

## **APPENDIX 1**

### **Justification for including the poaching behaviour in the community**

These could be incidences described by communities as (de facto) legitimate harvesting when they in fact constitute (de jure) poaching. Realizing this is important if one wants reliable responses about poaching in communities. During the interview stage, we did not make any judgement on whether communities were poaching or not. Communities themselves had to give the label to the type of harvesting occurring in their area. However, while analysing data, the study would classify any wildlife harvesting conducted in areas where the law forbids it as subsistence poaching.

### **Further information about sampling**

We used systematic random sampling in each cluster whereby, from the list of households in every village, we randomly selected every  $n^{\text{th}}$  household where  $n$  is the sampling interval calculated as the total number of households in the community divided by the required sample size for that community.

Upon entering a village, enumerators randomly selected a starting point and direction by flipping a coin and tossing a dice simultaneously. Our procedure ensured that chiefs and local authorities did not influence the sampling process by recommending some villages over others.

### **Enumerator training**

The enumerators were trained for two days during which they got the opportunity to go through the survey to get familiar with the questions and the sampling procedure. In order to test the applicability of the questionnaire and sampling, a pilot round was conducted on the third day in one village before the main data collection started in each country.

### **Focus Group Discussion (FGDs) and Key Informant Interviews**

Regarding the qualitative component, we recruited participants for the FGDs with help from traditional leaders. Participants came from the different segments of the society taking into consideration gender, level of education and their wealth status. We also made sure that all communities surveyed in the study area were well represented in these dimensions. A total of nine FGDs were conducted, three in each country with the average group size of ten participants. For the key informant interviews, we used a snowballing approach to identify the next key informant, which resulted in five interviews in total. An interview guide with both specific and probing questions was used allowing also new discussions to emerge while at the same time making sure that derailment from the main focus of the study did not occur. The discussions were on average 45 minutes long and we actively tried to keep them at this length as to avoid fatigue.

## Empirical model specification

**Dependent variables used in Model 1:** The survey item reads: “How many poaching events have you heard about during the recent year?” Respondents are given the following response options; please state number (\_\_\_).

**Justification for the dependent variable in Model 1:** In deciding on the number to report, each respondent recalls community-level poaching data based on the poaching they have witnessed as well as the poaching they have been reliably informed about. The only element missing from their reported data is their own poaching, that is if they happen to poach. This strategy gives a more reliable estimate of poaching as the sample size increases than if each respondent was asked to report their own poaching statistics. Our assumption is that understanding individual perceptions about group behaviour provides some important

## Justification for the using Craggs model

The difference between the Heckman and Craggs model is that the former assumes that in the second stage, there will be no zero observations once the first stage is passed, whereas the Craggs double hurdle still considers that there might be a possibility of a zero observation which might arise from the individual’s choices or random circumstances (*ibid*). For the Heckman model, we interpret the case of the positive values only because the zero values are problematic as they include liars, while for the Craggs double hurdle model we interpret both the positive and zero values (*Engel and Moffatt 2014*). The Heckman model is largely useful for controlling sample selection bias.

**Dependent variables used in Model 2:** This survey item asks: “When was the last time you or any member of this household went out to hunt?” Respondents are given the following response options; please specify year (\_\_\_\_) and/or month (\_\_\_\_) if quite recent.

**Justification for the dependent variable in Model 2:** All forms of hunting by local communities are generally considered as subsistence poaching since hunting is strictly forbidden by law in the study area. Thus, asking local communities about their previous hunting behaviour does not affect the analysis of correlation between subsistence poaching and the drivers identified in the literature, and the subsequent policy recommendations, since hunting is synonymous with poaching in these areas. To avoid protests from respondents who believe they have a right to hunt for one reason or another despite the *de jure* hunting ban instituted by the government, this question came first in the questionnaire.

## Computation of the dependent variable for the second model

If we define a natural cut-off point linked to the CBNRM regime shift as the difference between the survey period and the year of establishment of the community conservation project, the dependent variable for the logit model is re-defined as follows:

$$A_i = \begin{cases} 1 & \text{if } years \leq C \\ 0 & \text{if } years > C \end{cases}$$

where  $C$  = year of establishment – survey period (May 2017, Aug 2018) and  $A_i$  equals 0 if the number of years the household was actively involved in hunting is greater than  $C$  and 1 otherwise. We chose this natural cut-off point because it is exogenous to the system in the sense that beneficiaries were not able to influence it. Therefore, if CBNRM reduced subsistence poaching, then we would want to know whether a household ceased poaching after its inception. For the case of Mozambique, we used the year the household was removed from the park and relocated to the village where they are staying now as the year of establishment of the CBNRM.

### **Computation of the indices**

All categorical variables and variables that require respondents to rate from 1 to 10 (i.e, the use of a Likert scale) were converted into binary variables (median-split) and the computed index is expressed as a fraction between zero and one for ease of interpretation. For instance, a categorical question was recorded into two values, i.e., zero if the response is negative (or below average on a Likert scale) and 1 if it is positive (or average and above on a Likert scale). Negative questions were recorded to match questions that were asked in a positive sense. This was done so that the index lies between 0 and 1 and is easy to read, where zero signifies a negative outcome and one stands for a positive outcome.

**Table A1.1.** Type of question asked by theme.

Theme	Type of questions
<i>Dependent variables</i>	
Perception of benefits	Does the rules from “the park” benefit you, for instance by generating income or employment? 0 = No 1 = Yes
	Does your community receive any income from recreational hunting in the area? 0 = No 1 = Yes
	To what extent do you believe that these economic benefits will be distributed fairly? 1 = Not at all 2 = To a limited extent 3 = To some extent 4 = To a great extent
Perception of rules	How willing are you to follow the rules of the park? 1 = Not at all willing 2 = Not willing 3 = Neither willing nor reluctant 4 = Willing 5 = Very willing
	To what extent do you consider violating the rules of the park? 1 = do not consider it at all 2 = do not consider it 3 = neither willing nor reluctant 4 = to some extent 5 = to a large extent
	In general, to what extent do you actually obey the regulations of the park? 1 = Not at all 2 = To a limited extent 3 = To some extent 4 = To a large extent 5 = To a complete extent
	Rules governing the park are clear and simple to understand 0 = No, 1 = Yes
	You are well informed about the park and its rules? 0 = No, 1 = Yes
	Rules governing the park intend doing the right thing 0 = No, 1 = Yes
	Rules governing the park are enforced fairly 0 = No, 1 = Yes
	There is a moral obligation to comply with the rules governing the park [0,1]
	A person would feel shame if caught for violating the rules governing the park
	Local communities are involved in the making of rules governing the park [0,1]
	Authorities listen to local communities when designing rules governing the park
Perception of wildlife	What the people and its livestock need is more important than saving plants and wild animals? 0 = No, 1 = Yes
	It is important to protect wildlife for our children 0 = No, 1 = Yes
	There are so many wild animals nowadays that the laws to protect them are no longer necessary 0 = No, 1 = Yes
	Wildlife and nature in the area of the park is in risk of being depleted
	Wildlife is nowadays more abundant than it used to be
	In recent time, the overall threats to wildlife and resources have increased

	Has your property or any person you know been damaged by wildlife? [0,1]
Perception of environmental crime	Collecting firewood in a protected area 1 = Not wrong 2 = Wrong but understandable 3 = Wrong and should be punished
	Collecting firewood in a protected area 1 = Not wrong 2 = Wrong but understandable 3 = Wrong and should be punished
	Shooting an animal that destroys your crops 1 = Not wrong 2 = Wrong but understandable 3 = Wrong and should be punished
	Fishing although there is a closed season 1 = Not wrong 2 = Wrong but understandable 3 = Wrong and should be punished
	Poaching inyalas or impalas for bushmeat 1 = Not wrong 2 = Wrong but understandable 3 = Wrong and should be punished
	Has illegal hunting increased or decreased during recent years? 1 = decreased 2 = not changed 3 = Increased
	How many poaching events have you heard about during the recent year? 0 if less than three and 1 if greater than 3
	Most poachers in this area never get caught
	It is sometimes justified to harbour a poacher in your house
	You would tell authorities if you had information that could send a poacher in front of the legal system to face sanctions
	Poaching for commercial use is morally wrong
	Poaching for subsistence use is morally wrong
	Collecting firewood, although illegal, is morally acceptable
	People engaged in poaching should face harder sentences
	If a poacher comes from another country then it is more acceptable to tell the police about this person
<i>Explanatory variables</i>	
Park management	What are your opinions about the current management of the park? 5 = Very good 4 = Good 3 = Neither good nor bad 2 = Bad 1 = Very bad
	How common is it that local communities are involved in monitoring rules governing the park? 1= Very rare 2 = Rare 3 = Common 4 = Very common
	How effective is enforcement to reduce violations? 1 = Not effective at all 2 = Somewhat effective 3 = Effective 4 = Very effective
	How much of illegal behaviour related to conservation in your area will the rangers

	<p>generally be able to hinder?</p> <p>1 = Nothing 2 = Hardly anything of it 3 = Some of it 4 = Most of it</p>
	<p>How often are you in contact with rangers or other state employees enforcing the park rules?</p> <p>1 = Less than once a year 2 = On some occasions over a year</p> <p>3 = Every month 4 = Every week 5 = Almost daily</p>
	Rangers from your country are more efficient than rangers from neighbouring countries
	Help park rangers in their surveillance by telling them of suspicious activities
	A joint ranger force with staff from all the countries engaged in the TFCA
	Surveillance of poaching activities should be increased
	<p>Are you ever in contact with enforcement officers from other countries?</p> <p>0 = No 1 = Yes</p>
Corruption	<p>Offering a bribe to avoid being arrested by the police</p> <p>1 = Not wrong 2 = Wrong but understandable 3 = Wrong and should be punished</p>
	You personally know some of the rangers [0, 1]
	Rangers are on friendly terms with your community [0, 1]
	You can pay rangers them to make refrain to impose sanctions for rule violations
	Rangers from your country are more easily bribed than rangers from neighboring countries
Expertise	<p>Do you consider yourself or anyone else in the household to be a hunter?</p> <p>0 = No 1 = Yes</p>
	<p>Do you consider yourself or anyone else in the household to be a fisherman?</p> <p>0 = No 1 = Yes</p>
	Do you consider yourself or anyone else in the household to be reliant on activities that consist of using natural resources? 0 = No 1 = Yes
	How many times have you eaten bushmeat within the previous month? (state a number) 0 if less than 5 times and 1 if greater or equal to five