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# IMPACT OF NATURAL RESOURCE CONSERVATION POLICIES ON HOUSEHOLD CONSUMPTION AROUND ZAMBIAN NATIONAL PARKS

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***Key Policy Points***

- *Game Management Areas (GMAs) in Zambia aim to combine nature conservation with economic empowerment of rural households and communities.*
- *We find evidence of consumption gains from living in GMAs and from participating in natural resource management through Community-Resource Boards (CRBs) and Village Action Groups (VAGs).*
- *However, these benefits are unevenly distributed. Only GMAs with limited alternative livelihoods (Bangweulu and South Luangwa) exhibit significant consumption benefits. Also, the benefits accrue mainly to the relatively well off while the poor do not gain even if they participate.*
- *Resources from ZAWA to CRBs seldom reach the VAGs. Richer, more educated community members participate at CRB or higher level while poorer households participate at VAG level. There is need to address impediments to effective participation by the majority of the community members.*
- *Infrastructure development, which is more evident in Kafue and Lower Zambezi park systems, does not necessarily translate into household level consumption gains in the short run. Moreover, the observed infrastructure development in these areas cannot be attributed to the GMA institution.*

**INTRODUCTION:** Game Management Areas (GMAs) in Zambia are buffer zones around national parks, in which licensed safari and subsistence hunting is permitted (ZAWA 2007). It is a communal area in which people live by semi-subsistence agriculture, coexisting with wildlife. The community-based natural resource management (CBNRM) program allows Zambia Wildlife Authority (ZAWA) to share hunting license revenue and wildlife management responsibilities with the communities living in GMAs (GRZ 1998). The communities allocate the revenues between employment of village scouts, and local infrastructure and developmental projects through Community Resource Boards (CRBs) and Village Action Groups (VAGs). The argument is that the resultant increased natural resource conservation will lead to increased tourism activity and private-sector investment, leading to greater revenue for the communities and greater conservation. However, the increased wildlife population is bound to increase crop damage by wildlife, tsetse infestation, and other human-wildlife conflicts. In the end the impact of GMA policies on household welfare is the net effect of the benefits and costs associated with wildlife management.

**OBJECTIVES:** This policy brief summarizes a larger study which has the objective to determine the welfare effects of the GMA institution and of participation in CRBs and VAGs. The study also determines whether such benefits (if they exist) accrue more to the poorer segments of the communities, a hypothesis implicit in the establishment of the GMAs. We use consumption expenditure in the analysis as the welfare indicator. Broader measures of

welfare based on education and health, which measure longer term non-economic benefits, may not be evident for the CBNRM program in the GMAs, which started relatively recently.

**DATA AND METHODS:** This study uses household and community data from the 2006 "Impact of Game Management Areas on Household Welfare (IGMAW)" survey by the Zambia Central Statistical Office (CSO) with technical and financial support from the World Bank (WB), the Natural Resources Consultative Forum (NRCF), and ZAWA. The survey covered 2,769 households in 139 communities in GMAs and other, control areas around national parks, selected through a two-stage stratified cluster sampling process. With the exception only of those in the north and north-western parts of the country, the rest of the national parks were covered. About half of the interviewed households were in treatment areas. The study also benefited from key informant interviews with tour operators, VAG and CRB committee members and ZAWA officials in the study areas.

Many factors affect household welfare, including participation in the CBNRM program. Some of these factors also affect the household's propensity to live in GMAs and/or to participate in the CRBs and VAGs. One of the important implications of selection bias is that the simple differences in average welfare between treatment and control households are not an accurate measure of impact (Ravallion 2001). We use joint estimation of outcome and treatment relationships (Maddala 1983; StataCorp 2003) to consistently estimate the impact on consumption expenditure (for details, see Bandyopadhyay and Tembo 2010).

**RESULTS:** Although agriculture is generally the most important livelihood activity, it is relatively more important in non-GMAs, identified by 86 percent of the households (compared to 79 percent in GMAs). In contrast, GMAs exhibit more diversified off-farm income sources which include an impressive showing by the tourism sector. Evidence shows that, as expected, households in GMAs are significantly more likely to participate in community-based natural resource management through CRBs and VAGs than their counterparts in non-GMAs, but have significantly less durable assets, are more likely to be female-headed, are less educated, and are further away from all-weather roads. However, unconditional descriptive statistics indicate that, statistically, the two strata are not different with respect to per capita consumption expenditure and access to basic schools and health centers. On average, a typical household has an annual per capita consumption expenditure of ZMK 846,000 regardless of where it is located (GMA or non-GMA).[1]

Table 1 presents treatment regression estimates of the average impact on household welfare of living in GMAs (Column 1), and the impact of participating in community resource management through CRBs and VAGs. On average, 66 percent of the consumption expenditure enjoyed by households in GMAs can be attributed to the GMA institution (Table 1). Though huge, these benefits were not possible to see with the unconditional mean comparisons discussed above. This is because GMA communities and households have other attributes (less wealthy, less educated, more remote, etc), which would make them worse off in the absence of the GMA interventions. Within the GMAs, those who participate in CRBs and VAGs have 44 percent more per capita consumption expenditure than they would have had had they not been participating (Column 2).

However, these gains accrue only in GMAs around Bangweulu and Luangwa park systems. Households in these two park systems have proportionately more female-headed households, less education, longer distances to all-weather roads and less livestock, which may imply less resources

[1] Average exchange rate in 2006 was 1 USD = 3600.00 ZMK.

and alternative economic opportunities. Thus, they are more likely to depend on natural resources and to seek benefits from the GMA institution. This may explain the greater migration pressure and participation in community-based organizations, including CRBs and VAGs.

**Table 1. Treatment Regression Estimates of the Impact of Being in GMAs and of Participating in CRBs and VAGs, 2005/06**

| Park system | Being in GMA | Participating in CRB/VAG |
|---|---|---|
| | (1) | (2) |
| | ---------- (%) ---------- | |
| Bangweulu | 72.9*** | 85.8*** |
| Kafue | -44.4 | -28.6 |
| Lower Zambezi | -36.2 | 49.4 |
| Luangwa | 74.4*** | 53.0*** |
| Overall | 66.5*** | 43.8*** |

Significance: *= 10 %; **= 5 %; ***= 1 %

Notes: 1) Impact estimated as the average treatment effect on the treated (ATT) using per capita consumption expenditure as the outcome variable

The significance of these factors is that they are different in Bangweulu and Luangwa as compared with Kafue and Lower Zambezi, and may explain part of the observed differential impacts. Surprisingly, Kafue and Lower Zambezi park systems have greater infrastructure development activity.[2] However, after controlling for wealth, community size, frequency of meetings by the leadership, number of droughts during the 10 years prior to the survey, distance to all-weather roads, nongovernment organization-funded projects in the community, and labor contribution by the community, the impact of the GMA institution on the age of new infrastructure disappears.[3] This implies that the observed infrastructure developments may have been facilitated by processes outside of the GMA institution.

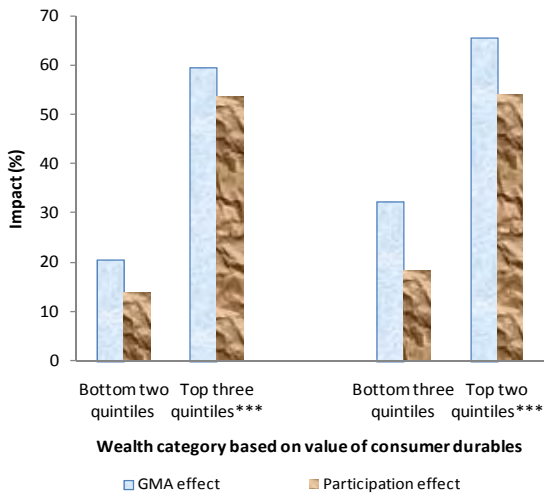
[2] The average age of the newest infrastructure in Kafue and Lower Zambezi park systems was between 2 and 5 years, compared to 8-10 years in Bangweulu and Luangwa.

[3] Full results of both the treatment regressions and other auxiliary regression models such as this are not reported here due to space limitations. Interested readers are referred to Bandyopadhyay and Tembo (2009).

The impact of the GMA institution is also non-uniform with respect to the household's initial asset wealth. The impact of the GMA institution as well as participation in CRB and VAG activities on per capita consumption is large and positive but only for the households in the top two quintiles of the value of consumer durable assets (Figure 1). About 54-60 percent of per capita consumption expenditure among non-poor participating households are associated with the GMA institution and participation in community-based natural resource management activities.

However, the GMA and participation effects, though positive, are not significant in the asset-poor category. The results do not change even if the asset-poor category is redefined to include the bottom three quintiles of the value of assets. Therefore, the GMA institution does not necessarily benefit the poorest in the community.

**Figure 1. Heterogeneous Impact of GMAs and Participation in CRBs and VAGs on Per Capita Consumption Expenditure**




Notes: 1) Impact estimated as the average treatment effect on the treated (ATT) ; 2) Significance: *= 10 percent; **= 5 percent; ***= 1 percent

One of the explanations for the heterogeneous impacts is that participation in community resource management is in levels. The powerful, who often are more enlightened, richer, and closer to traditional power participate more actively in the CRBs and ZAWA meetings. Discussions with

community stakeholders indicate that such active members can even access CRB funds as loans.

Blunt misappropriation of CRB funds has also been reported in a number of active CRBs (Mulenga 2003; Astle 1999). At the other end of the participation continuum, the poorer and less powerful members of the communities only attend local meetings in their respective VAGs. Conversations with community members suggest a clear disjoint between the CRBs and their member VAGs. Therefore, resources from ZAWA seldom trickle down to the VAGs. Mulenga (2003) cites weak community participation and information sharing regarding community entitlements as major constraints.

**CONCLUSIONS:** We find substantial gains associated with living in GMAs and participating in CRBs and VAGs. However, these gains are unevenly distributed, accruing mainly in remote park systems with limited alternative economic activities and among the relatively richer households. Other things being equal, the poor and non-poor households are equally likely to participate in CRBs and VAGs. However, the nature and degree of participation varies between the two groups.

While the non-poor households participate close to the ZAWA-supported CRB resources, the poor are largely passive participants in their VAGs. Elite capture of the benefits from GMAs cannot be ruled out, given the unclear links between CRBs and VAGs. Historically powerful national institutions like ZAWA and local elites have vested interests in maintaining the status quo in revenue sharing.

These and other impediments to effective bottom-up resource management need to be understood and addressed. Clearly, the existing model, in which ZAWA shares the revenues through CRBs, and in which the VAGs are weak players is not achieving the intended objectives.

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