish at least two peer-reviewed journal articles within two years of the completion of the second round of data collection.

## PRESENTATIONS

The evaluation team will draft baseline and midline presentations for policy and academic audiences based on the evaluation research.

## DISSEMINATION

All reports, data, and survey instruments are subject to review by USAID prior to release. When cleared for public release, documents and data will be available on the LTPR portal (http://usaidlandtenure.net/) and will also be submitted appropriately to the USAID Development Experience Clearinghouse (DEC).

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