



# A bioeconomic analysis of community wildlife conservation in Zimbabwe



Herbert Ntuli<sup>a,\*</sup>, Edwin Muchapondwa<sup>a,b</sup>

<sup>a</sup> School of Economics, University of Cape Town, Private Bag, Rondebosch 7701, Cape Town, South Africa

<sup>b</sup> Department of Business Administration, Technology and Social Sciences, Luleå University of Technology, Sweden

## ARTICLE INFO

### Article history:

Received 3 October 2016

Received in revised form 24 February 2017

Accepted 11 April 2017

### JEL classification:

Q20

Q57

Q28

### Keywords:

Bio-economic

Institutions

Community wildlife conservation

CAMPFIRE

## ABSTRACT

This paper uses a bio-economic model to analyze wildlife conservation in two habitats adjacent to a national park by two types of communities in Zimbabwe. One community is made up of peasant farmers operating under a benefit-sharing scheme such as CAMPFIRE, while the other is made up of commercial farmers practicing game farming in a conservancy. Both communities exploit wildlife by selling hunting licenses to foreign hunters but with different levels of success. The park agency plays a central role by authorizing the harvest quota for each community. We formulate a bio-economic model for the three agents, optimize the market problem for each agent and compare the outcomes with the social planner's solution. Our results show that the level of anti-poaching enforcement by the park agency is suboptimal, while anti-poaching effort exerted by the conservancy community achieves social optimality. CAMPFIRE communities exert more poaching effort than what the social planner would recommend. Our model shows that institutional reforms in benefit-sharing schemes could result in the decisions of CAMPFIRE communities gravitating towards the social optimum.

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## 1. Introduction

Integrated Conservation and Development Projects (ICDPs), commonly referred to as Community-Based Natural Resource Management (CBNRM), are central to future rural development in Southern Africa (Munthali, 2007; Thomson et al., 2013). Conceptually, CBNRM is a sound idea and seems likely to encourage conservation of wildlife resources and to improve the livelihoods of poor rural households if resources are exploited legally and commercially by local communities. Nevertheless, despite such arrangements, community wildlife conservation in the region still faces some serious challenges, one of them being illegal harvesting<sup>1</sup> of wildlife resources by local people living adjacent to protected

areas (Fischer, Muchapondwa, & Sterner, 2011; Gandiwa, 2011; Murombedzi, 1999).

This paper considers two communities that are involved in wildlife conservation under two different CBNRM arrangements around the Gonarezhou National Park (GNP) in Zimbabwe, but are experiencing very different wildlife conservation outcomes. Both communities exploit wildlife by selling hunting licenses to foreign hunters. In Zimbabwe, community-based wildlife conservation takes place mainly under conservancies and the Communal Areas Management Program for Indigenous Resources (CAMPFIRE) program. Ntuli and Muchapondwa (2017) demonstrated heavy dependence on wildlife and other types of environmental resources by CAMPFIRE communities. As a result, we consider the CAMPFIRE communities and private game farms in the Save Valley Conservancy<sup>2</sup> (SVC). The conservancy community exhibits charac-

\* Corresponding author.

E-mail addresses: [NTLHER001@myuct.ac.za](mailto:NTLHER001@myuct.ac.za) (H. Ntuli),

[Edwin.Muchapondwa@uct.ac.za](mailto:Edwin.Muchapondwa@uct.ac.za) (E. Muchapondwa).

<sup>1</sup> A distinction is made in this paper between commercial and subsistence poaching. Commercial poaching is presumed to be an open access business usually conducted by outsiders with the help of local communities, while subsistence poaching is mainly done for subsistence by the local communities themselves (Fischer et al., 2011). Local communities contribute to commercial poaching or illegal trophy hunting by supplying information to outsiders about the movements of wild animals in their wilderness area and sometimes provide escort services for a very small fee. The paper studies subsistence poaching by CAMPFIRE communities.

<sup>2</sup> The SVC is chosen due to its proximity to the GNP, the fact that the conservancy interacts with neighbouring communities and farmers in the SVC are operating as a community, in order to supply the required habitat size and to expanding the management scale of common pool wildlife resources (Kreuter et al., 2010). Although the paper utilizes the GNP area as a case study, the results would generally apply to other areas in Zimbabwe. While there is no statutory definition of a conservancy in Zimbabwe, the working definition is: "Any number of properties, which are amalgamated into a single complex in order to enable more effective management, utilization and protection of the natural resources" (Fitzgerald, 2012).

teristics that enhance CBNRM and coordinated decision-making for wildlife conservation (Kreuter, Peel, & Warner, 2010; Krug, 2001).

The history of wildlife conservation outside of the state started about 40 years ago with the enactment of the then Parks and Wildlife Act (1975), which gave landowners property rights to wildlife on their land (Murombedzi, 1999). Upon independence, the government enacted a new law, the Parks and Wildlife Act of 1982, which gave birth to the CAMPFIRE program—a benefit-sharing scheme involving local communities. The law aimed to provide democratically elected Rural District Councils (RDCs) the appropriate authority for managing wildlife within their geographical boundaries. This new paradigm entails conferring on local communities, through their respective RDCs, (i) greater control over formerly public wildlife in communal areas in defined territories, (ii) enhanced capacities to add value to local wildlife, and (iii) specific financial rewards linked to the estimated conservation value of wildlife within their territories (Balint & Mashinya, 2006; Bond & Frost, 2005; Gadgil & Rao, 1994; Murombedzi, 1999).<sup>3</sup>

However, this goal has not been achieved, as CAMPFIRE only managed to devolve authority over natural resources from the central government to RDCs. Murombedzi (1999) argues that, if CAMPFIRE is to be effective, a further devolution of authority is required so that producer communities, those who live directly beside wildlife, are given full control of the natural resources on their land.

Campbell and Shackleton (2001) noted that the conservancy community differs from traditional CBNRM arrangements involving local communities with respect to biodiversity conservation, livelihood outcomes and other community attributes such as institutions, management and utilization of common pool resources. The difference between price taking (for CAMPFIRE communities) and price making (for the conservancy community) behaviour in this paper constitutes one of the differences in institutions. The conservancy community has market power to influence the price because of autonomy, while CAMPFIRE communities through their respective RDCs rely heavily on safari operators who act as middleman. Accordingly, resolving this problem will necessarily not require some market based instrument only, but also institutional reforms.

The differences in characteristics between the CAMPFIRE community and the conservancy could be responsible for driving the discrepancies in outcomes between the two communities. However, in this paper we will model only those key attributes that we believe matter for conservation and welfare. The main difference between the conservancy and CAMPFIRE community is that the former community has a greater degree of autonomy and is able to exercise anti-poaching enforcement, while the latter community works under the RDC and sometimes engages in illegal harvesting of wildlife which is not guided by the quota. This means that the incentives to conserve wildlife are dissipated under the latter than the former regime because the benefits are shared between the local communities and the RDC. These key differences could potentially influence the two communities to achieve different outcomes. Table 1 below summarizes some of these observed differences and similarities using data that was collected during a survey.

The park agency is the custodian of wildlife in the country; it cares about the stock of wildlife on both communal and private

land. Potentially, both communities will benefit if they are able to grow the stocks on private and communal land. Based on the knowledge and overall impressions about the community's conservation effort, the park agency plays a central role in deciding the harvest quota for each community. The park agency plays a central role by authorizing the harvest quota for each community. The park agency differs from the conservancy community in that the former is a government arm responsible for regulating the activities in the wildlife sector, while the latter is made up of private game farms whose objective is to conserve wildlife and maximize returns from conservation. Fig. 1 below clarifies the relationships and how the various stakeholders differ from each other.

Given the background above, three important questions arise: (i) What are the significant differences between the two types of communities that interact with wildlife in Zimbabwe? (ii) How and why do their differences affect livelihoods and stewardship practice? (iii) What type of reform is necessary in the wildlife sector to achieve equivalent outcomes? Therefore, the main objectives of this paper are to develop a bio-economic model<sup>3</sup> for each of the three agents identified above (i.e., the park agency, conservancy and CAMPFIRE community); optimize the market problem for each agent and compare the outcomes with the social planner's solution; and finally to suggest appropriate wildlife reforms or establish conditions under which a seemingly suboptimal regime might gravitate towards optimality.

Several studies have used bio-economic modelling to address various challenges affecting wildlife in Sub Saharan Africa. For example, the study by Mukanjari, Muchapondwa, Zikhali, and Bednar-Friedl (2013) done for the Mountain Gorillas of Central Africa, Fischer et al. (2011) on African Elephants in Zimbabwe's CAMPFIRE, the study of habitat conversion, species preservation and welfare in Eastern and Southern Africa by Bulte and Rondeau (2007), A bio-economic analysis of protected area expansion in Africa by Johannessen (2007), strategic interaction between the park manager and local people in Integrated Conservation and Development Projects in Africa by Johannessen and Skonhofs (2005), analysis of property rights and wildlife utilization in the Serengeti-Mara ecosystem by Johannessen and Skonhofs (2000), and wildlife conflict and land use in East Africa by Schulz and Skonhofs (1996).

This study contributes to the bio-economic literature and sustainability of wildlife conservation in the context of developing countries. From a policy perspective, the study contributes towards the debate on devolution of CPRs into the hands of local communities and 'tragedy of the commons'. The 'tragedy of the commons' is an economic theory of a situation within a shared-resource system where individual users acting independently according to their own self-interest behave contrary to the common good of all users by depleting that resource through their collective action (Ostrom, 2007; Ostrom et al., 2007). A key innovation of this study is through adding a different type of CBNRM community comprising of private game farms, and then compare the outcome to the results of the standard case (traditional CBNRM community). In real life, there is preference for the former community than the later, but how and why these results differ is not well understood.

Our model is practical in as far as portraying what is happening on the ground is concerned, and this is something quite common in Eastern and Southern Africa. For example, in Tanzania, Kenya, Namibia, Botswana and South Africa, traditional CBNRM communities and conservancies coexist side by side. The results that we get can be interpreted as a guide towards the transition from subsistence to commercial game farming. Although in reality, convergence takes a long time to occur, there are cases in Southern Africa where convergence is happening. For instance, in Namibia and Botswana, there is evidence of local communities gravitating towards commercial game farming. Furthermore, the results of this study have practical policy implications not only to wildlife, but also

<sup>3</sup> We use a bio-economic model to evaluate the behaviour of various actors in order to propose institutional changes that might move individual decisions closer to the social optimum. The social planner's solution is considered to be the most desirable solution since it includes the concerns of everyone. Basically, moving from a suboptimal level requires each of these agents to follow the commands of the social planner. Though they have different starting points, there are additional requirements that the social planner also consider in order to differentiate them.

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