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THE IMPACTS OF WILDLIFE CONSERVATION POLICIES ON RURAL HOUSEHOLD WELFARE IN ZAMBIA

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KEY POLICY POINTS

- *Tourism is increasingly important in Zambia as a vehicle for economic growth, and has been identified as a key sector for poverty reduction due to its potential to generate off-farm income and employment in rural areas. Growth in arrivals and receipts in Zambia has outpaced average growth rates for developing countries.*
- *Tourism in Zambia relies mostly on the stock of natural resources, including the protected area system which includes national parks and game management areas (GMAs). Co-management agreements between Zambia Wildlife Authority (ZAWA) and rural communities present opportunities and threats for households living in GMAs.*
- *Households living in GMAs have lower average income than households in other rural areas. Yet we find that, for prime GMAs (those well stocked with wildlife), the GMA designation leads to higher incomes than households would otherwise be expected to achieve, based on their own characteristics and those of the areas in which they reside.*
- *We further find that the benefits of living in a prime GMA accrue mostly to the wealthier segments of the population.*
- *Though overall effects on households are positive, losses from crop damage by wildlife are a threat to this success: we find that such losses are statistically significant, large enough to be meaningful to households, and greatest in prime GMAs*

INTRODUCTION: Tourism is one of the most rapidly growing economic sectors in the world, especially in developing countries; growth rates in international tourist arrivals and receipts in these countries are roughly double the world average (UNWTO 2006). In Zambia, the tourism sector has grown steadily in recent years; international tourist arrivals from 1990 to 2005 grew at an average annual rate of 9.7%, and tourism receipts grew at 10.2%, compared to average growth rates for developing countries of 6.6% and 9.9%, respectively (UNWTO 2006).

Tourism in Zambia is largely based on the country's stock of natural resources, particularly the system of national parks (NPs) and game management areas (GMAs). GMAs serve as buffer zones between the NPs and rural agricultural land. They were intended to promote sustainable hunting as an alternative to activities not compatible with wildlife protection. The Zambia Wildlife Authority (ZAWA) partners with community organizations to share wildlife management responsibilities and revenue from hunting licenses. This approach is an example of Community Based Natural Resource Management (CBNRM), with the dual goal of enhancing the welfare of local communities and creating incentives for the protection and conservation of natural resources (Leach, Mearns, and Scoones. 1999). Through the CBNRM program, communities receive a share of the revenues generated from hunting licenses and concession fees paid by hunting outfitters. These funds are distributed to Village Action Groups (VAGs), which use the revenue to employ village scouts (who aid in wildlife protection) and for implementation of community development projects (such as the construction of health clinics, schools, water wells, and boreholes). Tourism development also creates opportunities for wage employment and entrepreneurship, in addition to the benefits from increased access to infrastructure and services. However, capturing these benefits depends on various factors, such as the potential

for tourism growth, the appropriate planning of land uses and human settlements, the transparency with which the main actors (ZAWA, area chiefs, community representatives) manage the program, the authority for decision making granted to communities, and the community's commitment to protect wildlife.

The effectiveness of the program is also threatened by unintended negative effects, such as greater crop destruction with increasing wildlife populations and the pressure that in-migration puts on land and other natural resources. Crop losses from wildlife conflicts are cited by village leaders and residents as the greatest impediment to socioeconomic development in GMAs. Despite the apparent increase in crop losses and injuries related to wildlife conflicts, there is currently no means to compensate households for such losses.

This Policy Synthesis summarizes results from a larger study on the effects of GMAs on rural welfare. We find that households in GMAs enjoy higher incomes, but that the gains accrue primarily to wealthier households. Households located in prime GMAs (those with higher levels of biological diversity) benefit more, but are also more likely to suffer more damage from crop losses related to wildlife. The findings suggest that tourism and wildlife conservation are positively associated with household welfare, but have implications for natural resource management policies and the objectives of pro-poor tourism development, which may be sustainable only if human-wildlife conflicts are minimized or compensated.

DATA AND METHODS: We use data from the Impact of Game Management Areas on Household Welfare (IGMAW) survey, which was jointly commissioned by the Natural Resources Consultative Forum (NRCF), the World Bank (WB) and ZAWA as part of an effort to inform policy-makers on the effectiveness of the GMAs as currently operated. The specific objective of the survey was to determine the impact of GMAs on the economic welfare of households residing in them. Stratified two-stage cluster sampling was used to identify households adjacent to four national park systems: Bangweulu (including Isangano, Lavushi and Kasanka NPs), Kafue (including Kafue, Blue Lagoon and Lochinvar NPs), Lower Zambezi (Lower Zambezi NP) and Luangwa (South Luangwa NP). Each of the park systems was considered a reporting domain in the sampling process.

In the first sampling stage, the list of Standard Enumeration Areas (SEAs) within GMAs was obtained by overlaying GMA digital maps from ZAWA with maps of SEAs from the Central Statistical Office (CSO). All SEAs outside GMAs but bordering national parks were included as control areas. A sample of 139 SEAs was drawn from the two lists using probability proportional to size methods (PPS), and drawing upon the 2000 census of population and housing.

In the second stage, all households in each SEA were listed, and sample households were selected for interviewing using systematic probability sampling. The total number of households interviewed was 2,769 out of a target of 2,800, amounting to a 99% response rate. Approximately half of the respondents reside in GMAs (58%) and the other half in non-GMA or control areas (42%). Data were collected at the household and community levels using structured questionnaires; the community questionnaire was administered to groups of village leaders, chairpersons of CRBs, chairpersons of VAGs, school headmasters, and others.

Household welfare was measured by total income, including farm income (total value of sold and retained harvest; value of livestock sold, consumed and owned; value of sold forest products, income from hiring of equipment and income from game meat) and off-farm income (wage employment and self employment).

RESULTS: We use ordinary least squares (OLS) regression to estimate the effect of GMAs on household income (Table 1). Typically, the determinants of household income include human capital, physical assets, locational characteristics, and other social and institutional assets (De Janvry and Sadoulet 2001). All coefficients have the a priori expected signs and for the most part are statistically significant.

Table 1. Ordinary Least Squares Regression of the Effect of GMAs on Household Income

Variable	Coefficient (standard error)	Sig.
Intercept	13.101 (0.12)	***
Human capital		
Age of household head (in years)	- 0.003 (0.00)	*
Sex of household head (=1 if male)	0.069 (0.06)	
Maximum education (in years)	0.043 (0.01)	***
Number of children	0.019 (0.01)	
Number of female adults	0.113 (0.03)	***
Number of male adults	0.070 (0.03)	**
Social and institutional assets		
Distance to nearest main road (km)	- 0.005 (0.00)	***
Population density (per sq km)	0.001 (0.00)	***
Infrastructure	0.032 (0.01)	***
Physical capital		
Cropped area (hectares)	0.039 (0.02)	*
Log of consumer assets (Kw)	0.020 (0.00)	***
Log of productive assets (Kw)	0.010 (0.00)	***
Locational Variables		
Tourist lodge in SEA (=1)	0.186 (0.10)	*
GMA-1 (=1 if prime GMA)	0.170 (0.08)	**
GMA-2 (=1 if secondary or specialized GMA)	0.022 (0.07)	

Dependent variable is logarithm of total household income
R-squared = 0.213 n = 2,264
* 10% significance ** 5% significance *** 1% significance

We find that education and number of adults are positively associated with household income. Population density, infrastructure, and the presence of a tourist lodge are also positively associated with income, while distance to the nearest main road has a negative effect on income. Households living in a prime GMA (GMA-1) have 17% higher total incomes than comparable households residing in non-GMAs, after controlling for other factors. For households living in secondary or specialized GMAs (GMA-2), the result is positive but not statistically significant and is low in absolute terms. By classifying GMAs by stocking levels and diversity, we show that the GMA effect is dependent on the level and variety of wildlife population. This is an expected outcome since the potential benefits from living in a GMA are hypothesized to be directly linked to the tourism industry and the revenues obtained from hunting.

To explore how the GMA effect varies by type of household, we separated households into quintiles—five groups of equal size ordered by the value of consumer assets—and repeated the regression in Table 1 while interacting the two GMA variables with the consumer new asset variables.

Results show that only the wealthiest 40%—the upper two quintiles—significantly benefit from living in a GMA. Because most opportunities for increased income in GMAs come from the non-farm sector, this result is not surprising (Haggblade, Hazell, and Reardon 2007). The impact is insignificant for all segments living in secondary or specialized GMAs.

For the analysis of the effect of GMAs on crop losses from wildlife conflicts, we use a model that allows separate estimation of the probability of sustaining crop damage and the value of that damage (Cragg 1971). Results are presented in Table 2.

Table 2. Two-stage Analysis of the Probability and Value of Crop Losses from Wildlife Conflicts

	Marginal Effects	
Variable	On probability of crop loss	Overall
Intercept	n/a	n/a
Age of household head	-0.000	-0.001
Sex of household head	-0.006	-0.046
Household size (#)	-0.006 **	-0.076**
Distance to main road (km)	0.001 **	0.009*
Cropped area (hectares)	0.010 **	0.077
Consumption assets (Kw)	-0.000	-0.005
Production assets (Kw)	-0.001*	-0.010**
Population density	-0.000	-0.000
Infrastructure	-0.001	-0.013
Number of scouts (#)	0.004	0.053*
Value of harvest	0.006***	0.102***
GMA-1 (=1 if prime)	0.161***	1.486***
GMA-2 (=1 if secondary/ specialized)	0.122**	1.238***

* 10% significance ** 5% significance *** 1% significance

The first column shows the effects of the independent variables on the probability of experiencing crop damage from wildlife conflicts. The second column shows the expected overall effect of each variable, taking into account both the probability of crop loss and the value of that loss for those that experience it[1]. This column is of particular policy interest as a summary indicator of the effects of GMAs on crop losses.

Household size has a negative impact on the probability and overall value of crop loss, suggesting that additional labor may help contain wildlife and protect fields. Distance to all-weather roads is also positively associated with the probability and overall value of crop damage, suggesting that, as expected, more remote areas are likely to have greater wildlife

[1] Econometrically, this column reports the "unconditional average partial effect".

populations. The number of scouts hired in the community has a significant and positive effect on the overall value of crop damage, suggesting that the anti-poaching patrols have helped increase (or sustain) wildlife populations, thus leading to more crop losses and a failure to protect local livelihoods.

Finally, the GMA effect is, as expected, positive and significant, more so in prime GMAs than in secondary or specialized GMAs. The results clearly confirm the hypothesis that households are more likely to be affected by crop loss in better stocked GMAs. As mentioned before, the human-animal conflict represents one of the biggest threats to the success of CBNRM programs.

CONCLUSIONS: Results of this analysis indicate that GMAs generate meaningful economic benefits but that these benefits accrue primarily to wealthier households and to those GMAs with greater levels and variety of wildlife. These results should encourage the continuation of CBNRM programs. However, the uneven distribution of the benefits of living in a GMA demonstrates that, to have meaningful impact on rural poverty alleviation, tourism development needs to be pro-poor by design. Community participation in tourism development is one of the major avenues for promoting pro-poor tourism. These findings suggest a role for policies that enhance the upstream linkages between tourism and small enterprises in rural areas, particularly in agriculture, in order to boost rural incomes and increase demand for locally-manufactured goods.

Despite the overall positive effect of GMAs on household income, our results confirm the views expressed by community leaders and residents regarding crop loss from wildlife: households living in areas with higher wildlife populations suffer more intensely from crop destruction. Current policies provide no compensation to households experiencing such damage. Yet continued success of the GMAs in protecting the population and diversity of wildlife may exacerbate this problem, potentially threatening the sustainability of tourism development and eroding community support for environmental conservation. Wildlife conservation and tourism development may thus be sustainable only if human-wildlife conflicts are minimized or compensated.

This research also highlights policy implications for the role of village scouts, since we find that more scouts in a community are associated with *more* crop loss. This suggests that scouts have been successful in protecting wildlife but have been unable to prevent (or to focus on preventing) wildlife from destroying agricultural fields. A review of the scouts' mandate could help more appropriately balance their role across these competing objectives. Policies that simultaneously protect wildlife and minimize or compensate for conflict may more effectively advance the overall goals of wildlife conservation.

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