

**Evaluation Design Report (Updated Final at  
Endline)**

MCA-N Contract: MCAN/COM/RFP/5E01002

**Evaluation of MCA Namibia's Conservancy  
Support and Indigenous Natural Products Activities**

June 2014

**Commissioned by the Millennium Challenge Account Namibia  
with funding from the Millennium Challenge Corporation**



**Evaluation of MCA Namibia's Conservancy Support (CS) and  
Indigenous Natural Products (INP) Activities**

**Evaluation Design Report (Updated Final at Endline)**

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**June 2014**

**MCA-N Contract: 5E01002**

## Acknowledgements

The NORC team would like to express its thanks for the technical and logistic guidance and assistance of the following people: Ndeu Amulungu (MCA-N), Kandi Shejavali (MCA-N), Dr. Chris Thouless (CDSS), David Cole (MCA-N), Bennett Kahuure (MCA-N), Karen Nott (NRI), Anna Davis (CDSS), Algerlynn Gill (MCC), and Dr. Martin Gonzalez-Rozada (Universidad Torcuato Di Tella).

Needless to say, the views, errors, and omissions in the present document are solely those of the NORC team. The NORC technical team members comprised Dr. Clifford Zinnes, Yvonne Cao, Kareem Kysia, Sam Haddaway, Aparna Ramesh, Aaron Wilson, Dr. Ralf Zimmerman, Roy Hagen, Piet and Lizl Stoman (Survey Warehouse), and Elise Le.

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## List of Acronyms

AGM	Annual General Meeting
ARD	Associates in Rural Development, Inc.
CBO	Community-Based Organisation
CBRLM	Community-Based Rangeland and Livestock Management
CBNRM	Community-Based Natural Resource Management
CBS	Central Bureau of Statistics, now replaced by the Namibia Statistics Agency (NSA)
CDSGF	Conservancy Development Support Grant Funds
CDSS	Conservancy Development Support Services
CNA	Conservancy Institutional Needs Assessment
CPP	Country Pilot Partnership
CRIAA SA-DC	Centre for Research, Information, Action in Africa Southern Africa - Development and Consulting
CTV	Continuous-treatment-variable model
CS	Conservancy Support
CS/INP Survey	Conservancy Support and Indigenous Natural Products Household and Organisational Survey
DC	Devil's Claw
DQR	Data Quality Review
EA	Enumeration Area
FGD	Focus Group Discussion
GIS	Geographic Information System
GPS	Global Positioning System
HH	Household
ICC	Intra-unit Correlation Coefficient
INP	Indigenous Natural Product
IPTT	Indigenous Plant Task Team
IRDNC	Integrated Rural Development and Nature Conservation
ITT	Intent to treat
KII	Key Informant Interview
KMS	Kalahari Melon Seed

M&E	Monitoring and Evaluation
MAWF	Ministry of Agriculture, Water and Forestry
MCA-N	Millennium Challenge Account Namibia
MCC	Millennium Challenge Corporation
MET	Ministry of Environment and Tourism
NACSO	Namibian Association of CBNRM Support Organisations
NBRI	National Botanical Research Institute
NCA	Northern Communal Area
NDT	Namibia Development Trust
NNDFN	Nyae Nyae Development Foundation of Namibia
NNF	Namibia Nature Foundation
NORC	NORC at the University of Chicago
NRI	Natural Resources Institute, University of Greenwich (UK)
NSA	Namibia Statistics Agency (NSA), formerly the Central Bureau of Statistics (CBS) of the National Planning Commission
PIF	Promoting Indigenous Fruit
PPIG	Primary Production Improvement Grants
PPO	Producer and Processor Organisation
PSU	Primary Sampling Unit
RFP	Request for Proposal
SDR	Survey Design Report
SW	Survey Warehouse
TOR	Terms of Reference
TtT	Treatment of the Treated
UoG	University of Greenwich
WWF	World Wildlife Fund

## Executive Summary

The Millennium Challenge Account Namibia (MCA-N) has contracted NORC at the University of Chicago to undertake an evaluation of its Conservancy Support (CS) and the Indigenous Natural Products (INP) activities. Though the activities are separate and distinct, there is some overlap between INP producers and conservancy members. Therefore, the opportunity exists for synergies between the two sets of activities. NORC, where possible, will take into account these synergies. While interactions between CS and INP activities will be taken into account, the evaluation is organized to consider each activity separately. Both activities involve a range of interventions and programmatic initiatives, and each part of the evaluation will identify the effects of the set of activities implemented taken as a group.

Broadly, the purpose of the evaluation is to shed light on the consequences of providing association members with technical training and grants to improve productivity and association management with governance capacity building, value-chain strengthening, and investment facilitation. The program logic predicts that these interventions should increase the sustainability of economic activities and social empowerment and thereby raise household wellbeing. To make this evaluation most useful, we combine rigorous quantitative methods with comprehensive, stakeholder-critiqued, qualitative interpretation so as to gear findings towards drawing concrete implementable lessons for future programming and building of sustainability in the sectors under study.

More specifically, the evaluation addresses separate sets of questions for the CS and INP interventions. The following is the current set of research questions for the CS and INP components of the evaluation:

### **CS Research Questions**

1. Do technical support and grants to conservancies increase business partnerships between conservancies and private businesses, and, in turn, increase conservancy revenue?<sup>1</sup>
2. Does technical support to conservancies improve conservancy governance? Does improved governance impact the equitable distribution of conservancy benefits?
3. Is there an increase in conservancy-related employment as a result of the CS activities? If so, how many new jobs are created and at what levels of employment?
4. Do the CS activities lead to an increase in household wellbeing over the life of its programme?
5. What is the impact of game acquisitions on the conservancies and on their members?
6. How sustainable are the results of business partnerships in terms of increased employment and improved mechanisms for distribution of revenue?
7. What impact does MCA-N support have on conservancy members in terms of the distribution of benefits by gender?
8. What is the perceived impact on recipient-household gender relationships from the intervention?

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<sup>1</sup> Cash receipts, goods, and services received as payment for services and products sold by the conservancy.

## **INP Research Questions**

1. Do the technical assistance package and the small grants increase the quantity and quality harvested and/or processed by recipients?
2. To what extent has the Delivery of Market Information Sub-Activity contributed to increased understanding of the broader INP sector (e.g., volumes, markets, key players, etc.)?
3. What is the uptake rate and effect of the practices and techniques introduced as part of the technical assistance on recipient harvesters?
4. For the PPO did the technical assistance improve organisational capacity to manage the business and income/revenue?
5. How sustainable are the results in terms of increased production, sales and income? E.g., market chain (are there long-term buyer contracts in place, are the institutions functional and independent).
6. How has the re-organisation of the Indigenous Plant Task Team contributed to the growth and sustainability of the INP sector?
7. How did new developments from the INP Innovation Fund impact on the INP sector?
8. Did the composition and level of household incomes change (more income sources, more diversification, and higher income)?
9. What changes are apparent in intra-household incomes and assets, including specifically around income earned by male and female household members? Does the intra-household distribution of income and employment by male and female household members change?
10. Did household assets change (houses, bicycles, radios, television sets, telephones, etc.)?
11. Did the composition of household financial assets change (savings, debt, borrowing, insurance)?
12. What is the perceived impact on household gender relationships from the intervention among recipients?
13. What is the combined effect of being part of a conservancy and a PPO member among women?

The designs presented here build on those set forth in NORC's technical proposal by taking explicit account of (i) the separate program logics of the conservancy activity and that of each INP; (ii) the detailed presentations by and interviews with program implementers and beneficiaries during the evaluation team's two field trips to Namibia; and (iii) the wealth of documentation and publications that have flowed from these ambitious interventions.

NORC's task is to conduct a performance evaluation and not to assess the effectiveness of program implementation by the two service-provider teams. The former seeks to determine the extent to which apparent impacts can be associated with the intervention while the latter considers whether implementers adequately carried out their terms of reference.

While MCA-N's ultimate focus is on longer-term outcomes, especially the economic well-being of conservancy members and INP harvesters, it is likely that the evaluation period will not be long enough for these longer-term effects to manifest. We recognize that in the INP sector, for example, there are complex interactions among PPOs and supply chains involved in the realisation of higher harvester household incomes, both in the short term and sustained into the future. Hence, emphasis is placed on detecting intermediate outcomes as predicted by each programme's logic.

The evaluation employs a mixed-methods approach in which qualitative techniques and quantitative analysis support each other, recognizing that the techniques used will depend on the evaluation question to be addressed. The qualitative analysis aims to provide local context as well as representative concrete examples that illustrate in greater detail the quantitative findings as well as provide credible arguments for (or against) those aspects of the research questions not amenable to statistical analysis or for which statistical analysis is inconclusive. Such an approach is critical due to the inherently qualitative nature of the expected impacts as well as to guide and contextualize quantitative analysis. The source of information for the qualitative analysis is through Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) with the household and conservancy or PPO member-households and management, as well as with stakeholders in the tourism sector from the private-sector and associated regulatory bodies. These FGDs and KIIs were conducted at midline (second half of 2013) and will be conducted again at endline (May 2014).<sup>2</sup>

The midline qualitative analysis highlighted a number of issues that will further guide upcoming quantitative data collection and analysis. For the conservancy evaluation, these include:

- a. How is conservancy-benefits-sharing perceived by members and have perceptions of conservancy accountability and fairness changed over the last few years? Are revenue distributions and their amounts becoming better known?
- b. Are villages that are more susceptible to HWCs sufficiently compensated? Which type of benefits provides the best incentives to members to adhere to wildlife and habitat protection rules?
- c. What happens to the share of conservancy income going directly to members as incomes increase?
- d. How prevalent has post-training attrition been among management and has it affected impacts?
- e. FGDs found that no change in intra-household gender relationships occurred. This finding will be checked.
- f. Have conservancy capacities converged as a result of the MCA intervention?

For the case of the INP evaluation, midline qualitative analysis raised questions for both further qualitative work as well as quantitative study. Among the former include:

- a. More interviews with international market representatives should be carried out, including their familiarity with the Market Bulletin.
- b. Commiphora and Marula unused harvests and spoilage need to be looked at.
- c. The *Market Bulletin* was to disseminate price information. Who needed it and did they get it as a result of the publication?
- d. To what extent did the absence of a central marketing facility in the program design affect performance?
- e. Viz. Devil's Claw, what is actually being done regarding the accreditation process? And what do harvesters say is the implication (for product differentiation) on their efforts to improve product quality?
- f. Are harvesters aware of price changes over time, especially for Marula?

Likewise, quantitative study will now be augmented to cover:

- a. Did PPO capacities converge to the same level or remain as dispersed as at baseline?

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<sup>2</sup> Key informant interviews were also conducted at the initiation of the survey contract.

- b. To what degree is there harvester frustration regarding rejected raw material and delayed payments? Is this affecting project impact?
- c. Which member of the household actually dispenses the cash, regardless who earns the income? (Consider using a randomized response protocol)
- d. To understand productivity changes and training benefits, examine why people drop out of harvesting. Too much work? Too little pay? Too much inventory?

Neither CS nor INP activities can be adapted to permit the identification of a compelling counterfactual. In other words, control groups are not available for the evaluation of either the CS activity or INP sub-activities. The CS activity is taking place in many of the conservancies of the Northern Communal Areas. Conservancies outside of this activity are generally in areas with differing natural endowments and market access and, as such, cannot serve as a comparable set of non-intervention conservancies (counterfactuals). In the case of the INP sub-activities, it is not feasible to establish a valid comparison group because the intervention covers nearly the entire population of producers of viable INPs. Hence, since a design-based approach to evaluation could not be considered, NORC has opted for a model-based approach. This consists of a “before-and-after” design based on a dose-response (or continuous-treatment-variable) model. The models are estimated using comprehensive information gathered at baseline and endline through household surveys and data collected by the implementing service providers.

Unlike under a design-based approach where a distinct control group is identified as the counterfactual, under the model-based formulation, each conservancy or producer and processor organisation (PPO) at baseline contributes to our understanding of the counterfactual by allowing us to infer whether differences in the amount of Compact assistance (the “dosage”) influences—and, therefore, impacts on—CS or INP performance. Though a model-based approach carries some advantages over a design-based approach it also poses challenges to the evaluator. To address these challenges, NORC will conduct a series of tests to ensure that assumptions underlying the models are acceptable, that all reasonable confounders have been considered (to prevent “reverse causality” inferences), and that parameter estimates are robust. Still, MCC considers the model approach to be a “performance evaluation”, not an “impact evaluation”. The implications for the present study are discussed in Chapter 2.

The quantitative analysis aims to objectively reveal using multivariate statistical methods the stylized facts concerning the key indicators and, broadly, whether and how changes in these indicators can be convincingly associated with (i.e., caused by) the CS and INP activities of the Compact. Its analytic goal is to identify program impacts by estimating the marginal effects of different intervention levels (e.g., intensity of training or number and type of grants) on outcomes of interest, particularly household incomes as well as other, less tangible benefits that may be easier to measure before the end of Compact. Considerable effort is dedicated to two aspects. The first is the design and construction of suitable indicators to measure appropriate intervention indicators (e.g., training intensity) and to capture the various qualitative effects of interest to MCA-N and MCC (e.g., sustainability). The second is to ensure “backdoor” channels of causality (endogeneity bias) are blocked during model estimation. (Table 2 on page 36 and Table 8 on page 66 indicate for CS and INP, respectively, whether qualitative and/or quantitative methods are to be employed for the analysis of each research question introduced above).

While the evaluation plan was under development, it was essential for baseline data to be gathered on households likely to be affected by the MCA-N activities with conservancies and PPOs. Under a separate contract, NORC implemented the Conservancy Support and Indigenous Natural Products Household and Organisational Survey (CS/INP Survey), which was fielded in July of 2011. The data are a resource for the evaluation of the CS and INP sub-activities to the extent that the data limitations allow them to be relied upon. An endline round of data will be collected in intervention areas after the MCA-N-funded CS and INP come to an end in 2014. The data collection will take the form of a panel study in which the same participants are interviewed from the baseline.<sup>3</sup> The baseline and endline household surveys, monitoring data provided by service providers, and a baseline and endline institutional assessment will provide the principal inputs to the quantitative analysis.

In the case of the conservancy evaluation, where the primary unit of treatment is the conservancy itself, NORC sought to administer an additional endline survey to form a panel, using as a baseline the extensive set of institutional and governance characteristics of conservancies collected in 2009, by ARD for MCA-N. This approach turned out to be both infeasible and unnecessary. The collection of high-quality data of this type from this population with the resources and timeframe available was found to be infeasible by CDSS experts, who have many years' experience in seeking to acquire the same data. Fortunately, two existing datasets were identified (the CDSS "governance data" and the NASCO conservancy database) as a substitute. For the former, however, its producers raised several concerns about inter-temporal consistency as well as coverage. Hence, NORC subjected the data in question to a series of statistical tests and determined that (i) possible inter-temporal bias could be reduced econometrically and (ii) in conjunction with the NASCO database and ARD dataset the CDSS governance would provide more reliable and comparable panel data than what could be reasonably expected from a quick and modest new governance endline survey whose ultimate comparability to the ARD baseline would be hard to confirm.

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<sup>3</sup> In some cases (e.g., primarily in Kavango, Caprivi, and Kunene) new participants will be interviewed where there was low coverage in the baseline survey.

# 1. Introduction

The Millennium Challenge Corporation's (MCC) Compact with the Republic of Namibia aims to reduce poverty through economic growth fostered by investment in the Education, Tourism and Agriculture sectors. The Millennium Challenge Account Namibia (MCA-N) was established to design and implement activities in these three areas to achieve this anti-poverty objective. As part of the Tourism component of the Compact, the Conservancy Support (CS) Activity will develop the capacity of 31 communal conservancies in the Northern Communal Areas (NCAs) to attract investments in ecotourism and capture a greater share of tourism-generated revenue in Namibia. As part of the Agricultural component of the Compact, the Indigenous Natural Products (INP) Activity will assist producer and processor organisations (PPOs) to improve their volume, quality, and value-added products, in addition to their organisational and business capacity.

Broadly, the purpose of the evaluation is to shed light on the consequences of providing association members with technical training and grants to improve productivity and association management with governance capacity building, value-chain strengthening, and investment facilitation. The program logic predicts that these interventions should increase the sustainability of economic activities and social empowerment and thereby raise household wellbeing. To make this evaluation most useful, we combine rigorous quantitative methods with comprehensive, stakeholder-critiqued, qualitative interpretation so as to gear findings towards drawing concrete implementable lessons for future programming and building of sustainability in the sectors under study.

MCA-N has contracted NORC at the University of Chicago to undertake an evaluation of the CS and INP Activities. Both activities involve a range of interventions and programmatic initiatives, and each evaluation will identify the likely effects of the set of activities implemented taken as a group. There is significant overlap between INP producers and conservancy members and for this reason it would have been preferable for the two programs to be evaluated simultaneously using a multi-dimensional experimental design. Unfortunately, limitations in sample size make this approach infeasible. Instead, the two activities are to be evaluated in parallel and interactions between CS and INP activities are to be taken into account by modeling each activity as a source of exogenous change in the other activity. Likewise, FGDs and KIIs will endeavor to disentangle these influences for those who are in producer and processor organisation (PPO) within a conservancy.

While the evaluation plan was under development, it was essential for baseline data to be gathered on households likely to be affected by the MCA-N activities with conservancies and PPOs who work with harvesters of INPs. NORC received a separate contract to implement the Conservancy Support and Indigenous Natural Products Household and Organisational Survey (CS/INP Survey), which was fielded in July of 2011. Among the objectives of this project were to conduct the baseline and endline surveys for the CS/INP Activities in selected conservancies and PPO coverage areas and to produce cleaned data sets that cover households and communities affected by the CS/INP Activities. The data coming out of this survey are intended for baseline and longitudinal project monitoring. The data are also one of several components that will inform the evaluation of the CS and INP activities.

Although the survey is viewed as a key resource for the evaluation of the CS and INP activities, there are important limitations to the data which are outlined in detail in the CS/INP “Final Survey Design Report”. From the point of view of the evaluation, the relevant limitations relate to the survey’s incomplete sampling frame, which lacked some harvester names for the 31 PPOs as well as critical geographic village-level information for 11 PPOs.

## 1.1 Evaluation Method

The evaluation addresses separate sets of questions for the CS and INP interventions (see Table 2 and Table 8, for CS and INP, respectively). The design presented here builds on the concept set forth in NORC’s technical proposal and described below. The evaluation employs a mixed-methods approach in which qualitative techniques and quantitative analysis support each other, recognizing that the techniques used will depend on the evaluation question to be addressed.<sup>4</sup>

The qualitative analysis aims to provide local context as well as representative concrete examples that illustrate in greater detail the quantitative findings about likely causal links between activity inputs to households, on the one hand, and conservancy- or PPO-level outcomes, on the other. It can also provide credible arguments for (or against) those aspects of the research questions not amenable to statistical analysis or for which statistical analysis is inconclusive. Such an approach is critical due to the inherently qualitative nature of the expected impacts as well as to guide and contextualize quantitative analysis. The source of information for the qualitative analysis is through Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) with the household and conservancy or PPO member-households and management, as well as with stakeholders in the tourism sector from the private-sector and associated regulatory bodies.

In the case of the quantitative analysis, control groups are not available for the evaluation of either the CS activity or INP sub-activities. The CS activity is taking place in most of the conservancies of the Northern Communal Areas (NCAs), which were selected for their tourism potential. Conservancies outside of this activity are generally in areas with differing natural endowments and market access and, as such, cannot serve as a comparable set of non-intervention conservancies. In the case of the INP sub-activities, it is not feasible to establish a valid comparison group because the intervention covers nearly the entire INP producer population. Instead, a type of a reflexive (before-and-after) design called a dose-response model is employed whereby each conservancy or PPO at baseline contributes to our understanding of the counterfactual by allowing us to infer whether differences in the amount of Compact assistance (the “dosage”) influence—and, therefore, impact on—CS or INP performance. Comprehensive information is being or will be gathered through household surveys, surveys of PPOs and conservancies, key informant interviews, and focus group discussions.

The model identifies likely program impacts by estimating the marginal effects of different intervention levels (e.g., intensity of training or number and type of grants) on outputs and outcomes of interest at critical points along the causal chain from the short to medium run. Originally, program impact on household income, the ultimate expected result by MCA-N, was to be a focus of examination, but it is now accepted that such changes would not likely be large enough to be detected over the relatively short evaluation period.

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<sup>4</sup> As discussed in Chapter 2, MCC refers to such approaches as “performance evaluations”, not “impact evaluations”.

While we will still examine household wellbeing, greater focus will be on its within-household gender distribution as well as greater diversity of income sources. NORC's task is to conduct a performance evaluation of MCA-N-funded activities around CS and INP and not to assess the effectiveness of program implementation by the two service-provider teams who are organizing interventions around two key MCA areas. We recognize that in the INP sector, for example, there are complex interactions among PPOs and supply chains involved in realisation of higher harvester household incomes both in the short term and sustained into the future. For this reason we employ a mixed methods approach.

The baseline and endline household panel survey (keeping its limitations in mind), a governance and institutional capacity baseline survey (from an earlier contractor, ARD in 2009), and monitoring data provided by service providers will support the quantitative analysis, comprising a series of estimated multivariate models that endeavor to identify causal relationships between project activities and outcomes. Central to the credibility of findings from a model-based evaluation is that the assumptions underlying the model are acceptable and that all reasonable confounders have been considered. We address these by testing the robustness of the approach in several ways. First, alternative models are estimated using different indicators of outcomes and/or treatment (dose), each representing a slightly different channel of impact according to theory. Second, for each channel modeled, several different yet reasonable model specifications are tested. These alternative specifications will focus on using additional variables to block (capture) "backdoor" paths of reverse causation. In both cases, agreement across models that the hypotheses of attribution cannot be statistically rejected will underscore robustness of findings and strengthen their credibility. Third, qualitative methods will be used to permit stakeholders to assess and provide feedback on potentially important confounders still to consider as well as on the model's findings. Such feedback is then used by the evaluators to re-analyze or re-specify the models accordingly.

In addition to injecting greater balance among the qualitative and quantitative analytic contributions to the study, our approach has been enriched in several ways since the proposal was submitted. First, the team has read the extensive set of reports on the CS and INP activities, beginning with the assessments done in 2008 and running through recently completed activity reports. Second, the team's sector experts on conservancy support and indigenous natural products contributed to refining our thinking about economic development in these sectors. Third, our thinking and knowledge were sharply enhanced by a comprehensive set of qualitative assessments (focus groups and key informant interviews) during the summer of 2013 as well as by the team's visits to Namibia, October 10-22, 2011 and August 2-12, 2012, to discuss the project with MCA-N staff, key stakeholders, activity implementers, and a few conservancies and PPOs. Of particular importance was better understanding the data being collected on technical assistance and grant activities benefitting conservancies and PPOs. Finally, we conducted a literature review of evaluations of similar projects.

## **1.2 Report Organisation**

This report presents the evaluation motivation, design, and plan. It consists of five chapters beyond this Introduction. Chapter 2 introduces common elements of the evaluation techniques employed for the CS and INP activities. Chapters 3 and 4 each start by reviewing the objectives and activities within the MCA-N intervention and then, building on the aforementioned common methodological foundation, detail our plans for qualitatively and statistically identifying the likely impacts on conser-

vancies, PPOs, and their households on the CS and PPO support activities. While the two sets of impacts are related, and this will be taken into account in the analysis, the presentation is facilitated by discussing them separately. Turning to the implementation side, Chapter 5 outlines the evaluation's implementation plan and Chapter 6 assesses the plan's various risks and discusses the steps planned to mitigate them. The report ends with recommendations for incorporating the evaluation design into the conservancy and INP implementers' plans.

## 2. Common methodological considerations for CS/INP evaluations

A major challenge facing a rigorous evaluation is that the intervention (treatment) under scrutiny is being provided to all observational units (conservancies and PPOs) that meet the Compact conditions. Since these conditions are very much correlated to expected performance (and, therefore, impact), other similar units almost by definition are *not* suitable as a counterfactual comparison group. Hence, neither experimental nor quasi-experimental design approaches are permissible in the present case. As such, MCA-N requested that the approach taken reverse the original. Rather than have qualitative input augment and confront statistical attributions, the revised approach endeavors to assess key aspects of project performance through a series of qualitative methods—focus groups and key informant interviews—whose insights NORC will balance with model-based quantitative analysis. Table 2 (for conservancies) and Table 8 (for PPOs) list the hypotheses to be investigated and indicate whether qualitative, quantitative, or both approaches will be applied toward this end.

The following presents the common elements of our performance evaluation methodologies for both CS and INP activities and assumes the absence of discrete counterfactuals. The discussion first lays out the qualitative foundation of the assessment and then proposes alternative estimation strategies for the quantitative dimension whose goal is to synergize, in as rigorous a way as possible, with the qualitative findings.

### 2.1 Qualitative methods

NORC's performance evaluation will include a set of qualitative narratives based on sets of non-panel, key-informant interviews (KIIs) and focus-group discussions (FGDs) at midline and at endline.<sup>5</sup> The idea is to ask stakeholders about their situation, experiences, views on changes they have observed over the intervention period, and what they believe the causes for the changes were. Topics of interest will include experience and satisfaction with the services provided under the intervention, as well as perceived impacts on (i) household wellbeing and gender relations, (ii) flora and fauna sustainability, and (iii) the role and relevance of the member organisation.

By having knowledgeable experts compare responses from the many perspectives canvassed in these interactions a consistent story or narrative can be constructed regarding potential causal linkages between stakeholder-observed changes (outputs and outcomes) and the CS and INP program interventions. Qualitative methods are also important for assessing hypotheses that do not lend themselves to quantitative analysis, either because the sample size would need to be unfeasibly large, measurement issues would be formidable, or the evaluation period could not be long enough for the statistically detectable effects to become manifest. Separately, NORC's "Data Collection Design Report – Qualitative" details the exact construction and implementation of these qualitative activities.

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<sup>5</sup> Key informant interviews were also conducted prior to the baseline survey.

The sample for the qualitative data collection is by no means statistically representative in the same way that a quantitative survey is. However, NORC still attempted to get representation from a diverse group of conservancies and PPOs in order to capture different experiences and perspectives that might vary based on language, geographic location, plant/wildlife species, and other conservancy/PPO characteristics. In Chapters 3 and 4 we detail our sample selection for the conservancy and the PPO samples, respectively.

Toward this end, the contract makes provision for conducting focus groups of twelve conservancies (Table 2) and twelve PPOs (Table 8), both at midline and at endline. During the midline, for each conservancy and each PPO, two focus groups were conducted: one focus group with the management members of the conservancy/PPO, and one focus group with non-management members of the conservancy/PPO. Participants were selected so as to cover the range of functions, experiences, and characteristics of the respective organisational unit.

FGD guides were developed and customized for each type of FGD: conservancy management, conservancy non-management, PPO management, PPO non-management. CS and INP KII guides were also developed. The guides were originally drafted by the NORC team and then underwent several rounds of revisions with participation from NORC's sector experts, NORC's local subcontractor, Survey Warehouse, CS and INP implementers, and MCA Namibia.<sup>6</sup>

The questions included in the guide were derived from the research questions outlined in Table 2 (conservancies) and (Table 8 (PPOs) and cover a number of topics of interest to MCA-N and the sector.

More specifically, the conservancy guide covers the following topics, as relevant:

- Business partnerships and conservancy revenue
- Conservancy governance
- Effect of game acquisitions
- Household well-being
- Gender dimensions of access and benefits
- Sustainability

The PPO guide covers the following topics:

- PPO organisational capacity
- Harvest, sales and income
- Household wellbeing
- Intra-household gender considerations
- Sustainability

The FGD guides for the management and non-management group differ slightly given the differences in the nature of participants. For instance, the management guides focus more on conservancy and PPO revenue and organisational capacity, while the non-management guides focus on impact on household well-being.

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<sup>6</sup> The FGD/KII guides can be found in the Qualitative Data Collection Fieldwork Report and the Midline Qualitative Data Analysis Report.

NORC sector experts also carried out a series of key informant interviews following each set of focus groups. Those for the CS activities took place in July and August of 2013 while those for the INP activities, originally scheduled for the same period, took place in late-September 2013 due to the need to change NORC's INP expert. Both sets will take place again between May and June 2014. The 2014 round should be completed in time to allow for all analysis and deliverables to be completed before the end of the compact.

For the midline, NORC sector experts in consultation with MCA-N and relevant stakeholders generated a list of proposed KII respondents, including the number from each category and specific guidelines on the type of respondent desired. Then, the sector experts worked with MCA-N and implementers to generate a list of specific names in each role. Contacts were made either directly or through MCA-N or implementers to schedule appointments for the KIIs. KIIs were conducted in a quiet, confidential location that was convenient to the respondent, such as their office or a meeting room nearby. KIIs were administered directly by NORC's sector experts; they are not recorded, but the sector experts took notes during the interview and immediately wrote up the results of the KII. A similar method will be employed for the endline qualitative data collection. The focus groups will be conducted by moderators from the Namibian firm, Survey Warehouse (SW) and the KIIs will be conducted by NORC sector experts. The objective is that the 2013 qualitative data inform 2014 data collection for both the qualitative and quantitative components of the evaluation.

## 2.2 Quantitative methods

### *One-Group, Pre-test/Post-test, Model-Based Design*

The quantitative side of the evaluations of the CS and INP interventions will take the form of a "One-Group Pre-test/Post-test Design," in which observations made on a baseline sample prior to the implementation of the interventions will be compared to observations taken on the same group of program subjects after the intervention is applied. The information for this purpose will be drawn from several sources (described below). By comparing various measures of the *intensity* of intervention—e.g., the number of technical assistance and training sessions provided, length of time since the sessions for them to "germinate" (become internalized), session durations and number of repetitions—to the size of the change in outcome indicators (using the "continuous treatment variable" or CTV model described, below) it is possible to link observed changes to the program intervention.

This formulation reduces the severity of threats to validity. First, the existence of adequate variation in the degree of intervention ("exposure") across observational units acts as the identifying condition for statistical inference of potential causality. Second, data are being collected on the same observational units in the follow-up endline survey as in the baseline survey (i.e., a panel dataset is being created). This allows us to control for other household-level "unobservable" influences and increases statistical power, given data limitations, by mitigating the need for matching households inter-temporally.

Absent a comparison group, however, it will be very important to take into account data outside of the sample design in order to control for the effects of external factors and isolate the effects of the program intervention on observed changes. Prime examples of such external developments for the

case of conservancies would be the world price of cosmetic ingredients produced in INP areas and the total number of tourists visiting the country annually.<sup>7</sup>

Quantitative data for estimating pre-test/post-test changes in impact variables will be derived from three primary sources:

- **Household surveys.** Two rounds of the CS survey and the INP survey, which are explicitly designed for the evaluation, and will track the same group of 300 INP harvester-households and 1,000 CS members in 2011 (baseline), and 2014 (endline).<sup>8</sup> To compensate for INP harvesters not accessible during baseline an additional 200 will be interviewed at endline to bring the endline total to 500. These data will provide information on important measures of impact, as well as on household characteristics and demographics.
- **Organisational surveys.** Both to track governance and management improvements at the level of the conservancy and PPO, as well as to collect fixed-effect covariates for household-level multivariate analysis, “factsheets” will be completed for each conservancy and PPO. In the case of the former, NORC will draw on the implementer databases (see next bullet) as well as the 2009 ARD baseline conservancy needs assessment (CNA) of conservancy institutional capacity.<sup>9</sup> In the case of the PPOs, the expectation is that the factsheets could be completed using NRI’s database of monitoring data; any remaining unanswered questions would be answered during the fielding of the household survey.
- **Implementer databases.** For the CS activity these would include the NACSO Community-Based Natural Resource Management (CBNRM) database, which has annual information on key economic indicators of interest such as revenues at conservancy level and share of conservancy revenue paid out in dividends, as well as conservancy-level GIS data and game counts available through internal databases for the Conservancy Development Support Services (CDSS), and the Conservancy Development Grants Fund (CDSGF). Separately, there are data on the size of grants and the geographic distribution of services and grants. For the INP activity these would include Natural Resources Institute (NRI), University of Greenwich’s program monitoring outputs.
- **Implementer reports.** “Quarterly Progress Reports” from NRI on their implementation activities and on fund grantee monitoring and reporting data related to the PPO Primary Production Improvement Grants (PPIG), and Innovation Fund managed through MCA-N. Likewise, NORC receives quarterly reports on CDSS, augmented by annual “State of Conservancy” reports. While these reports are rich in institutional detail (qualitative data) they also contain many tables and annexes of numeric and categorical data.

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<sup>7</sup> We recognize that there is a potential joint determinacy here, i.e., the number of tourists visiting Namibia annually may be increased by better tourism experiences in the improved CS areas. However, improved tourist experiences do not impact the number of tourist visits *in the same year*. Hence, this effect can be taken into account with lagged variables.

<sup>8</sup> See “Baseline Data Quality and Analysis Report”, NORC, 21 September 2012 for a summary of the dataset. Originally, the INP harvester sample was set at 500 but weather conditions prevented access to several PPOs. The endline however, will use replacements to achieve the original 500-harvester target.

<sup>9</sup> ARD(2010), “Current Management Capacity Summary Report”, Final Report #2, 31 March, prepared under MCA-N contract “MCAN/CIF/RFP P2.3.1, Assessment of Conservancy Needs”.

### *Using a Model-Based Approach*

Useful techniques are available to address threats to validity associated with the lack of a comparison group. A powerful technique applicable in this situation is to use a model-based approach to analyze the survey data, rather than the usual design-based approach.

The design-based approach is the traditional approach used for experimental and quasi-experimental impact evaluation. Under these approaches, participation in the intervention is randomly assigned by the evaluator (in the case of experiments) or is self-selected by the beneficiary (in the case of quasi-experiments). In the design-based approach, descriptive surveys, which are typically used for monitoring, form the basis of data collection. The survey data are randomly drawn from separate yet comparable groups of observational units (e.g., conservancy- or PPO-member households) in the population—those targeted to receive the intervention and those not eligible to receive it (in the case of experiments) or do not choose to take up participation in the intervention (in the case of quasi-experiments). A statistical comparison of these groups is then made to draw inferences about overall characteristics of the particular finite population at hand and, often, alternative sub-populations (e.g., income quartiles, head-of-household gender, member households with more than five children) from it, accounting for the probabilities of selection of each observational unit selected. (Examples of such overall characteristics are total crop production, new harvesting techniques employed, sales, household income, meetings attended.) These design-based estimates lead to unbiased measures of the characteristics in the population being surveyed under the right conditions and with respect to the appropriate sample design, conditioned on the particular design approach. Importantly, the intrinsically simple set-up of the approach is typically viewed as relatively free of assumptions and ideology and so yields results that are more readily accepted than other approaches, though sometimes at the cost of generalizability.<sup>10</sup>

In the model-based approach, a theoretical causal model is specified to describe the relationship postulated between the outcomes of interest (intervention response variables, explained variables, dependent variables) and those characteristics (explanatory variables) believed to influence them. These latter characteristics would include both program intervention variables and other “explanatory” variables (covariates) that may influence outcome. This relationship is then specified by one or more equations (the “model”) and its parameters are then estimated statistically using (in the present case) the survey data collected for this purpose, as well as data made available from other sources at the level of the PPOs and conservancies. In this approach the particular finite population at hand is considered to be a sample from a conceptually infinite process, in which the program intervention plays a role. The conceptual framework is that we are making inferences about the process, not the particular finite population. If the underlying theoretical causal model that describes the relationship of the outcome variables to the program intervention variables and other explanatory variables is correct and the econometric model is correctly specified and estimated, then unbiased estimates of parameters of interest can be obtained.<sup>11</sup>

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<sup>10</sup>The notion of generalizability in impact evaluation is referred to as external validity.

<sup>11</sup> In particular, no salient causal factors have been omitted, interaction and inter-temporal (lagged) effects are taken into account, endogeneity and simultaneity among variables is properly specified, and the functional relationship (e.g., linearities and non-linearities) among endogenous and exogenous variables is approximately correct.

Under this approach and in contrast to the design approach, the existence of the theoretical model offers both pluses and minuses. On the plus side, it is often more accepted to make generalisations and “out-of-sample” predictions (i.e., statements about other samples from the same population but with different characteristics) from an empirically estimated theoretical model. A model also increases the statistical precision for a given sample size (or, equivalently, reduces the required sample size to achieve a given level of precision). On the minus side, since the correctness of the population estimates are contingent on the theoretical model and its mathematical specification and estimation, the inferred (within-sample) findings are often more susceptible to doubt. The practical difficulty rests in determining a correct specification of the model. This is accomplished through careful application of causal model analysis (and, in particular, directed acyclical graph or “DAG” analysis), whose goal is to obtain estimates that avoid endogeneity and omitted-variable issues and are, therefore, “model-unbiased,” instead of “design-unbiased.”

Though the CS and INP activities do not allow for a comparison group, the goals and objectives of the present evaluation can and should be met by a model whose parameters are estimated from data that come from a one-group pretest-posttest survey design. This is done by constructing the survey design in such a way as to assure good variation (high spread) within and low correlation among the explanatory variables of the program outcome model. At the same time the sample should ideally include observational units with a good variation in their degree of exposure to the MCA-N’s intervention. Sample design techniques for accomplishing this were stratification, matching, two-stage sampling, and selection of first-stage sampling units (primary sampling units) with variable probabilities. A baseline survey was administered (fall, 2011) to households in the intervention areas before the (MCA-N-funded) interventions and an endline will be afterwards (spring, 2014), forming a panel dataset.

The models we propose for both the conservancy and INP components represent changes in outcome variables of interest (the “dependent” variables) as a function (indicated by an  $f$ ) of explanatory variables which in turn are divided into treatment variables (program intervention variables) and other covariates (e.g., size of household or level of head-of-household educational attainment):

$$\text{Impact} = \text{Change in outcome measure} = f(\text{Explanatory variables, changes in explanatory variables}).$$

Let us look briefly at these sets of variables. **Impact measures** depend on the project’s Support Component and would include, among others, changes over the evaluation period in:

1. Conservancy component

- conservancy income
- member cash dividends or revenues and in-kind benefits such as meat distributions, fuel and transportation
- member household income
- employment at conservancy level

- Institutional assessment variables<sup>12</sup>
2. INP component
    - volume and value of production and sales of indigenous natural products (by PPOs)
    - productivity (volume harvested per unit of input, such as labor)
    - household income (expenditure) and agricultural income, and the woman’s share thereof
    - Revenue from INP to harvesters and PPOs

**Explanatory variables** fall into two classes:

1. Program-intervention<sup>13</sup>
  - *Intervention variables* such as whether an intervention was received, and, if so, the intensity or dosage of the intervention;<sup>14</sup> mix of interventions or sub-interventions received. A review of the MCA Namibia M&E Plan shows that such data on the recipients, mix, and intensity of MCA-N activities by intervention area, is available from the CS and INP program implementers, MCA-N, and MET. For example, the MET records annual data on numbers of game and rare game translocated to conservancies with MCA-N support; this indicator could serve as a “dosage” measure for assessing the impact of game acquisition.<sup>15</sup> MCA-N and the INP implementer will be collecting data on numbers of PPOs trained; if this data are available by type of training and intervention site or hours of training, they could be used as a measure of intervention mix or intensity. Likewise, there will be variation across PPOs in the level of exposure to the PPIG grants in support of harvester common activities.<sup>16</sup>
  - Intervention variables can also be used to examine the combined effects (interaction effects or integrated impacts) of the intervention on CS and INP activities—in other words, we can include independent variables that indicate whether a certain household received only the CS interventions, only one INP sub-activity or more than one INP sub-activity, or whether they received a combination of CS intervention and INP sub-activities. The differential impacts, or dosage effects, of these different combinations of inputs can then be estimated.
2. *Covariates* we expect to have an effect on impact measures. These variables may include:<sup>17</sup>

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<sup>12</sup> These would come from the institutional capacity assessment (ARD baseline, NORC endline) and, perhaps, ConInf, the CDSS database.

<sup>13</sup> Note that there is no presumption that the explanatory variables are exogenous (i.e., not simultaneously related to the dependent variable). The existence of endogeneity is explicitly addressed, below.

<sup>14</sup> This is referred to as a continuous treatment-variable formulation and is analogous to a dose-response function with the “dose” being the degree or intensity of technical assistance the beneficiary receives (the uptake).

<sup>15</sup> The game stock effect is likely complex. First, the appropriate specification would require a set of lagged co-variates of animal stock. Second, the effect may operate through tourist-sector investor responses in the medium run and to an increase in the number of tourist visits in the long run.

<sup>16</sup> While the level of funding must be considered an input (explanatory variable), the increase as a result in the number, type, and quality of projects undertaken by INPs is clearly an outcome.

<sup>17</sup> Not all covariates will be used in each regression. It will depend on the activity within the intervention, the outcome indicator, and the effectiveness of the covariate. Also note that the inter-temporal pattern of residual errors not captured by

- household characteristics such as age, education, gender, assets, family size, occupation, that could affect the extent of the impact on a specific household;
- geographic variables related to the location of a household, PPO, or conservancy, village/conservancy size, region, access to transport and other infrastructure and social/economic services, geophysical characteristics (rainfall, temperature, elevation), agricultural characteristics (productivity, plant species);
- indicators of relevant support infrastructure—presence of farmer-based organisations and other organisations and the intensity of their operations, presence of other interventions, and product (species) type;
- conservancy characteristics—tourism potential, management strength in different areas at baseline;<sup>18</sup> and
- PPO characteristics—number of producers, INP species, degree of processing, and management strength in different areas at baseline.

As appropriate and feasible we plan to construct indicators for some intervention variables and covariates. This strategy may be used (i) where there is no natural measure of the concept, e.g., as in the case of sustainability and (ii) where the concept includes many aspects and there is no single variable that can summarize them, e.g., as in the case of training. Indicators may also be constructed using questions included in the household survey that ask respondents about their perceptions of the reasons for observed changes. This should lead to the best of both worlds: the qualitative information will provide context and interpretation and the quantitative analysis assures consistency, objectivity, and comparability. The quantitative methods would also provide some back-up where ambiguities emerge from the qualitative data.

It is extremely important to include the covariates in these models. If one does not, then effects due to differences in the quality of the soil or market access for INP producers (for example) may incorrectly be attributed to certain interventions. This would mislead program managers into investing in further use of certain program activities when in fact they may not be very effective. As detailed below, we plan to obtain covariate data from several sources including the CS and INP surveys, MCA-N and implementing agency files on intervention sites and target PPOs, and the CDSS databases.

Finally, statistical power of model-based approaches like design-based approaches depends on the survey sampling design. The conceptual framework for the CS/INP sample surveys was to provide data useful for an unstructured observational study (“analytical model”). To this end, the design employed multi-stage sampling, stratification, and selection with variable probabilities. Multi-stage sampling involves selection of a first-stage sample of geographically proximate units (Census Enum-

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the explanatory (structural) variables in the model can result in autocorrelation. While estimators remain unbiased and consistent, autocorrelation can lead to inefficiency. NORC will use standard econometric approaches to test for autocorrelation (e.g., the Durbin-Watson test, Breusch-Godfrey test) and, if necessary, correct for autocorrelation calculating cluster-robust standard errors, or alternatively, using GLS or, if there is a lagged dependent variable, using FGLS with Hatanaka two-step estimator.

<sup>18</sup> See Annex C for an example of a tourism potential indicator.

eration Areas or “EAs”) and selection of a second-stage sample of households from each selected first-stage unit.<sup>19</sup>

The sample survey design proposed for the two surveys in this project is called an “analytical” survey design, since the goal was to obtain a sample that is a good basis for estimating parameters of the analytical model representing the process under study. Briefly, this means that the sample contained (to the extent feasible) substantial variation in the explanatory variables of the analytical model, and low correlation among them. This ensures that the relationships between explanatory outcome variables may be estimated with high precision. The analytical survey design differs from the usual type of survey design, which is a “descriptive” survey design. The objective of a descriptive survey design is to provide estimates of useful precision for the overall population (or subpopulation) characteristics, such as means, proportions and totals. The objective of an analytical survey is also to achieve adequate precision for estimates of interest (such as an impact estimate), but it is more specifically to achieve a high level of power for parametric tests of hypothesis. The selection probabilities for an analytical design usually vary substantially more than for a descriptive survey design. Descriptive surveys are usually “design-based,” whereas analytical surveys are “model-based”. Monitoring is more concerned with descriptive statistics, and evaluation with analytical statistics.

The target population for the CS survey was 31 target conservancies in the Northern Communal Areas (NCAs). A sample frame was constructed for 29 of the 31 conservancies. It was decided that 10 households would be (randomly) selected from each first-stage sample unit (EA). Since the total number of households to be surveyed is 1,000, this implies that the EA sample size is 100 (in each survey round). The target population for the INP survey was 63 INP producer groups (Producer and Processor Organisations, or PPOs, and related associations) located throughout the country. The list of PPOs was further defined by MCA-N, bringing the total for the sample to 31.<sup>20</sup> The optimal sample size for the INP survey was calculated to be 500 households, with approximately sixteen households randomly drawn from each PPO.

### *Model I: Treating selection bias*

A major threat to the internal validity of models such as the one described, above, is from indirect, reverse, or simultaneous causation. One case of this is selection bias. For example, suppose NRI gives more training to those PPOs it assesses to be weaker than others. Then, when we analyze performance we might find a correlation between more training and lower performance! The red arrow in Figure 1 provides an illustration this “backdoor” causality using a directed acyclical graph corresponding to this case.

Once the impact indicators have been selected (the “left-hand-side” variables in the model), the “right-hand-side” variables in the model must be chosen based on a careful assessment of “backdoor” causal chains—other channels which must be “shut” to ensure valid causal inference.<sup>21</sup> This requires drawing on the program logic of the intervention, which encapsulates expert opinion and

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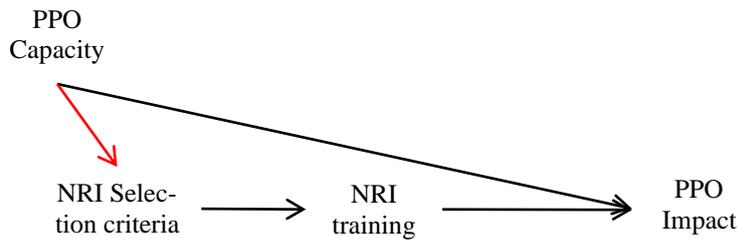
<sup>19</sup> For details, see NORC (2011), *Implementation of Conservancy Support and Indigenous Natural Products Household and Organizational Surveys*, Draft Survey Design Report, 4 March.

<sup>20</sup> It is important to note that this was not an increase in the overall number of PPOs but rather an elaboration of PPOs within associations.

<sup>21</sup> See Pearl (2000), *Causality*, Princeton University Press, 2<sup>nd</sup> Edition. These threats to internal validity also encompass endogeneity bias.

theory as to the various channels of possible causality at play in the relationships under study. Then right-hand-side covariates are identified to control these unwanted channels, thereby ensuring that the treatment indicator(s) properly captures just the intervention’s contribution and nothing else.

**Figure 1: Illustrative Directed Acyclic Graph of Selection Bias**



Toward this end we will estimate a propensity score model to “predict” the probability that NRI (CDSS) would have determined that each PPO (conservancy) required each training. We then include the predicted propensity score as an additional explanatory variable in the original model described at the outset to shut (control for) this backdoor causal chain.

Here are the details. Assume that all organisations are to be brought up to a particular level,  $S^k$  on each skill or capacity,  $k$  then the probability of selection into the associated course (same index), is a function of the gap between  $S^k$  and  $S_{i,0}^k$ , the amount of skill the average member in organisation  $i$  has at baseline. Letting  $\mathbf{C}_{k,i}^I$  be the set of *initial* assessment variables used to establish treatment intensity (training and technical assistance), and  $D_{k,i}^I$  be a dummy variable equal to 1 if organisation  $i$  receives course  $k$  at time  $t=1$  (and 0 otherwise), then this probability can be written as:

$$\Pr(D_{k,i}^I = 1 | S^k - S_{i,0}^k, \mathbf{C}_{k,i}^I) = \Lambda_k^I(\cdot) \quad (1)$$

where  $\Lambda(\cdot)$  is the logit function of the conditioning variables in the probability expression. Note that there is no time subscript where there is the “I” superscript since the superscript implies “initial”, which can be thought of as Period 0.

In an analogous way, the probability that the implementer provides extra assistance to organisation  $i$  over the evaluation period be

$$\Pr(D_i^A = 1 | \mathbf{C}_i^A) = \Lambda^A(\cdot) \quad (2)$$

where  $\mathbf{C}_i^A$  is a set of characteristics and influences (possibly including some from  $\mathbf{C}_{k,i}^I$ ) that lead the implementer to its decision. A crucial difference between these two sets of characteristics is that the values of  $\mathbf{C}_i^A$  refer to a period *subsequent to* when  $D_{k,i}^I$  was administered.<sup>22</sup> Also note that, by assumption,  $\mathbf{C}_i^A$  is not skill/capacity-specific (i.e., not indexed by  $k$ ).

Let  $\hat{P}_{k,i}^I$  and  $\hat{P}_{k,i}^A$  be the predicted probabilities (the propensity scores) from the estimation of Equation (1) and Equation (2), respectively. Putting these into an attribution equation to control for

<sup>22</sup> For simplicity, neither set of decision-influencing characteristics are a function of (are indexed by)  $n$ , the INP and only the initial set is hypothesized to be influenced by skill/capacity.

selection bias and including dummies for the sequence of treatments would allow us to estimate the unbiased partial treatment effect on outcomes,  $\Delta Y_i$ , i.e.,

$$\Delta Y_i = a_k + b_k D_{k,i}^I + c_k D_i^G + r_k D_i^A + g_k \hat{P}_{k,i}^I + h_k \hat{P}_{k,i}^A + e'_k(\Delta Z_i) + \varepsilon_{k,i} \quad (3)$$

where  $D_i^I$  is a dummy variable for organisation  $i$  receiving *initial* training and technical assistance,  $D_i^A$  is a dummy variable indicating whether *additional* (or repeated) training and technical assistance (beyond that assigned at the outset) was administered, and  $D_i^G$  is a dummy variable on whether the organisation received a grant (e.g., a PPIG if the organisation is a PPO) over the evaluation period, and  $\Delta Z_i$  is a set of additional *time-varying* factors not related to training decisions but that might influence performance over the evaluation period. By specifying the relationship in differences the panel fixed effects drop out as do all time-invariant unobservables. Note that the coefficients to estimate are also indexed by  $k$  since in principle there could be an Equation (1) for each  $k$ . Two key (maintained) assumptions underlying the validity of Equation (3) are that (i) there is no correlation between  $\Delta Y_i$  and either  $C_i^A$  or  $C_{k,i}^I$  and (ii) that besides  $C_i^A$  and  $C_{k,i}^I$  there are no other covariates (presumably unobservable) that influence both  $\Delta Y_i$  and either  $D_{k,i}^I$ ,  $D_i^A$ , or  $D_i^G$ .<sup>23</sup>

It is important to highlight that including estimated variables in the model (in this case, the propensity scores) implies that the standard errors need to be corrected. Toward this end, we will explore bootstrapping the standard errors and, alternatively, calculating the correct standard errors using the Murphy-Topel correction method.

### *Model II: Identification strategy through duration of assimilation*

Another strategy to deal with endogeneity is to use the fact that equally needy targets of training received training at different times. Those receiving it earlier in the Compact intervention period would have had more time to assimilate the lessons and, therefore, show greater performance gains. In this case, in the original model specification we replace the treatment dummy variables with continuous treatment variables (CTVs) indicating the length of time between initial or additional course completion ( $T_{k,i}^I$ ,  $T_{k,i}^A$ ) or grant receipt ( $T_i^G$ ) and the evaluation's endline:<sup>24</sup>

$$\Delta Y_i = a_k + b_k T_{k,i}^I + c_k T_i^G + r_k T_{k,i}^A + g_k \hat{P}_{k,i}^I + h_k \hat{P}_{k,i}^A + e'_k(\Delta Z_i) + \varepsilon_{k,i} \quad (4)$$

where all the other variables and superscripts/subscripts are defined as before.

### *Model III: Production-side considerations*

In the case of INPs, the lack of comparison group is complicated by the fact that price and weather conditions can lead to fluctuations in the amount harvested quite independently of the success of technical assistance efforts. Hence, simply considering the change in harvest size from baseline to endline may lead to spurious causal inference regarding technical assistance. One way to address this issue is to estimate a production-side model and use the predicted values to impute changes in outcomes (i.e., impacts).

<sup>23</sup> Note that, in principle, the  $k$  attribution equations could be estimated simultaneously either using the technique of seemingly unrelated regression or using MANCOVA.

<sup>24</sup> This approach may require some matching of the units being trained or the addition of additional covariate controls to ensure that assimilation time is the only remaining systematic factor driving variation in the outcome variables of interest.

Such a model might comprise an equation capturing labor force participation (in the relevant sector, e.g., INP harvesting), e.g.,

$$L_{i,t} = \lambda_p P_t + \lambda_v V_{i,t} + \lambda_z \mathbf{Z}_{i,t}^L + \varepsilon_{i,t} \quad , \quad (5)$$

where the right-hand-side variables are price of INP, value of outside option for labor, and other influences (including panel fixed effects), and an equation capturing harvesting production, e.g.,

$$H_{it} = h_0 + h_D D_{i,t}^k + h_k \hat{P}_{k,i}^1 + h_w W_t + h_L L_{i,t} + h_2 L_{i,t}^2 + \mathbf{h}'_z \mathbf{Z}_{i,t}^H + v_{i,t} \quad (6)$$

where  $D_{i,t}^k$  and  $\hat{P}_{k,i}^1$  are as before and  $W$  and  $\mathbf{Z}^H$  are weather and other influences (including panel fixed effects). These two equations may be combined to produce the following reduced-form harvest function:

$$H_{it} = h_0 + h_D D_{i,t}^k + h_k \hat{P}_{k,i}^1 + h_p P_t + h_w W_t + h_L L_{i,t} + h_2 L_{i,t}^2 + h_v V_{i,t} + \mathbf{h}'_z \mathbf{Z}_{i,t} + \xi_{i,t} \quad (7)$$

Here,  $\mathbf{Z}_{i,t} \equiv \{\mathbf{Z}_{i,t}^H | \mathbf{Z}_{i,t}^L\}$  is simply the set of covariates from its constituent equations.

#### *Model IV: Testing for convergence*

An objective we heard time and again from the implementers was that the expectation of targeting training was to bring all targeted entities (conservancies and PPOs) to the same (higher) level of competence. Success on this front can be statistically tested. There is what one might call the “strong” test and the “weak” test. The strong test would test whether the percent of conservancies or PPOs with scores on outcome variables of interest that were statistically significantly different decreased over the evaluation period. The weak test would statistically compare baseline and end-line measures of dispersion for each outcome variable of interest to see whether it had narrowed.

#### *Analysis of gender issues*

As is the case with the evaluation of causal relationships, qualitative analysis of gender issues will be supplemented by quantitative analysis. This is not just a matter of disaggregating average intervention effects by head-of-household gender, but also an issue of the degree to which social structures can change over the evaluation period and how gender roles, responsibilities, and benefit streams change in the household as a result of the CS-INP activities. Hence, NORC will analytically examine the gender hypotheses presented in Chapter 3 and Chapter 4. In summary, these hypotheses can be classified, together with some representative examples, into the following dimensions.

**Performance differences among female headed households.** Here, all impact indicators (production, income, sales, and productivity) will be disaggregated by head-of-household gender and the results for each gender statistically compared.<sup>25</sup> For example, do females in female-headed households dedicate more time to INP harvesting, processing, and marketing than females in male-headed households and how does this time allocation change as a result of participation in the various types of training? A similar question can be posed regarding household activities in support of their conservancy.

<sup>25</sup> For example, in the basic attribution equation, below, if the hypothesis  $\pi_k = 0$  is rejected (for the value of  $k$  corresponding to gender) then we can assert that there is a statistically significant gender difference in the intervention impact.

**Differences in benefits received due to a female head of household.** For example, do INP harvesters get more—or seek different—types of technical assistance if the head of household is female? Do female heads of household have more or less knowledge of prices? Are female heads of household engaged in INP harvesting less likely, when their PPO is within a conservancy, to be employed by the conservancy and, if employed, receive a lower wage than a male counterpart?

**Behavioral differences by gender.** Seasonality, family responsibilities, social dynamics, culture, etc. all will potentially influence treatment uptake and need to be incorporated into the analysis. Since people of Namibia are not homogenous, behavioral responses may vary. Does female participation in harvesting INPs cause attendance at conservancy meetings to differ by gender? Given technical assistance is received, is its uptake greater and found more useful for harvesters in households with female heads? Are households with female heads more likely to be registered with a PPO? Do the answers to these questions differ by INP?<sup>26</sup> If the MCC intervention leads to greater harvesting and processing effort by the females in the household, how does that affect the level of child welfare? Is there a change in expenditures on clothes and schooling, for example? As a result of MCC support, who is more likely to carry out family responsibilities in the household, the female or male members?

**Changes in responsibilities.** Does participation in gender awareness training lead to greater representation of women in conservancy management? What about at the household level: does such training lead to more women representing the household at conservancy meetings where there is a male head of household? Do women have greater access to the incomes they earn as a result of income increases due to MCC support of their PPO?

### *Using Other Multivariate Techniques*

As pointed out above, analysis at the level of the PPO or conservancy will be limited to a small sample—18 PPOs and 29 conservancies. While panel data are being collected, effectively doubling the sample size, the resulting samples will still be relatively small. A powerful technique applicable in this situation is to use the multivariate technique called MANCOVA, also a model-based approach.<sup>27</sup>

MANCOVA is a generalisation of univariate ANOVA (in which mean scores on just one quantitative variable are compared across groups). In MANCOVA, however, several quantitative outcome variables may be compared for participants across multiple groups. As such, it is ideal for small-sample non-experimental research situations. Thus, for example, instead of singly comparing the means for northeastern vs. northwestern conservancies on one outcome (say, conservancy jobs), we can *simultaneously* compare these two groups on multiple outcomes (say, conservancy jobs, business partnership revenues, member services provided).

Among the benefits to this approach include reducing Type-I errors from carrying out multiple single-equation hypotheses, the ability to take inter-correlations among the outcome variables into

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<sup>26</sup> This last question, in fact, requires a logit model formulation, changing the nature of the left-hand-side variable in the dose-response model, below, but would have the same right-hand-side variables.

<sup>27</sup> MANCOVA stands for multivariate analysis of covariance. See Rebecca Warner (2008) *Applied Statistics*, Los Angeles: Sage Publications. An alternative similar technique is seemingly unrelated regression (SUR), which posits a common error structure (covariance matrix) across model equations. See Greene (2000), *Econometric Analysis*, New York: Prentice-Hall.

account, and identifying jointly considered differences among groups (when the differences on any one outcome may be too small to detect).

## 3. Conservancy Support Activity

### 3.1 Activity Overview

Over the last 15 years, community-based natural resource management has been an effective mechanism for the Government of Namibia to combine conservation with developing governance structures to enhance the wildlife resources needed to attract tourism to rural communal areas of Namibia. To encourage sustainable management of natural resources, the Namibian Government passed a law in 1996 that gave communities in communal areas the legal right to form a management unit, called a *conservancy*, in order to obtain management rights over wildlife.<sup>28</sup> More specifically, conservancies are areas on communal land for which legally constituted conservancy communities have been empowered by government with the rights to manage and benefit from consumptive and non-consumptive use of wildlife and other natural resources within defined boundaries.

Currently there are 76 registered conservancies covering 155,205 square kilometers (15 percent of Namibia's surface) and encompassing almost 234,400 citizens or almost 13 percent of the national population. Results of the conservancy movement have included increased wildlife populations on conservancy lands, devolution of authority over land-use management to rural communities, generation of employment in tourism enterprises, and generation of financial benefits for conservancy members.<sup>29</sup>

The MCA-N Conservancy Support (CS) Activity aims to strengthen capacity of conservancies to protect and manage their natural resources, attract investment, and achieve financial sustainability so that households in communal conservancy areas can receive a greater share of increased revenues. Based on individual conservancy needs and demands, the CS Activity is providing a range of *technical assistance* services and *grant funding* to 31 conservancies considered likely destinations for tourism. The 31 selected conservancies include the majority of Namibia's most progressive and financially viable communal conservancies.<sup>30</sup> Of these, 29 are existing conservancies and two entered into agreements with CDSS too late to be included in the baseline. On the advice of MCA-N and implementation contractor, only the 29 existing conservancies were offered for inclusion in the evaluation. Finally, one conservancy turned out to be inaccessible during data collection and was dropped. This left a total of 28 conservancies in the evaluation.

The CS Activity is being implemented by a consortium of organisations led by the World Wildlife Fund (WWF) under the Conservancy Development Support Services (CDSS) umbrella. Four additional partners each with very extensive experience in the specific region in which it operates, deliver services:

- Integrated Rural Development and Nature Conservation (IRDNC)

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<sup>28</sup> As defined under the Nature Conservation Amendment Act, 1996 (Act N. 5, 1996)

<sup>29</sup> These two paragraphs are slightly edited versions of those in the RFP for the evaluation project issued by MCA-N.

<sup>30</sup> World Wildlife Fund, Data Collection Plan for the Conservancy Development Support Services (CDSS) Project, March 2011, p.7.

- Namibia Development Trust (NDT)
- Namibia Nature Foundation (NNF)
- Nyae Nyae Development Foundation of Namibia (NNDFN)

Hereafter we refer to the implementers simply as the CDSS team.

A comprehensive management-needs assessment was conducted for conservancies selected for program participation in 2009-2010, covering the following nine areas:<sup>31</sup>

- Principles of democratic governance
- Governance of resources—financial and institutional
- Natural resource management
- Wildlife management
- Human wildlife conflict
- Business planning and development
- Identification & management of tourism enterprises and systems
- Tendering & negotiations of JV contracts & capacity to manage relationship and benefits
- Benefit distribution planning and execution<sup>32</sup>

Importantly, the results of the assessment, although not without issues, are available as evaluation inputs. Based on course themes provided in their contract, the implementation team then designed a set of training courses and technical assistance activities for each conservancy based on the needs assessment and further internal review. These are outlined in Table 1. The variation in the baseline capacity of the different conservancies is clear from the entries in the third column, which gives the number of conservancies that are scheduled to receive a particular training or technical assistance. For example, in terms of training to strengthen institutional development (the top panel in the table), 31 were slated for finance management training but only 19 for the Annual General Meeting Management. Overall, the pattern is for the great majority of participating conservancies to receive most trainings. This is consistent with the CDSS team's view that the training should in general try to advance a conservancy's capability rather than simply move it to a minimum level of competence.

Complementing the training and technical assistance are grant resources under the Conservancy Development Support Grants Fund (CDSGF) targeted to promoting joint-venture tourism enterprises (JVs) between conservancies and private sector firms, mitigating human-wildlife conflict, supporting game acquisition through translocations, and other income generating activities. Grants are being awarded on a competitive basis. A conservancy can receive more than one JV grant.<sup>33</sup>

The package of technical assistance and funding is designed to help mitigate existing barriers to tourism enterprise investment and help render conservancies financially self-sustainable. This in turn will raise the incomes of households living in conservancies.

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<sup>31</sup> ARD, *Conservancy Needs Assessment: Final Report #2, Current Management Capacity Summary Report*, March 2010, revised in 2011.

<sup>32</sup> ARD, *Conservancy Needs Assessment: Final Report #4, Assistance Packages Report*, March 2010.

<sup>33</sup> According to an MCA reviewer.

**Table 1 Assistance Packages Recommended for Conservatories**

Number	Component	Number of conservancies recommended for training
<b>Institutional</b>		
<i>Training</i>		
1.	Governance-constitution development	21
2.	Annual general meeting management	19
3.	Management committee training	27
4.	Stakeholder communication and relationship management	29
5.	Gender awareness training	24
6.	Public speaking and presenting (women)	24
7.	Policy and legislation	30
8.	Financial management	31
9.	Distribution planning and benefit sharing	
10.	Conservancy framework/management plan development	25
11.	Staff management	29
12.	Project management	30
<i>Technical assistance</i>		
1	Governance	31
2	Financial management	31
3	Framework/management planning and implementation	31
4	Staff management	30
<b>Business and Tourism</b>		
<i>Training</i>		
1	Basic business	29
2	Tourism awareness – staff	30
3	Tourism awareness – members	28
4	Tourism JV development	29
5	Tourism SME product development	31
6	Tourism guiding	
<i>Technical assistance</i>		
1	Basic business	30
2	Financial sustainability analysis	31
3	Tourism JV development	29
4	Legal support	30
5	Tourism SME product development	31
<i>Study tour/in-service training</i>		
1	Tourism JV development	29
2	Tourism & business awareness	27

Notes at end of table.

**Table 1 Assistance Packages Recommended for Conservancies (continued)**

Number	Component	Number of conservancies recommended for training
<b>Natural resource management</b>		
<i>Training</i>		
1	Event book system	22
2	Game count training	17
3	Game value	23
4	Quota setting	26
5	Game utilisation	28
6	HWC management	31
7	Management planning & zoning	25
8	Wildlife biology/behavior	29
9	Law enforcement	31
10	NRM management	27
<i>Technical assistance</i>		
1	Event book system	30
2	Management planning & zoning	30
3	NR rules & regulations	30
4	HWC	30

Source: CDSS, "Update on the status of Conservancy Needs since the Conservancy Needs Assessment in November/December 2009", February 2011. At the time of writing this report there were 76 conservancies registered.

This description of the conservancy sector and the MCA-N intervention can be used to sketch out, as in Figure 2, the CDSS program logic. The NORC evaluation logic is based on this underlining program logic and builds a framework for measurement of change that fits within a shared understanding of that logic. Before moving onto the evaluation design though, it is important to draw out our understanding of the nuances of the program logic.

**CS Program Logic.** For the CS component, the intervention began with the ARD baseline conservancy institutional needs assessment (CNA). Although not without its own measurement issues, the CNA baseline provided CDSS with a starting point to help focus their capacity-building interventions.<sup>34</sup> This assessment was supplemented by an additional CDSS needs assessment which further refined which interventions would be offered to which conservancies. Importantly, each conservancy started with a different mix of capacities and levels of institutional development. Intervention modules were thus rolled out using a methodology that targeted the specific needs of particular conservancies.

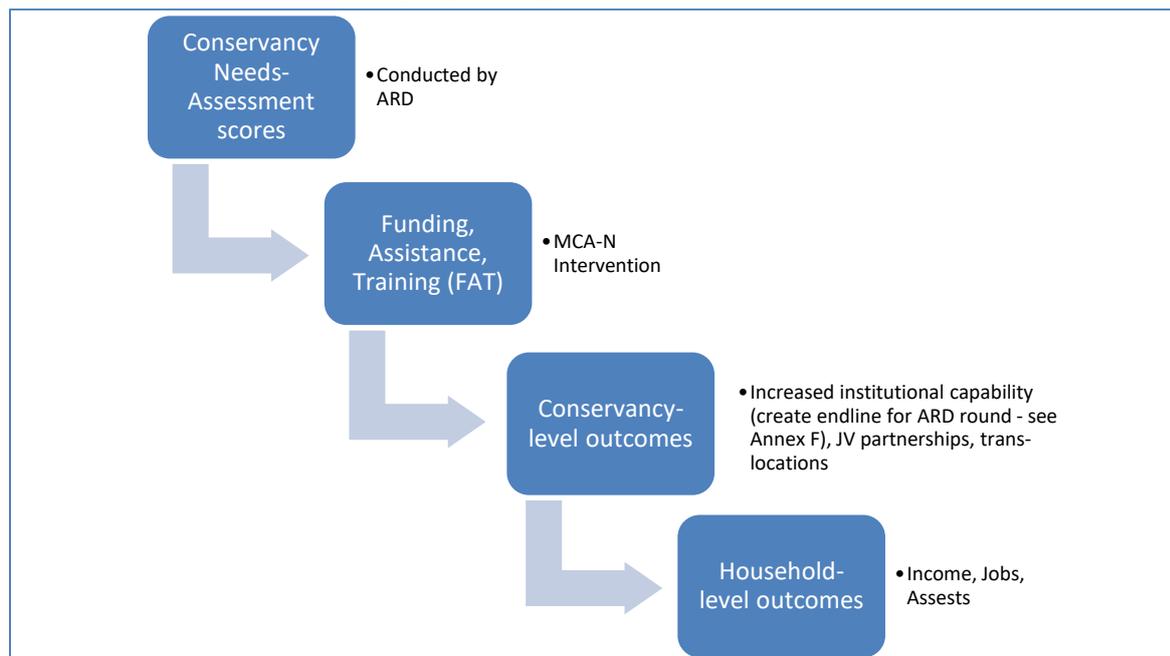
CS interventions, unlike INP interventions, are focused entirely at the institutional level of the conservancy. The logic is predicated upon the hypothesis that the stronger the institutional capacity of conservancy management structures the more likely conservancies will grow and the resulting

<sup>34</sup> The ARD baseline assessment has been criticized by local experts as having a problematic methodology that relied too much on subjective criteria. In addition, each conservancy may not have been rated based on a strong understanding of where they stood in relation to other conservancies.

increased revenue/benefits will filter down to the household level. Hence, CDSS program logic does not assume a direct causal relationship between funding, assistance, and training, on the one hand, and household standard-of-living indicators, on the other. Rather, the logic of the intervention suggests increased conservancy capacity will lead to conservancy-level outcomes (JV lodge development, SME growth, tourism growth) and these outcomes will, in turn, impact household indicators.

Given the underlining logic of the interventions (institutional capacity building → institutional outcomes → household-level change), it is conceivable that there will not be measurable impacts at the household level before the Compact ends. As such, it is important for the evaluation to consider additional, measurable, mid-term benefits as listed in Table 3 (e.g., job creation).

**Figure 2: Schematic of the CDSS program logic**



### 3.2 Evaluation Questions Being Addressed

The Terms of Reference (TOR) listed a set of questions to be addressed by the evaluation. During the team’s visit to Namibia in August 2012, key stakeholders were asked if there were other questions that should be addressed or whether some of those listed in the TOR should be replaced with others. Working together with the CDSS team, MCC, and MCA-N an updated list of research questions were developed to form a base for further discussion. Table 2 provides the final list.

By design, this list of key research questions was amplified during midline qualitative data collection. It led to a further set of questions falling within each of the main research questions already presented. For the case of the conservancies, the issues identified that have bearing on our present objectives include:

- a. How is conservancy-benefits-sharing perceived by members and have perceptions of conservancy accountability and fairness changed over the last few years? Are revenue distributions and their amounts becoming better known?

- b. Are villages that are more susceptible to HWCs sufficiently compensated? Which type of benefits provides the best incentives to members to adhere to wildlife and habitat protection rules?
- c. What happens to the share of conservancy income going directly to members as incomes increase?<sup>35</sup>
- d. How prevalent has post-training attrition been among management and has it affected impacts?
- e. FGDs found that no change in intra-household gender relationships occurred, including which member dispenses cash. Is this borne out by survey evidence?
- f. Have conservancy capacities converged as a result of the MCA intervention?

As will be seen, the various surveys developed for the evaluation at baseline have been revised to support an endline analysis of these additional considerations.

**Table 2: CS Evaluation Questions**

CS hypotheses		Methods
1	Do technical support and grants to conservancies increase business partnerships between conservancies and private businesses, and, in turn, increase conservancy revenue? <sup>(a)</sup>	Qualitative
2	a. Does technical support to conservancies improve conservancy governance? b. Does improved governance impact the equitable distribution of conservancy benefits?	Qualitative & quantitative
3	a. Is there an increase in conservancy-related employment as a result of the CS activities (including grants)? b. If so, how many new jobs are created and at what levels of employment?	Quantitative
4	Do the CS activities (including grants) lead to an increase in household wellbeing over the life of its programme? <sup>(b)</sup>	Qualitative & quantitative
5	What have been the effects of game acquisitions on the conservancies and on their members?	Qualitative
6	How sustainable are the results of business partnerships in terms of increased employment and improved mechanisms for distribution of revenue?	Qualitative
7	What impact does MCA-N support have on conservancy members in terms of the distribution of benefits by gender? <sup>(b)</sup>	Qualitative & quantitative
8	What is the perceived impact on recipient-household gender relationships from the intervention?	Qualitative

(a) Total annual gross revenue to conservancies receiving MCA assistance from all sources except donors and government. Includes revenue to conservancies from (1) cash income to conservancy, (2) household income from conservancy-related wage, salary, or sale of crafts, and (3) non-financial income such as meat or in-kind services such as training or housing for lodge staff. (b) MCA-N program logic indicates that impacts on household income may not be detectable within the lifetime of the compact; however, intangible benefits (e.g., aspects of women's empowerment, increase in rural-urban economic integration) measurable in the short term may be detectable through FGDs.

<sup>35</sup> Only three conservancies made direct payments.

### 3.3 Analytic Specification

The principal means of study for each hypothesis are the information and vignettes that emerge from the many FGDs and KIIs conducted. A summary of the hypotheses is provided in Table 2 and indicates for each where quantitative analysis will be applied to augment the qualitative methods. This section builds on the designs articulated in the previous section in two ways. First, it relates them to particular research questions from Table 2. This permits us to determine the sample sizes and composition that these designs require. Second, this section discusses the issue of indicator construction for the cases in Table 3 in which directly measurable variables are not available, even in principle.

#### *Tying research questions to CTV models*

Table 3 shows the specific analytic approach for each research question.<sup>36</sup> It underscores the mixed-methods, balanced approach taken for this evaluation. The table contains five columns. The first restates the research question and shows the unit of analysis as a conservancy or household. For samples of conservancies and households our intention is to employ the type of regression analysis described above, as  $\Delta Y=f(\mathbf{X}; \Delta\mathbf{X})$ , where  $\Delta Y$  is the change in any indicator in Column 2 of table,  $\mathbf{X}$  represents the analyst's choice of any combination of the intervention activities and covariates in Column 3 and 4 of the table, and  $\Delta\mathbf{X}$  is the change in  $\mathbf{X}$  over the evaluation period. Conceptually, as detailed in Chapter 2 the model can be considered as a continuous treatment-variable ("dose-response") function.

For the large CS household survey, with 1,000 completed interviews for conservancies, sample size is not an issue. With only 29 conservancies in the program (see note below about the two conservancies not included), however, this sample size appears to be quite small; but it may be larger than it appears. There will be at least two observations for all data items for each conservancy—baseline and endline. However, CDSS will develop annual data for the two years between baseline and final, i.e., 2012 and 2013 from monitoring and service delivery data. From discussions about the data being collected, we believe obtaining the data on most key variables at four points in time will be possible (see below). Twenty-nine conservancies with four data points each yields an analysis sample of 116 observations. Moreover, the use of MANCOVA techniques, which jointly test hypotheses for several outcome indicators simultaneously, will permit more powerful tests than either the 2x29 or 4x29 would suggest.<sup>37</sup>

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<sup>36</sup> Note that several statistical, theoretical, and practical considerations pertaining to the quantitative impact evaluation have been placed in Appendices C and D.

<sup>37</sup> See Chapter 2.2 for a description of the purpose and means of applying this technique.

**Table 3 Analysis Plan for Estimating Impacts of Conservancy Support Activities**

Research Question and Analysis Unit	Associated Impact Measure or Indicator	Intervention activities <sup>f</sup>	Covariates	Data Sources and Analysis Type
1a. Do technical support and grants to conservancies increase business partnerships between conservancies and private businesses.	Number and year-to-year changes in number of business partnerships between conservancy and private businesses. <sup>(j)</sup>	Purpose, value, and date disbursed of each grant to each conservancy	n.a.	FGDs and KII <sup>(i)</sup> to assess effects of technical assistance on business partnerships.
1b. Does an increase in business partnerships between conservancy and private businesses increase conservancy revenue?  Analysis unit is conservancy.	Annual gross revenue of conservancy	<ul style="list-style-type: none"> <li>▪ Number and year-to-year changes in number of business partnerships between conservancy and private businesses<sup>(j)</sup></li> <li>▪ # of training and TA events in which conservancy staff participated each year in each type</li> <li>▪ # of game animals translocated each year to each conservancy</li> <li>▪ # of rare game animals translocated each year to each conservancy</li> <li>▪ Amount (N\$) and year to year change in private investment secured per year by MCA-assisted conservancies</li> </ul>	<ul style="list-style-type: none"> <li>▪ Year conservancy created</li> <li>▪ Proximity to protected areas</li> <li>▪ Proximity to other conservancies with joint ventures</li> <li>▪ Existing JV with conservancy</li> <li>▪ Diagnostic ratings of management in each of 9 categories, baseline scores</li> <li>▪ # of trainings CDSS indicated at baseline as needed in each of 3 major groups</li> <li>▪ Baseline: # of visitors in previous year to country; % change in visitors from previous year<sup>(b)</sup></li> <li>▪ Quality of conservancy governance each year.<sup>(c)</sup></li> <li>▪ Conservancy has business or sustainability plan</li> <li>▪ CNA indicators of business planning and development</li> <li>▪ CNA indicators of JV relationship management</li> <li>▪ Conservancy has tourism plan</li> </ul>	<ul style="list-style-type: none"> <li>▪ CDSS records</li> <li>▪ NACSO (ConInfo)</li> <li>▪ CNA indicators (ARD baseline)</li> <li>▪ <i>Regression analysis of change in conservancy revenue from change in business partnerships, accounting for Compact assistance.</i></li> <li>▪ <i>Compare conservancies joining a partnership with those that don't.</i></li> </ul>

See page following end of table for notes.

**Table 3 Analysis Plan for Estimating Impacts of Conservancy Support Activities (continued)**

Research Question and Analysis Unit	Associated Impact Measure or Indicator	Intervention activities <sup>f</sup>	Covariates	Data Sources and Analysis Type
2a. Does technical support to conservancies improve governance?	Member perceptions and experiences with management’s accountability, transparency, responsiveness.		n.a.	FGDs and KIIs <sup>(i)</sup> to assess improved governance, with technical assistance as a possible causal factor
Analysis unit is conservancy.	<ul style="list-style-type: none"> <li>▪ CNA governance indicators</li> <li>▪ CNA financial resource management indicators</li> <li>▪ CNA NRM indicators</li> <li>▪ CNA wildlife indicators</li> <li>▪ CNA HWC indicators</li> <li>▪ Distributional measures of income benefits to members</li> <li>▪ Transparency of revenue distribution mechanisms<sup>38</sup></li> <li>▪ Last year’s AGM-reviewed report on year’s finances, spending plan for next year, and distribution of conservancy income.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Number of relevant trainings provided</li> <li>▪ TA events for conservancy staff each year in each type</li> </ul>	<ul style="list-style-type: none"> <li>▪ Covariates in CS-RQ1<sup>a</sup></li> <li>▪ Conservancy policy on cash vs. in-kind distribution each year</li> <li>▪ Share (or number) of membership at AGM</li> <li>▪ Share of conservancy spending for operations</li> <li>▪ literacy, number of traditional authorities, drought status</li> </ul>	<ul style="list-style-type: none"> <li>▪ NACSO</li> <li>▪ CS/INP survey</li> <li>▪ CNA indicators (ARD baseline, NORC endline)</li> </ul> <p><i>CTV regression analysis of assistance dosage (intervention) effects on impact indicators with endogeneity correction. Ordinal and multinomial variables on the method used for a standardized set of budgeting and distribution processes.<sup>g</sup></i></p>

See page following end of table for notes.

<sup>38</sup> We will develop an index based on (a) whether the distribution methods were discussed at the AGM, and (b) the share of revenue being distributed by each of the four methods (per-capita cash payouts, compensation for HWC, loans, and school fees), each being assigned a transparency score.

Research Question and Analysis Unit	Associated Impact Measure or Indicator	Intervention activities <sup>f</sup>	Covariates	Data Sources and Analysis Type
2b. Does improved governance impact the equitable distributions of conservancy benefits?  Analysis unit is conservancy.	Member perceptions of equitable distributions of conservancy benefits  <ul style="list-style-type: none"> <li>▪ Household cash dividends</li> <li>▪ Share of conservancy revenue paid out in dividends and/or spent on community services</li> <li>▪ Benefits concentration measures (both by household and by conservancy population )</li> </ul>	<ul style="list-style-type: none"> <li>▪ Relevant governance trainings provided</li> <li>▪ Quality of conservancy management index each year</li> <li>▪ CNA indicators of benefits distribution planning and execution<sup>(e)</sup></li> </ul>	n.a.  <ul style="list-style-type: none"> <li>▪ Covariates in CS-RQ1<sup>a</sup></li> <li>▪ Share of population at AGM</li> <li>▪ Conservancy policy on cash v. in-kind distribution each year</li> </ul>	FGDs and KIIs <sup>(i)</sup> to assess distributional equity of benefits, with improved governance as a possible causal factor.  <ul style="list-style-type: none"> <li>▪ CDSS databases</li> <li>▪ CNA indicators (ARD baseline, NORC endline)</li> <li>▪ <i>CTV regression analysis of assistance dosage (intervention) effects on impact indicators with endogeneity correction.</i></li> </ul>
3a. Is there an increase in conservancy-related employment as a result of the CS activities (including grants)?  3b. If so, how many new jobs are created and at what levels of employment (formal v. informal; unskilled/skilled; management)?  Analysis unit is conservancy	Number of new jobs created in conservancies, by type.	<ul style="list-style-type: none"> <li>▪ CS-RQ1 variables<sup>(a)</sup></li> <li>▪ CNA indicators of success in identification and management of tourism opportunities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Covariates in CS-RQ1<sup>(a)</sup></li> </ul>	<ul style="list-style-type: none"> <li>▪ CDSS data on conservancy employment, conservancy-related employment (data on employment by skill level not available)</li> <li>▪ CS/INP survey</li> <li>▪ CNA indicators (ARD baseline, NORC endline)</li> </ul> <p><i>Regression analysis of assistance dosage effects (intensity and mix) on number of jobs created.</i></p>

See page following end of table for notes.

**Table 3 Analysis Plan for Estimating Impacts of Conservancy Support Activities (continued)**

Research Question and Analysis Unit	Associated Impact Measure or Indicator	Intervention activities <sup>f</sup>	Covariates	Data Sources and Analysis Type
4. Do the CS activities (including grants) lead to an increase in household wellbeing over the life of its programme?  Analysis unit is the household.	Member perceptions of changes in income and expenditure	CS-RQ1 <sup>(a)</sup>	n.a.	FGDs and KIIs <sup>(i)</sup> to assess changes in household wellbeing over evaluation period
	<ul style="list-style-type: none"> <li>▪ Household income</li> <li>▪ Household expenditures</li> </ul>		<ul style="list-style-type: none"> <li>▪ Covariates in CS-RQ1 (possibly replace with dummy variables for conservancies)</li> <li>▪ Annual gross revenue of conservancy</li> <li>▪ HH is conservancy member</li> <li>▪ HH attended most conservancy meetings in past 12 months</li> <li>▪ HH member holds conservancy position</li> <li>▪ HH harvests INPs</li> <li>▪ PPO is in MCA-N program</li> <li>▪ HH is female headed</li> <li>▪ Education of HH head</li> <li>▪ # workers in HH</li> <li>▪ Agricultural &amp; livestock production HH consumes (<i>for expenditure analysis only</i>)</li> <li>▪ Household assets value and livestock size</li> </ul>	CS/INP survey  <i>Regression analysis with endogeneity correction of assistance dosage effects (intensity and mix) or change in institutional capacity on wellbeing indicators</i>

See page following end of table for notes.

**Table 3 Analysis Plan for Estimating Impacts of Conservancy Support Activities (continued)**

Research Question and Analysis Unit	Associated Impact Measure or Indicator	Intervention activities <sup>f</sup>	Covariates	Data Sources and Analysis Type
5. What have been the effects of game acquisitions on the conservancies and on their members? <sup>(d)</sup>	<ul style="list-style-type: none"> <li>Member perceptions of changes in jobs, HWC, income</li> <li>Management’s perceptions of impact on business partnerships and associated investment</li> </ul>	<ul style="list-style-type: none"> <li>Game translocations</li> <li>Conservancy on new tourist route</li> <li>HWC training</li> <li>HWC compensation</li> </ul>	n.a.	<ul style="list-style-type: none"> <li>FGDs and KIIs<sup>(i)</sup> to assess changes in household wellbeing over evaluation period</li> <li>CDSS databases</li> <li>NTB data for national trend to give context</li> </ul>
6. How sustainable are the results of business partnerships in terms of increased employment and improved mechanisms for distribution of revenue?	<ul style="list-style-type: none"> <li>Member perceptions of the security of jobs created as a result of business partnerships or new labor demand by conservancy.</li> <li>Management expectations on stability of future revenue inflows.</li> </ul>	New business partnerships	n.a.	FGDs and KIIs <sup>(i)</sup> to assess robustness of job creation and increased conservancy revenues from business partnerships established during the Compact.
7. What impact does MCA-N support have on conservancy members in terms of the distribution of benefits by gender?	Male and female differences in perceptions of changes in benefits from the conservancy over evaluation period	New business partnerships generate additional jobs, income for member benefits	n.a.	FGDs and KIIs <sup>(i)</sup> to assess changes in household direct gender benefits (both for heads of household and for spouses) from the intervention
	Gini coefficients and other distributional measures of benefits over time by gender	<ul style="list-style-type: none"> <li>CS-RQ1 variables<sup>(a)</sup></li> <li>CNA indicators of benefits distribution planning and execution</li> </ul>	Covariates in CS-RQ1 <sup>(a)</sup>	<ul style="list-style-type: none"> <li>Compare differences in conservancy benefits and general changes in income and expenditure for male and female household heads over the evaluation period.</li> <li>Compare intra-family benefit patterns over the evaluation period by household characteristics.</li> </ul> Household survey, CDSS/NACSO databases
8. What is the perceived impact on recipient-household gender relationships from the intervention?	Male and female perceptions of changes in their roles and interactions as a result of changes they experienced from Compact support to the conservancy and its business partnerships.	<ul style="list-style-type: none"> <li>New business partnerships generate additional jobs and income for member benefits</li> <li>Training</li> </ul>	n.a.	FGDs and KIIs <sup>(i)</sup> to assess changes in household gender relationships from the intervention

See next page for table notes.

- a. CS-RQ1 = Variables listed in Question 1 under the column, “Intervention” or “Covariates” in this table.
- b. NORC understands that it has proven difficult to get data on conservancy-specific tourist visits(which has therefore been removed from the indicators in MCA-N’s M&E Plan) and so will simply control for country-level changes..
- c. There is a series of variables on management quality to be tested. See discussion in Section 2.3.
- d. It is possible that the time scale is too short to detect this relationship.
- e. Whether these variables are dependent or independent variables depends on the regression, but they will never appear on both sides of the regression equality.
- f. By “intervention” we refer to the implementation of any of the activities described in Table 1.
- g. These refer to a set of indicators that NORC will construct from the characteristics of each method used to carry out a standard set of budgeting and revenue-distribution tasks.
- h. Gross revenue for year  $t$  refers to all cash and non-cash payments received in year  $t$  for goods and services sold in either year  $t$  or a previous year. This includes income from all sources, including wildlife utilisation, joint ventures, SMEs, plant utilisation, and other agriculture, commercial sales, and, benefits (e.g., royalties) from tourism ventures. This value is, prior to accounting for what the conservancy pays itself (as opposed to the entity it has a stake in) for any direct or indirect costs (including depreciation) of managing its stakes in other entities or in producing said goods or services. We understand that conservancies are not subject to income tax. NORC’s source of documentation for these variables is the NASCO codebook.
- i. See corresponding protocol guides and Data Collection Design Report (July, 2013).
- j. CDSS doesn’t record start-up date of actual operation, just the number of new JVs and significant upgrades. It is often very difficult to record exactly if and when a business partnership starts or ends. As such, we intend to use data on employment, investment, operating costs, and revenues to confirm when a JV actually started operation (or termination).

There is a strong conceptual justification for a multi-year analysis: earlier analysis of the household incomes in conservancies showed that households in longer-established conservancies had higher incomes when measured at a future date, after controlling for other factors.<sup>39</sup> This suggests that the earlier a conservancy benefits from a particular type of training or receives a JV grant, for example, the larger the effect on household income at a future income measurement point. Using annual data will permit identification of such timing effects if they exist.

There are 76 conservancies in Namibia and MCA-N is supporting 31. Only 29 conservancies were included in the baseline household survey because the newest two conservancies were still in the formation process. Given their late start-up they will not be included in the analysis.

The second column in Table 3 gives the outcome or output indicator to be used in the analysis, whether qualitative or quantitative, corresponding to the hypothesis posed. Generally these are straightforward. Note that indicators of both household income and household expenditure are proposed for Question 5. The justification for the addition is that the complexity of measuring household income suggests that measurement errors may be present despite best efforts to the contrary. One issue, for example, concerns the prices to use in valuing home consumption of agricultural production, e.g., eggs, in the absence of small-area data gathered for measuring inflation.<sup>40</sup> Household expenditures, which may also be imperfectly measured because of recall problems, provide a check on estimated incomes. The analytic results will be regarded as most robust and reliable if they are significant for both indicators.<sup>41</sup> See Box 1 for further discussion.

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<sup>39</sup> S. Bandyopadhyay, P. Shyamsundar, L. Wang, and M.N. Humavindu, *Do Households Gain from Community-Based Natural Resource Management? An Evaluation of Community Conservancies in Namibia*. Windhoek, Namibia: Ministry of Environment and Tourism, Directorate of Environmental Affairs, DEA Discussion Paper 68, 2004.

<sup>40</sup> The plan is to use the prices of farm produce reported by households within the same conservancy or PPO as the respondent under analysis who actually sold the good. Where that is not possible, we will draw on the next closest conservancy. A more concrete plan will be made after the household survey data are examined.

<sup>41</sup> Both measures were employed by Bandyopadhyay et al., *ibid*. Note, there is a conceptual difference between household income and expenditures. Income, the flow of cash and in-kind resources to the household, is comparatively sensitive to short-term changes in resource flows to the household. Expenditures in contrast are less sensitive to changes in the flow because households take actions, such as drawing down on savings when income fall or increasing savings in particularly prosperous periods. Incomes and expenditures do, however, tend to be highly correlated across households.

### Box 1 Household Income and Expenditure Definitions<sup>42</sup>

*Household income* is composed of cash and in-kind income and is computed on an average monthly basis. Gross cash income is money received for INP or other kinds of crops sold, livestock and related products sold, income from various forms of labor, conservancy cash income and other types of income such as social payments and land rental.

In-kind income is computed by asking about crops the household had consumed (questions were also asked about how much of each harvested crop was in storage) and livestock and related products consumed. To value this consumption, local prices were applied to the quantity of each product consumed. Prices will be determined for each PPO or conservancy where there are at least five price observations reported for a product. Where there are insufficient local observations, prices will be the mean reported price for the product for all observations. Some in-kind income from conservancies is valued by the respondents in the interviews; these estimates will be analyzed before being accepted. Other in-kind conservancy benefits such as training or electric fencing will not be included, since they are in fact types of investment. Respondents reported the value of in-kind income provided as part of compensation for employment excluding raising livestock and crops on the household's plot.

Total income is gross cash income plus in-kind income. *Household income* is total income minus production costs. The questionnaire obtains data on such costs for each type of crop grown and livestock.

*Household expenditures* are computed from respondents' reports on monthly-cycle expenses and yearly cycle expenses. Specifically, respondents were asked about expenditures in the 30 days prior to the interview for 11 classes of goods and services and 16 classes of goods and services in the past 12 months. Monthly expenses were obtained by dividing by 12 the total figures for the 12 month expenditures and adding this value to the reported spending for the past 30 days.

Another source of data that the evaluation design will endeavor to take advantage of are the institutional and governance indicators MCA-N had the foresight to commission from ARD at project baseline.<sup>43</sup> NORC plans to supplement these at endline by utilizing CDSS and NACSO governance-related data collected to varying degrees over the period 2010 to 2014 and the CS household survey NORC itself has collected to construct an endline for the same ARD indicators.<sup>44</sup> This will allow measurement of changes in these critical measures of governance and institutional capacity over the course of Compact's intervention.<sup>45</sup> The logic here is that implementer assistance should lead to changes in

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<sup>42</sup> The definitions in the Box are consistent with those being employed by the evaluation of the Competitive African Cotton for Pro-Poor Growth Initiative (COMPACI). COMPACI, and the evaluation, are underway in seven countries: Benin, Burkina Faso, Cote d'Ivoire, Ghana, Malawi, Uganda, and Zimbabwe. The CS/INP household questionnaire is quite similar to that employed in COMPACI. While the questionnaire gathers a great deal of information on small holder agricultural production, it stops short of asking about all equipment and structures and their age and estimated value so that depreciation can be subtracted from gross income to obtain net income. Similarly, in computing production costs as defined in the Box, the cost of a piece of equipment is included in full in the year in which it is purchased rather than only a share of it (depreciation). For further discussion, see N. Allen and E. Weiss, *COMPACI Baseline Survey in Malawi: Data Analysis and Findings* (Chicago: NORC Report to *Deutsche Investition- und Entwicklungsgesellschaft* (DEG), 2011, draft).

<sup>43</sup> See Footnote 9 for reference.

<sup>44</sup> See Chapter 5 for further details, as well as Annex F.

<sup>45</sup> The methodology of creating indicators from multinomial data is analogous to the process proposed herein for training indicators.

institutional performance which in turn should affect a variety of intermediate outputs, such as the ability to extract value added from wildlife, manage JV relationships, and identify and reap benefits from NRM and tourism opportunities. As illustrated in Figure 2, these intermediate outputs should lead to higher revenues and, thus, higher distributions of benefits to conservancy-member households. If NORC determines that the ARD and NORC-constructed rounds are insufficiently comparable to form a “panel” dataset for quantitative impact-evaluation purposes, then each round will be examined as an independent cross-section and analyzed for changes in distributions and rankings of conservancies at the two points of time. Table 3 indicates what sets of these indicators have been selected as outcome or intervention variables for Research Questions 1, 2, 3, and 7.

The third and fourth columns list the intervention and covariate or control variables to be included in the regression models. As indicated by the intervention entries for Question 1, there are a substantial number of intervention variables to take into account. Having a less-than-full specification could result in some included variables picking up the effects of one or more of the excluded variables and thereby provide misleading results. It may be that the intervention variables for some trainings are dropped because the project is planning to conduct those training in all conservancies in the first year.<sup>46</sup> Consistent with the discussion above on model specification for the conservancy sample, annual data are indicated for the intervention variables.

The covariates or control variables in the model are designed to account for important factors such as the number of years a conservancy has been in operation and management quality at baseline. There are two sets of covariates: one for conservancy characteristics and one for household characteristics. For models where the conservancy is the unit of observation only conservancy covariates are included. In models where the household is the observation unit both sets are included.

An important additional set of influences to conservancy progress is support conservancies receive from non-MCA-N sources each year. Assistance to project conservancies has three funding sources: (a) MCA-N funds to CDSS for MCA-N activities, (b) other donor funds for MCA-N activities also being managed by CDSS,<sup>47</sup> and (c) other donor funds for other activities. Data on this funding are not collected centrally by MCA-N or CDSS at the conservancy level. There are also significant issues raised by the way technical assistance provision is organized and tracked. For example, it makes it difficult for MCA-N (or NORC) to account for its contribution to outcomes when there is other assistance going into a particular area from another donor.<sup>48</sup> Our strategy to address this concern contains two prongs. First, as part of endline data collection we will ask both the government agencies in charge of donor coordination (or international cooperation) and donors operating in Namibia to list or describe financial and in-kind support they have provided to conservancies over the evaluation period. Second, once the incremental support is accounted for as best as practical, an assumption is made that permits specification of the dose-response model for estimation in a way that reduces this threat to validity, though at a cost of lower statistical power due to the ensuing noise. The assumption is that the distribution (pattern) of performance *changes* across member-households

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<sup>46</sup> There may be a similar issue with the control variable on the diagnosis result of the number of trainings needed. Nearly every conservancy was rated as needing essentially all trainings.

<sup>47</sup> CDSS was able to generate funds for the project when MCA-N funding proved to be insufficient for the full programme that had been designed.

<sup>48</sup> What is meant here is that it is difficult if not impossible to pull apart MCA funding from other technical assistance going into the conservancies

within and across conservancies is not correlated to *changes* in other sources of funding. In other words, we assume that other support is either constant or not changing in a way correlated to the role-out of MCA-N assistance. With this compound strategy, the use of a CTV model should minimize the risk of spurious inference even if the *levels* of funding from other donors are similar to those of the MCA-N.

For most questions, the unit of analysis is the conservancy. The exception is the impact of the intervention on household income and expenditures, where the household is the analysis unit (Question 4 in Table 3). Several types of control variables are added for household characteristics such as household members' level of involvement in the conservancy, whether a female heads the household, the household head's education level, number of workers in the household, and the share of agricultural production consumed by the household (to control for measurement errors in both income and expenditures).

As noted in Chapter 2, there may be instances of endogeneity between the dependent variable and a covariate in some models. For example, in the analysis of the increase in partnerships between a private firm and a conservancy (Question 1), a covariate is the quality of a conservancy's governance. Governance may improve due the availability of greater revenue which permits more hired staff and professionalism in conservancy management, including dealing with private firms on partnerships. We will test for the presence of such simultaneity and where it is present use appropriate statistical techniques to address the issue.

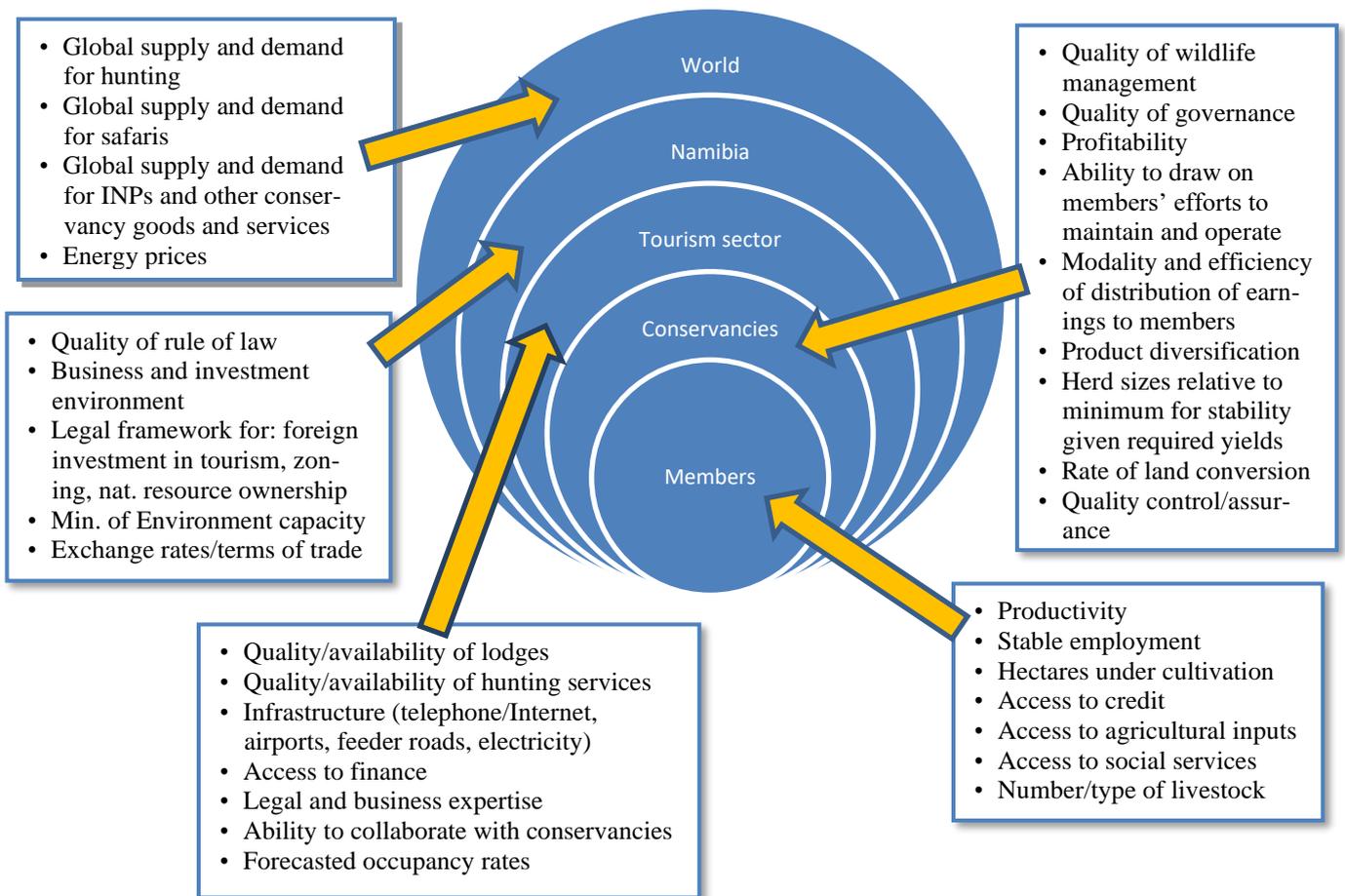
The fifth column of the table lists the sources of the data to be included in the analysis and beneath each list the type of analysis to be conducted. In cases where either the question does not lend itself to the regression analysis being employed or the number of observations is very small, e.g., national change in tourism employment, then other types of analysis will be undertaken or qualitative methods employed.

More detailed model specifications will be developed after the NORC team has had the opportunity to review the actual data sets that CDSS has kindly offered to provide, as well as once the team receives feedback on the present report.

### *Construction of impact indicators and covariates*

In addition to conceptualizing the models testing causal relationships, it is also necessary to develop indicators of each impact indicator and explanatory variable, whether intervention or conditioning covariate. In some cases simple single-variable proxies are readily available—for example, household expenditure for household income—but in other cases such as for a measure of governance or sustainability, it is doubtful that a single native proxy can be found. In still other cases, a native indicator should exist but measurement challenges make it of dubious use. For example, what NORC would normally use but is unavailable at the conservancy level is the number of visitors to the conservancy. Conservancies are open and do not have controlled entrances. Visitor counts do not exist. We will use the number of bed-nights as a proxy. This clearly has the limitation that not all conservancies have lodging. Therefore a control variable indicating no-lodging will have to be included in models to explain bed nights.

**Figure 3: Heuristic model of conservancy sustainability**



In such cases, it is necessary to take the field concepts and construct a multivariate (often hierarchical) aggregated indicator. Examples in the present case of where such techniques are called for include:

- Conservancy quality of governance
- Sustainability (e.g., financial, ecological, human capital)

While these indicators or their proxies are still under development, consider the case of sustainability intensity as an indicative example of avenues NORC is exploring. Its method of construction is indicative of how other indicators would be created and built.

**Sustainability indicator.** An important issue for the evaluation is the degree to which the CBNRM model in Namibia is sustainable.<sup>49</sup> While sustainability means different things to different people, the issue clearly goes beyond its role in habitat protection, employment generation, or the profitability of the lodges: sustainability is a systems-level characteristic. As a concept that cannot be directly observed, a measure of sustainability is intrinsically different from, say, an elephant-herd count, a measure of the price of an excavator, the revenues from coconut oil, or the number of female heads of household. Rather, the empirical measure of sustainability depends on how one

<sup>49</sup> Note too that in order not to complicate the illustration further, the role of INPs is not explicitly broken out. The topic of sustainability will also be discussed in the key informant interviews.

defines the concept. We start, therefore, with a pre-analytic conceptual statement of what we believe to be a useful definition of sustainability and then provide a heuristic model of its components. This, in turn, allows us to develop a recipe (or hierarchical formula) that we can then use to collect data and compute an indicator of sustainability over time and place.

Simply, sustainability refers to the degree to which an activity is likely to continue over an extended period of time in the future given the current and expected progression of causal factors and behaviors endogenous and exogenous to the system in which the activity occurs. Without belaboring the point, several facets are worth underscoring. First, note that sustainability refers to the future and, therefore, inherently must reflect uncertainty and risk. Second, the definition also makes clear that sustainability is a contingent quality, that is, it depends on how a multitude of direct and indirect factors affect the system within which the activity takes place. Third, as an outcome of a *system*, sustainability has many dimensions. Fourth is the issue of whether the focus is on levels or rates of change (growth).

Before building on these insights note that there is a basic conflict underlying the issue of sustainability at the conservancy level that is implied but not explicitly modeled by the indicator construction design, below. In particular, there is an inherent tension between the community-level enterprise (the conservancy) and household-level enterprises (agriculture). The households have economic incentives to expand their cropping, the number of their livestock, and the amounts of product that they harvest. These activities are detrimental to the community-level enterprise of conservancy natural resource management. Maintaining the viability of the conservancy will mean putting constraints on the household—and nearly all households are involved in cropping and/or grazing. It is doubtful that without such formal constraints social pressure (such as that which was brought to bear to control poaching) will be sufficient.<sup>50</sup>

Our heuristic model recognizes that the primary market for Namibian conservancies is global and key-country demand for their goods and services. Factors influencing demand are, of course, consumer income, the Namibian prices of services, and the availability of substitutes (especially those nearer to the consumer's home country). Within Namibia itself, what counts for sustainability is the physical, legal, and institutional infrastructure. For example, a predictably implemented foreign investment legal framework is required if the country wishes to attract and maintain successful joint ventures. Of its economic sectors, however, it is the tourism sector that matters most and the quality and availability of domestic service providers (who, themselves, require the availability of professional legal, business and financial services) who are able to collaborate with conservancies. To be sustainable, conservancies need to be well managed and able to draw on their own human and natural resources so that they are profitable, and able to expand organically. Finally, the conservancies are only as healthy as their members so the latter must have stable employment, and access to inputs, credit, and social services. These observations are illustrated in Figure 3, above.

In principle, we are able to use a variable corresponding to each of the bullets in Figure 3 to construct sub-indicators for each of the circles in the figure. For our present purposes, however, we are interested in the *relative* sustainability of each conservancy and not the sector as a whole—although

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<sup>50</sup> At present, conservancies do not have zoning authority to legally control where households conduct agricultural activity.

the former would be an important input into the latter calculation.<sup>51</sup> This means that we can ignore global, and to a large extent, domestic factors in the *conservancy-level* indicator since these would be scored the same for all conservancies.<sup>52</sup>

We can thus construct (but not statistically estimate) a sustainability indicator of conservancies in Namibia,  $S$ , from sustainability sub-indicators of their members ( $M_j$ ), their lodges ( $G_j$ ), and the conservancies themselves ( $C_j$ ). In each case, we rate the probability of unit of the group collapsing by coding the factors (covariates) that influence its sustainability and then partitioning the scores into four ranges, corresponding to high (4), medium-high (3), medium-low (2), and low (1) risk of collapse.

$$S = \text{std}(\sum_j w_j S_j) \quad \text{and} \quad S_j = \text{std}[(C_j)^{\sigma_C} (M_j)^{\sigma_M} (G_j)^{\sigma_G}]$$

where

$$w_j = N_j / (\sum_k N_k) , \quad M_j = \text{std} \sum_{i \in j} m_i , \quad G_j = \text{std} \sum_{h \in j} \gamma_h g_h , \quad \gamma_h = Y_h / (\sum_{q \in j} Y_q) ,$$

$N_j$  is the population of conservancy  $j$ ,  $Y_h$  is the income provided to conservancy  $j$  by lodge  $h$ ,  $h \in j$  means all lodges associated with conservancy  $j$ ,  $i \in j$  means all members associated with conservancy  $j$ ,  $\gamma_h$  are income weights,  $J$  is the total number of conservancies (so  $m_i$  is summed over  $J$  while  $g_h$  is summed over the lodges associated with conservancy  $j$ ), and

$$C_j = \text{std}_{i \in j} [\zeta_1^C Z_{1j}^C + \zeta_2^C Z_{2j}^C \dots]$$

$$g_h = \zeta_1^G Z_{1h}^G + \zeta_2^G Z_{2h}^G \dots$$

$$m_i = \zeta_1^M Z_{1i}^M + \zeta_2^M Z_{2i}^M \dots$$

where the  $\zeta$  are weights to be set by expert opinion (and should, for each sub-indicator, add to 1) and the  $Z$  are covariates (to be identified) equal to 1, 2, 3, or 4, as argued, above.

### *Analysis of NRM and institutional development technical assistance*

Among the categories of CDSS TA/Training are natural resource management (NRM) and Institutional Development/Governance (IDG) as listed in Table 1. These two areas warrant more analysis than implied by the two evaluation questions, namely,

- Do technical support and grants to conservancies improve the effectiveness of the mechanisms used for revenue distribution?
- What is the impact of game acquisitions (number of game translocated) on income to conservancies, and tourist visits?

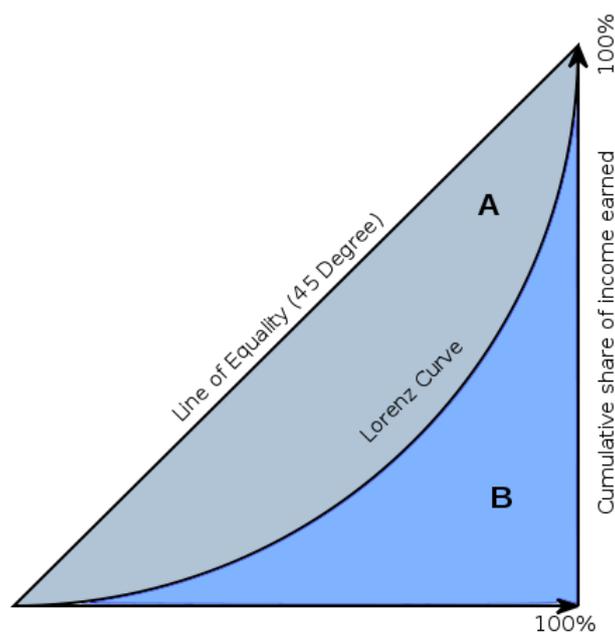
Let us first suggest how these two questions would be analyzed and then indicate some additional questions and outline how they too could be analytically addressed.

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<sup>51</sup> A comprehensive measure of sustainability would require a detailed model of international tourist markets, something quite outside the scope of the present evaluation. Perhaps a more appropriate term for the indicators proposed herein would be "resilience".

<sup>52</sup> The exception here would be the degree to which national infrastructure serves some conservancies better than others.

**Figure 4: Calculation of the Gini Coefficient, A/(A+B)**



Cumulative share of people from lowest to highest incomes  
 Source: Wikipedia, [http://en.wikipedia.org/wiki/File:Economics\\_Gini\\_coefficient2.svg](http://en.wikipedia.org/wiki/File:Economics_Gini_coefficient2.svg).

**Improving revenue distribution.** We can evaluate whether technical support and grants to conservancies led to (i) a greater proportion of revenues being distributed, (ii) revenue distribution taking place sooner (closer to the time the conservancy receives it), and (iii) a more equitable distribution of conservancy income socially and gender-wise.<sup>53</sup>

According to MCA-N the assignment of training modules to particular conservancies was done by the conservancy management with some advice from outside-experts (and, guidance from the findings of the 2009 ARD institutional assessment) and thus potentially subject to self-selection bias. To confront the threat of bias, we add an additional analytic apparatus analogous to that which was proposed at the household level in Chapter 2.2.

With this in mind, we start by proposing two measures of impact, both of which should provide useful views: the share of revenues that are distributed to members and the Gini Coefficient, a statistical measure of equality.<sup>54</sup> The basic model we propose, which would be applied to either of the just-described indicators, denoted by  $y_{ip}$ , is

$$y_{i,p} = \alpha + \beta R_p + \sum_{j \in \{I,A,G\}} \theta^j \hat{P}_{i,p}^j + \sum_{k=1}^K (\delta_k + \varphi_{k,p} R_p) D_{i,p}^{(k)} + \sum_{m=1}^M \pi_m Z_{i,p}^m + \epsilon_{i,p}$$

in which  $D_{i,p}^{(k)}$  are the  $K$  types of training (as in Table 1) and  $M$  covariates (the  $Z_{i,p}^m$ ) with values for each conservancy (and includes conservancy panel fixed effects),  $i$  and period,  $p \in \{0,1\}$  corresponding to pre- and post-intervention;  $R_p$  is a round dummy variable equal to 0 for  $p = 0$  (before intervention) and 1 for  $p = 1$  (after intervention);  $\alpha$ ,  $\beta$ ,  $\delta_t$ ,  $\pi_k$ ,  $\theta^j$ , and  $\varphi_{kt}$  are parameters to estimate; and  $\epsilon_{ip}$  is the

<sup>53</sup> In fact the literature on public finance explains that distributional issues are not just a matter of income returned but also the nature of the goods and services on which the organization spends its revenues.

<sup>54</sup> See Figure 4 for a description of how this coefficient is calculated.

identically independently distributed normal error term. With 28 conservancies, there would be  $28 \times 2 = 56$  observations with which to estimate this regression. This very low number of observations means that the number of covariates will need to be few; it also suggests that a MANCOVA approach should be considered in addition to ordinary regression.

The issue in the above equation is in how  $D_{ip}^{(k)}$  is constructed. NORC plans to construct training indicators at the level of the household, not the conservancy. Without a comparison group—recall, conservancies in part self-selected their own training—we need a multi-valued training variable and not a dichotomous training variable. While it is not possible to definitively select the preferred indicator until the data are examined,<sup>55</sup> several will be created and used to ensure robust results.

In the case of NRM activities, the simplest conservancy-level indicator would be the number of CDSS activities in which a conservancy participated. (The second column of Table 1 lists the possible activities.) A second training indicator would be the same sum but weighted by the degree to which each type of training contributes to income. The weights would be set by expert opinion and by feedback from conservancy management. Other options include an indicator on the number of conservancy members that have received each training course over the last, say, three years.<sup>56</sup>

In addition to the issues considered, above, there are a number of additional interesting questions that may be addressed. Among these are does increased value of distributions or more equitable revenue distribution increase the respect for the commons?<sup>57</sup> Or does the incentive, such as they are, originate from social pressure independently of revenue characteristics? Does the incentive matter if it is in cash or in kind?

Strengthening institution governance. MCA-N is also interested in the effectiveness of training in strengthening governance. An important baseline was provided by the ARD institutional-assessment cross-section of 2009, which NORC had hoped to repeat for an endline to create a panel institutional assessment.<sup>58</sup> Unfortunately, feedback from CDSS made it clear that such a survey would be very time-consuming and challenging to elicit unbiased responses. NORC thus conducted a side-analysis of alternatives and found that, fortuitously, CDSS has been collecting governance-related data that NORC could use to construct an endline or at least a cross-section to examine the endline. This institutional panel will provide both outcome as well as explanatory variables that will feed into some of the attribution models that NORC will estimate.

The universe of training offered is given in Column 2 of Table 1. Better governance has two major areas of potential impact. First, it might lead to more efficient provision of conservancy services,<sup>59</sup> greater influence of members' preferences over which services are offered, and stronger accountability and oversight of spending and distribution of income to members. Second, better governance should allow management to exercise greater control over member activities that could compromise

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<sup>55</sup> This will require examining the degree of disaggregation of the data mentioned in Table 4 for the data sources NORC does not yet possess.

<sup>56</sup> A further discussion of training indicator construction is given in Section 4.4.

<sup>57</sup> Two major sources of not respecting the commons are engaging in poaching and member extensification of agriculture.

<sup>58</sup> ARD, *Conservancy Needs Assessment: Final Report #2, Current Management Capacity Summary Report*, March 2010.

<sup>59</sup> Regardless, it would be useful to know whether there much variation in the efficiency in which these services are provided in the first place.

the commons, the ultimate source of conservancy income. Two particularly important concerns are poaching and extensification of agriculture. These two areas can be combined for additional questions, such as does the provision of some services to members have a greater incentive effect on respecting the commons than others?

As in the case of NRM training, lack of an experimental comparison group means that the main quantitative method to address these questions is the CTV model from above (though, of course, such questions will also be investigated in focus groups and key informant interviews.) A model similar to that proposed for NRM, above, could be used where now  $D^{(k)}$  are the types of training from Column 2 of Table 1 (or indicators constructed from them) and some of the covariates ( $Z_{ip}^m$ ) would be different.<sup>60</sup>

While income would still be one of the impact variables to explain, the regression model would also use indicators of governance as well as of conservancy control of the commons as the dependent variable,  $y$ . Alternative indicators of governance will also be constructed using information collected in fact sheets, which will look at the use of voting, degree of member participation in decision making, competitiveness of election of officers, use of audits, existence of various planning and management tools, quality of IT, among others.<sup>61</sup> We can also draw on member satisfaction ratings of conservancy services. Likewise, the issue of appropriate indicators of training must be formulated. These may be handled in a way analogous to those described for NRM, above. Given that the training courses tend to target different objectives and to different degrees, it is not necessary to include measures of all courses when evaluating their influence on each of the impact indicators ( $y$ ). Instead, we will either combine or include subsets of them in the regression equation to estimate.

Lastly we note that two of the training courses are aimed at gender issues. Given we understand that conservancies have a role in choosing training courses, it would be interesting to see whether such courses are selected by conservancy boards that have more (or any) women members. There do not appear to be any questions on the baseline survey related to gender attitudes. Hence, this set of issues will be vigorously pursued using qualitative methods.

### 3.4 Data Sources

We have verified the availability of the data items needed to produce the variables listed in Columns 2-4 in Table 3. The data items and sources are listed in Table 4. Not included are items coming from the CS/INP household survey, which all come from the survey data set. As indicated earlier, a few items are not available and these are marked by “NA” in the column indicating the source of the information. Detailed specifications of the variables will be done when the data sets in final form are received. At this stage the focus is on model specification.

The project is unusually fortunate in having the highly developed conservancy data base which has been assembled over the years by the WWF and NACSO, with many others contributing. The com-

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<sup>60</sup> Unfortunately, for most variables in our sample there would still be between 56 observations (if only baseline and endline rounds are available) and about 110 observations (if the variable is from CDSS/NACSO's database and is complete).

<sup>61</sup> We plan to create a brief questionnaire to be filled out by the conservancy management and by drawing upon implementer existing data.

prehensiveness of the CDSS data is evident in the table as it is the source for the great majority of the data items. All monetary values will be deflated to 2009 using the CPI compiled by the Central Bureau of Statistics.<sup>62</sup>

**Table 4: Sources for Data Items Planned to be Used in the Analysis**

No.	Data Item	Source
1	Number and year-to-year change in the number of business partnerships between conservancies and private businesses by conservancy, showing JVs versus others	CDSS-E <sup>a</sup>
2	Amount (N\$) of private investment secured per year by MCA-assisted conservancies by conservancy	CDSS-E
3	Investment secured per year from different sources by conservancy by year	CDSS-E
4	Annual gross revenue of conservancy by conservancy by year	CDSS-Y <sup>b</sup>
5	Conservancy income by source (JV, forest products...) by year	CDSS-Y
6	Actual conservancy payments in cash and some in-kind benefits distribution	NORC survey, CDSS-C <sup>c</sup>
7	Household cash dividends by conservancy by year (total amount)	CDSS-C
8	Share of conservancy revenue paid out in dividends or spent on community services by conservancy by year (and distribution of all spending per year)	CDSS-C
9	Number of conservancy-related jobs created by conservancy by year <sup>(l)</sup>	CDSS-C
10	Number of conservancy-related jobs by job level by conservancy by year <sup>(l)</sup>	NA
11	# annual visitors to conservancy by year <sup>e</sup>	CDSS-C
12	# of visitors in the baseline year by conservancy <sup>e</sup>	CDSS-C
15	Conservancy located on newly developed tourist route	MCA-N Tourism Project <sup>h</sup>
17	# game animals translocated each year to each conservancy	CONInfo <sup>g</sup>
18	# rare game animals translocated each year to each conservancy	CONInfo <sup>g</sup>
19	Year conservancy created	CDSS-C
20	Other (non MCA-N) support to each conservancy each year by type, e.g., TA, training, grants	NA
21	Quality of conservancy governance (14 indicators, overall score) by conservancy at baseline and endline <sup>j</sup>	Conservancy Needs Assessment (CNA) <sup>j</sup>
22	AGM held by conservancy by conservancy by year	CDSS-C
23	At AGM: report made on prior year's spending; plan for next year's spending presented; and distribution of net revenues discussed with members	CDSS-C
24	Pct of all members attending AGM each year	CDSS-C and AGM attendance records
25	Conservancy has a sustainability or business plan in place	CDSS-C
26	Business plan/sustainability plan exists	CDSS-C
28	Conservancy has a tourism plan prioritizing opportunities <sup>(m)</sup>	CDSS-C
29	# of grants & value to each conservancy by year for JV and each other grant purpose from CDSGF	CDSS-G
30	Accessibility indicators	NA
31	Training by type of training by conservancy by year	CDSS-C
32	Technical assistance received by type of assistance by conservancy by year	CDSS-C
33	Rating of results of training by conservancy by year (based on student assessments)	CDSS-C
34	Conservancy expenditures by category by conservancy by year	CDSS-C
35	Percent of conservancy's operating costs covered by own income	CDSS-Y
36	Ratings in Annual Natural Resource Management Assessment Tool	CDSS-C
37	Conservancy population, most recently available data	CDSS-C
38	Number of conservancy members	CDSS-C

<sup>62</sup> This is consistent with MCA-N guidance for computation of the official monitoring indicators.

**Table 4: Sources for Data Items Planned to be Used in the Analysis (continued)**

No.	Data Item	Source
39	Conservancy land area	CDSS-C
40	Turnover of Management Committee members by conservancy by year	NA <sup>i</sup>
41	Turnover of conservancy staff by conservancy by year	NA <sup>i</sup>
42	Number of new SMEs by sector by conservancy per year	CDSS-E
43	Conservancy share of annual income of SMEs by conservancy by year	CDSS-E

- a. CDSS-E – enterprise data base
- b. CDSS-Y – income data base
- c. CDSS-C – conservancy data base
- d. CDSS-G – grants data base
- e. Information on number of visitors is not available so the number of paid bed nights in a conservancy per year will be used instead. If this information is not feasible to acquire from the lodges or the government regulator then NORC will use number of annual tourist visits to the country.
- f.
- g. CDSS indicated that they could merge these variables into its data base but is no longer able to. NORC will acquire and merge the data itself.
- h. NORC was originally told this would probably be included in CDSS data base but CDSS has now indicated they were not asked to do so. NORC will contact MCA-N Tourism Project to determine availability; otherwise, this variable will be dropped.
- i. May be included in CDSS data base; otherwise, we will include it in the Conservancy Governance Survey we will administer.
- j. These data were collected at baseline. NORC will conduct a similar assessment at endline.
- k. If there is no information in the Conservancy Database with which to build this indicator then we will drop it.
- l. Employment data such as CDSS has chosen to track will be used to create a proxy for this variable, if possible.
- m. Unfortunately, according to CDSS some tourist plans are “very old”.

Strong management is an essential ingredient for conservancy economic development and financial sustainability. The table includes several items designed to signal management strength (21-23, 25-28, 36). To summarize these items into variables for use in the regressions, these items will be aggregated into one or more indicators of management quality in which the degree of sub-indicator hierarchy and their associated weights would come from expert opinion and be informed by KIIs or from a principal-components factor analysis.

### 3.5 Qualitative Analysis

Qualitative analysis, based primarily on information obtained from key informant interviews (KII) and focus group discussions (FGD), will be employed in two ways.<sup>63</sup> First, the information will be used as an aid to interpreting and corroborating the patterns revealed from cross-tabulations, results of the analytic attribution analysis, and hypothesis testing derived from the quantitative data.

Second, as indicated in the last column of Table 2, certain of the research questions are either more suitable to qualitative rather than quantitative methods or can be interrogated further through qualitative methods. These questions are explored through KIIs and FGDs with insight from NORC sector experts. Questions 5 and 6 are handled through KIIs and help us understand issues of sustainability as well as the role of game acquisitions. Question 2a is covered through both KII and FGD with KII

<sup>63</sup> Of course, KIIs have already been used to design the baseline survey and to focus the evaluation design.

exploring issues of benefit distribution from the perspective of conservancy management and FGD exploring the issue among conservancy members. Finally, Questions 7 and 8 are explored through FGD and focus on gender in relation to the intervention impacts. In addition to having been used at midline (summer 2013) to inform and refine the present report, KIIs and FGDs are to be carried out at endline (in May 2014). The detailed results of the midline FGDs are found in “Midline Qualitative Data Analysis Report”, February 2014.

The plan for the endline qualitative analysis is presented in detail in the “Data Collection Design Report – Qualitative” (forthcoming, spring 2014). It includes detailed descriptions of the FGDs to be carried out at endline and how organisations and participants are selected for each activity. The report also lists the functional stakeholder positions slated for the KIIs. It is important to note that past and upcoming qualitative data collection, both in content and timing, was developed in close collaboration with MCA-N and CDSS. As was the case for the midline, all questions, participants, and timings will be closely vetted by key stakeholders before data collection begins in April/May 2014.

These focus groups are essential for NORC’s balanced, mixed-methods approach. They provide context for the baseline data and providing policy makers with actual voices rather than just quantitative tabulations. The FGD focus on issues relating to gender, conservancy management, sustainability, and perceived secondary or non-monetary benefits of the MCA-N intervention.

**Table 5: Tentative participating conservancies**

Name	Implementer	Received:		Area		Criteria				
		Game	Grant <sup>(e)</sup>	Geoclimatic zone	Region	Area km <sup>2(f)</sup>	Pop. <sup>(a)</sup>	Level <sup>(b)</sup>	Potential <sup>(c)</sup>	Spending power <sup>(d)</sup> N\$
Marienfluss	IRDNC		SME	Acacia/ Nam. Karoo	Kunene N	3,034	300	M	2	5,429
Doro !Nawas	NNF	X	HWC		Kunene S	3,978	1,500	B	3	10,532
Uibasen	NNF		HWC		Kunene S	286	230	A	2	19,185
Omatendeka	IRDNC	X	JV		Kunene N	1,619	2,500	M	2	11,631
Sikunga	IRDNC	X	SME	Broad- leafed Savanna	Caprivi	287	2,000	B	3	9,137
Mayuni	IRDNC	X	SME/HWC		Caprivi	151	2,400	A	2	7,661
Kwandu	IRDNC	X	SME/HWC		Caprivi	190	4,300	A	3	7,018
Salambala	IRDNC	X	SME		Caprivi	930	7,700	A	3	11,023
Muduva Nyangana	NNF		JV		Kavango	615	2,000	B	3	13,286
Nyae Nyae	NNDFN	X	SME/HWC		Otjondjupa	8,992	2,300	A	2	6,385
King Nehale	NDT		SME	Acacia Savanna	Oshikoto	508	20,000	B	3	13,537
Uukwaluudhi	NDT	X	none		Omusati	1,437	25,000	B	1	13,315

(a) Number of people in conservancy. Source: *Namibia’s Communal Conservancies: A Review of Progress and Challenges in 2011*, NACSO, pg. 106-7. (b) Institutional level: B=Beginning, M=Medium, A=Advanced. (c) 1=“Just Started”, 2=“Developing”, 3=“Sustainable”. (d) Average of total household income and expenditure as revealed by NORC baseline household survey. (e) These are grants that have been approved; however, not all of them have been implemented yet. (f) Source: *Namibia’s Communal Conservancies: A Review of Progress and Challenges in 2011*, NACSO, pg. 106-7.

For the midline qualitative data collection, to the extent possible, NORC selected conservancies in order to get representation from each regional area that would also cover a range of conservancy characteristics, such as conservancy size (area and number of households), age (date of registration),

geography-climatic zone, region, and household expenditure. The list of selected conservancies along with their selection criteria is presented in Table 5. NORC shared this sample with MCA-N and implementing partners and received the following feedback:

1. Kunene North is under-represented.
2. There is under-representation of those conservancies that have benefitted from MCA-N enterprise grants. For example the two conservancies in Kunene South are the two out of four that have not received grants. However, neither of these concerns represents a risk to the reliability of the data collected. From a statistical point of view, the appropriate sample size does not depend on population size. Hence, the fact that two regions have different numbers of conservancies does not imply they should have such a relative representation in the FGDs; a similar explanation can be used for the representation of conservancies having received enterprise (SME) grants.

**The conservancy sample for KIIs.** In addition to the FGDs, NORC’s sector experts conducted 8 KIIs over the summer 2013 for the CDSS activity. They were guided by Table 6, which presents the specific research questions that were explored during the KIIs as well as the associated intended KII participants. The detailed results of those interviews are found in “Midline Qualitative Data Analysis Report”, February 2014.

**Table 6: KII participants for CS Activity, by research questions**

Research Questions	Type of Participant
Does improved governance impact the equitable distribution of conservancy benefits?	<ul style="list-style-type: none"> <li>■ Conservancy management</li> <li>■ Sector experts</li> </ul>
What is the impact of game acquisitions?	<ul style="list-style-type: none"> <li>■ Conservancy management</li> <li>■ Sector experts</li> <li>■ Lodge and tourism operators</li> </ul>
How sustainable are the results in terms of business partnerships, increased employment and improved mechanisms for the distribution of revenue?	<ul style="list-style-type: none"> <li>■ Conservancy management</li> <li>■ Sector experts</li> </ul>

As a result of the midline qualitative fieldwork and analysis, additional follow-up questions were found necessary to pursue. (They have already been presented at the beginning of Chapter 3.2).

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## 4. The INP Support Activity

### 4.1 Activities Overview

The harvesting of natural resources, mostly from plants, for their nutritional and economic value, forms an important part of the livelihood system of many rural households in Namibia. Given Namibia's marginal agro-environmental conditions, their value is high.

In the mid-1990s, the demand for Namibian indigenous natural products (INPs) gained momentum when Namibian stakeholders developed and refined an innovative and coordinated approach to creating economic opportunities based on harvesting, processing, and trading INPs. In 2000 the early success of this approach was used as a foundation to design the Ministry of Agriculture, Water and Forestry's (MAWF) Promoting Indigenous Fruit (PIF) project, which in turn resulted in the formation of the Indigenous Plant Task Team (IPTT), a multi-stakeholder coordinating body chaired by the Directorate of Agricultural Research.

This approach has so far brought four new Namibian natural products (Devil's Claw, Marula, Kalahari Melon Seed and *Ximenia*) to international cosmetic markets, with several others at various stages of development (mainly *Commiphora* and Mopane).

Most primary INP producers are some of the poorest and most marginalized people in Namibia. They are cash-poor and have little access to commercial inputs or post-harvest infrastructure. They are isolated with very limited contact with markets. Even some people, who are relatively wealthy based on their livestock assets, have limited access to cash and liquidity because of their remoteness and lack of readily accessible livestock markets. INP harvesters depend on "traditional" technology and practices. INP producers are almost entirely women and operations typically depend on hand labour. This group dominates the sector, accounting for almost all of the raw materials produced, harvested, and collected.

The markets for each resource (product) appear to have particular characteristics. In some cases a small number of exporter-buyers have a degree of monopsony power. Additionally, price-setting regimes clearly differ among resources, exporter-buyers, and contracts facilitated by different service providers. In the case of Devil's Claw (*Harpagophytum procumbens* and *Harpagophytum zeyheri*), a major exporter-buyer signs contracts with PPOs that set a minimum price but generally pays more. He differentiates between conventionally and sustainably produced Devil's Claw, and pays a higher price for the latter. He can also make bonus payments for high quality.<sup>64</sup> When agents call about purchase opportunities outside of clients with whom he has purchase contracts, he gives them a spot price based on current conditions and expectations. On the other hand, for a particular species of *Commiphora* (*Commiphora wildii*) unique to Namibia (and possibly Angola), a fixed price is set by the involved PPOs with NGO technical assistance. Prices offered for most resources are sensitive to exchange-rate movements because the Namibian exporter takes the exchange rate risk.

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<sup>64</sup> In addition, a management fee is also paid to the PPO (where agreed) to cater for various PPO services.

Markets are segmented between resources produced using conventional and sustainable processes (organic and "pharmaceutical and traceable") and they are contracted and paid a bit differently. Harvesters of organic and traceable INPs receive higher prices, at least from one exporter-buyer, but incur the substantial cost of compliance.

Expansion of some overseas markets is constrained by existing and evolving regulations as well as the costs and effort associated with compliance. International demand for INPs has also proven to be volatile on a year-to-year basis. In short, INP product markets are complex. One implication of these various attributes is that we have found it appropriate to address some evaluation questions on a product-by-product basis.

The INP activity is expected to increase incomes for an estimated 7,000 primary producers and their households, benefitting a total of about 35,000 individuals. An important aspect of the INP activity is not just generating income for the rural poor but to do so in accordance with an "access and benefit sharing" approach.

The INP Activity has three sub-activities:

- Support to Producer and Processor Organisations (PPOs), including both training and grant support through Primary Production Improvement Grants (PPIG);
- Delivery of market information on INP products and market data through the National Botanical Research Institute (NBRI); and
- Provision of an INP Innovation Fund.<sup>65</sup>

These activities are now described in more detail to provide a basis for the evaluation presentation.

### *Support to PPOs*

PPOs are community-based organisations that are used as first-level collators and bulkers of wild-harvested or semi-domesticated raw materials. The program intends to take advantage of this existing network of grassroots collators as it provides ready entry points for promoting sustainable management, hence strengthening their capacity is fundamental to program success. The program does this through supporting PPOs in two ways: training combined with technical assistance and small grants through the PPIG program. All members of PPOs are eligible to receive training, assuming they sign a service agreement with the project's local service provider, but not all PPOs may receive grants. However one PPO may receive a grant on behalf of many associations.

Assistance to PPOs is led by the Natural Resources Institute (NRI), University of Greenwich. It has contracted three service providers (CRIAA SA-DC, IRDNC and NNF) for delivery of services to the PPOs.

Participant PPOs were selected using the results of on-site meetings between PPO representatives and those of one of the Activity's three service providers at which a PPO "profile" was completed and the PPO's training needs discussed. The capabilities of the PPOs were then assessed using a diagnostic tool and 79 PPOs identified who met the requirements for receiving training and technical support in Year 1. The service providers then visited these PPOs to conduct a more in-depth analysis

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<sup>65</sup> This description is a slightly edited version of that in Section 2.2 in the RFP for the evaluation project issued by MCA-N.

of strengths and weaknesses to define the types of support needed.<sup>66</sup> Using this information, 63 PPOs were selected for inclusion in the activity but only 60 are targeted through this intervention

**Training Support.** One result of the exercise just described was a list of training requested by PPOs that is shown in Table 7 with those most often requested at the top of the table.<sup>67</sup>

**Table 7: Areas of Training Requested by PPOs**

	Area of Training	Number PPOs requesting
1	Organisation development	53
2	Business and marketing skills	28
3	Record keeping	28
4	Monitoring quality of INPs	27
5	Leadership skills	26
6	Sustainable harvesting methods	25
7	Processing and production methods	21
8	Cultivation and enrichment planting	19
9	INP resource management	14
10	Monitoring during harvest and post-harvest	14
11	Gender mainstreaming	14
12	Administrative skills	10
13	INP product development and value addition	6

This training supports the planning efforts of collaborating PPOs. Plans include a Resource Management Plan and a Business plan for fragile INP. The latter is needed by all PPOs to ensure that a PPO's harvesting activities are coordinated with those of other PPOs so that the market is supplied with good quality material within the agreed time frame and to prevent over- or destructive harvesting of the resource. Such a plan has two components. Getting these plans where relevant in place is an important milestone for PPOs.

**Primary Production Improvement Grants (PPIGs).** The PPIGs constitute the second line of support to PPOs. The program's principles are: (a) simplicity—grants for a small number of standard items are to be made; and, (b) grant purposes are to support PPOs to expand INP production and processing on a sound environmental and social basis.

Grants can be for basic equipment, facilities, or services. The grant program's objective is to assist the PPOs to expand their capacity to produce and subsequently market INPs. Primary processing equipment, storage facilities, services and packaging and labeling equipment account for a substantial share of the grants. Grants are not disbursed as cash; the actual equipment is provided. In particular, NRI puts together quotes but MCA-N arranges the actual procurement. Where needed assist-

<sup>66</sup> Information from *Producer and Processor Organizations Sub-Activity PPO Diagnostic Report, Part 1*, September 2010.

<sup>67</sup>Ibid., Appendix 4.

ance is provided by service providers to plan for use of equipment and perhaps additional training in its use.<sup>68</sup>

Grant applications are accepted periodically and can be used by the PPO or a sub-group of members. As of October 2013, a total of US\$262,261 in grants had been approved (though only about half of these come from MCA contributions).<sup>69</sup> Funds will be disbursed relatively evenly over the February 2011–June-2014 period. The first 18 grants were made in 2011 with an additional 5 grants made in Round 2 (2012), 4 grants in Round 3 (2012), 3 grants in Round 4, 3 grants in Round 5, 10 grants in Round 6, and 7 grants in Round 7.

**INP Innovation Fund.** The Fund’s purpose is to provide financial support for improvements in the INP industry that are essential to ensure both the short- and long-term competitiveness of Namibia’s indigenous natural products in the global market place. INP Innovation Grants are available on a competitive basis to research entities, academic institutions, and other private sector organisations, Government of the Republic of Namibia agencies, NGOs, and CBOs. Broadly the projects should be for new product platforms, extraction and refinement innovations, the development and promotion of improved techniques for processing, product analysis and regulatory compliance.<sup>70</sup>

The Fund supports a series of “calls for proposals” to solicit interest from public and private entities to develop innovations for broad application in the INP industry. By September 2012 the INP Innovation Fund had awarded eight grants through three grant rounds.

As of November 2012, the funds of the INP Innovation Fund had been fully committed and no further Calls for Proposals will be made.

**Market Information Delivery.** Most PPOs’ sole source of market information is intermediate buyers. In this circumstance a third-party source to validate offers of buyers or provide a knowledge base from which to negotiate a price can be very valuable. NBRI was to collect volume and price information from PPOs, processors, and buyers, and assemble and disseminate this information in a timely and effective manner to regional extension offices and PPOs. NBRI had established a database (NamIP) for capturing market information relating to indigenous plant species; however the original plan for the Market Information Delivery was not implemented. Instead, a Market Bulletin published every 7-9 months was created. As part of the evaluation NORC will investigate how (and if any) pricing information was methodically transmitted to PPOs.

Figure 5 presents the MCA-N and NRI program logic. The MCA-N’s evaluation logic, as presented in Section 4.3 will be based entirely on this underlining program logic and builds a framework for measurement of change that fits within a shared understanding of that logic. Before moving onto the evaluation design, though, it is important to draw out our understanding of the nuances of the program logic.

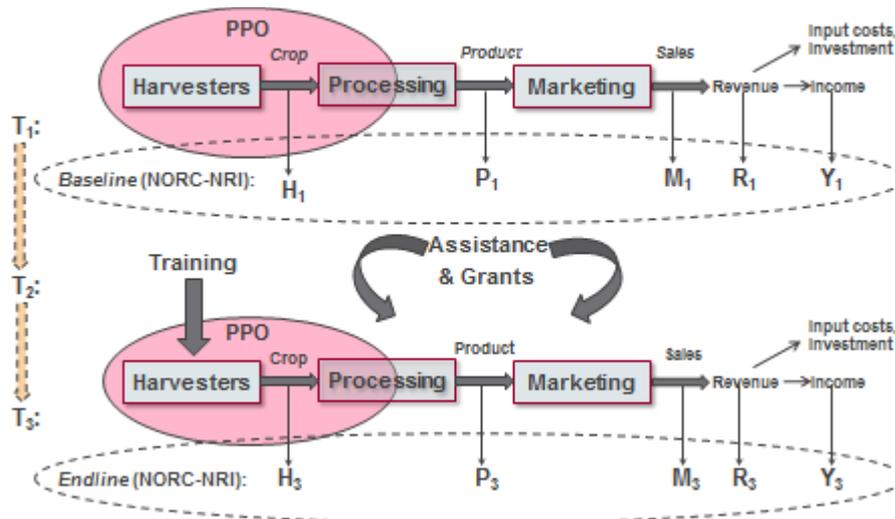
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<sup>68</sup> Information on the program is drawn from the report: NRI, *Indigenous Natural Products, Primary Production Improvement Grant (PPIG) Manual: Guidelines for Applicants*, November, 2010; *Indigenous Natural Products, Producer and Processor Sub-Activity, Quarterly Progress Report 3*, May 2011; and comments on earlier drafts by NRI.

<sup>69</sup> According to the NRI, *Quarterly Report*, Q12.

<sup>70</sup>Based on the report, *INP Innovation Fund: Grants Manual*, May 2010.

**Figure 5: The MCA-N and NRI program logic for the INP Support Activity**



For the INP component, the intervention begins with harvesters who are part of a PPO. Training and assistance can go directly to harvesters, as is the case with trainings on sustainable harvesting techniques, or be filtered through a PPO, as is the case with the PPIG grants. Harvesters collect/harvest the INP which in some cases then undergoes a small amount of processing at the harvester level, for example decortication in the case of Ximenia and Devil’s claw slicing (as shown by having the PPO ellipse overlap both harvesting and processing). In other cases there is no processing at this level or processing is done at a separate site, for example with Marula at the EWC. The next step in the process is developing or strengthening markets for each product to ensure the INP can be moved through the value chain.

The intervention is designed to impact each point in this chain:

1. Harvesting – through training
2. Processing – through training, PPIG grants, and the Innovation Fund (in reference to developing more efficient processing and refining techniques)
3. PPO – PPO level trainings, facilitation of buying agreements and assistance to help harvesters work together to receive the best prices for their goods, and institutional assistance and strengthening.
4. Marketing – To develop new markets for INP and strengthen existing markets.

The end goal of the intervention is to ensure that harvesters receive more income from harvesting INP, the resource is sustainably harvested (especially Devil’s claw) and that the PPO structure is sustainably managed over time. A secondary goal of the activity is to ensure that historically marginalized groups, such as women, benefit from the intervention. It may be the case that, as INP revenue increases, men will insert themselves into the process in order to benefit from the new revenue stream. Toward these ends, the PPO sub-activity under INP Activity is to increase economic opportunities for INP stakeholders through four areas:

1. PPO organisational development
2. Development of PPO competence in business and marketing principles<sup>71</sup>
3. The application of technical improvements to INP processing and/or refinement
4. Introduction and wider diffusion of sustainable harvesting practices (mostly just in the case of Devil's Claw)

The application of technical improvements in Point 3 is described by NRI as referring to the application of technology to improve harvesting and the processing and preparation of products for the market. These improvements are realized through technical training in simple processing techniques and quality management, as well as upgrading to higher value streams through the application of simple technical solutions. They also relate to improved, on-farm cultivation (in the case of Marula), harvesting and handling.<sup>72</sup>

Although these goals are most likely reachable, the time frame for the evaluation may not be long enough to capture large-scale changes in income or sustainability. Therefore it is also important to consider possible shorter-term successes such as increased INP sales, gender empowerment, the development and fielding of new and innovative processing techniques, and increased harvesting yields when assessing the impact of the INP intervention.

## 4.2 Evaluation Questions Being Addressed

The Terms of Reference (TOR) listed a set of questions to be addressed by the evaluation. During the team's visit to Namibia in August 2012, key stakeholders were asked if there were other questions that should be addressed or whether some of those listed in the TOR should be replaced with others. Working together with the NRI team, MCC, and MCA-N an updated list of research questions was developed to form a base for further discussion. Table 8 shows the resulting list. This list is used below to guide what is evaluated via the FGDs, KIIs, and statistical tests.

As in the case of the conservancies, the midline qualitative analysis highlighted a number of issues that have guided upcoming quantitative data collection and analysis. The questions raised will influence both further qualitative work as well as quantitative study. Among the former include:

- a. More interviews with international market representatives should be carried out, including their familiarity with the Market Bulletin.
- b. Commiphora and Marula unused harvests and spoilage need to be looked at.
- c. The *Market Bulletin* was to disseminate price information. Who needed it and did they get it as a result of the publication?
- d. To what extent did the absence of a central marketing facility in the program design affect performance?
- e. Viz. Devil's Claw, what is actually being done regarding the accreditation process? And what do harvesters say is the implication (for product differentiation) on their efforts to improve product quality?

<sup>71</sup> A big part of this is not only the training but also assistance with contracts with buyers and the marketing.

<sup>72</sup> NRI, *Indigenous Natural Products: Producer and Processor Organisations Sub-Activity Data Collection Plan*, April 2011, p.7. Note that Marula was not under cultivation at the time of this writing.

- f. Are harvesters aware of price changes over time, especially for Marula?

Likewise, quantitative study will now be augmented to cover:

- a. Did PPO capacities converge to the same level or remain as dispersed as at baseline?
- b. To what degree is there harvester frustration regarding rejected raw material and delayed payments? Is this affecting project impact?
- c. Which member of the household actually dispenses the cash, regardless who earns the income?
- d. Technical assistance has not apparently helped improve PPO organisational capacity to manage their business and income/revenue as most PPOs seem to be largely managed with the help of implementing partners. Can we investigate whether this actually the case, say, using the upcoming PPO “factsheet” and, if it is, then why.
- e. To understand productivity changes and training benefits, we should examine why people drop out of harvesting. Is it because harvesting is too much work for too little pay? Is there too much inventory?

As will be seen, the various surveys developed for the evaluation at baseline have been revised to support an endline analysis of these additional considerations.

### 4.3 Evaluation Design

The principal questions to ask when designing an impact evaluation are who is to be the treated population, what are the interventions (and how should they be measured), how should they be assigned to the target population, and what are the impacts of interest to attribute (and how they should be measured)?

#### *Who and what is being evaluated?*

The issue of who is to be the beneficiary of the MCC intervention is less straightforward than at first it appears. To answer the question some deconstruction is required.

First, part of the intervention directly targets the PPOs, with grants of implements, etc., management training, and even modest fees paid. MCA-N has indicated interest in learning whether there is systematic evidence that PPOs have increased their capacity and that they are on the road to financial sustainability. Some of the research questions of Table 8 focus on the extent of such impacts.

Of course, the ultimate purpose of the intervention must be to improve the wellbeing and productivity of the harvesters comprising PPO membership. Yet even here, who is the target of the evaluation: all members of the PPO or, perhaps, only those members who self-select to participate in the intervention (e.g., receive training and, importantly, harvest)? There were challenges with the sample frame for PPO members.<sup>73</sup> First, the baseline sample frame was put together from 2009 PPO membership lists but since the baseline household survey took place in 2010, the enumerators found that some harvesters were no longer harvesting and thus were excluded from the baseline survey. Furthermore, the sample frame only included membership from 28 PPOs (out of 63 targeted PPOs) since only the most organized PPOs could provide us with membership lists. As such, sampling

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<sup>73</sup> These are detailed in the Baseline Survey Design Report.

bias was introduced from the start. Moreover, the harvesters which were represented in our final baseline dataset include harvesters who received training from NRI As well as harvesters who did not receive training. However to augment the sample size for endline (to reach our original target of 500 INP harvesters), the additional households will be drawn from a list of trained harvesters provided by NRI. Hence, the new harvesters will all be trained. Therefore, the endline dataset will contain a mix of trained and untrained harvesters: panel respondents (trained and untrained) + new harvesters (trained only).

**Table 8: INP Evaluation Questions**

N.	Evaluation question*	Method
1	Do the technical assistance package and the small grants increase the quantity and quality harvested and/or processed by recipients? <sup>(a)</sup>	Both qualitative and quantitative
2	To what extent has the Delivery of Market Information Sub-Activity contributed to increased understanding of the broader INP sector (e.g., volumes, markets, key players, etc.)?	KIIs only
3	What is the uptake rate and effect of the practices and techniques introduced as part of the technical assistance on recipient harvesters?	Both qualitative and quantitative
4	For the PPO did the technical assistance improve organisational capacity to manage the business and income/revenue?	Qualitative
5	How sustainable are the results in terms of increased production, sales and income? E.g., market chain (are there long-term buyer contracts in place, are the institutions functional and independent).	Qualitative
6	How has the re-organisation of the Indigenous Plant Task Team contributed to the growth and sustainability of the INP sector?	Qualitative
7	How did new developments from the INP Innovation Fund impact on the INP sector?	Qualitative
8	Did the composition and level of household incomes change (more income sources, more diversification, and higher income)?	Quantitative
9	What changes are apparent in intra-household incomes and assets, including specifically around income earned by male and female household members? Does the intra-household distribution of income and employment by male and female household members change?	Qualitative
10	Did household assets change (houses, bicycles, radios, television sets, telephones, etc.)?	Quantitative
11	Did the composition of household financial assets change (savings, debt, borrowing, insurance)?	Quantitative
12	What is the perceived impact on household gender relationships from the intervention among recipients?	Qualitative
13	What is the combined effect of being part of a conservancy and PPO member among women?	Both qualitative and quantitative

\*Abbreviations in parentheses indicate whether qualitative methods are the primary approach to addressing the evaluation question. The default is quantitative. (a) Here, small grants refer to Primary Production Improvement Grants (PPIGs).

A second and unfortunate problem encountered during baseline administration was the existence of intermittent harvester participation in PPOs. In other words, often for social and cultural reasons,

there seemed to be a substantial number of harvester-households that do not harvest INPs consistently from season to season. This has the consequence that a member of a PPO (i.e., on a PPO list) may not have been harvesting INPs during the baseline period, so was rejected for interviewing, though their name was on the original PPO sampling list.

This may seem at first like purely a sampling issue and not one that should concern us in the present context. This is not the case. We need to define the population to be evaluated. Do we evaluate intermittent harvesters, especially if they have received some amount of implementer assistance? We believe the answer must be yes—but with a clarification. Those who receive at least some recorded level of participation in the intervention, whether they harvest consistently or not, should be included within the scope of the evaluation. However, the average intervention effect of this latter group—the so called Intent-to-Treat (ITT) effect—should not be combined (or confused!) with the earlier ToT effect, which should be rather larger.

Toward this end, we propose the following post-baseline evaluation strategy to pursue. First, any household in the baseline should be interviewed at endline. Second, for additional (“new”) households, any harvester-household that has received program training<sup>74</sup> should be interviewed if they are selected from the sampling list and are located in the field.

Next, the operative question is how many evaluation designs are required for the four INPs targeted. Note that this is a separate question from (i) whether each INP has a unique supply chain and (ii) what the requisite composition and size of the sample needs to be. First, we must recognize that the five INPs under evaluation—Commiphora, Ximenia, Marula, Mopane, and Devil’s Claw—can be distinguished according to three realities on the ground:

- Whether harvesting methods are intrinsically sustainable or can in principle threaten future production;
- Whether there is an international market with a large demand for the species (without further R&D) relative to Namibia’s production capacity;
- Whether Namibia (the project) has a factory to process downstream product(s).

The key to answering the operative question, beyond establishing the beneficiary unit and recognizing the above realities, lies in determining what is required for addressing the research questions and, relatedly, what the outcome (impact) indicators are. Drawing on all the above considerations, as well as Figure 5 and its accompanying text (which indicate that the interventions interact with the INP sector at the point of harvesting, processing, and marketing), we conclude that separate analyses will be required for:

- household impacts of additional employment for women (reduction of women’s time for household activities; redistribution of income and empowerment toward women; more total household income; changes in family physical and financial assets composition);

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<sup>74</sup> Theoretically, all “new households” will have received program training since they are sampled from the list of trained harvesters provided by NRI.

- harvester impacts of training, grants, factories (capture of more pre-processing value added; uptake of new techniques; changes in harvest output, quality, productivity, and ecological sustainability; change in composition of non-INP agricultural output);
- PPO impacts from capacity building (improved business practices; increased revenues; formation of additional groups); and
- Sector impacts from new infrastructure and services (factories; marketing intermediation and facilitation; distribution transport and logistics).

In what follows, we describe evaluation designs for each of these impact targets, starting, first with a translation of the original MCA-N program logic (see Figure 5 for their common elements). Our plan, therefore, is to investigate the research questions using sectoral, PPO, and household (which includes harvesters) data and where, depending on the research question, the unit of analysis is the PPO, harvester or household.

### *Evaluation logic and its common design elements*

The evaluation logic is central to the conception of the evaluation design and is firmly rooted in the MCA-N's overall program logic (see Figure 5). Though very similar, it is helpful to present this logic explicitly as is done in following three figures.

Figure 6 illustrates how the INP Support Activity operates on three levels (sector, PPO, and harvester), each modulated by the spheres within which it is embedded. For example, the ultimate effectiveness of PPO capacity building (middle sphere) on impact indicators depends on the improvements to the supply-chain within which the PPO operates. Figure 7 elucidates how the same bundle of support that is sectorally disaggregated in

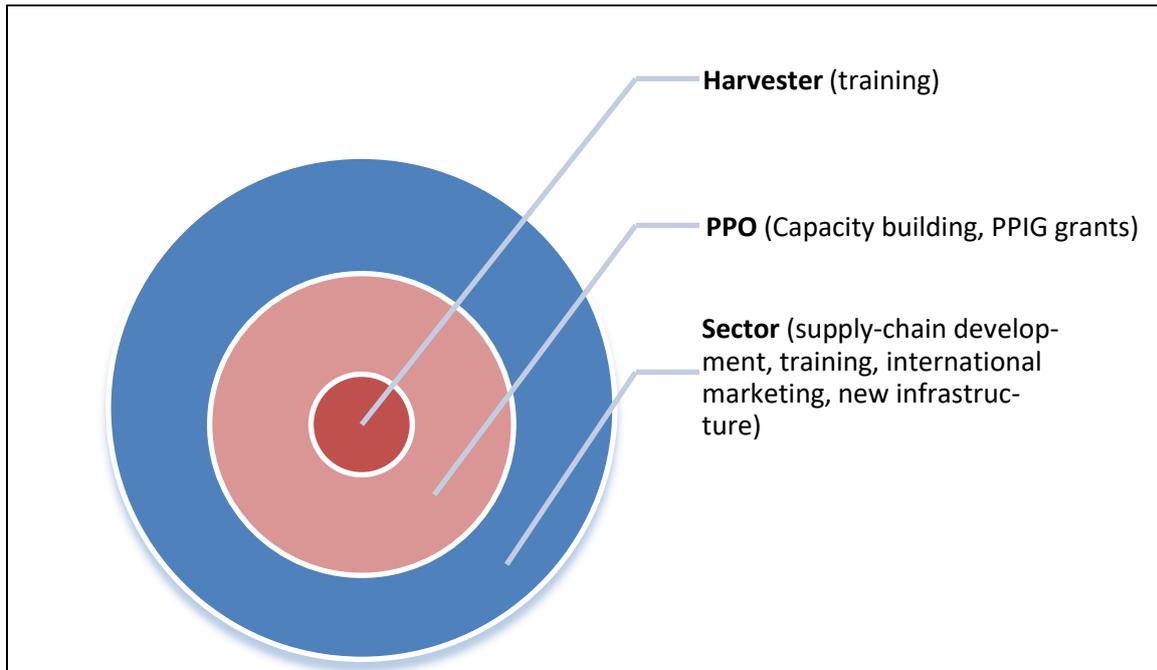
Figure 6 functions to increase harvesting effort. The idea is that the increase in productivity increases the opportunity cost of dedicating an additional unit of labor to other activities so labor is reallocated toward harvesting, increasing its labor supply..<sup>75</sup> Finally, in

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<sup>75</sup> There is also a smaller income effect: existing units of labor generate a higher return, causing a reduction in effort. A bit of introspection makes clear, however, that the net effect is positive: most people don't work less when they get a raise.

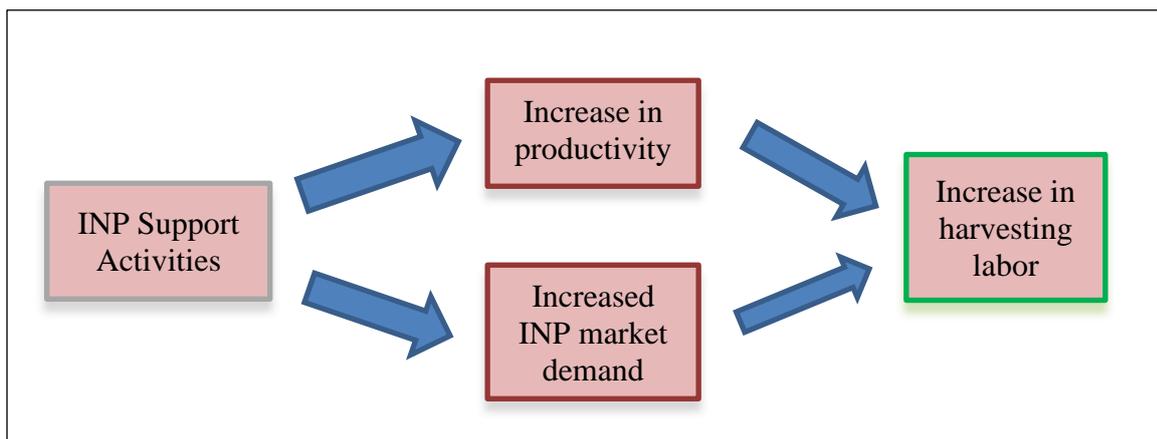
Figure 8 we see how the increase in harvest effort leads to changes in household—and women’s, in particular—wellbeing.

**Figure 6: The nested (recursive) nature of the INP Support Activity intervention**

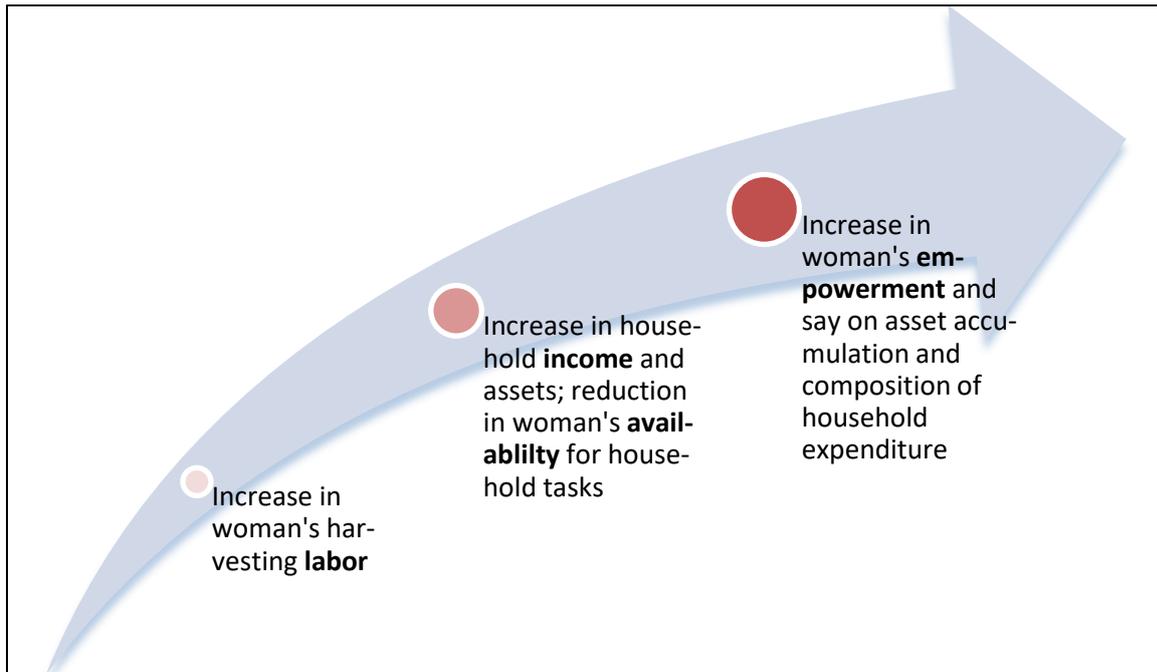


The assessment of Innovation Grants (Question 8) will be limited and is qualitative, involving interviews with key informants. This is because the outcomes of the grants are considered proprietary and confidential. We expect, therefore, only to examine the process.

**Figure 7: Impact of INP Support Activity on household labor supply**



**Figure 8: Indirect impact of INP Support Activity on woman's empowerment**



It is also helpful to heuristically illustrate the sequence of events in project as implied in Figure 5 from a perspective of the evaluation. This is given in Figure 9, where, we see two of many possible sequences of intervention activities as received by two representative PPOs,  $k$  and  $m$ . Here, the variables  $F$ ,  $A$ , and  $T$  stand for funding, technical assistance, and training and the subscripts refer to PPO and time period (for which 8 are illustratively indicated in the figure). (The other variables,  $H$ ,  $R$ ,  $M$ , and  $P$  are defined as above in Figure 5.)

Below, we translate this heuristic program and evaluation logic into mathematical expressions to form a system of equations that can be estimated and then used to support the existence of possible causal relationships. While each component equation of the resulting impact statistical model is unique, their specification and intervention are similar. Therefore, prior to diving into particulars, let us examine the main aspects of their common elements.

**Figure 9: Illustrative sequences of intervention activities and data collection**

Period	1	2	3	4	5	6	7	8	Data Source
PPO <sub>k</sub>	$H_{k,1}, Y_{k,1}$							$H_{k,8}, Y_{k,8}$	NORC survey
	$P_{k,1}, M_{k,1}, R_{k,1}$							$P_{k,8}, M_{k,8}, R_{k,8}$	NRI
		$F_{k,2}$							NRI
					$A_{k,5}$ →				NRI
			$T_{k,3}$ →				$T_{k,7}$		NRI
PPO <sub>m</sub>	$H_{m,1}, Y_{m,1}$							$H_{m,8}, Y_{m,8}$	NORC survey
	$P_{m,1}, M_{m,1}, R_{m,1}$							$P_{m,8}, M_{m,8}, R_{m,8}$	NRI
				$F_{m,2}$ →			$F_{m,7}$		NRI
		$A_{m,2}$ →							NRI
	$T_{m,1}$		$T_{m,3}$		$T_{m,5}$	$T_{m,6}$			NRI
...	...						...	...	

First, we choose to use the **continuous-treatment-variable (CTV) model** as the basis for inferring likely causality. While Chapter 2 contains a discussion of this model’s mathematical form, strengths, and weaknesses, one aspect of the INP intervention has added bearing to the benefits of its present application. Recall the original argument for using the CTV model was a lack of comparison group; all eligible harvesters and PPOs were to participate in the intervention. However, there appears to exist a subset of this eligible population (and, in particular, that part found in the baseline sampling frame, as introduced, below, that the evaluation will require) that may *not* participate in the intervention over the course of the evaluation period. In addition, there is reason to believe that, at the time of the baseline (or endline, as the case may be), this subset was statistically equivalent (once conditioned on other observables) to the subset of observations that receives the intervention. Hence, the former subset would register values of zero for the intervention variables (the “dosage”) in the various CTV models being estimated. While these zero-intervention observations are not likely numerous enough to implement a quasi-experimental design, they are rather felicitous, since the expand sample variation in these key explanatory variables.<sup>76</sup>

Second, we note that the system of structural equations is recursive, that is, that the results of each one feed into the next one in the causal chain. For example, once labor supplied as a dependent (endogenous) variable is attributed then that amount of labor becomes an explanatory variable in the next stage of estimation focusing on income. This recursive system is presented in Table 9.

Third, we may distinguish in the formulation of Table 9 two conceptual challenges: (i) identification of which variables require *models* for estimation, e.g., change in income, and (ii) which variables require construction of an appropriate indicator, e.g., intensity of training. We examine the issue of indicator measurement in Section 4.4.

<sup>76</sup> Contrary to the case of experimental-design-based impact evaluation, the greater dispersion of the explanatory covariates in a multivariate regression analysis the more statistically powerful is the estimation, *ceteris paribus*.

**Table 9: System of recursive CTV models of INP Activity’s impacts**

Hypothesized causal relationships	Specification of recursive continuous-treatment-variable models	Explanatory covariates*
Intervention affects productivity ( $P$ ) and sector demand ( $D$ )	$\Delta P = f^p(\Delta T, \Delta G, \mathbf{Z}_p, \dots)$ $\Delta D = f^d(\Delta M, \Delta H, \mathbf{Z}_D, \dots)$	Training intensity ( $T$ ), marketing ( $M$ ), supply chain ( $H$ ), grants ( $G$ )
Increase in demand and productivity increase INP labor ( $L$ ) and harvester output ( $S$ )	$\Delta L = f^l(\Delta P, \Delta D, \mathbf{Z}_L, \dots)$ $\Delta S = f^s(\Delta L, \mathbf{Z}_S, \dots)$ Note $D = \sum S_i$	-
Increases in amount harvested or market prices increase both household income ( $Y$ ) and woman’s income ( $Y_w$ )	$\Delta Y = f^y(\Delta S, p, \mathbf{Z}_Y, \dots)$ $\Delta Y_w = f^w(\Delta S, p, \mathbf{Z}_Y, \dots)$	Farm-gate price of INP ( $p$ )
Increases in household income increase household assets, “woman’s” assets ( $A_w$ ), and women’s empowerment ( $E_w$ )	$\Delta A = f^a(\Delta Y, \mathbf{Z}_A, \dots)$ $\Delta E_w = f^e(\Delta L, \xi_w, \Delta Y_w, \mathbf{Z}_E, \dots)$ $\Delta A_w = f(\Delta Y_w, \alpha_w, \mathbf{Z}_A, \dots)$	Relative empowerment of wife ( $\xi_w$ ) Share of “woman’s” assets ( $\alpha_w$ ),

\* The  $\mathbf{Z}_k$  are vectors from Table 3.4-1 of other controls and covariates (including time elapsed since key intervention activities), where  $k$  identifies the equation in which they appear. The symbol,  $f$ , refer to a function whose arguments are the variables in parentheses that follow it.

Fourth, there is a strong conceptual justification for a multi-year analysis: earlier analysis of the household incomes in conservancies showed that households in longer-established conservancies had higher incomes when measured at a future date, after controlling for other factors. This suggests that the earlier an organisation benefits from a particular type of training or improves its productive capacity through grant financing, the larger the effect on household income—and by extension, the organisation’s—at a future income measurement point.

Fifth, an analysis is planned to determine if there are significant differences in the basic characteristics of PPOs. It is necessary to understand if there are systematic differences in the aspects of the intervention received by the PPOs with households included in the INP household survey and other participating PPOs. Significant differences could call into question the generalizability of the analysis findings.<sup>77</sup> We already know, for example, PPOs differ by INP, membership size, age, and whether part of a conservancy. In particular, some PPOs are part of a conservancy management group and some are not. These institutional idiosyncrasies can be handled in the model’s specification using dichotomous variables. Such an approach also allows us to determine the importance of institutional arrangements for capturing intervention benefits. Age is also a source of difference among PPOs,

<sup>77</sup> This study pertains only to the set of PPOs that IRDC certified as eligible for INP Support Activity participation. It is only with this group that we refer to the generalizability of findings.

leading to vastly different degrees of experience. Some PPOs have already benefited from many years of assistance from previous interventions while other PPOs are only now starting up and, therefore, have no previous experience.<sup>78</sup> The typical way to handle the influence of training is to use some combination of an “exposure” length variable and its interaction effect with one or two other covariate causal factors.

Finally, as argued throughout this report, qualitative research can provide many of the insights of quantitative analysis. The sample of PPOs selected to participate in the focus group discussions will be drawn from conservancies and non-conservancy PPOs. Although this method of assessment will not yield statistically significant results, as we argue in Section 4.7, the informal nature of the research method should reveal important observations of the opportunities, operations and impacts of PPOs under the different institutional arrangements.

### *Evaluation-specific design elements*

Let us now build on these common design elements for the individual impact evaluation designs corresponding to the INP sector, PPOs, harvesters, and households.

**Household design elements.** The unit of observation of interest is the household, which may comprise more than one harvester. While Table 10 provides a more exhaustive list, the *principal* impact variables whose attribution is sought include:

- Medium-term impacts: Changes in women’s allocation of labor, change in household expenditure patterns, changes in woman’s income (sale of INP harvest);
- Longer-term impacts: Household income, expenditure, and change in the composition of household assets.

To this list we add empowerment (see Section 4.3 on how it is measured). For social and cultural reasons, among others, it is not theoretically clear whether changes in women’s empowerment should be detectable in the short-, medium, longer-run, or all three.

Covariates are likely to cover sales of INP, location, demographics, family composition, and education, among others.

Finally, data are required for households across the seven regions under study. We do not foresee this set of models as imposing special constraints or additional requirements over and above those that flow from sampling considerations.

**Harvester design elements.** The unit of observation here of interest is the harvester, which is loosely organized within PPOs (some of which, in turn, are within conservancies). Data are being collected on harvesters across households and regions so as to include harvest activity for each of the five INPs under study. The *principal* impact variables whose causal antecedents are sought are the same for the medium run as for the longer term: output, labor supplied, and productivity.

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<sup>78</sup> At the risk of too much detail, in fact, some of the “new” PPOs are made up of members of old PPOs that grew too large. That means that the members may have received trainings under the bigger PPO they broke off from

Covariates are likely to cover intensity and amount of training, type of grants to harvester's PPO, measures of increased demand due to implementer success in opening international markets, changes in salient characteristics of the supply chain (vehicle transport, increase/use of supply points and rapid payment of harvesters).

**PPO design elements.** The CTV statistical equations to be estimated for PPOs will draw heavily on NRI's monitoring data and their quarterly and annual reports. Examples are PPO size, geographic coverage, history, output, assets, sales, species harvested, governance structure, and member participation measures. They will also include information on the receipt of PPIG grants, such as type, amount, purpose, and outcomes. NORC will also create a PPO fact sheet to examine PPO-level characteristics and experiences. In principle, NORC will complete these based on existing NRI monitoring data, though if important characteristics are missing for some PPOs then those PPOs would need to be dropped from the analysis (or, if the data are missing for PPO with households that are part of the endline sample, then, possibly, the data could be self-reported by PPO management at the time that the endline household survey is fielded).<sup>79</sup> Finally, PPO-level harvester characteristics and performance indicators will be created from variables in the INP household survey by aggregating or averaging them over all harvesters in the PPO.

**Sector design elements.** This design envisions up to five overlapping sectors comprising the five INPs under study. We say "up to" since some aspects of processing, distribution and marketing may entail the same infrastructure and actors. It is not likely that econometric analysis can be done for this level of the evaluation. Rather, the assessment of IRDC work on the supply chain and its logistics, international marketing initiatives, and additions to processing plant capacity will be carried out through key informant interviews. (Of course, a dichotomous sector variable will figure in the causal-model equations of the other levels of analysis.)

#### **4.4 Analysis of Research Questions**

This section builds on the designs articulated in the previous section in two ways. First, it relates them to particular research questions from Table 8. This permits us in Section 4.5 to determine the sample sizes and composition that these designs require. By comparing these requirements to the original baseline sample, an assessment of further data collection is carried out. Second, this section discusses the issue of indicator construction for the cases in Table 9 in which directly measurable variables are not available, even in principle.

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<sup>79</sup> Of course, if a key is missing for all PPOs in our sample then the particular analysis itself would need to be dropped.

**Table 10: Analysis Plan for Estimating Impacts of INP Support Activities**

Impact Indicator	Interventions		Covariates	Analysis Type
	Treatment	Indicator		
1. Did the technical assistance package and the small grants increase the quantity and quality harvested by recipients? <sup>80</sup>				
<ul style="list-style-type: none"> <li>Volume of INP harvested</li> </ul>	PPIGs received	Number, value, type of PPIG by PPO each year	<ul style="list-style-type: none"> <li>Date of service agreement</li> <li>Non-MCA support to PPO</li> <li>Type of PPO organisation</li> <li>Part of a conservancy</li> <li>Product type at baseline</li> <li>Market price by INP produced</li> <li>Types of INPs harvested</li> <li>Baseline values for state-of-development indicators</li> <li>PPO has bank account</li> <li>Commercially sold INP products at baseline</li> <li>Has contract or verbal agreement with buyer</li> <li>Maintains quality required</li> <li>Does grade or quality check</li> <li>Keep record of sales</li> <li>Year above conditions made</li> <li>Has Organic Certification</li> <li>INP volume exported in year</li> </ul>	Separate analyses at the level of the PPO and the harvester  <i>Regression analysis (with endogeneity correction) of assistance dosage, training intensity, and mix on volumes of harvest, processed product, sales, and quality thereof</i>
	<ul style="list-style-type: none"> <li>Technical advice and demonstration assistance received</li> <li>Training</li> </ul>	<ul style="list-style-type: none"> <li>Type of assistance</li> <li>Frequency of assistance received</li> <li>Date of assistance received</li> <li>Duration of assistance</li> </ul>		
<ul style="list-style-type: none"> <li>Volume of INP harvested using organic methods<sup>81</sup></li> </ul>	<ul style="list-style-type: none"> <li>(a) business plan development and adoption</li> <li>(b) organisational management training</li> <li>(c) business/marketing principles training</li> <li>(d) management/monitoring plan assistance</li> <li>(f) training in sustainable harvest techniques</li> <li>(e) training in organic methods to become certified</li> </ul>	Year in which PPO: <ul style="list-style-type: none"> <li>(a) adopted business plan</li> <li>(b) was trained in organisation management</li> <li>(c) was trained in business/-marketing principles</li> <li>(d) produced management/monitoring plans</li> <li>(f) was trained in sustainable harvest techniques</li> <li>(e) Year in which PPO became certified for using organic methods</li> </ul>		

<sup>80</sup> We are still inquiring with NRI whether their monitoring data contain any information on harvest quality (e.g., rejection percentage, spoilage) besides whether organic.

<sup>81</sup> Means that the INPs produced and processed by a PPO can be certified as coming from an organic source or be proven to have been sustainably harvested, both environmentally and socially, or should have been fair-traded.

Impact Indicator	Interventions		Covariates	Analysis Type
	Treatment	Indicator		
2. To what extent has the Delivery of Market Information Sub-Activity contributed to increased understanding of the broader INP sector (e.g. volumes, markets, key players, etc.)				
Buyers and policy makers are awareness and use of <i>Market Bulletin</i>	Delivery of market information	Characteristics of information dissemination methods <sup>82</sup>		<i>KIIs with buyers and policy makers to substantiate causal inferences</i>
3. What is the uptake rate and effect of the practices and techniques introduced as part of the technical assistance on recipient harvesters?				
<ul style="list-style-type: none"> <li>■ Number or percent of new techniques introduced that harvesters are familiar with or use</li> </ul>	<ul style="list-style-type: none"> <li>■ New practices &amp; techniques introduced to harvesters</li> </ul>	<ul style="list-style-type: none"> <li>■ Number or percent of practices and techniques introduced to harvesters</li> <li>■ INP-RQ1 variables</li> </ul>	INP-RQ1 covariates	<p>Analysis at HH units</p> <ul style="list-style-type: none"> <li>■ Implementer monitoring data</li> <li>■ CS/INP survey with new questions on knowledge &amp; adoption of new practices</li> </ul> <p><i>Regression analysis of degree and factors influencing the uptake of assistance dosage, intensity, and mix;</i></p> <p><i>FGDs with PPOs and KIIs with buyers to assess existence and effects of new knowledge</i></p>

<sup>82</sup> NORC is still tracking these down from NRI.

Impact Indicator	Interventions		Covariates	Analysis Type
	Treatment	Indicator		
4. Did the technical assistance improve PPO organisational capacity to manage the business and income/revenue?				
Number or percent of introduced practices & techniques now used by PPO management	New practices & techniques introduced to PPO management	Number or percent of practices and techniques introduced to PPO management	INP-RQ1 covariates	PPO as unit of analysis PPO fact sheet, NRI training and monitoring data <i>Regression analysis of degree and factors influencing the uptake of assistance dosage, intensity, and mix</i> <i>FGDs with PPO management &amp; members to determine uptake of management training</i>
5. How sustainable are increased production, sales and income? E.g., market chain (are there long-term buyer contracts in place, are the institutions functional and independent)				
<ul style="list-style-type: none"> <li>■ Management of INP resource</li> <li>■ Nature of contracts with buyers</li> <li>■ Functional independence of PPO</li> <li>■ Resilience of marketing channels</li> </ul>	n.a.	All intervention activities	n.a.	<i>FGDs with PPOs and KIIs with INP implementers and buyers.</i>
6. How has the re-organisation of the Indigenous Plant Task Team contributed to growth and sustainability of INP sector?				
n.a.	n.a.	Re-organisation of the Indigenous Plant Task Team (IPTT)	n.a.	<i>FGD with PPOs; KIIs with INP implementers and with IPTT participants.</i>
7. How did new developments from the INP Innovation Fund impact on the INP sector?				
n.a..	n.a.	INP Innovation Fund (IIF)	n.a.	Unit of analysis is the innovation <i>FGD with PPOs; KIIs with INP implementers and with IIF recipients and IIF staff.</i>

Impact Indicator	Interventions		Covariates	Analysis Type
	Treatment	Indicator		
8. Did the composition and level of household incomes change (more income sources, more diversification, and higher income)? 10. Did other household assets change (houses, bicycles, radios, television sets, telephones, etc.)? 11. Did household financial assets change (savings, debt, borrowing, insurance)?				
<ul style="list-style-type: none"> <li>▪ Distribution of income</li> <li>▪ Distribution of income sources</li> <li>▪ Distribution of household expenditure by category</li> <li>▪ Household physical assets by type (farming and other assets)</li> <li>▪ Household financial assets by amount and type</li> </ul>	<ul style="list-style-type: none"> <li>▪ Harvester training</li> <li>▪ Organizing of buyers to raise harvest income</li> <li>▪ PPIG productivity grants</li> </ul>	INP-RQ1 variables disaggregated to the harvester level where feasible (e.g., training) <ul style="list-style-type: none"> <li>▪ HH attended trainings</li> </ul>	<ul style="list-style-type: none"> <li>▪ INP-RQ1 covariates</li> <li>▪ HH has a registered harvester</li> <li>▪ HH has official position w PPO</li> <li>▪ HH years selling INPs</li> <li>▪ HH is conservancy member</li> <li>▪ Education of HH head</li> <li>▪ Education of spouse</li> <li>▪ Number of workers in HH</li> <li>▪ HH is female headed</li> <li>▪ Pct. agriculture and livestock production consumed by HH</li> <li>▪ Asset and livestock holdings</li> <li>▪ HH knowledge of INP prices</li> <li>▪ HH aware of ISF innovations</li> </ul>	Analysis unit is households CS/INP survey  <i>Panel regression analysis on dosage, intensity, and mix of assistance and factors influencing the distribution of:</i> <ul style="list-style-type: none"> <li>▪ employment sources of income</li> <li>▪ expenditure categories</li> <li>▪ physical asset types</li> <li>▪ financial asset types</li> </ul> FGDs with PPOs; KIIs with service providers
9. What changes are apparent in intra-household incomes and assets and, specifically, by male and female household members?				
<ul style="list-style-type: none"> <li>▪ Earnings, by spouse</li> <li>▪ Earnings share, by spouse</li> <li>▪ Ownership/use of key assets, by spouse (qualitative analysis only)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Project-generated demand for INP harvest</li> <li>▪ Increased harvester productivity tools and practices</li> </ul>	INP-RQ1 variables	INP-RQ8 covariates	Analysis unit is households CS/INP survey  <i>Panel regression analysis on dosage, intensity, and mix of assistance and factors influencing household income distribution</i>  FGDs with PPOs; KIIs with service providers to focus on intra-household ownership of assets

Impact Indicator	Interventions		Covariates	Analysis Type
	Treatment	Indicator		
12. What is the perceived impact on household gender relationships from the intervention among recipients?				
Spousal perceptions of female empowerment	Project-generated INP employment opportunities	n.a.	n.a.	Analysis unit is households Separate FGDs with male and female spouses
13. What is the combined effect of being part of a conservancy and PPO a member among women?				
<ul style="list-style-type: none"> <li>▪ Earnings, by spouse</li> <li>▪ Earnings share, by spouse</li> <li>▪ Distribution of income sources</li> <li>▪ Expenditure (including value of conservancy benefits)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Project-generated INP income</li> <li>▪ Project-generated conservancy employment opportunities and cash and in-kind benefits</li> </ul>	<ul style="list-style-type: none"> <li>▪ Household membership in a conservancy</li> <li>▪ Household membership in a PPO</li> </ul>	INP-RQ8 covariates	FGDs with PPO members and with PPO management  <i>Multivariate analysis for each outcome indicator, including include dummy variable for conservancy membership in PPO harvester-level models and PPO membership in conservancy-household models</i>

Notes: INP-RQn = Variables listed in Question n under “intervention” or “covariates” in this table.

### *Tying research questions to CTV models*

Table 10 shows the specific analytic approach for each research question. The table contains five columns, each preceded by a restatement of the research question. The first column identifies the quantitative impact expected by the research question and provides an indicator of it that is measurable. The second column indicates the treatments under analysis corresponding to the question asked.

The third and fourth columns list the intervention and covariate or control variables to be included in the regression models. The inclusion of each of the intervention variable rests on the explicit causal model and hypotheses laid out earlier in this chapter. A PPO's receipt of a PPIG for storage shed construction, for example, is expected to lead to higher value of INPs sold by the PPO through a diminution of spoilage to crops harvested. A PPO that has adopted a business plan is expected to have a higher volume of harvested INPs and a higher value per kilogram sold through better management of harvesting, processing, storage and marketing that result from taking explicitly defined actions at each step in the process. Note that in at least one case the intervention variable is the output associated with the training and technical assistance rather than the input of training. For example, for Question 1 the PPO becoming certified is part of the intervention reflecting a combination of programme inputs and PPO effort.

More generally, some interventions will require gender breakdowns; others income or expenditure type breakdowns. Note that household expenditure will be considered, alongside household income, as another indicator for standard of living, as discussed in the previous chapter.<sup>83</sup> Finally, as indicated by the intervention entries for Question 1, there are a substantial number of intervention variables to take into account. The number may be reduced in the analysis if they are highly inter-correlated. Having a less than full specification could result in some included variable picking up the effects of one or more of the excluded and thereby provide misleading results. Interventions will be captured by continuous and dichotomous variables, depending on the question being investigated.

The covariates in the model are designed to control for important factors such as PPO management quality at baseline, when the PPO achieves certain management improvement milestones defined by the sub-activity, and assistance besides that from MCA-N that a PPO receives each year. There are up to four sets of covariates: one for sector/INP characteristics, one for PPO characteristics, one for harvester characteristics, and one for household characteristics. Models at any given level will always include variables to control for the higher levels within which they are embedded. For example, where the PPO is the unit of observation, INP and PPO covariates are included; where the household is the observational unit, both INP, PPO, and household sets are included.

Each of the covariates is included to control for factors besides interventions hypothesized to affect outcomes. In the analysis of household income, education of the household head and spouse, and the number of workers in the household are expected to increase incomes because heads and spou-

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<sup>83</sup> We plan to estimate household income change models with the PPO-level-of-observation data base in addition to the household-based model so that all 63 PPOs can be included. The dependent variable in this case is total income from sales of INPs, which we have in the data set. Clearly, this is an imperfect household income measure because it potentially leaves out other important income sources. It may still yield informative results.

ses with greater education are qualified for higher skilled, higher paying work and the more earners present, the greater the household's income. Among the covariates is whether the household harvests INPs, which is anticipated to increase income relative to other households, holding other factors constant. We hypothesize that training and technical assistance received by the harvester's PPO (through the MCA-N INP Activity) should increase household income, compared to households with INP harvesters not receiving training.

As described in detail in Chapter 2 there may be instances of endogeneity between the dependent variable and a covariate in some of the models. For example, in the analysis of household income, a covariate is the number of earners in the household. A household might well add an earner between the baseline and follow-on surveys if the opportunities in the PPO are increasing. Such backdoor causal channels can threaten the internal validity of the evaluation's inferences. To block these channels, we will test for the presence of such simultaneity and where it is present use appropriate statistical techniques, such as those introduced earlier in this chapter, to address the issue. These generally require the strategic inclusion of additional covariates.

The fifth table column indicates how the analysis, either qualitative or quantitative, is to be performed. For samples of PPOs, harvesters, and households our intention is to employ the type of regression analysis described in Chapter 2. Toward this end, the unit of analysis is shown (INP sector, PPO, harvester, household, or innovation) as are the sources of the data to be included in the analysis and beneath each list the type of analysis to be conducted. In cases where either the question does not lend itself to the regression analysis being employed or the number of observations is very small, then the analysis will rely on data from KIIs and FGDs as appropriate.

### *Construction of impact indicators and covariates*

As indicated in Section 4.3, in addition to conceptualizing the causal models it is also necessary to develop indicators of each impact indicator and explanatory variable, whether intervention variable or conditioning covariate. In some cases simple single-variable proxies are readily available—for example, household expenditure for household income—but in other cases such as for a measure of marketing, sustainability, or empowerment, it is doubtful that a single native proxy can be found. In such cases, it is necessary to take the field concepts and construct a multivariate (often hierarchical) aggregated indicator. Examples in the present case of where such techniques are called for include:

- the amount as well as intensity of training
- amount of (international) marketing
- degree of women's empowerment
- measure of PPIG received
- quality (and, possibly, the extent) of supply chain
- equity of earnings or benefits

While these indicators or their proxies are still under development, in Appendix D we use the case of training intensity as an indicative example of avenues NORC is exploring. Its method of construction is indicative of how other indicators would be created and built.

### *Dealing with external validity*

While NORC attempted to survey 500 INP harvester-households at baseline, less than 300 were locatable and surveyed. For the reasons explained in the baseline report, this unexpectedly small sample size was obtained in spite of having an implementer-provided sampling list (frame) and ample enumeration planning.

The size was inadequate in several ways:

- It lacked observations for PPO harvesting certain INPs (Commiphora and Mopane) central to the object of the evaluation;
- It lacked PPOs in regions of interest to the MCC in which the intervention was being implemented;
- It lacked PPOs recruited for intervention subsequent to the original INP 2011 baseline; and
- It lacked observations for half those randomly selected for interviewing in the original sampling plan.

While the last item may be remediable using the baseline data and the data from enumerators describing attrition for each non-responding household, the former three will affect the evaluation's generalizability.<sup>84</sup>

The ability to infer impacts on the population in general depends on how representative the sample studied was. If not representative then there is a risk that inferences made may not be applicable to others in the population whose characteristics are a bit different—for example, the impact on highland farmers in a conservancy from agricultural extension may not be indicative of their lowland peers, even if they are in the same conservancy and otherwise indistinguishable socio-economically and demographically. If the evaluation methodology is able to avoid threats to its internal validity then achieving such representativeness is referred to external validity—the ability to generalize beyond the sample to the broader population of PPOs and, from there, to the broader population of harvesters themselves.

One can avoid the threat to external validity by taking care to ensure that the resulting sample is balanced for strata of interest along influential population characteristics. In the present case, the sampling frame used to develop the INP survey left out what appeared to be less-organized PPOs—those without a list of members—and so runs the risk of not being representative of PPOs receiving the MCA-N intervention in general. Naturally, the greater the diversity of coverage the larger must be the sample size to achieve a preset level of precision.

The problem is that, *ex post*, one cannot simply go to the missing households and ask them to complete the baseline survey; more than two years would have gone by (one year, had it been done at midline), resulting in their answers corresponding to a later period. Moreover, simply asking the new respondents to recall what happened several years ago would mean (i) depending on perhaps-foggy

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<sup>84</sup> To mitigate these threats, NORC proposed to take a small midline of those households in the baseline as well as those missed in the latter and then econometrically infer baseline values of the originally missing households. While preparations were made for this option MCA-N eventually decided it would be too costly.

memories of already-difficult concepts and (ii) adding another difference between groups of respondents, namely, the amount of recall embedded in their responses.

To remedy this problem NORC had proposed to employ a recall model whereby key questions in the original baseline would have been administered survey to households in the PPOs absent from the original baseline survey—but with a novel twist. In particular, one could administer the endline survey to the original households interviewed plus all those we would have liked to interview as implied by the bulleted items above *but* augment the original instrument by repeating questions for a few of the key input and output variables and asking the respondent to provide an answer that refers the original baseline period. By comparing the original respondents' recalled answers to their original baseline answers one can infer the effect of the extra amount of recall. Then one can adjust the responses of new households surveyed in the endline using the full original instrument. In this way one is able to expand the baseline sample and have the full sample correspond to the original baseline time period.

After weighing the characteristics of the PPOs missing from the baseline sample, MCA-N decided that they preferred to drop Mopane as one of the key INPs for the evaluation and not to spend additional resources on implementing a recall model.<sup>85</sup>

## 4.6 Data Sources

We have almost completed verification of the availability of the data items needed to produce the variables listed in Columns 1-5 in Table 10.<sup>86</sup> The data items and sources are listed in Table 11. With one exception, items coming from the INP household survey are not listed since all come from the survey data set. Detailed specifications of the variables will be done when the data sets in final form are developed. At this stage the focus is on model specification.

Data for those variables not from the INP survey will either come from the CONINFO data portal or, where not in the former, be extracted by NORC staff studying NRI quarterly reports and the baseline and diagnostic report. (Computerized data will also be available for the indicators in the aforementioned report that are required by the MCA). All monetary values will be deflated to 2009 using the CPI compiled by the Central Bureau of Statistics.<sup>87</sup>

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<sup>85</sup> Of course, the household surveys will still pick up Mopane harvesting where it is done, only that no inferences will be possible about Mopane farmers in general since they were lost to the baseline sample as explained earlier in the body of the text.

<sup>86</sup> For reasons not completely known, it has not been easy to determine the exact extent of NRI's computerized monitoring data.

<sup>87</sup> This is consistent with MCA-N guidance for computation of the official monitoring indicators.

**Table 11: Sources for Data Items Planned to be Used in the Analysis**

No	Data Item	Source
1	Value added in processing INP products produced by each PPO by year by resource (kg)	NRI <sup>a</sup>
2	Volume of raw INP products sold by each PPO by year by resource (kg)	NRI
3	Value of sales of processed INP products sold by each PPO by year by resource	NRI
4	Value of sales of raw INP products sold by each PPO by year by resource	NRI
5	Average price received by harvesters by resource by year	MCA-N <sup>b</sup>
6	PPO adopted sustainable harvesting and processing practices in past two years	NRI-Q rpts <sup>c</sup>
7	# and purpose (equipment, facilities, services) of PPIGs each year received by PPO	NRI
	<b>Year in which PPO:</b>	
8	(a) adopted business plan	NRI-Q rpts
9	(b) was trained in business/ marketing principles	NRI-Q rpts
10	(c) was trained in organisation management	NRI-Q rpts
11	(d) produced management/ monitoring plans for environmentally fragile INPs	NRI-Q rpts
12	(e) PPO achieved Certification for using organic methods	NRI-Q rpts
13	(f) was founded	NRI-D <sup>d</sup>
14	NRI rating of baseline level of development <sup>f</sup>	NRI
15	Summary variables for training and support needs by need by PPO	NRI-D rpt <sup>e</sup>
16	Training received by each PPO each year	NRI-Q rpts
17	Date PPO service agreement signed with provider	NRI-Q rpts
18	Type of PPO (conservancy, community forest)	NRI-D
19	PPO size (number of harvesters)	NRI-Q rpts
20	Other (non MCA-N) support to PPO each year	NRI-Q rpts
22	Annual Euro : N\$ exchange rate	IMF
23	Annual export price per kg for each resource	TBD
24	Annual rainfall by region relative to the average for the region	GIS data
25	Harvester of Devil's Claw adopted sustainable methods in the past two years	CS/INP survey

- a. Monitoring data
- b. Data collection organized by NRI but MCA is collecting complete "sales event forms" and preparing the data set.
- c. Information will come from NRI's CONINFO database. Where data are not resident therein then NORC will obtain the data from the NRI's quarterly reports to MCA reports.
- d. Information is in the baseline diagnostics reports on each PPO prepared by NRI.
- e. Annex Table 3 in Diagnostic Report, Part 1.
- f. Table, "PPO Status 2009 Baseline," prepared by NRI.

While most of the entries are clear, a few warrant comments.

- a. *Harvester of Devil's Claw adopted sustainable methods in the past two years, item 25.* NRI indicates that this is the only type of harvester-level improvement that will be made. We will check before the second round CS/INP survey that this has not changed.
- b. *Type of PPO (conservancy, community forest), item 18.* The 60 included PPOs have 10 different organisational forms, including conservancies, associations, cooperatives, and settlements. Some, such as conservancies, benefit from significant additional assistance in developing governance structures, for example. This might be expected to give them a performance advantage in the INP sector. On the other hand, keeping the INP field operations—har-

vesting, drying—simple is also seen as an advantage. At this point we have no strongly held hypothesis about the effect that organisational forms will have.

- c. *Average price received by harvesters by resource by year, item 5.* The data for this variable will be derived from entries in “sales event” books that record every sale made by a PPO, including resource, price, quantity, unit of sale, date, type of product (e.g., cake, kernel, certified, etc.). PPOs fill in the books which will be collected by MCA-N. MCA-N will enter each sale data. Prices can be derived from quantity and sales value information for raw material.
- d. *Year in which PPO achieved Certification for using organic methods, item 12.* At present such certification is available only for Devil’s Claw and three PPOs have it: Kyaramacan Association, Nyae Nyae Conservancy, and N#ajaqna Conservancy. If certifications are created for other resources, parallel additional variables will be created.
- e. *Exchange rate, item 22.* Exporter-buyers take the exchange rate risk in international contracts. They can be expected to try to pass the losses of adverse exchange rate movements through to the PPOs.
- f. *Annual rainfall by region relative to the average for the region, item 24.* Too much or too little rain has strongly affected harvest size of different resources. We understand that the timing of rainfall is as important as the quantity and that seasonal patterns in Namibia are erratic. We will in effect test the basic hypotheses that sharply higher or lower rain amounts influence volumes harvested and sold. NRI is providing NORC will GPS addresses for each PPO and NORC will obtain publicly available GIS annual rain information for each location.

## 4.7 Qualitative Analysis

Qualitative analysis, based primarily on information obtained from key informant interviews (KII) and focus group discussions (FGD), will be employed in two ways. First, the information will be used as an aid to interpreting and corroborating the patterns revealed from cross-tabulations, results of the analytic attribution analysis, and hypothesis testing derived from the quantitative data. Second, certain of the evaluation research questions in Table 8 are more suitable to qualitative rather than quantitative methods. The relevant questions are noted in the right-hand-side column of Table 8.

These questions will be explored through KIIs and FGDs with protocols developed, and in the case of FGDs, training provided by NORC experts. The qualitative analysis will also look at the Market Information Sub Activity, the impact of the IPPT, and developments coming out of the INP Innovation find in terms of sustainability and Compact goals.

The Survey Design Report contains the interview protocols for the rank-and-file FGDs, the PPO management FGDs, and the KIIs. A timeline for activities is presented in Chapter 5 of this report. It is important to note that qualitative data collection, both in content and timing, will be developed in close collaboration with MCA-N and NRI. All questions, participants, and timings will be closely vetted by key stakeholders before data collection begins.

It is important to point out that the above KIIs and FGDs will also take place near the end of the evaluation in 2014. Questions on household gender impacts, though asked in the 2013 FGD round, will be pursued further during the 2014 round. Likewise, additional nuisances that were discovered during the 2013 FGD round (and listed in Section 4.2) will be investigated in the 2014 round.

As detailed in the Survey Design Report, we are planning to administer approximately 12 INP FGDs spread among regions and species. In addition to providing information not suitable for quantitative data collection methods, these focus groups are essential for providing context for interpreting the findings derived from the analysis of the baseline and endline data. They will also generate vignettes offering examples—no doubt both pro and contra—for policy makers with actual harvester voices rather than just quantitative tabulations. Unfortunately, timing constraints related to Compact closure require that the FGDs take place before the analysis of the quantitative data rounds. Hence, the normal practice of vetting the analytic findings with the intervention group will not be feasible. As a second best, we expect that the final presentation of the evaluation to MCA-N and its stakeholders can serve to identify suspect findings or offer supportive examples of unexpected results where they agree with them.

The FGD will focus on issues relating to gender, production practices, sustainability, and perceived secondary or non-monetary benefits of the MCA-N intervention. The specific content of the FGDs will be part of a later deliverable and developed in close collaboration with MCA-N and the service providers.

**The PPO sample for FGDs.** During midline preparations, NORC selected PPOs in order to get representation from each regional area that would also cover a range of PPO characteristics including size (which proxies management complexity, economies of scale in production, processing and marketing), NRI implementer, average household income and expenditure, receipt of a Primary Production Improvement Grant (PPIG), and institutional type (association, conservancy, cooperative, community forest, factory, or combination thereof). Furthermore, MCA-N has requested that evaluation of PPOs should cover the INPs of Devil’s Claw, Marula, Ximenia, and Commiphora.<sup>88</sup> The list of PPOs selected for the midline along with their selection criteria is presented in Table 12. This sample was finalized through collaboration with MCA-N and implementing partners. The originally proposed sample included Marienfluss, Sanitatas, and Omafa, but these were replaced with Opuwo, Otjiu-West, and Tunetu. These replacements were made due to the fact that during midline FGD administration harvesters in the three replaced PPOs were not expected to be in their usual locations due to drought.

NORC plans to conduct the endline FGDs with a subset of the same PPOs as it did at the midline. While it may appear that going to new PPOs would elicit new issues or experiences, we do not believe that such benefits outweigh their costs. This is because (i) NORC gave considerable thought to ensuring the representativeness of the midline PPO sample, (ii) the logistical planning (and improvements thereto) can build on the midline experience, which would be lost if new PPOs are used instead, (iii) PPO members will now be familiar with the FGD protocols, and (iv) we will have the chance to get clarification or hear of progress regarding earlier statements by specific PPOs.

While the exact number of FGDs is still under negotiation, the expectation is that there would be about individual management and general-membership FGDs at six PPOs. Criteria for selecting the subset would include: (i) representativeness (as per the characteristics in Table 12, (ii) degree that PPO was articulate during midline FGD, (iii) emphasis on including PPOs that were missed by the household survey.

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<sup>88</sup> Note that Commiphora is not covered in the accompanying household survey.

**Table 12: Participating PPOs and selection criteria, by focus group**

FGD INP <sup>(d)</sup>	Name (NRI #)	Region	Implementer	Institution type <sup>(e)</sup>	No. of harvesters <sup>(b)</sup>	PPIG <sup>(c)</sup>	Economic power <sup>(a)</sup> N\$
X	Tulongeni (35)	Ohangwena	CRIAA SA-DC	CV	324	Yes	9,757
CM	Opuwo (12)	Kunene	IRDNC	PF		Yes	n.a.
CM	Otjiu-West (9)	Kunene	IRDNC	CN-CF	385	No	n.a.
DOCU MEnt	Kyaramacan (14)	Caprivi	IRDNC	AS	595	Yes	1,641 <sup>(f)</sup>
DOCU MEnt	Dzoti (21)	Caprivi	IRDNC	CN-CF	129	Yes	1,298 <sup>(f)</sup>
DOCU MEnt	Tjaka Ben Hur (63)	Omaheke	CRIAA SA-DC	SHDC	121	Yes	473 <sup>(f)</sup>
DOCU MEnt	George Mukoya (77)	Kavango	NNF	CN-CF	115	Yes	164 <sup>(f)</sup>
DC	Shifula (48)	Oshana	CRIAA SA-DC	AS	45	No	14,788
DC	Nkugoyepongo (52)	Oshana	CRIAA SA-DC	AS	23	No	7,906
M	Diinina (33)	Ohangwena	CRIAA SA-DC	AS	122	No	10,976
M	Kuupenda (58)	Oshikoto	CRIAA SA-DC	AS	164	Yes	11,155
M	Tunetu (39)	Omusati	CRIAA SA-DC	AS	43	Yes	8,775

(a) Average of average household income and average household expenditure according to the INP Baseline Survey, where available. (b) From NRI list of PPO members trained as of December 2012. (c) MCA Primary Production Improvement Grant. (d) X=Ximena, CM=Commiphora, DC=Devil's Claw, M=Marula. (e) CN=Conservancy, CF=Community Forest, AS=Association, CV=Cooperative, SHDC=Sustainably Harvested Devil's Claw, PF=Processing Facility. (f) Average female-harvester income in one season of 2012 (NRI quarterly report).

**The PPO sample for KIIs.** In addition to the FGDs, NORC's sector expert will conduct approximately a dozen-to-fifteen KIIs for the INP activity, raising the number from the midline. Table 13 below presents the specific research questions that will be explored during the KIIs as well as the associated intended KII participants.

**Table 13: KII participants for PPOs, by research question**

Research Questions	Type of Participant
To what extent has the Delivery of Market Information Sub-Activity contributed to increased understanding of the broader INP sector (e.g., volumes, markets, key players, etc.)? How is INP current price information transmitted to harvesters? How price-sensitive are harvesters?	<ul style="list-style-type: none"> <li>■ NNF</li> <li>■ MAWF</li> <li>■ CRIAA</li> <li>■ IRDNC</li> <li>■ MCA-N</li> </ul>
How sustainable are the results in terms of increased production, sales and income? E.g., market chain (are there long-term buyer contracts in place, are the institutions functional and independent).	<ul style="list-style-type: none"> <li>■ NNF</li> <li>■ MAWF</li> <li>■ NRI</li> <li>■ Buyers</li> </ul>
How has the re-organisation of the Indigenous Plant Task Team contributed to the growth and sustainability of the INP sector?	<ul style="list-style-type: none"> <li>■ IPTT members</li> <li>■ MCA-N</li> <li>■ NRI</li> </ul>
How did new developments from the INP Innovation Fund impact on the INP sector?	TBD based on content of each funded activity
How has the increase in women’s income affected the allocation and control of household expenditure and assets? Are there signs of increased women’s empowerment within the household unit, for example, changes in spousal duties?	<ul style="list-style-type: none"> <li>■ NNF</li> <li>■ MAWF</li> <li>■ CRIAA</li> <li>■ IRDNC</li> <li>■ MCA-N</li> </ul>
What has been the situation with INP inventories and spoilage? How have these affected harvester supply responses?	<ul style="list-style-type: none"> <li>■ NNF</li> <li>■ MAWF</li> <li>■ CRIAA</li> <li>■ IRDNC</li> <li>■ MCA-N</li> </ul>
How has harvest quality changed over the evaluation period?	<ul style="list-style-type: none"> <li>■ NRI</li> <li>■ Buyers</li> </ul>



## 5. The Implementation Plan

The proposed work plan for the Evaluation of MCA-N's CS/INP Activities generally follows the areas of work and deliverables outlined in the TOR.

### 5.1 Phase 2: Evaluation Implementation, Management and Analysis

(End of Compact, 2014)

**Endline CS-INP Survey.** We will carry out the endline survey, described in Section of this report, starting in April 2014. We will re-visit all the households that were interviewed during the baseline in July 2011, as well as an additional 204 INP households to reach our original target of 500.<sup>89</sup>

**Endline Governance Survey.** We will also carry out the endline governance survey, using a self-administered instrument that mirrors the capacity assessment tool used by ARD in 2009 and described in Chapter 3 of this report. We anticipate administrating it starting April 2014.

**Monthly Progress Reports.** The NORC Team Leader will provide written updates to MCA Namibia each month on evaluation implementation. These monthly updates will include a summary of activities undertaken during the month, organized within the framework of the work plan activities; identification of any problems or delays and measures taken to address them; and recommendations, if any, for adjustments to the evaluation implementation. The monthly progress reports will be a useful tool both for MCA-N as well as NORC and will allow all parties to track the progress of key tasks as well as produce a historical picture of project activities. It has been our experience that progress reports can serve as a firm foundation to keep all activities on track and identify problems in advance.

**Report on KIIs and FDGs.** Following completion and analysis of the FGDs and KIIs, NORC will deliver a detailed report outlining the number and content of each meeting. In addition the report will detail key findings and unexpected results.

**Survey Oversight.** NORC's Home Office Project Director's role as data collection Team Leader for the CS/INP surveys will ensure that there is seamless, effective, and cost efficient oversight of the actual survey process. NORC will ensure that the survey and any corollary data collection efforts meet the needs of the evaluation at every step of the process. We will review the questionnaire for content and applicability towards the evaluation. NORC will ensure that essential evaluation items are integrated into the survey and, in our role as the data collection agency, oversee the development and rollout of the CS/INP endline survey. In addition we will work closely with the DQR consultant to ensure all parties are represented.

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<sup>89</sup> 296 INP households were interviewed at baseline. Please see the Baseline Field Survey Report for more information.

## 5.2 Phase 3: Communication and Finalisation

(End of Compact, 2014)

**Key Informant Interviews and Focus Group Discussions.** FGDs and KIIs in the end of compact round will closely follow the methodology of the earlier FGDs. The final KIIs will be used by our sector experts to understand several of the evaluation questions outlined in Table 2 and Table 8. It is important to note that there should be a detailed discussion with MCA-N and other stakeholders to ensure that the 2014 round is completed in time to allow for all analysis and deliverables to be completed before the end of the MCC compact. NORC survey and sector experts will travel to Namibia to train enumerators on the FGDs and to carry-out the KIIs.

**Draft Evaluation Report.** The draft evaluation report will focus heavily on using the analytical model described in this report, multiple rounds of CS/INP survey data, the CNA panel data, and FGDs and KIIs to estimate activity impacts. The report will also emphasize sustainability and make concrete recommendations towards this end. NORC understands that when dealing with large scale social investment projects it is essential to develop sustainable outcomes.

**Stakeholder Workshop.** Following MCA-N acceptance of NORC's Draft Evaluation Report, we will quickly develop workshop materials for presenting key findings to stakeholders. In advance of the workshop NORC will provide materials to stakeholders for review to aid the flow of the actual workshop. These materials will be based on the Draft Evaluation Report and present findings in an easily accessible format. In addition, we will develop slide decks. Although the workshop will be tailored to a general audience, NORC is well prepared to engage in technical discussions as needed. Our intent for the workshop will be to present key findings to stakeholders, collect comments and feedback on both findings and our overall report, and answer any questions in reference to the evaluation. The workshop will be attended by the NORC Team Leader and Project Manager.

NORC will work closely with MCA-N to identify participants for the workshop. Survey Warehouse will be tasked with securing an appropriate venue for the workshop as well as providing refreshments and materials.

**Workshop Report.** Within one week of the workshop, NORC will develop a workshop report which will include comprehensive minutes and detail the outcomes of the workshop. This report will include: (1) detailed workshop minutes; (2) a participant list; (3) topics covered; (4) important outcomes; (5) potential changes to the Evaluation Report.

**Evaluation Report: CS/INP (Final).** Within one week of the workshop report NORC will deliver the final Evaluation Report integrating lessons learned from the workshop as well as comments from key stakeholders on the draft report.

**Final Informational Materials.** Building on our experience in designing the informational materials described above, NORC will develop detailed informational materials around the Final Evaluation Report. We will develop the informational materials for a broad and non-technical audience and in such a way as to make the structure of our design is approachable to individuals who may not have a strong knowledge of evaluation.

The informational materials will be delivered one week after the stakeholder workshop.

## 6. Risk Assessment

NORC does not currently see any high risk situations arising in the implementation of the CS/INP evaluation. However there are some items that are of concern and should be noted.

### 6.1 Data Acquisition

As described in this report, receiving timely and well organized data from the implementing agencies is essential for NORC to carry out the tasks associated with this project and deliver a robust and informative evaluation. Without the data promised by the implementers, conducting a full evaluation will be extremely challenging.

For the CS component it is necessary for the CDSS team to provide NORC with data used to feed into MCA indicators. Towards that end, NORC entered into a Data Use Agreement (DUA) with CDSS to ensure the appropriate use of project data. Although some data has been received to date, it is still challenging at times to receive all of the data we require in a timely fashion.

For the INP component of the project the situation is more complex. Although the INP implementers' staff is open to sharing data and dedicated to working with NORC as we move forward, some of the data needed for the evaluation was not part of NRIs scope of work in terms of data collection. NRI has indicated that NORC can glean much of the information needed from their quarterly reports and its baseline and PPO diagnostic and profile reports. However, the format of the data is in many cases incompatible with a timely evaluation since it would require the evaluator to manually reformat the data into rectangular (flat-file or tabular) datasets (a project that is time and budget consuming). In addition, while the average price and quantity of INPs sold by each PPO is available in later years, transaction-by-transaction electronic data on pricing and sales between the PPO and the buyer, while available in hard copy, is often missing (hard copies have not yet been digitally captured). This information is important to know in order to evaluate how the program has impacted the sale of INPs and resultant increases in payments (if any). NORC is dedicated to completing the evaluation with the information that is available.

### 6.2 Respondent Access and Honesty

During our initial visit to Namibia the NORC team was able to speak with beneficiaries and implementers of the CS and INP programs. These informal interviews were extremely useful in calibrating ourselves to the cultural realities in Namibia and formatting our research questions appropriately. However, it should be noted that it is at times difficult to access program beneficiaries without a complex and time consuming process of approvals. In addition, without clear approval from either the implementing agencies or traditional authorities, individuals are understandably reluctant to speak to us openly. Contacting respondents for the FGDs and KIIs is a risk in the current project. NORC is dedicated to ensuring that all stakeholders are informed of exactly where we plan to conduct interviews (with input from stakeholders), at the same time we may need MCA-N help in assuring the appropriate people are informed in advance.

An additional issue related to respondent access is one of respondent honesty. During our visit we found that some respondents were hesitant to give us a full picture of the situation on the ground. In part, this may have been because staff from implementing agencies were present. (We will avoid their presence during the actual interview in the future.) The implementing agencies have a long and positive relationship with the local population. In part this points to a successful working environment and should be lauded. However, it also means that respondents are hesitant to comment on the programs being offered when some degree of criticism is involved. We encourage the implementers, in turn, to encourage participants to speak openly with NORC. Our role is one of an independent outside observer. We are not tasked with evaluating the implementers but rather the MCA-N program. This nuance is at times difficult to convey to local populations. In addition it is advised that when actual KIIs and FGDs are carried out only evaluation staff are present and the venue chosen for meetings a neutral one (when possible).

### **6.3 Sampling assumptions**

To create the sampling design a number of assumptions had to be made. Some of them should be resolvable prior to fielding the data collection team; others perhaps not. Though mentioned throughout the report where they had bearing, here we bring them together into one place and indicate the degree to which we believe each to be resolvable (R) or not (NR).

- (a) Whether the assumption that the eighteen PPOs selected for the sample are representative of the 63 PPOs in the MCA-N's program. (NR)
- (b) Whether the requested distribution in the terms of reference is aimed at the sample probability weights for drawing the sample or aimed at the distribution of the resulting sample and, regardless, whether NORC's alternative sampling strategy is preferred by MCA-N to that of the terms of reference. (R)
- (c) Whether the list of trained harvesters can be used to randomly select households, i.e., that the list can be used to distinguish unique households. (R)

### **6.4 Timing**

As noted above, one concern is over the timing of the 2014 data collection and evaluation. It is important to note that the compact between the Republic of Namibia and MCC ends in October of 2014. As such, evaluation activities need to be completed prior to that. The baseline CS/INP data collection took place in July/August 2011 and data cleaning is time consuming. Since it is important to evaluation quality that the same schedule be kept in 2014 there is only limited room for schedule changes, either forward or backwards, if the evaluation report is to be ready prior to the end of the Compact. To address this concern, additional resources at both the data collection firm and at NORC will be dedicated to speed up the process. In addition, evaluation KII and FGD need to be scheduled for the beginning of the year in 2014 in order to ensure that all activities are completed on time, including analysis and report writing.

# Annex A. Literature review

*Prepared by Sam Haddaway*

Under the Terms of Reference for the Evaluation of MCA Namibia's Conservancy Support (CS) and Indigenous Natural Products (INP) Activities, NORC is tasked with "a literature review of relevant prior evaluations and research on INP and conservancy interventions and prepare an annotated bibliography of the identified documents." NORC's research using online resources such as Google Scholar and USAID's Development Experience Clearinghouse uncovered very few results of rigorous evaluations of INP and conservancy interventions. After extensively searching, we consulted MCA-N and other stakeholders for assistance; these efforts also provided a limited number of results for review. Documents reviewed almost unanimously noted a severe lack of evaluations in the subject area. As such, this literature review focuses on studies that are mostly tangentially related to the CS and INP activities. On the CS side, we focus on studies concerning community-based natural resource management (CBNRM) and analyses of conservancies in Namibia. On the INP side, the focus is on evaluations of farmer organisations and agricultural extension services.

The discussion is presented in two parts. First, research related to the CS activity is reviewed. Second, we focus on research related to the INP activity. Finally, we offer a brief section on conclusions. An annotated bibliography is presented after the conclusions.

## **Conservancy Support (CS) Activity**

The literature related to the CS activity falls under two main categories: studies on CBNRM in general and those on Namibian conservancies in particular. In both categories, evaluations exist but few are rigorous. The studies consulted typically involve meta-analyses or desk evaluations of CBNRM policies and conservancies to identify successful or unsuccessful elements in order to build evidence as to how to effectively structure CBNRM policies and organisations. While they typically do not provide useful benchmarks against which we can grade the results of the current evaluation, they do prove instructive as to how one might structure an evaluation of the CS activity.

The most rigorous evaluation of Namibian conservancies was conducted by Bandyopadhyay (2004), who analyzed data from a household survey of 1,192 households in seven conservancies participating in the Wildlife Integration for Livelihood Diversification (WILD) project. As a proxy for a comparison (non-conservancy) group, the authors used young 'comparator' conservancies included in the sample to find statistically significant increases in household welfare within conservancies. They found socio-economic status to have mixed effects on conservancy benefits, with some conservancies being "pro-poor" and others being "poverty-neutral." Interestingly, the authors found no significant difference in increased welfare between male- and female-headed households and that "households with lower education levels gain more from conservancy establishment". They also found that "participants in conservancies do not necessarily enjoy higher levels of income or expenditure compared to non-participants" within the same conservancy. As a possible explanation (and a limitation of their study), the authors note that many benefits provided by conservancies are *community* benefits rather than *household* benefits, and suggest that community benefits be taken more into

account during future evaluations. Overall, these results should be used guide the analysis of the current evaluation.

Other studies reviewed identified successful qualities of CBNRM policies and provided advice for future evaluations. Some successes of past CBNRM policies are:

- 1 An observed increase in wildlife species, though this was not directly attributable to conservancies. (Agricultural Development Consultants (ADC) 1998)
- 2 Direct financial and non-financial contributions to local communities, particularly through non-consumptive tourism. (ADC 1998; Barnes 2002b)
- 3 Increased household welfare. (Bandyopadhyay 2004)

There are also relevant results about conservancies in Namibia:

- 1 Namibian conservancies are “economically efficient” and contribute positively to the national economy. (Barnes 2002a; Barnes 2002b; Barnes 2001)
- 2 Most of the revenue to conservancies results from non-consumptive tourism. (Barnes 2002a; Barnes 2002b; Barnes 2001)
- 3 The success of conservancies in Namibia is largely attributable to the fact that Namibian policies allow conservancies to be localized according to the needs of its members. (ADC 1998; Barnes 2002b; IUCN 1997)
- 4 Conservancies “provide a channel for the capture of international donor grants (wildlife non-use values) as income.” (Barnes 2002b)

Finally, authors reviewed provide some suggestions for future CBNRM policies. Agricultural Development Consultants (1998) suggest that successful CBNRM programs cannot be duplicated across countries, but rather must be adapted to fit the needs of the local people. Child (2003) and Jones (2003) both suggest that the natural resource must have a direct value to residents and benefits must accrue directly to households, and they, along with Martin (2003) and Mulonga (2003), found that decisions concerning management must be made at the lowest level possible in order for conservancies be effective. Increased, consistent monitoring evaluation was also called for in a number of studies (ADC 1998; Conley 2003; IUCN 1997), and the most effective methods vary by project (Conley 2003). Participatory research in particular has been conducted with positive results on economic impacts, especially when the participation begins early in the program (Conley 2003; Johnson 2003).

### **Indigenous Natural Products (INP) Activity**

The review of literature pertaining to the INP activity was perhaps less successful than that of the CS activity. We focused on two types of studies: those on agricultural extension services<sup>90</sup> and farmer organisations (FOs).

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<sup>90</sup> Agricultural extension services, as defined by 3ie (2010) are services whose “ultimate aim is to increase farmers’ productivity and income.”

The literature regarding agricultural extension services notes a severe lack of evaluations in the field, and those that do exist are rather weak (Zie 2010; Birkhaeuser 1991). Existing evaluations typically rely on small samples and lack comparison groups and baseline information and as such face difficulties measuring significant impact of extension services. However, those evaluations that were successful demonstrated high rates of return in both developed and developing countries (Birkhaeuser 1991). Participatory research in particular was found to be an effective evaluation approach increasing the use of technology and economic impacts (Johnson 2003; Uphoff 1988). More evaluations are encouraged in the field by all authors reviewed.

Given the lack of evaluations, the literature focuses instead on presenting a framework for structuring agricultural extension services. Gautam (2000) reviews two World Bank projects in Kenya - which ran from 1982 to 1998 but had no significant impact on productivity or farmer efficiency – to present some suggestions for future agricultural extension services:

- 1 Focus the extension services where the marginal impact is likely to be greatest.
- 2 Use constant monitoring and evaluation to tailor the services offered to farmers.
- 3 The intensity of interaction with farmers needs to be fluid according to demand.
- 4 Programs need to be flexible, as a blanket approach is unlikely to be effective.
- 5 The delivery mechanism should be client-focused, i.e. should focus on empowering the farmer.

IRAM (2010) conducted a similar exercise, instead focusing on support to farmer organisations (FOs). The study concludes that partners should:

- Be flexible, “encourage experimentation and self-generated solutions.”
- Focus on helping FOs build capacity, especially in the human resources department.
- Encourage synergy between FOs.
- “Support innovative solutions to sector-based problems.”

## **Conclusions**

While the literature reviewed does not provide any promising studies on which to base our evaluation, it does uncover several proven metrics by which we may evaluate the current activities primarily through the qualitative analysis.

For the CS activity, there are several proven factors to CBNRM and conservancy success which must be followed by the present activity. Firstly, the activity must encourage decisions about natural resource use to be made at a low level – perhaps that of the village. Second, payouts must be quick enough for conservancy members to easily see that their participation provides immediate and tangible benefits to their households and communities. Thirdly, the activity must not be over prescriptive, as several studies illustrated that careful attention must be paid to local complexities. All of these factors are observable and should be measured. We can also structure our analysis, at least in part, to replicate some of the findings uncovered. Particularly, we should build on Bandyopadhyay’s study to test whether we can replicate the findings presented with the superior data we plan to col-

lect. We can also pay close attention to the revenue streams accrued by conservancies, to see if we find the same emphasis on non-consumptive tourism found by many of the authors above.

For the INP activity, like the CS activity, we can inquire whether the activity is sensitive to local complexities. The activity might also place an emphasis on building the HR capacity of PPOs, as was crucial in the development of FOs.

The dearth of rigorous evaluations in the topic areas of both activities is clear, as the majority of authors reviewed suggested. As such, we are poised to make a significant contribution to the field with the present evaluation.

## ANNOTATED BIBLIOGRAPHY

### **3ie (2010) *The Impact of Agricultural Extension Services, 3ie Synthetic Reviews – SR00 9.***

This is a review of evaluations of agricultural extension services, i.e. services whose “ultimate aim is to increase farmers’ productivity and income.” The authors determine that while there is much literature related to agricultural extension services, rigorous impact evaluations are not common and those that do exist are weak. “Most evaluations ... tend to use quasi-experimental methods ... [and] mostly rely on relatively small samples and often provide little information on the control group apart from that there is no intervention in the village.” Only 14 impact evaluations were found for review, eight of which dealt with farmer field schools.

### **Agriculture Development Consultants, Inc. (ADC) (1998) *Assessment of Community-Based Natural Resource Management (CBNRM) in Southern Africa*, Draft, Prepared for The Regional Center for Southern Africa (RCSA), USAID.**

This is a summary of regional experiences in USAID’s community-based natural resources management (CBNRM) programs in southern Africa since 1989. Key findings include that CBNRM stakeholders feel that the work is beneficial, that “CBNRM is making meaningful contribution to many *local* economies”, and that there has been an increase in wildlife species (though this is unattributable to CBNRM). Suggestions include increased monitoring. Relevant lessons learned include that CBNRM programs cannot be replicated from country to country but must rather evolve locally and that the goals are best achieved when “people are motivated to participate with officials”.

### **Bandyopadhyay, S., Shyamsundar, P., Wang, L. and Humavindu, M. N. (2004) *Do households gain from community-based natural resource management? An evaluation of community conservancies in Namibia*, DEA Research Discussion Paper, Number 68.**

The authors utilize data from a 2002 household survey conducted in seven conservancies to evaluate the benefits of conservancies in Namibia. They find that generally conservancies have a positive impact on household welfare; some conservancies are especially beneficial to the poor while others are poverty-neutral; and the difference in benefits between participants and non-participants living within conservancy boundaries was not as great as expected. The authors note that many conservancy benefits are non-income community benefits, so household income is likely not the best measure of success.

### **Barnes, J. I. (2002a) *Community-based Tourism and Natural Resource Management in Namibia: Local and National Economic Impacts*, in *Responsible tourism: Critical issues for conservation and development*, Edited by: Spenceley, A.**

In this chapter, the author performs cost-benefit analyses on five Namibian conservancies and determines that they are “economically efficient and contribute positively to national economic well-being” and that the benefits are driven by non-consumptive tourism.

### **Barnes, J. I., MacGregor, J., and Weaver, L. C. (2002b) *Economic Efficiency and Incentives for Change within Namibia’s Community Wildlife Use Initiatives*, *World Development* Vol. 30, No. 4, pp. 667-681.**

Five Namibian conservancies are analyzed, and it is concluded that “conservancies are economically efficient and able to contribute positively to national income and the development process. They also provide a channel for the capture of international donor

grants (wildlife non-use values) as income, and generate attractive financial returns for communities.” The most important source of income is tourism, and flexibility and adaptability are key qualities of Namibian conservancies that allow them to be successful.

**Barnes, J. I., MacGregor, J., and Weaver, L. C. (2001) *Economic Efficiency analysis of community wildlife use initiatives in Namibia*, DEA Research Discussion Paper, Number 42.**

In this paper, five conservancies are analyzed using cost-benefit analysis. The authors determine that conservancies are financially viable – they contribute to national income and development, and provide financial returns to communities – and the largest source of revenue for conservancies is non-consumptive tourism.

**Birkhaeuser, D, Evenson, R. E., and Feder, G. (1991) *The Economic Impact of Agricultural Extension: A Review*, Economic Development and Cultural Change, Vol. 39, No. 3, pp. 607-650.**

“Effective agricultural extension can bridge the gap between discoveries in the laboratory and changes in the individual farmer’s fields...By accelerating the diffusion process of improved technology, extension can bring about a faster growth of yields and rural incomes than would occur in the absence of extension.” This is a review of studies done in the 1970’s and 1980’s on extension impact on productivity, technology adoption, and farmer knowledge. The author finds that studies faced difficulty in measuring impacts and few used controls or baseline data. Overall, “the few studies that were undertaken demonstrate that investment in extension can have very high rates of return in both developing and developed countries.”

**Child, B. (2003) *Principles, Practice and Results of Community Wildlife Management in Southern Africa*.**

This article lays out three critical elements for sustainable use of natural resources by communities – (1) the natural resource needs value, (2) the value of the resource should be “Captured by landholders, not stakeholders”, and (3) decisions on the use of resources should be made at the lowest level possible. While the “fast track” focuses on devolving property rights, the “slow track” focuses on capacity-building. Some drawbacks of the slow track are that it is slow and expensive.

**Conley, A. and Moote, M. A. (2003) *Evaluating Collaborative Natural Resource Management*, Society & Natural Resources, 16:5, 371-386.**

The authors examine collaborative natural resource management in the United States with a special focus on evaluation. They find that the best methods for evaluation will vary by project, but identify participatory evaluation, longitudinal surveys, case studies, and meta-analyses as particularly useful in different situations.

**Gautam, M. (2000) *Agricultural Extension: The Kenya Experience*, The World Bank, Washington D.C.**

This is an impact evaluation of two World Bank projects – the National Extension Project (NEP I) and the Second National Extension Project (NEP II) – which, from 1982 to 1998 attempted to develop agricultural extension services using the Training and Visit (T&V) system of management and increase agricultural productivity in Kenya. The main finding is that there was no “significant impact of the current extension system on farmer efficiency or crop productivity.” Five lessons for future agricultural extension projects are proposed:

1. Targeting – focus where the marginal impact will be greatest.

2. Information systems – need monitoring and evaluation to tailor service.
3. Intensity – intensity should be minimal, needs to be suited for the particular circumstances and able to change.
4. Pluralism – a blanket approach is unlikely to be effective.
5. Client focus – the delivery mechanism should always focus on empowering the farmer.

**IRAM (2010) *The effects of institutional and political changes on West African FOs and adaptation strategies*, report by Celia Coronel (IRAM) and Seydou Keita (Afdi).**

In this paper, farmer organisations (FOs) in Benin (CPF) and Burkina Faso (FUPRO), along with Afdi (French Farmers and International Development Association) and IRAM (French Institute for Research and the Application of Development Methods) analyze how FOs deal with institutional changes from government, donors, or the market to make broad suggestions to FOs and their partners. Among the relevant suggestions are:

- 1 “FOs need to develop (or redevelop) varied remits within their network and must not abandon their cross-cutting functions.”
- 2 “FOs need the support both of technical and financial partners and government.”
- 3 Partners need to:
  - Help FOs build strong human resources capacity.
  - “Encourage synergy between FOs.”
  - “Not impose pre-conceived modes of structuring and organisation but encourage experimentation and self-generated solutions.”
  - “Support innovative solutions to sector-based problems.”
- 4 FOs should “not allow themselves to be boxed into imposed structures that do not fit with the missions and values that they have set themselves. There is no stock answer to the question of whether FOs need to formally *structure* themselves.”

**IOS Partners (2009) *Mid-Term Evaluation of Task Order No. 1 – Support for Accelerated Growth and Increased Competitiveness IQC Final Report*, prepared for USAID.**

This is a mid-term evaluation of a USAID program in Senegal in support of business development services (BDS), policy reform, and public private partnership (PPP). The results are rather specific to the project, but several recommendations are relevant. First, that the project should focus on building the capacity of BDS providers and actors relevant to PPPs; second, that focus on PPPs should be, at least in part, at the local or municipal level and PPP champions should be developed as examples; and third, that PPPs need human resources assistance to be successful.

**IUCN (1997) *Community Wildlife Management in Southern Africa – A Regional Review, Evaluating Eden Series, Working Paper 11.***

This study reviews community wildlife management in seven south African countries. Namibia’s flexibility in conservancy structure is seen as a significant positive. The authors conclude that “continued monitoring, evaluation, and understanding” is needed, and offer some guidelines for successful policy for community wildlife management

**Johnson, N. L., Lilja, N., and Ashby, J. A. (2003) *Measuring the impact of user participation in agricultural and natural resource management research*, *Agricultural Systems* 78, pp. 287-306.**

This paper reviews participatory research methods in natural resource management research to conclude that participatory research leads to better technologies and economic impacts, and that the effects are greatest when the participation occurs early in the process.

**Jones, B. T. B. (2003) *Lessons learned from the philosophy and practice of CBNRM in Southern Africa*, Paper for the southern African workshop in preparation for the World Parks Congress**

This paper reviews several different wildlife management systems to identify lessons learned from experience in community-based natural resource management (CBNRM) and relationships between local communities and Protected Areas. "Policy ... needs to ensure that wildlife has a value that can be realized by landholders" (economic instrumentalism) and "in order to create positive conditions for landholders to manage wildlife sustainably, the ability to take crucial management decisions needed to be devolved from the state to the land holders" (devolutionism) and finally, if the people on the communal lands have the authority, "then who should receive these rights, and could effective institutions develop for collective management of wildlife" (collective proprietorship). Conservancies in Namibia have had trouble deciding what to do with their income. There is a need for more direct involvement with decisions. Two relevant key suggestions: (1) to maximize benefits, income should reach the household level, and (2) decision-making about benefit distribution should be made at the village level.

**Martin, R. (2003) *Condition for Effective, Stable and Equitable Conservation at the National Level in Southern Africa*, paper prepared for a workshop in preparation for the World Parks Congress.**

This article advocates for community based conservation as opposed to the establishment of national parks, and suggests that for conservation efforts to be successful, they must give authority to local stakeholders and include a mechanism for re-investment into the conservation area. The author concludes, "the devolution of legal authority to landholders to manage and benefit from wildlife on their land is without doubt the single most important factor in successful conservation outside state protected areas."

**Mulonga, S. and Murphy, C. (2003) *Spending the money: The experience of conservancy benefit distribution in Namibia up to mid-2003*, DEA Research Discussion Paper, Number 63.**

This paper uses case studies to examine different benefit distribution plans used in conservancies. Some successful principles are proposed: distribution should be participatory, immediate, fair, and should directly support "livelihood priorities."

**Uphoff, N. (1988) *Participatory Evaluation of Farmer Organisations' Capacity for Development Tasks*, *Agric. Admin. & Extension*, 30: 43-64.**

This article presents a methodology used in Sri Lanka to evaluate the capacity of farmer organisations (FOs) through participatory evaluation. The author argues that participatory evaluation as a process is very helpful for the FOs, and that it leads the evaluation to have greater impact.

## Annex B. PPOs and their INPs

<b>Service provider</b>			IRDNC	1
			CRIAA SA-DC	2
			NNF	3
<b>Region</b>			Kunene	1
			Caprivi	2
			Ohangwena	3
			Omusati	4
			Oshana	5
			Oshikoto	6
			Omaheke	7
			Karas	8
			Erongo	9
			Hardap	10
			Otjozondjupa	11
			Kavango	12
<b>Service provider</b>	<b>Region</b>	<b>PPO no.</b>	<b>PPO Name</b>	<b>Resource</b>
1	1	1	Marienfluss Conservancy /Community Forest	Commiphora
1	1	2	Orupembe Conservancy/Community Forest	Commiphora
1	1	3	Sanitatas Conservancy/Community Forest	Commiphora
1	1	4	Okondjombo Conservancy/ Community Forest	Commiphora
1	1	5	Puros Conservancy/Community Forest	Commiphora
1	1	6	Anabeb Conservancy	Mopane
1	1	7	Sesfontein Conservancy	Mopane
1	1	8	Orupupa Conservancy	Mopane
1	1	9	Otjiu-West Conservancy/ Community Forest	Mopane
1	1	12	Opuwa Processing Facility	Commiphora & mopane
1	1	13	Kunene Conservancies	DC
1	2	14	Kyaramacan Association	DC
1	2	15	Kwando Conservancy/Community forest (MNC)	DC
1	2	16	Mayuni Conservancy (MNC)	DC
1	2	17	Mashi Conservancy (MNC)	DC
1	2	18	Sobbe Conservancy (MNC)	DC
1	2	19	Balyerwa Consvancy and Community Forest (MSC)	DC
1	2	20	Wuparo Conservancy and Community Forest (MSC)	DC
1	2	21	Dzoti Conservancy and Community Forest (MSC)	DC
1	2	24	Masida Community Forest (Sobbe Cons.)	DC
1	2	25	Lubuta Community Forest (Mashi Cons.)	DC
1	2	27	Ngonga Community Forest (Lizauli Cons)	DC
1	2	28	Sachona Community Forest	DC

<b>Service provider</b>			IRDNC	1
			CRIAA SA-DC	2
			NNF	3
<b>Region</b>			Kunene	1
			Caprivi	2
			Ohangwena	3
			Omusati	4
			Oshana	5
			Oshikoto	6
			Omaheke	7
			Karas	8
			Erongo	9
			Hardap	10
			Otjozondjupa	11
			Kavango	12
<b>Service provider</b>	<b>Region</b>	<b>PPO no.</b>	<b>PPO Name</b>	<b>Resource</b>
2	3	29	Ependulo Association (EWC)	Marula
2	3	30	Lyeendongula Association (EWC)	Marula
2	3	31	Meameno Association (EWC)	Marula
2	3	32	Tulongeni Association (EWC)	Marula
2	3	33	Diinina Association (EWC)	Marula
2	3	34	Oshawapala Association (EWC)	Marula
2	3	35	TulongeniTwahangana Producers (TTP)	Ximania & KMS
2	4	37	Pendapala Association (EWC)	Marula
2	4	38	Okahulo Association (EWC)	Marula
2	4	39	Tunetu Association (EWC)	Marula
2	4	40	Gwamiitayi Association (EWC)	Marula
2	4	41	Mangundu Association (EWC)	Marula
2	4	42	Omafa Association (EWC)	Marula
2	4	43	Okalyohambo Association (EWC)	Marula
2	4	44	Onongalo Association (EWC)	Marula
2	4	45	Iingungula Association (EWC)	Marula
2	5	47	Ohole Association (EWC)	Marula
2	5	48	Shifula Association (EWC)	Marula
2	5	49	EWMM Pty Ltd as EWC factory company	Marula
2	5	50	Eudafano Women Cooperative	Marula
2	5	51	Oshiwana Community Trust (OshCT) formerly OOP	KMS & Ximania
2	5	52	Nkugoyepongo Association (EWC)	Marula
2	6	54	Omuntele Association (EWC)	KMS (& Marula)

<b>Service provider</b>			IRDNC	1
			CRIAA SA-DC	2
			NNF	3
<b>Region</b>			Kunene	1
			Caprivi	2
			Ohangwena	3
			Omusati	4
			Oshana	5
			Oshikoto	6
			Omaheke	7
			Karas	8
			Erongo	9
			Hardap	10
			Otjozondjupa	11
			Kavango	12
<b>Service provider</b>	<b>Region</b>	<b>PPO no.</b>	<b>PPO Name</b>	<b>Resource</b>
2	6	55	Nakagumbo Association (EWC)	Marula
2	6	56	Iihongo Association (EWC)	Marula
2	6	57	Onankali Community Trust (OCT)	KMS (& Ximania)
2	6	58	Kuupenda Association (EWC)	Marula
2	7	61	SHDC Vergenoeg	DC
2	7	62	SHDC Gemsbokfontein	DC
2	7	63	SHDC Tjaka Ben Hur	DC
2	7	64	Donkerbos / Sonneblom	DC
2	11	69	Nyae Nyae Conservancy	DC
2	11	70	N#aJaqna Cons and Mkata Community Forest	DC
2/3	11	73	Okamatapati Conservancy (Okakarara)	DC
2/3	11	74	Otjituuo Conservancy (Okakarara)	DC
2/3	11	75	OndjouConservany (Gam)	DC
3	12	76	Muduva Nyangana Conservancy	DC
3	12	77	George Mukoya Conservancy	DC
3	12	78	Joseph Mbambangandu Conservancy	DC
3	12	79	Shamungwa Conservancy	DC

Source: Natural Resources Institute, *Producer and Processor Organisations Sub-Activity: Inception Report*, Appendix E, Revised PPO list. The 2009 baseline and the April 2011 sampling frames were also consulted.

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## Annex C. Examples of tourism indicator

The section of the main report, “Using a Model-based Approach to Construct Impact Variables” indicates that indicators will play a role in the evaluation’s quantitative methodology. This annex provides several examples of how such indicators can feasibly be implemented. In addition to the top-level indicator, sub-indicators may also provide useful descriptive windows into the constituent processes.

The reader should note two caveats. First, while the baseline and endline surveys will provide a principal source of household-level data for the indicators, conservancy-level data will need to come from other sources. Among these sources would be, on the one hand, the PPOs and their supporting international partners as presented in Table 3.5 and, on the other hand, a future survey NORC proposes to administer to the conservancies themselves. Second, while the examples below are presented in some detail, they are in no way finalized. Rather, they illustrate the breadth and scope of indicator “technology” that the evaluation has at its disposal.

### 1. Indicator of tourism potential

For each level (world, Namibia, conservancy) of the impact model summarized in Figure 3, there is an analogous measure of tourism potential. In this section, a description of a conservancy-level tourism-potential indicator is presented.

The idea is that current and historical data on performance measures of the existing conservancies can be used to map out the performance (production) “frontier” of conservancies for a given set of management technologies.<sup>91</sup> The frontier is constructed econometrically pooling the data on all of the Namibian conservancies and their attributes (covariates). The distance below the frontier then becomes an indicator of a conservancy’s potential. The idea is that, based on the track record of the other conservancies, any conservancy well below (within) this frontier should be able to engage in some combination of better management and reallocation (rearrangement) of its assets and resources (“inputs”) to obtain some point on the frontier.<sup>92</sup>

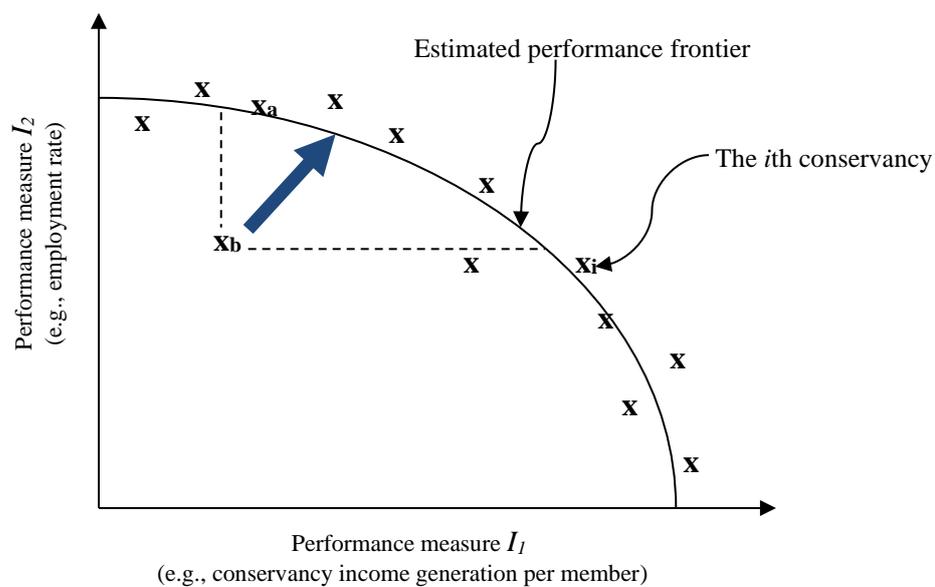
An example of this approach is presented in Figure 10. For the conservancy located at Point  $x_b$ , a better use of its available resources and better management would likely permit the conservancy to increase its score on either performance measure  $I_1$ ,  $I_2$ , or both. The thick arrow northeast of Point  $x_b$ , indicates one such possible path of *feasible*—i.e., potential—improvement.

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<sup>91</sup> The present example is illustrated for the case of just two performance characteristics. The method can easily be extended to higher dimensional measures of performance.

<sup>92</sup> Training in business or management techniques—and their application—would shift out the frontier.

Figure 10: Illustrative performance possibility frontier for a conservancy



## Annex D. Indicator construction for measuring outcomes

Several of the outcomes from the CS-INP activities may require indicators as no simple standard metric of the associated concepts is readily available. This annex provides an example for the case of training intensity of how such sets of indicators is being developed.

**Training indicator.** The first step in constructing an appropriate indicator is to posit the dimensions and characteristics of the training being provided, being careful not to include any aspects of the consequent outcomes or behavioral responses. This is because our dose variable(s) must be causally antecedent and is theorized to explain in part the outcome.<sup>93</sup>

The overall dimensions of training are quality and quantity and to a degree these are both complementary and substitutable, that is, interdependent. Quality contains depth, scope, and the degree comprehended—which often requires an experiential component; quantity relates to frequency and duration. Other factors include elapsed time since last dose (training) and the degree to which the trainee’s frontier of knowledge on subject of training is progressing. It would *not* include any measure of consequences resulting from the trainee having put this knowledge into practice; that is an outcome.

We propose to test two approaches to the quantifying training. The first approach is to create a systemic indicator which aggregates the key characteristics of training as just described. The top level of the indicator would take the form,

$$T_i = \text{std} \left[ \sum_n \tau_n (L_{in}^{\tau_L} N_{in}^{\tau_N}) \right]$$

where  $\tau_L$  and  $\tau_N$  are parameters set by expert opinion so that  $\tau_L + \tau_N = 1$ , the subscripts  $i$  and  $n$  refer to the INP harvester and to the training course, and  $T$ ,  $L$ , and  $N$  are standardized indicators of overall training, training quality, and training quantity.<sup>94</sup> The second level of the indicator would take the form,

$$\begin{aligned} L_{in} &= \text{std}[(\hat{U}_{in})^{\ell_1} (\hat{P}_{in})^{\ell_2}] \\ N_{in} &= \text{std}(\hat{H}_{in} \hat{C}_{in}) \end{aligned}$$

where  $\hat{H}$  and  $\hat{C}$  are the average number of hours per class and the number of classes attended,  $\hat{U}$  and  $\hat{P}$  are the participant’s ratings of the usefulness and presentation quality of the course,  $\tau$  and  $\ell$  are weights set by expert opinion (and  $\ell_1 + \ell_2 = 1$ ), and the “hat” indicates the variable has *not* been standardized. Finally, the indicator  $T_i$  would be used in the dose-response equation, for example, as

$$\Delta y_i = \beta_0 + \dots + \beta_T T_i + \dots + \varepsilon_i$$

<sup>93</sup> Ideally, one would calibrate the parameters of a training indicator by using past observations on training intensity and performance outcomes.

<sup>94</sup> By standardized we mean that all observations have been subtracted by the variable’s mean and divided by the variable’s standard deviation.

where the  $\beta...$  are parameters to econometrically estimate,  $\Delta y_i$  is a change in performance (impact measure), and  $\varepsilon_i$  is an (i.i.d.) residual error term.

The second approach is to maintain the quality and quantity dimensions of training separate in the dose-response regression, for example, as

$$\Delta y_i = \beta_0 + \dots + \beta_N N_i + \beta_{LN} L_i N_i + \dots + \varepsilon_i$$

where parameters and variables are defined as before and

$$L_i = \text{std} \sum_n [(\hat{U}_{in})^{\ell_1} (\hat{P}_{in})^{\ell_2}]$$

$$N_i = \text{std} \sum_n (\hat{H}_{in} \hat{C}_{in})$$

One obvious concern about the approaches above is where the data would come from. If it is not possible to get  $\hat{U}$  and  $\hat{P}$  from the endline survey, perhaps because of recall issues, then expert opinion could be used to rate each course's importance and such ratings would then be used to weight the  $N_i$ . Regarding  $\hat{H}$  and  $\hat{C}$ , these may be available from the service providers and implementers that administered the course (training) and might also be collected in the endline survey.

## Annex E General model for analysis of gender issues

The general quantitative model we propose to use to evaluate gender questions is:

$$y_{hjp} = \alpha + \beta\theta_p + \sum_{t=1}^T \delta_t D_{hp}^{(t)} + \sum_{k=1}^K \pi_k Z_{jp}^{(k)} + \sum_{m=1}^M \xi_m X_{hp}^{(m)} + \sum_{t=1}^T \sum_{k=1}^K \varphi_{kt} Z_{jp}^{(k)} D_{hp}^{(t)} + \sum_{t=1}^T \sum_{m=1}^M \gamma_{mt} X_{hp}^{(m)} D_{hp}^{(t)} + \varepsilon_{hjp}$$

in which  $y_{hjp}$  is any of the just-described gender outcomes for household  $h$  located in jurisdiction  $j$  (either a conservancy or PPO); the  $D_{hp}^{(t)}$  are multivalued (non-fixed-effect) indicators drawn from the  $T$  types of intervention activities (such as gender awareness training) directed at the household member;  $Z_{jp}^{(k)}$  are the  $K$  covariates with values for each conservancy (or PPO, as the application requires),  $j$  and period,  $p \in \{0,1\}$  corresponding to pre- and post-intervention;  $X_{hp}^{(m)}$  are the  $M$  covariates (for example, gender) with values for each household;  $\theta_p$  is a dummy variable equal to 0 for  $p = 0$  (before intervention) and 1 for  $p = 1$  (after intervention);  $\alpha$ ,  $\beta$ ,  $\delta_t$ ,  $\gamma_{mt}$ ,  $\pi_k$ ,  $\xi_m$ ,  $\varphi_{kt}$  are parameters to estimate; and  $\varepsilon_{hjp}$  is the identically independently distributed normal error term. The household sample used to estimate this regression contains either all members in the conservancies or in the PPO.

Before continuing, let us endeavor to translate or demystify this dose-response equation. The first summation indicates whether a particular intervention by itself has an impact on the (left-hand-side) outcome of interest. The second and third summations simply control for those jurisdictions (conservancy or PPO) and household characteristics that influence the outcome of interest and so, if not taken into account, would lead to a (misspecification) bias in the parameters of interest (those measuring the intervention effect). Finally, the last two summations capture the potential interaction effects between the jurisdiction or household characteristics, on the one hand, and the various interventions, on the other.

As an example, consider how this equation might be applied to the question of whether female harvesters earn more as a result of receiving training in various harvesting techniques and if this amount depends on whether she is the head of household. We can hypothesize that, in addition to the amount of training ( $D_{hp}^{(T)}$ ) and head of household status ( $A_{hp}^{(S)}$ ), harvester income ( $y_{hjp}$ ) would depend on the type of INP ( $A_{hp}^{(n)}$ , where  $1 \leq n \leq 4$  are dummies for each of the four INPs), other household income ( $A_{hp}^{(Y)}$ ), age of harvester ( $A_{hp}^{(A)}$ ), family size ( $A_{hp}^{(F)}$ ), amount of rainfall ( $A_{jp}^{(R)}$ ), and size of PPO ( $A_{jp}^{(P)}$ ).<sup>95</sup> The general model would then reduce to

$$y_{hjp} = \alpha + \beta\theta_p + \delta_T D_{hp}^{(T)} + \xi_S A_{hp}^{(S)} + \xi_A A_{hp}^{(A)} + \xi_F A_{hp}^{(F)} + \xi_Y A_{hp}^{(Y)} + \sum_{n=1}^4 \xi_n A_{hp}^{(n)}$$

<sup>95</sup> This example is purely illustrative and is not necessarily meant to indicate a preferred specification of NORC INP experts.

$$+\pi_R A_{jp}^{(R)} + \pi_P A_{jp}^{(P)} + \varphi_{kt} D_{hp}^{(T)} A_{jp}^{(P)} + \gamma_T D_{hp}^{(T)} A_{hp}^{(S)} + \varepsilon_{hjp}$$

where all other parameters and variables are as described in the general model. The test on whether training has an impact on harvester income is whether  $\delta_T = 0$  can be statistically rejected. The test on whether training has a different (or, alternatively, smaller) impact on harvester income if the harvester is also the head of household is whether  $\xi_S + \gamma_T = 0$  (or  $< 0$ ) can be statistically rejected.

## Annex F Choosing the best source for governance data

In order to assess the quality of governance at the conservancy level, the CS evaluation requires, at a minimum, baseline and endline measures of institutional and governance characteristics. Originally, NORC planned to utilize two data sources to measure the level and quality of governance in each conservancy: 1) the Conservancy Needs Assessment conducted by ARD in 2009, which captured governance across a series of nine categorical indicators and 2) an endline governance survey that would endeavor to measure the same concepts captured by the ARD baseline assessment. An alternative is to draw on an extremely rich database collected by CDSS from 2010 through 2014 on 31 conservancies

This memo examines each option to determine whether the evaluation team should draw on CDSS's governance data or conduct its own governance survey. The conclusion we reach is that while neither option is ideal, once all the factors are weighed we find that using CDSS's data poses fewer risks to internal validity.

### I. Reviewing the main arguments

*The argument "for" CDSS data.* The NORC team has had the opportunity to interact with CDSS and NACSO/Coninfo, who collect governance-related data. This data include 165 variables collected from 2010 through 2014 on 31 conservancies. CDSS uses this data to create indicators that cover eleven governance categories. In producing the higher-level indicators, CDSS goes through a rigorous verification process. Key to that process is refining the raw data. CDSS devotes considerable effort to this step by focusing their own subject-matter expertise and understanding of the local context on conducting data quality reviews and data cleaning. As an indication of the quality of CDSS's efforts, it broadly disseminates and publishes its data online and reports it to MCA.

Upon receiving a draft of the governance survey, the CDSS team expressed concerns with using a self-assessment to accurately capture answers to such governance questions. Moreover, CDSS pointed out that in spite of years of experience carrying out interviews and administering questionnaires to this specific population, it still finds it challenging and extremely time-consuming—often necessitating many return visits—to collect accurate and reliable responses from conservancy members. Given the obstacles CDSS has clearly faced, it would be impractical for NORC to improve upon the quality of data collection achieved by CDSS in just a couple of months.

A third concern, though more of NORC than of CDSS, is that the ARD baseline was built by coding qualitative vignettes of a team of experts. After considerable assessment of the ARD 2009 data, NORC has found it difficult to re-apply the same subjective assessments made by the ARD team, especially since they are not available to query and neither sub-indicator data nor indicator documentation exists.

*The argument "against" CDSS data.* The chief concerns of the CDSS team on NORC's use of this governance data relate to data quality and to interpretation of differences over time. Concerning data quality, CDSS points to (1) significant amount of missing data, especially for some key variables, (2) inconsistencies in the raw data values provided by conservancies, and (3) the lag in data availability

— ongoing data collection for 2013 is still underway. Concerning interpretation of differences over time, CDSS notes that there may be instances where a respondent’s understanding of an annual survey question would evolve as the respondent undergoes parallel CDSS training and related capacity building. Such evolution, CDSS worries, could potentially invalidate the comparability of intertemporal responses.

## II. Assessing the evidence

Concerns about missing data. CDSS’s concern focuses primarily on two years: 2010 (where data collection was less systematic) and 2013/2014, where data are still coming in and being processed.

**Table 14: Coverage in years**

Year	Coverage (% non-missing)
2010	49%
2011	62%
2012	67%
2013	55%
2014	3%

Across all variables and conservancies for the respective year

Table 14 confirms that coverage in the base year of 2010 is lower than that in 2011 and 2012. This indicates that CDSS governance data would likely need another source in order to provide adequate coverage for the baseline. If the CDSS governance data option were selected then missing data for 2010 could be predicted (estimated) using the ARD 2009 dataset.

CDSS is currently in the process of collecting data and making updates by mid-July 2014. Since data coverage has been increasing over time we expect that, ultimately, coverage of 2013 and 2014 will be higher than what is currently reported for 2011 and 2012. This bodes very well for the endline and, were the CDSS governance data option selected, NORC would use the final 2013 data to update its analysis. To the extent 2014 data are also ready, it will be used as well.

Missing data by category. Understanding where the missing data are and whether there are particular subject categories or conservancies most affected allows our team to identify whether and what proxy data might also be needed to compensate. When looking at the degree data are missing across categories in Table 15, it is clear that some categories have greater coverage than others. Because 2014 data are not yet unavailable, (except for the benefits category), we first look at coverage across the categories from 2010-2013 to provide a picture of the current situation. We see that more than 50 percent of the observations in the enterprise and benefits categories contain missing values. At the same time, only two categories had up to one-third of their individual questions with fewer than half the conservancies responding. This holds out the possibility that the remaining two-thirds questions could be used to create a latent (proxy) variable capturing the overall category.

**Table 15: Coverage across categories**

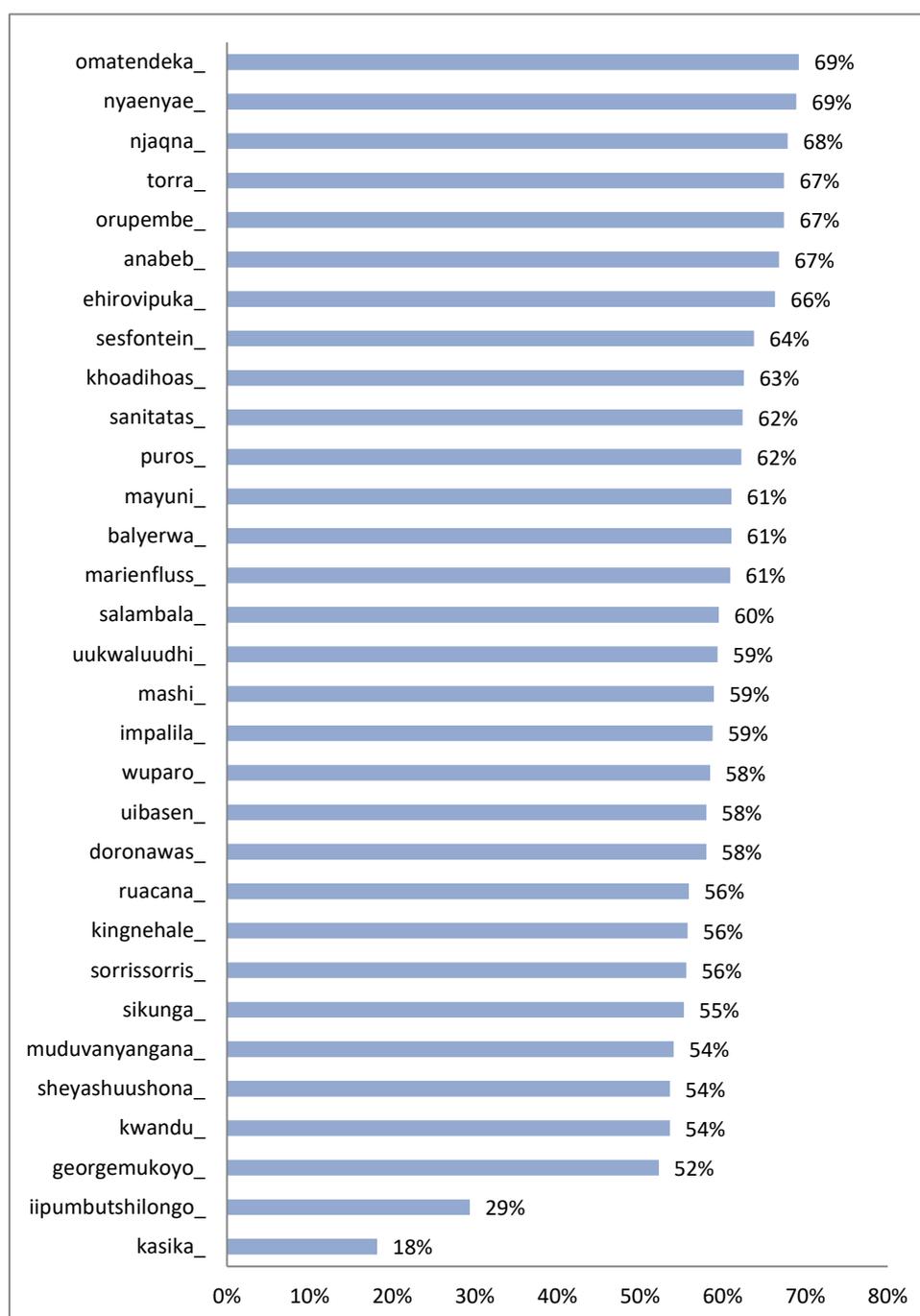
Category	# of Questions	2011-2012			2010-2013		
		# of Observations	% covered	# of n<10 questions	# of Observations	% covered	# of n<10 questions
agm	39	1535	63%	6	2755	57%	5
assets	12	549	74%	2	1033	69%	2
benefits	8	258	52%	2	476	48%	2
constitution	13	440	55%	5	800	50%	4
enterprise	25	736	47%	9	1200	39%	8
finances	16	830	84%	1	1406	71%	1
gender	6	293	79%		548	74%	
mgmtpln	8	448	90%		804	81%	
nrm	18	741	66%	2	1419	64%	
staff	14	669	77%	1	1256	72%	1
tourism	9	326	58%	3	606	54%	

Next, we consider the period 2011-2012 as a proxy for a worst-case scenario of what the final 2011-2014 period might look like. As shown in Table 15, coverage improves by about 10 percent on average compared to when 2010 and 2013 are included. However, the number of questions with less than ten observations does not fall. Still, with the exception of benefits (which we can capture with the CS household survey) even for categories with the lowest coverage we see that the number of *total* observations remains quite large—at least 200.

*Missing data by conservancy.* Patterns of missing values amongst conservancies may be attributed to an endogeneity issue. The more advanced a conservancy is in terms of governance, record keeping, and formalized policies and procedures, the higher the coverage may be, while less-advanced conservancies may have lower levels of coverage. Conversely, the more technical assistance a conservancy received, the more likely it is that CDSS and its partners may have been able to collect, better understand, or account for missing values due to their proximity to that particular conservancy.

Figure 11 reveals that there are two outliers in terms of coverage: the lipumbu ya Tshilongo Conservancy, and the Kasika Conservancy. Both these conservancies have close to zero observations in 2010 and 2011; lipumbu ya Tshilongo Conservancy has approximately 50-60% coverage in 2012 and 2013, while Kasika Conservancy has 21% coverage in 2012 and 45% coverage in 2013. These two conservancies were added to CDSS's training and technical assistance support list in 2012, with Kasika added in late 2012 (hence the low coverage in 2012), and lipumbu ya Tshilongo only gazetted in May 2012. Were we to drop them from the governance analysis, the latter analysis would have its external validity reduced. Otherwise, the relatively even coverage across conservancies would bode well were NORC to select the CDSS governance dataset. NORC would utilize corrective weighting to compensate for the variation in the number of observations per conservancy.

**Figure 11: Percent Coverage by Conservancy, 2010-13**



*Data inconsistencies.* As part of the data quality review and validation process, CDSS closely reviews each data point, verifying information that the conservancies report with other data sources, as well as their own subject-matter expertise. Where there seem to be logical inconsistencies, or conflicts between data sources, CDSS flagged these issues and provided a list to NORC. For the present document, NORC has also examined key variables (especially those it would use for outcome and treatment measures). CDSS is currently resolving these inconsistencies with partners in the field. CDSS has pointed out that, from their side, only some of these inconsistencies may be resolved through updates in time for the endline data analysis.

Many of these are concerns involve inconsistencies or outliers in one or two observations within a variable. For these data values, NORC will either code them as missing, adjust them according to CDSS's notes (or from NORC's rich qualitative assessments), or estimate them from non-missing data until (and if) CDSS provides an updated data file.

*Bias due to concept drift.* This refers to the threat to validity when a variable's definition drifts over the course of a panel. It is a very serious problem and CDSS is right to draw attention to it. In its Evaluation Design Report NORC lays out a specific set of econometric adjustments it would propose to implement to mitigate such risk. Among these include (i) testing for drift, (ii) modeling drift, and (iii) examining (comparing) distributional changes in baseline and endline cross-sections since, under weak assumptions, these would be immune to the effects of concept drift.

### **III. Recommendations**

NORC has reviewed the pros and cons to using CDSS and a survey as a source for governance data. The conclusion we reach is that while neither option is ideal, once all the factors are weighed we find that using CDSS's data poses fewer risks to internal validity. In fact, there is considerable uncertainty (unknowable risk) related to the survey option, especially given the cost of delaying a final report beyond its due date. In most cases, in the updated CDSS data file, the very valid issues that have been raised to date have either been resolved, can be (imperfectly) addressed econometrically, or CDSS has provided or is in the process of providing enough information for NORC to recode them. There do remain a limited number of outstanding—though non-critical—inconsistencies that NORC and CDSS have identified that have not yet been updated. These are listed in the Annex and are the subject of current discussion between the two organizations.

**Appendix to Annex F: Outstanding issues to resolve regarding CDSS governance data**

<b>CDSS Comment</b>	<b>NORC Response</b>
<b>AGMs</b>	
Dates for AGMs slightly differ between different sources	NORC will compare these dates for the analysis. If the difference is due to the number of days, not number of months, this will not impact affect the analysis.
Number of people at AGM seldom recorded but still claim to have a quorum	NORC will wait from CDSS for more updated information. However, NORC will also supplement this data with survey data from the CS/INP HH Survey.
Number of conservancy members not known until 2012, when we have info for 25 conservancies, but then in 2013 this dropped to 10	NORC has been advised by CDSS that conservancy membership numbers are not reliable in general.
Conservancies say minutes not taken or no information, therefore not possible to be presented next year	Because there seems to be uncertainty around this variable, likely will not be used
Increase in numbers of annual workplans and their presentation but sharp drop in 2013	NORC will wait from CDSS for more updated information, if available.
<b>Benefits</b>	
Coverage in benefits data is higher in later years, and low in earlier years.	NORC will use ARD baseline data to supplement baseline figures. In other places, NORC will utilize HH Survey items on benefits distribution.
<b>Constitution</b>	
i) More reports of process of revision started than constitution revised ii) more revisions completed than started iii) very few approved at AGMs	NORC will rely on the constitution progress published by CDSS online
<b>Gender</b>	
Hard to believe that a conservancy would draw up a gender issues plan without training	NORC will wait from CDSS for more updated information, if available.
<b>Financial</b>	
Not many conservancies report the amounts unaccounted for, whether audit unqualified (misassigned n/a instead of no)	NORC will wait from CDSS for more updated information, if available.
<b>Staff</b>	
Procedures for hiring and firing staff difficult to answer because of the “if” qualifier (low response rate)	Likely will not be used by NORC; but will wait from CDSS for more updated information, if available.
Some have contracts but no job descriptions—is that likely?	NORC will rely on “do all staff have contracts” until more reliable job description information is available
Staff performance is seldom reviewed or isn’t reported	NORC will wait from CDSS for more updated information, if available.
<b>Management Planning</b>	
Some inconsistency in several conservancies for the question whether the plan is up to date	Not necessarily an inconsistency; however, NORC will wait from CDSS for more

<b>CDSS Comment</b>	<b>NORC Response</b>
& was it updated	updated information, if available.
<b>Enterprise</b>	
No answers to “is there a functioning JMC or meetings”, JVCs with JMCs, JVs with dashboards	NORC will wait from CDSS for more updated information, if available; if not, it will not be included, and will rely on qualitative assessment.
Agreements- few or no data (on whether they are operational)	CDSS and NORC have discussed the lack of available data re: operations start date; if any updates are made available NORC will use them. However, NORC would like to secure employment and revenue data as proxy data.
<b>Tourism</b>	
No info on income, jobs, and salaries from jobs in 2011, 2012 & 2013 all conservancies	NORC will work with CDSS to get employment information from 2010-2014 (as reported out in indicator to MCA)
3 conservancies have inconsistencies in presence of tourism plan	NORC will wait from CDSS for more updated information, if available. Otherwise, they will clean inconsistencies accordingly.
<b>General</b>	
Where answers should be n/a instead of no	Where n/a makes sense, NORC will recode (e.g., management plan cannot be updated if there is no management plan).