

Non-conventional approaches to wildlife management in an African landscape

I. INTRODUCTION

As human activities come into increasing contact with wildlife populations, resource managers are turning to new and often unconventional approaches in which humans are a major part of the management equation. Such approaches typically shift the emphasis from biological sciences to economics, rural development, and social sciences and create innovative opportunities for cross-cutting linkages. Variation in land uses and living standards dictate these approaches be uniquely suited to a particular landscape of biodiversity, cultural practices and human needs.

With regard to the African landscape, where tradition of community life is strong and use of renewable resources provides the basis for rural livelihoods, a community-based approach to wildlife management is gaining wider acceptance and practice. Wildlife managers, who recognized the limitation of Government institutions to manage wildlife in rural areas, were catalytic in initiating the early development of community-based approaches to wildlife management in Africa. These efforts were centered largely on wildlife-based benefits supported by safari hunting or non-hunting tourism revenues. In most cases these efforts recognized the critical importance that community institutions be established to administer these funds for household needs and to develop ownership rights of wildlife resources to enhance the economic value of this resource for local residents.

Continued research on community-based management of wildlife has shown that the full impact of this approach on conservation is limited unless the underlying reasons for land use activities that threaten wildlife are fully understood and solutions as identified by community members are applied. From such understanding and with appropriate involvement by local residents, communities can mitigate against these disturbances themselves. More often than not, however, such solutions are less related to wildlife management practices, and instead, are more related to improving household livelihood needs in ways that reduce human conflicts with wildlife populations.

This paper reviews some recent work in Zambia and its significance in applying household level solutions to poverty reduction and food security for achieving improved wildlife management. This work also underscores the challenges wildlife managers face in applying these lessons and monitoring their success in rural areas. Despite these challenges, it is argued that unless such lessons are incorporated into wildlife-based CBNRM programs, long-term prospects for wildlife conservation in Africa will diminish.

II. THE NEED FOR MANAGEMENT AT THE HOUSEHOLD LEVEL

A summary of results by Zambia's national CBNRM program, referred to as ADMAD¹ (see Table 1), in areas where the program is well established suggests interventions supported by the program are increasing wildlife production for some species. Despite these positive indications of program success, wildlife mortality attributed to the use of wire snares and hunting by non-licensed local residents remains unsustainably high. Preliminary results suggest

- the percentage of households involved in these activities is small but contributes to high wildlife losses in localized areas where people reside in close proximity to wildlife populations,
- a high percentage of these households lacks sufficient food to support themselves and must compensate by exchanging game meat for their staple plant foods, such as maize and sorghum,

¹ *Administrative Management Design for Game Management Areas*

- a large portion of the rural populations in wildlife areas earn income from the sale of fish and chickens, but due to excessive fishing pressures, fish yields are diminishing; and due to uncontrolled and erratic outbreaks of New Castles disease, production of poultry is low, and
- household incomes are insufficient to provide security against hunger for many households and contributes additional pressures to snaring and illegal hunting of wildlife. This is particularly true during the dry season when production of green vegetables as an alternative source of nutrition is low and often non-existent.

Indicator	Trend	Data source
Wildlife populations	60 to 80% of the wildlife species showed trends as either stable or increasing	Indirect measures (hunting records, local knowledge perceptions), aerial surveys
Wildlife revenues	Revenues from safari hunting averaged 6% increase per year for four consecutive years	Licenses sold
Community involvement	Community employed scouts increased law enforcement manpower three-fold	Community accounts ledger
Community investment	Number wildlife camps increased by 30% and 4 out of 6 communities purchased their own vehicles to support wildlife management	ADMADE survey results

Only when the institutional community structure developed lower level structures that allowed individual households to participate in decision-making and decide how best to invest their legal wildlife revenues in livelihood needs were these constraints to improving wildlife production reduced. Previously, capital projects like schools and clinics were supported and a non-elected traditional authority made these decisions, which generally did not reflect the expressed needs or priorities of community members. The key lessons derived from this experience that relate CBNRM efforts to improved conservation of wildlife for subsistence-based communities are as follows:

- In order to sustain increased wildlife production, community members must be able to produce sufficient food to meet annual household-level needs.
- Community investments to support increased wildlife production will succeed if household livelihood needs that contribute to wildlife threats are effectively addressed.
- Community-based organizational structures designed to administer investments of wildlife revenues for community needs should incorporate lower-level household groupings as the basis for local participation in decision-making and peer review of their elected leaders.
- Representative leadership based on democratic elections requires that leaders facilitate the development of skills and market opportunities that will promote legal sources of household income not in conflict with wildlife production.

These lessons do not exclude the important role communities can and should play themselves in actively safe-guarding wildlife resources as a deterrent to anyone who may contravene wildlife laws or engage in activities that would lower the economic value of wildlife. ADMADE, for instance, allows communities to use their own wildlife revenues to employ local residents to police their area against such people. This approach has proven to be many times more cost-effective than a management approach that depends exclusively on Government-paid, non-resident wildlife police officers. However, such an approach, while extremely helpful, is not sufficient to contain all wildlife threats that emanate from local residents who face problems of poverty. For this reason, the above-mentioned lessons are proposed as necessary conditions for a wildlife-based CBNRM program to achieve and sustain wildlife conservation.

Implicit in these conditions are the following assumptions:

- Wildlife resources generate income sufficient enough to help finance household livelihood solutions.
- Government recognizes community-based institutions as the legal owners and producers of wildlife with full rights of retaining income derived from the legal use of this resource.

Major difficulties in realizing the full potential of the CBNRM approach often result when these assumptions are not realized. Policies governing resource use and tenure rights in support of these assumptions may prove lacking and can seriously constrain the success of a CBNRM program. In Zambia, for instance, policies allow only 35% of the revenues derived from fees and licenses for wildlife use on communal lands to go to communities. In addition, unclear ownership rights of wildlife by community-based institutions create a weak bargaining position for communities to negotiate partnerships with private sector interests.

III. APPLYING LIVELIHOOD SOLUTIONS TO CONSERVATION: PRELIMINARY RESULTS

A. Food security and effects on land use disturbances

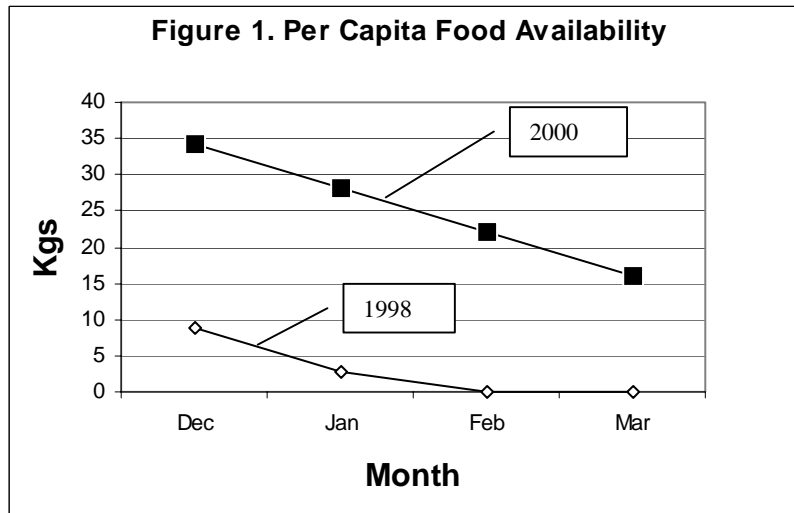
In 1998, intensive survey studies of Yakobe Village in Lower Lumimba GMA showed farming practices produced low yields and necessitated a high rate of land clearing to obtain more favorable crop production. The need to clear more land increased farmer exposure to crop damage from wild animals. Many households had insufficient stocks of bulk food (maize and sorghum) in their granaries to support them through the farming year and were forced to work in other people's fields to receive food as payment. In other cases, household heads spent time obtaining fish, game meat or honey to barter for food. As a result, food insecurity resulted among residents who failed as farmers, and to cope with this food shortfall, households exploited their renewable resources to compensate.

During 1999 and 2000 skills were provided to residents of Lower Lumimba GMA to improve food production methods through extension work provided by the African College for CBNRM². This was done by increasing protection of granaries from elephants with solar-powered electric fencing and improving water retention for crops, fertility of soils and quality of seeds. In 1999 Yakobe used its CBNRM revenues to purchase 120 x 90kg bags of maize to reduce household food shortages. This also allowed more households to concentrate on their own fields the next farming season to apply these new skills. Table 2 shows the increase in food produced from local farms by comparing food quantities measured in granaries for the months October/November in 1998 and 2000.

	Number of HHs	Population	Food stock (Total kg)
2000	180	859	34478
1998	183	896	7940

The deficit of food in 1998 contributed to poor school attendance, as children were required to search for food or help weed gardens while parents searched elsewhere for food to help feed family members. School attendance in 1998 was below 10% whereas in 1999 attendance rose to above 80%. School teachers were interviewed and revealed a high incidence of game meat in the village during these months, whereas in 1999-2000 farming season, incidence of game meat in the village was not reported. The significance of these data is reflected in Figure 1, which shows the projected amount of food per person for 1998 and 2000 during the months from December to March, which are the months residents actively farm. Resident begin to harvest their crops in March or early April. These results revealed a major improvement in food production from 1998 to 2000. Part of the explanation of the poor yield in 1998 is attributed to late and irregular rainfall, which is a problem farmers learned how to mitigate against with improved farming practices.

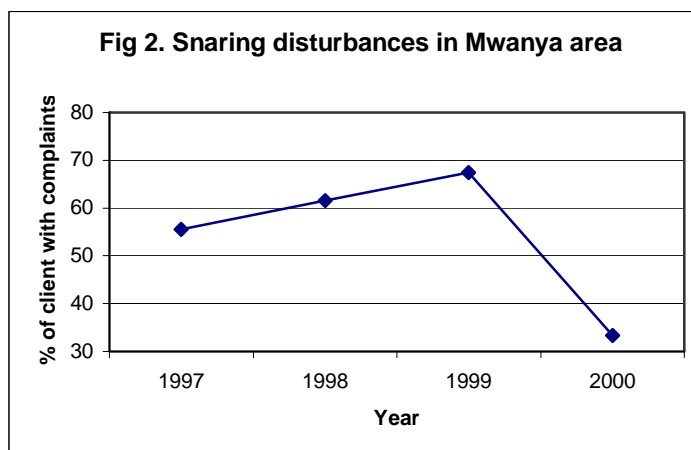
² African College for CBNRM is a training and research institute housed under the Zambia Wildlife Authority to promote CBNRM skills in rural communities



While these results pertain only to Yakobe Village, similar problems of food security were expressed by members of the community for the other four major village groupings in Mwanja, especially Lukusuzi, Mukusanga and Chisela. Household food levels were not monitored but each of these villages purchased comparable quantities of food relief as Yakobe, and conservation farming skills were also introduced in these villages.

To further measure the possible influence of this improved food security on land use disturbances, the African College for CBNRM relied on standardized scores provided by safari hunting clients. Mwanja area typically receives 10 to 15 clients annually and they actively hunt significant portions of the area during the hunting season, which lasts from June to November. Duration for a hunt varies from seven to twenty-one days. Professional hunting guides escort their clients around the GMA to different hunting areas in a 4-wheel drive vehicle and in this way exposes the client to possible land use conflicts over a large portion of the GMA. On the final day of hunting, the client receives a questionnaire to complete. As part of the questionnaire, the client is asked to indicate the particular land use disturbances encountered during the hunt. The questionnaire provides a choice of the common problems typical to most GMAs, such as snaring, bush fires, unlicensed hunters, too many licensed hunters, and so forth. Space is also provided for disturbances not listed. Clients take the form seriously and often provide detailed comments to their scorings.

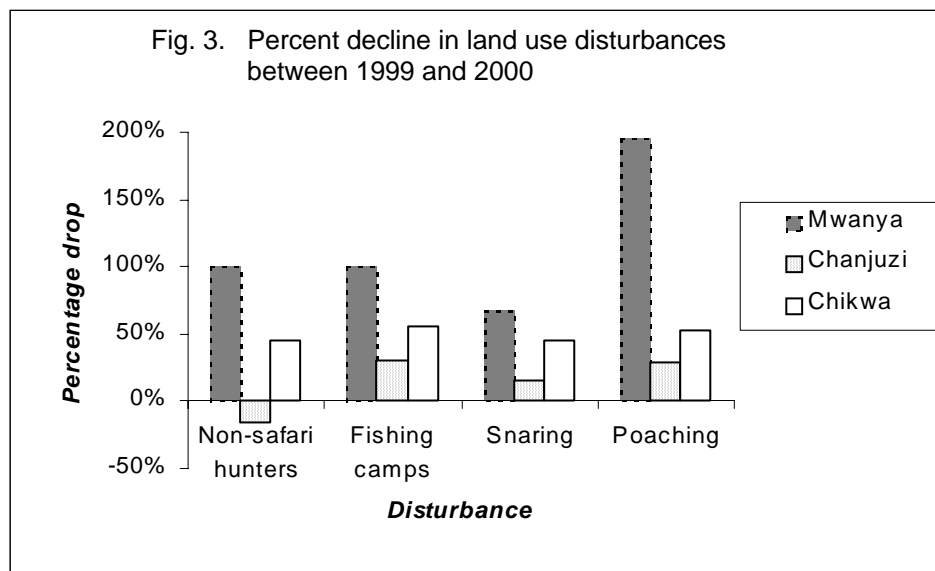
This questionnaire was administered in Mwanja area from 1997 to 2000. Despite efforts to improve community awareness about land use disturbances and the adverse effect they have on CBNRM revenues by the College, client assessments suggested that disturbances were not diminishing (see Fig 2). In 2000, however, snaring declined by over 50%. Snaring is a destructive form of illegal hunting and is not easily controlled by conventional law enforcement but is best controlled through voluntary efforts of the community. The results therefore suggest that community members made a conscious decision not to use snares in 2000. This is further



reinforced by the fact that the manpower levels of law enforcement officers in the same year was reduced by more than half due to employment lay-offs imposed by Zambia Wildlife Authority.

To help establish a cause and effect relationship between these improved food security results and lowered land use threats to wildlife, client questionnaire data for other GMAs, where food security efforts were not undertaken by the College, were compared with that of Mwanya area. This analysis was based on percent reduction of land use disturbances between 1999 and 2000, when improvements in food security were achieved in Mwanya area. Results showed a consistently higher percentage drop in disturbances for Mwanya area (see Fig. 3). Four different forms of land use disturbances were used:

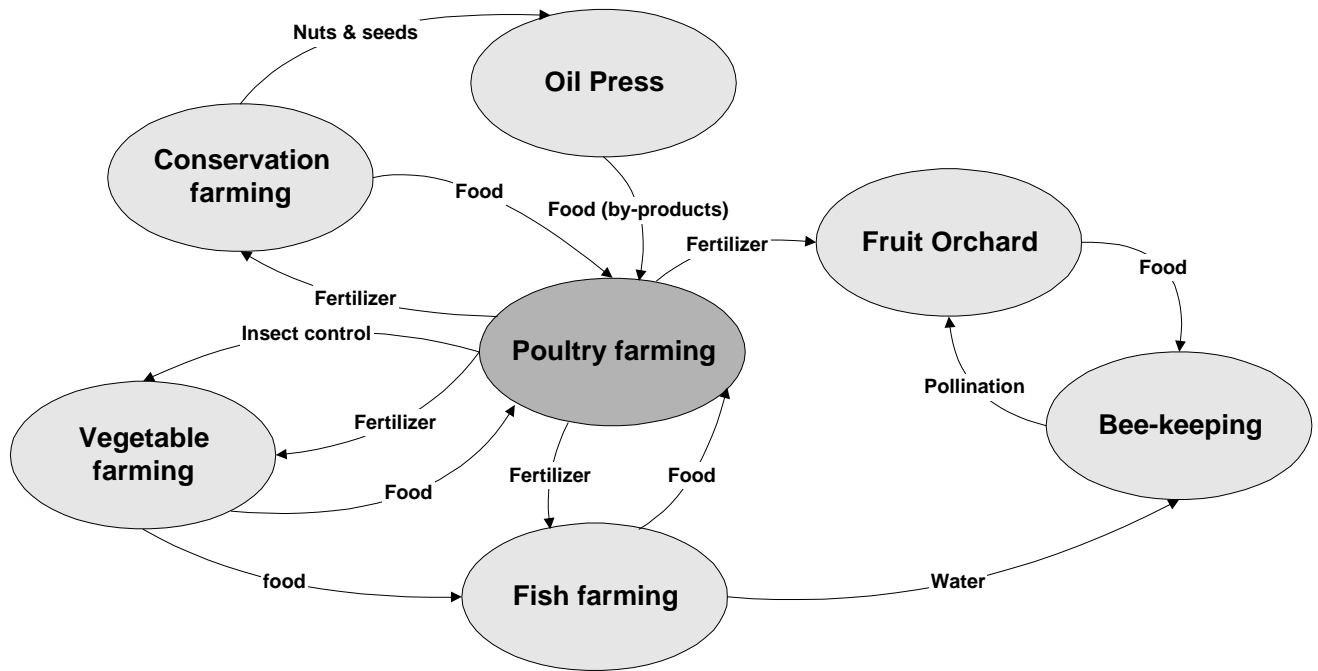
- Non-safari hunters: evidence of community controls to reduce local hunter activity during the safari season when community revenues are earned
- Fishing camps: interfere with animal movements and often source of bush fires and localized snaring
- Snaring: illegal form of poaching
- Poaching: unlicensed hunters, often from the local community or supported by local residents



B. Multiple livelihood approach toward improved wildlife management: dynamics of village ecology, local markets and reduction of threats to wildlife

Figure 4 shows a hypothetical set of relationships between different livelihood approaches residents of a rural community are able to adopt in whole or in part through relatively low-cost investments. By working with farmer groups to increase advantages of shared resources, labour, and skills, successful adoption of this multiple livelihood approach becomes much more feasible. It is argued that for some communities where threats to wildlife originate largely from households who reduce risks of poverty by depending on game meat, investment in wildlife management may be better served by realizing the value of this multiple livelihood approach in lowering this dependence.

Conclusions and potential benefits of a multiple livelihood approach as illustrated by Figure 4 are:



1. Increased household income and food security for participating farmer or farmer group members
2. By-products that provide positive inputs for other livelihood activities
3. Options to maximize yields or income without major increases in labor
4. Reduction in economic and nutritional pressures to over-harvest wildlife populations.

Critical assumptions of this multiple livelihood approach to achieve these benefits include the following:

1. Each livelihood activity is supported by appropriate skills or inputs
2. Markets exist to help drive the incentives needed to sustain this approach
3. Households or household groups have access to initial capital or loans to initiate a given livelihood activity
4. Households or household groups have sufficient skills to manage profits for reinvestments to expand or diversify livelihood activities

A community deriving significant revenues from wildlife through legal, sustained uses will be more inclined to conserve and produce wildlife on their lands if these revenues are effectively shared in support of livelihood needs. It is often those households in greatest need that result in land uses destructive to wildlife resources. Community capacity to use wildlife revenues in this way is an important catalyst to initiate, support and sustain a multiple livelihood approach. From a wildlife management perspective, such investments are likely to have a higher return in terms of increased wildlife production than other investments, such as law enforcement or purchase of wildlife management equipment. This is especially true when local residents within the community represent the greatest threat to wildlife populations through such activities as hunting, snaring or habitat destruction.

C. Closer examination of the multiple livelihood approach with a focus on poultry

The following example illustrates how improvements in household livelihoods at relatively low investment costs can have major positive impact on conservation by reducing the key threats to wildlife populations in a semi-protected area. The example also underscores the importance of understanding the ecological systems that apply to rural communities.

Rural communities living in game management areas throughout much of Luangwa Valley rely heavily on poultry production for a major part of household income. In practice, households are able to produce and sell about 20 chickens per year at approximately \$.75 to \$1 per chicken. For many this represents a major source of legal income for household needs. Approximately the same number is consumed. To supplement this income or source of meat with other sources, game meat is often used for exchange or sale or for consumption. It is hypothesized that if households could affordably double or triple their chicken production, then households would be more willing to reduce destructive disturbances to wildlife in order to increase revenue benefits derived from wildlife through programs like ADMADDE.

Major constraints to increasing income from chickens in Luangwa Valley are:

1. High seasonal mortality from New Castle's disease
2. High chick mortality from a range of predators
3. Low local market value
4. Lack of access to better market opportunities

Reducing mortality from New Castle's disease is possible through a commercially available vaccination, which is easy to apply and costs approximately \$1 per 1000 chickens. The challenge to using the vaccination is that it requires refrigeration and is available at most major town centres. Without the vaccine, villagers risk losing 80 to 95% of their chickens in a given year. Reducing mortality of young chickens, which can also be high, is possible by reducing the distance chickens travel when foraging. As chickens wander further away to feed in more open, natural cover, predation rates increase. Reducing these rates is achievable in several ways: 1) providing supplementary food so they are more inclined to stay close to villages where predation rates are lower, 2) keeping young chickens in enclosures to avoid predation, and 3) providing young chickens with improved feed that will accelerate growth and thus reduce vulnerability to predators. By using enclosures and feeding the chicks with higher protein supplement, their mothers can be separated when the young are only two or three days old. The chicks grow relatively fast while their mothers resume breeding at a more rapid interval than if they remained with their young. In this way, hens are able to complete three clutches per year as opposed to just two.

Applying these lessons and working out appropriate solutions for vaccines, enclosures, and improved chicken feed, communities can improve chicken production two to three-fold. Higher valued markets do exist where households can double the value of their chickens, namely restaurants, urban markets, and tourist lodges. Rural communities have not organized themselves to gain access to these markets and as a result sell their poultry at far below market value.

In order to reduce economic pressures within rural communities to over-exploit their wildlife resources, credit schemes that facilitate the adoption of the above solutions becomes a possible way to increase wildlife production. This becomes even more possible when farmers are also encouraged and assisted to grow more bulk food, such as sorghum and maize. Using improved methods of farming, a subsistence farmer can increase his yield from three to five-fold at a household cost of \$38. For an average household of 6, a family benefiting from improved farming practices may have a surplus of as many as two to four 90kg bags. By using some of the surplus to supplement chicken feed as a way of reducing predation, a farmer can conservatively realize a net increase of twenty-five chickens for market sales or an overall total of about 45 chickens. This increase in chicken sales at market value of \$1.50 increases annual household income by almost four-fold.

The increased production of chickens also increases the potential use of chicken manure for selected use in agricultural production: vegetable gardening, conservation farming and orchards. This lowers food production costs, resulting in more financial security per household as well as greater food security. Such linkages are the basis for the diagram in Figure 4.

While all of these improvements require an initial investment of financial support for essential inputs as well as the required skills to effectively adopt these livelihoods, the costs to support these requirements are relatively low as compared to conventional wildlife management costs or the opportunity costs of losing significant wildlife stock from more profitable uses. The critical question to ask in this regard is whether a communal area supporting wildlife is better supported

by investing in increased numbers of wildlife police officers or by investing the same amount in skills and start-up inputs for a multiple-livelihood approach. The table below illustrates the possible trade-offs based on on-going studies by the African College for CBNRM in Luangwa Valley.

<u>Wildlife threats:</u>	<u>Law enforcement:</u>	<u>Management cost:</u>	<u>Multiple livelihood cost:</u>
<p>Based on PRA surveys for GMAs in Luangwa Valley:</p> <ol style="list-style-type: none"> 1) 40-60 household heads within a community of 3000 households contribute to significant illegal hunting pressures on wildlife as a livelihood strategy 2) 20-40 animals/yr on average are harvested illegally per person, mostly by snares 3) Approximate loss of wildlife per year from these people = <u>1500 animals</u> 	<p>Based on results from Mwanya area where there are 35 Wildlife Police Officers (67% are Village Scouts)</p> <ol style="list-style-type: none"> 1) Total arrests for 1997 and 1998 were 9 and 13 respectively. 2) In 1998, 12 of the 13 arrested people interviewed were non-residents of the area. 	<p>To add 10 Wildlife Police³ Officers:</p> <ol style="list-style-type: none"> 1) Salary @ \$100/mth = \$12,000 2) Operational support costs/yr = \$6000 3) Fuel/capital replacement costs per yr. = \$12,000 <p>Total : \$28,000</p>	<p>Assuming 20% of a community of 3000 households are vulnerable to problems of poverty and will compensate through illegal hunting activities:</p> <ol style="list-style-type: none"> 1) Conservation farming input costs @ \$50/person for 600 households = \$3000 2) Truck rental for farmer inputs/ output market trips @ \$700/trip for 4 trips = \$2,800 3) Electric fencing for orchards and gardens @ \$1000 / enclosure for 10 enclosures = \$10,000 <p><u>Total: \$15,800</u></p>

Several important lessons are drawn from this table.

- 1) Local scouts based in a wildlife area, in which a rural community also resides, are not likely to reduce illegal wildlife hunting threats caused by local residents.
- 2) The number of people involved in this hunting is relatively small but they have a disproportionately large impact on wildlife mortality.
- 3) Directing livelihood solutions for these local hunters is far less costly than supporting a much smaller number of scouts whose level of deterrence in controlling this illegal hunting is low and ineffective.

IV. CHALLENGES IN LINKING RELATIONSHIPS BETWEEN LIVELIHOOD IMPROVEMENTS AND WILDLIFE CONSERVATION

While the logic between poverty reduction and improved conservation may appear simple and straightforward, putting this relationship into actual practice is anything but simple. To a great extent, the “science” of community-based natural resource management, or CBNRM, attempts to elucidate how methodologies for its implementation work best. Several important lessons learned by the African College for CBNRM suggest ways to link livelihood improvements more effectively to wildlife conservation:

- 1) Local residents dependent on illegal hunting as a livelihood strategy will more readily adopt alternative livelihoods if they are actively encouraged to do so by community members and their leaders.

³ Wildlife police officers refer to scouts currently employed directly by Zambia Wildlife Authority

- 2) A person will more readily adopt a new livelihood approach when successful practices of this approach are demonstrated locally to attract their interest and facilitate new skills.
- 3) A community institutional structure based on household groupings whose members are well-known and trusted among each other will also facilitate the introduction of skills needed for adopting new livelihood approaches.
- 4) Household groupings also provide an important unit for representative leadership to have access and influence higher-level elected leadership structures
- 5) Such a bottom-up representative leadership structure increases the likelihood that elected leaders will be more accountable to households in directing revenues derived from wildlife to support household livelihood needs
- 6) External extension officers who facilitate these processes tend to underestimate the social complexities in a rural community, especially if they visit the community only periodically.
- 7) Local extension officers selected and trusted by the community can provide a more effective approach to community training, organization and problem-solving.

V. CONCLUSION

Conserving wildlife is not an alien concept to African communities living with this resource. Within traditional systems of local governance, systems of controls were able to limit the number of animals hunted as well as the species hunted. Contemporary pressures on lands around protected areas, however, are becoming increasingly influenced by economic and nutritional demands for wildlife. This usually results in increased depletion of wildlife stocks. In dealing with these problems, wildlife management authorities have historically relied on law enforcement approaches to provide a deterrent to illegal or unsustainable harvests of wildlife. For example, most Government authorities responsible for wildlife management tend to spend as much as 70% of its budget on law enforcement.

This paper suggests that investments in ways to provide alternative livelihood approaches to those most vulnerable to poverty and dependent on wildlife will reduce wildlife depletion rates more cost-effectively than conventional law enforcement methods. A preliminary analysis of their relative cost-benefits suggests a many-fold comparative advantage to investing in multiple livelihood alternatives if such investments are planned properly through effective community structures. This finding suggests that law enforcement, while important as a potential deterrent to wildlife threats from outside the area, may not have the desired effect in controlling high rates of subsistence poaching as a coping strategy for poverty reduction. Further evidence for this conclusion was the high rate of wildlife mortality caused by wire snares and their persistent use up until when food security was improved. Previous years of active education against wildlife snaring and intensive use of wildlife scouts to police against snaring had no apparent effect on snaring rates.

Government-based wildlife management authorities are institutionally and historically weak in embracing communities through livelihood programs that encourage lowered rates of illegal hunting. Such programs are more than simply rural development because they focus efforts on livelihood needs for those households most likely to threaten the resource. For this reason, the approach should be regarded as an acceptable and necessary form of wildlife management. Management authorities will therefore require rapid transformation of their priorities, objectives and methodologies for conserving wildlife in Africa.

Acknowledgements

This research was supported by the Wildlife Conservation Society, Liz Claiborne Art Ortenberg Foundation, International Wildlife Foundation, and the US Agency for International Development as a contribution to the continuing development of CBNRM by the Zambian Wildlife Authority. Authors thank the Zambian Wildlife Authority for their support and cooperation throughout the work of this project.

Dale Lewis
African College for CBNRM
Box 82, Mfuwe ZAMBIA
Email: WCSZamba@uuplus.com