

# The Necessity, Complexity and Difficulty of Resolving the Bushmeat Crisis in West-Central Africa

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*Wildlife plays a significant role in rural peoples' lives throughout West-Central Africa. This important resource is relied upon for sustenance and income generation. However, human populations and markets have grown, subsequently increasing the rates of wild game hunting to unsustainable levels. Increasing hunting pressures are resulting in overexploitation and are driving many species to extinction. This essay calls attention to this 'bushmeat crisis', outlines the complexity of this issue, describes the difficulty in establishment and implementation of effective solutions, and identifies a considerable need for additional research on this topic.*

## Introduction

Over one hundred-sixty species are threatened in West-Central Africa (Hoffman & Pilgrim, 2005). Uncontrolled hunting practices are only pushing these species closer to extinction. Overhunting caused the recent extinction of Miss Waldron's red colobus monkey. Several other primate species are soon to follow (Oates, Abedi-Lartey, McGraw, Struhsaker, & Whitesides, 2000). To date, it is unknown exactly how many species have been eradicated due to excessive hunting. However, it is evident that many species will be lost forever if hunting pressures continue at their current level. The result of unsustainable hunting is a bushmeat crisis that merits domestic and international attention and rapid action to evade the dismal consequences of this crisis.

Bushmeat is defined as wild game that is harvested for consumption or for commerce (Cowlshaw & Rowcliffe, 2005). As a valuable nutrition source and commercial good, bushmeat plays a direct role in the livelihoods of nearly 150 million people across the world. This important, renewable resource is a vital component to the diets and income-generating activities of countless residents of developing nations. Because of its important role as an exploitable resource, dependence upon bushmeat has increased to excess. Each year, between one and two million tons of bushmeat is harvested in Central Africa alone (Brown & Williams, 2003). This tremendous reliance of rural people upon bushmeat has made hunting practices unsustainable throughout these regions.

Hunting is only sustainable when the number of animals (of a species) killed does not affect the productivity of the species, thus maintaining stable populations of the species (Bowen-Jones, Brown, & Robinson, 2002; Millner-Gulland, 2001). Overhunting poses the greatest direct threat to the sustainability of wildlife populations in tropical areas (Fa, Peres, & Meeuwig, 2002; Wilkie et al., 2005). In Africa, 68 percent of bushmeat species are hunted unsustainably (Knee, 2000). The pressure placed upon unsustainably harvested species has driven many of these species close to extinction.

Overexploitation of wildlife has resulted in extensive

biodiversity loss in tropical regions across the world (Fa et al., 2002). The tropical forests of West-Central Africa are considered some of the most biologically diverse in the world (Mittermeier, Myers & Mittermeier, 1999). A great deal is at stake if the bushmeat trade continues at this magnitude. It is no small feat however, to stop, or even slow, the forces that drive the bushmeat crisis. "[T]he bushmeat crisis is rooted in a myriad of complex social and political dynamics ... which are not well understood" (Kormos & Bakarr, 2001, p. 94). Large gaps exist in the current knowledge surrounding the bushmeat crisis. To arrive at relevant, effective solutions to this problem, these large gaps will need to be filled. Enhanced understanding of the bushmeat crisis will be necessary to halt its detrimental effects. International and domestic attention must be directed towards investigating and solving this problem in order to preserve the biological diversity of West-Central African forests, and to preserve a major rural livelihood. The focus of this paper is to describe the extremely complex, integrated nature of the bushmeat trade and the difficulties in finding useful, practical solutions to the problems of the sustainability of bushmeat as a resource.

## Scale of the Bushmeat Trade

Bushmeat has supplemented Africans' sustenance needs for centuries (Bowman, 2001). Wildlife populations in the past were sufficient to fill the needs of hunters and their families as hunting was practiced for the sole purposes of local consumption. The forests at this time were productive enough to reproduce the small amount that was lost to hunting. Since then, hunting accessibility has increased and dependence upon bushmeat as a resource has grown considerably, subsequently intensifying the exploitation of wildlife.

Population size has increased at a rapid rate, from 224 million in 1950 to nearly 906 million in 2005 (UN, 2004). This four-fold increase in population has augmented not only the number of hunters but also the number of individuals relying upon wildlife as a

nutritional resource (Caspary, 2001; Wilkie, 2001). Rural consumption of bushmeat varies considerably, however conservative estimates report average individual intake to be 0.13 kg per day (Wilkie & Carpenter, 1999). Over the course of one year this amounts to an average of nearly 50 kg of bushmeat consumed per person. Considering the aggregate bushmeat consumption of this growing population, this protein supply will be reduced by 81% within 50 years. By this time, most of these countries will not have sufficient bushmeat supplies to provide their populations with even half the current average rate of bushmeat consumption (Fa, Currie & Meeuwig, 2003).

Rural West-Central Africans are not only more numerous, but they are better equipped than ever to effectively harvest bushmeat. Advances in weapon technology have provided increasingly efficient means for hunters to exploit wildlife resources. Modern hunting tools increase potential rates of return on hunting efforts up to 25 times the rate of return on traditional hunting weaponry (Wilkie & Carpenter 1999). This coupled with meat preservation techniques and improving transportation systems enables hunters to obtain large quantities of bushmeat, selling for profit whatever is not consumed.

Transportation systems have contributed not only to the accessibility of bushmeat trading, but also to the availability of bushmeat sources. Remote areas of West-Central African forests have become more accessible due to the improvement of existing roads and the creation of new roads. Impenetrable forests once served as a haven for many bushmeat populations, but these areas are diminishing at a rapid rate due to improved transportation systems. Logging operations are particularly threatening since they not only create roads that travel directly to the heart of these forests but also establish small, nearby logging communities that depend heavily upon the forest's bushmeat resources (Bowen-Jones et al., 2002, Wilkie & Carpenter 1999). These factors have played a large role in excessive wildlife harvest by improving access to remote wildlife habitat areas that were previously inaccessible (Bowman, 2001).

Escalating market demands for bushmeat as a commodity has resulted in hunting efforts that go far beyond household needs alone (Bowen-Jones et al., 2002). One study conducted in the Democratic Republic of the Congo found that only 10% of bushmeat obtained by a household is actually consumed by that household; the remaining 90% is sold for profit (de Merode, Homewood & Colishaw, 2003 as cited in Brown & Williams, 2003). In rural areas, bushmeat is available at a low cost, often less expensive than domestic protein substitutes. In some cases bushmeat is the only source of animal protein available to rural communities (Bowen-Jones, Brown & Robinson, 2003). Bushmeat is conversely a luxury item to urban populations who consume bushmeat for cultural and traditional reasons, rather than solely as a protein source. Bushmeat sales under these conditions command a high price, sometimes three times higher than the price

of domestic meat substitutes (Bowen-Jones et al., 2003; Wilkie & Carpenter, 1999). Strong market demands for bushmeat, and the increasing ability to meet those demands, encourages rural West-Central Africans to harvest as much bushmeat as possible to maximize their profits from hunting efforts. The bushmeat trade has hence proliferated rapidly. It is now well established and has developed to include not only hunters, but also traders/transporters, market vendors, and 'chop shop'/restaurant owners.

The bushmeat trade now generates significant amounts of income for all individuals involved in the trade, serving as supplemental earnings for many rural households throughout West-Central Africa (Davies, 2002; Wilkie & Carpenter, 1999). The bushmeat trade generates millions of dollars each year for countries throughout the region. In some cases, the trade reaches dollar values in the hundreds of millions, the equivalent of up to 1-1.5% of these nation's GDP's. (Davies, 2002; Caspary, 2001).

The bushmeat trade is a major income source throughout West-Central Africa. Its financial benefits are considerable, and also widespread. Bushmeat is a regular component of many household economies (Wilkie, 2001). In Cote d'Ivoire, 55% of the male population aged 15 and older consider themselves hunters. Ninety percent of these hunters work in the agricultural sector and supplement profits from agriculture with bushmeat (Caspary, 2001). Though it is not known what percent of household incomes bushmeat revenues constitute, commercial hunters earn between 250-1050 USD annually (Wilkie, 2001; Davies, 2002). With a large number of hunters and the considerable income generated by the bushmeat trade, it is evident that it contributes significantly to the livelihoods of a large portion of the rural population of West-Central Africa (Bowen-Jones et al., 2002).

"Biodiversity is part of the natural capital that underpins the livelihoods of the rural poor" (Davies, 2002, p. 587). The gradual extinction of bushmeat species will mean an end to a significant food and income source of rural Africans. Despite the huge impact the bushmeat trade has upon the lives of rural peoples, it goes largely unnoticed in policy efforts or economic reports in this region (Davies, 2002; Bowen-Jones, 2003; Brown & Williams, 2003). The value of natural resources is notoriously difficult to capture and express. This is particularly true for wildlife (Pearce, Moran, & Ekins, 1994; Bowman, 2001). However, to ignore the important role this resource plays is to ignore its depletion and eventual disappearance. There is high reliance upon bushmeat, yet there is nothing done to address the well being, and maintenance of this resource. Loss of this important resource and the subsequent effects of such a loss on rural populations is an important consideration. If policies and actions continue to neglect the role of the bushmeat trade, these communities will endure major losses in their nutritional, economic and natural resources.

## Characteristics of the Bushmeat Trade

The bushmeat trade has been viewed as a success story, exemplifying the self-reliance, self-sufficiency, and resilience of rural peoples of developing countries. The intrinsic qualities of wildlife resources have helped the bushmeat trade to flourish throughout West-Central Africa. Bushmeat resources have evolved to serve as a valuable food and income source for rural peoples throughout the region (Brown & Williams, 2003). The growth and expansion of the bushmeat trade in West-Central Africa exhibits the inherent advantages of the trade and the important role it plays in rural communities.

Hunting for bushmeat appeals to rural people for various reasons. The availability of low-cost local hunting technology such as traps or snares facilitates entry into the profession regardless of hunters' investment capabilities (Bowen-Jones et al., 2002; Brown, Cobb & Inamdar, 1999). This low cost of entry makes the bushmeat trade a feasible option for anyone. The small investment required makes this a low-risk enterprise. If nothing is captured, only the small initial investment is lost, however when any gain is received it will result in a high rate of return relative to the initial investment.

The bushmeat trade in the West-Central African forest is also highly equitable. Forests throughout the region are open-access resources that exclude no one (Bowen-Jones, 2002; Brown & Williams, 2003). The opportunity to obtain bushmeat is equally available to every hunter. In addition, it is the hunter himself who reaps the benefits of hunting efforts. This feature is uncommon in extraction of other forest products like timber or minerals where a major corporation retains the majority of profits (Brown & Williams, 2003).

Hunting is an activity that can take place at any time during the day or any time throughout the year. It therefore can be conducted without jeopardizing or interfering with other income-generating activities, which is particularly important for agriculture-based communities (Bowen-Jones et al., 2002; Brown & Williams, 2003). The flexibility of the bushmeat trade makes it possible for anyone to incorporate hunting as a supplementary income.

With these characteristics, the bushmeat trade is accessible to anyone. In a sense, it is an ideal form of income growth and development because it is equitable, does not interfere with other activities, and is low cost and low risk. However, it is exactly these traits that make it dangerously unsustainable. Since no one is excluded from hunting wildlife, anyone can profit from it. Every hunter can harvest to the maximum of his or her efforts, and many do so, resulting in levels of exploitation that far exceed levels of wildlife production.

## Ecological Effects of the Bushmeat Trade

The bushmeat trade relies upon the availability of wildlife populations as a resource. Current rates of bushmeat

exploitation are causing rapid depletions in the wildlife resources of West-Central Africa (Barnes, 2002; Brown & Williams, 2003). Declines in bushmeat populations denote declines in an important income and food source, threatening the role of bushmeat in rural Africans' livelihoods. Overexploitation ultimately limits the availability of bushmeat resources to rural West-Central Africans. Despite its adverse effects on rural subsistence, it poses a more severe and immediate threat to the health of West-Central African ecosystems.

"A bushmeat crisis will typically manifest itself as an ecological rather than livelihoods crisis" (Bowen-Jones et al., 2003, p. 394). Various bushmeat species are hunted, traded and consumed. Consumer's preferences for bushmeat tend to shift with the availability and price of certain species over another as long as alternate bushmeat species are available (Bowen-Jones et al., 2003). The scarcity of one species will not immediately limit the availability of bushmeat in general, and will not directly lead to the demise of the bushmeat trade. However, decreasing populations of a species directly threatens the viability of that species, the role of that species in its biosphere, and ultimately, the ecosystem as a whole.

Many species throughout West-Central Africa are affected by bushmeat hunting (Eves & Bakarr, 2001). The bushmeat trade directly threatens eighty-four mammalian species in this region (IUCN, 1996 as cited in Bowen-Jones et al., 2002). Currently 60 % of mammalian species are hunted at a rate that cannot be supported (Fa et al., 2002). Some species in this region are hunted at rates up to fourteen times the sustainable level (Spinney, 1998; Bowman, 2001). These over-harvested species include many that are threatened or endangered, magnifying the gravity of the bushmeat crisis.

Large-bodied fauna, primate species in particular, are the most affected (Wilkie & Carpenter, 1999). Chimpanzees in the forests of Guinea, for instance, have recorded average production rates of one offspring every four to five years (Sugiyama, 1994). With reproductive rates as low as this, the loss of even just a few individuals due to opportunistic, incidental, or accidental offtake could devastate these chimpanzee populations (Milner-Gulland, 2001). Harvest rates of primate species often far exceed productivity, seriously threatening these species. Several countries of West-Central Africa are expected to lose more than 50% of their primate species (Colishaw, 1999). As mentioned previously, one primate species has already been lost due to bushmeat hunting pressures, and several other primate species are faced with a similar fate (Oates et al., 2000). If this practice continues unbounded, species could vanish forever, losing a priceless component of the environment. In addition to losing the intrinsic value of biodiversity, a species' extinction is a loss of 'un-mined riches', the potential value of that species lost forever (Jorgensen, 2002).

The bushmeat crisis not only endangers individual species, but also jeopardizes organisms that are linked with exploited bushmeat species. Milner-Gulland

(2001, p.124) describes the effects of keystone species: 'Keystone species have a disproportionate effect on their ecosystem, due to their size or activities. Any changes in their population size have correspondingly large effects on their ecosystem.' Eradication of a species from a local ecosystem can therefore have major effects upon that ecosystem. For instance, loss of a prey species (e.g. antelope) can mean the loss of a food source for some predator species (e.g. tiger). This results in decreasing population numbers of those predator species, pushing predator species closer to extinction. Species within an ecosystem are highly integrated with one another. Direct effects of hunting on one species will likely have indirect effects on other species within that ecosystem and ultimately change the ecosystem itself.

A species' extinction results in reduced biodiversity, and ultimately compromises entire ecosystems (Eves & Bakarr, 2001; Milner-Gulland, 2001). Biodiversity plays a vital role in ecosystem health, stability and resiliency, and ultimately affects the ecosystem services and natural resources that rural peoples rely upon (WRI, 2005). Extirpation of a species from an ecosystem can decrease that ecosystem's net productivity (Pearce et al., 1994). Biodiversity is inextricably linked to the well being of rural populations (WRI, 2005). Because of its threats to biodiversity and ecosystems, and consequently to rural people's well-being, the bushmeat crisis needs to be considered not only for its effects on individual species, but also for its inevitable effects on other natural resources and ecosystems as a whole.

## **Proposed Solutions and Their Limitations**

The dynamics and complexity of the bushmeat problem make it difficult to find effective solutions. Existing solutions have been roughly grouped into four categories: government controls, community management, market adaptations, and social norms. What follows is a description of these solutions and the constraints that impede their effective implementation in West-Central Africa.

### *Government Controls*

#### **Wildlife Protection Laws**

Many West-Central African nations currently possess laws that prohibit hunting in certain areas and that prohibit the harvest of certain vulnerable species. These laws are vital for the protection of certain species that cannot support any level of offtake by bushmeat hunters (Bowen-Jones et al., 2003). Though wildlife protection laws are crucial to maintain bushmeat species populations, implementation of these laws can be challenging (Bowen-Joes et al., 2003; Caspary, 2001; Rose, 2001; Wilkie & Carpenter 1999).

#### **Regulations on Hunting**

Countries throughout the West-Central African region lack the adequate financial and human resources necessary

to effectively regulate the bushmeat trade (Caspary, 2001; Brown et al., 1999). Government employees responsible for the enforcement of such laws tend to be highly dispersed and are responsible for extremely vast areas that are difficult to routinely access (Eves & Bakarr, 2001). To increase the efficacy of law enforcement, the number of officials in the field would have to substantially increase, incurring great costs. Sufficient regulation of the bushmeat trade, just for the Congo basin, would require over 46,720,000 USD per year (Wilkie & Carpenter 1999). No developing country or donating agency could support this expense. Though wildlife protection laws exist, enforcement of these laws is a cumbersome task that is backed with few resources. Until sufficient resources are available, well-intended wildlife protection laws will remain futile.

The mobility of the resource adds to the difficulty of regulating hunting practices. Bushmeat can traverse boundaries, though laws cannot. When regulating bushmeat hunting along the periphery of a protective park or along a nation's border, enforcement can become all the more complex. Borders can lead to ambiguity in the application of wildlife protection laws, such as what species are protected, where those species are protected, who is obligated to follow, and who is obligated to enforce these laws.

#### **Corruption**

Since officials responsible for enforcing the law are highly dispersed and far from administrative centers, there is little regulation of their activities. With lack of supervision and paltry salaries, often less than the incomes of hunters themselves (Wilkie, 2001), these officials' incentives to preserve biological integrity falls second to corrupt tactics that actually provide them with 'extra' income (Bowen-Jones et al., 2002; Rose, 2001). In Guinea, the penalties for hunting protected species can be large, but violators of the law rarely pay the legal fine. It is well known among rural hunters that a much smaller donation to the forestry official will suffice (personal communication, 2002). Such activities undermine the purpose of legal deterrents. Though laws protect bushmeat species on paper, corruption has turned these laws into just another means for a government official to gain a bribe from a rural hunter, perhaps making the existence of the law more harmful than its absence.

#### **Ineffectiveness of Prohibitive Laws**

The ability to regulate the bushmeat trade is poor and regulation measures that do exist are ineffective. This is especially true when restrictions are placed upon what has been traditionally been accepted as open-access. Non-timber forest products have been limitlessly available to rural community members; the use of these products has subsequently become an integral part of rural community members lives. "A law which makes the most common form of conduct illegal is itself an instrument of

indiscipline” (Egbe cited in Bowen-Jones et al., 2002, p. 77; Brown, 2003). Retracting the availability of resources rural people have grown to depend upon poses many problems. Effective solutions will need to consider the current activities and needs of rural communities when imposing limits upon the resources those communities rely upon.

#### Limits on Hunting Quotas/Seasons

Establishment of limits on hunting in the form of quotas or of seasons would permit continued harvest of bushmeat in a controlled manner. This solution ideally could conserve species without completely prohibiting hunter’s access to bushmeat. Though hunting quotas or seasons seems to be a fine compromise, this approach can be problematic. In addition to the problem of enforcement, this solution raises several issues. Since hunting is opportunistic there is little, if any, discretion in the type of animal hunted, making species controls difficult to enforce (Bowen-Jones et al., 2002). The majority of hunting is conducted using snares (Fa, Ryan & Bell, 2005). The non-discriminatory manner of this hunting method renders quotas and seasons ineffective. A snare left to trap a duiker ‘in season’ could easily trap another species that is not ‘in season’, or even a protected species that should never be trapped at all.

Seasons and quotas will depend upon the biology specific to each species in its specific habitat. This requires extensive research on specific species populations and their relative habitats throughout West-Central Africa. Research to date is limited and much more information has yet to be obtained (Casparly, 2001; Wilkie & Carpenter, 1999). Simple monitoring of populations will require a great deal of time, money, training, capacity building, data analysis and management; effective management and protection will require even more (Walsh & White, 1999). Even if this data is readily available, it is essential for this information to be adapted and integrated with information relevant to local ecosystems in order to achieve successful management of wildlife populations. This requires a great deal of capacity to rapidly synthesize knowledge and adapt management plans for these species, which may currently be beyond the capacity of local forest officials.

#### *Community Management*

##### Local Control

Communities and their activities directly affect the ecosystem that surrounds them. It may be more effective to empower communities to manage their own resources rather than for external authorities to impose restrictions on community activities. Indeed, the current lack of effective bushmeat management to date is a testament to the lack of capability of outside authorities to influence communities in this regard. Changes in community-ecosystem dynamics could be more effective if the changes are borne from within the communities

themselves. Community management is an appealing approach to bushmeat conservation because it involves key stakeholders in the conservation and management of their own vital resources. Under the appropriate circumstances, for instance where local populations have possessed ownership and control of their natural resources, and where the tools have been available for effective wildlife population management, community management has proven successful (Bodmer & Puertas, 2000; Leeuwenberg & Robinson, 2000; Roe et al., 2000). These successes are encouraging. However, community management “can fail miserably, and there are many contexts in which it would be pointless to try it” (Roe et al., 2000). Though community management has a great deal of promise for bushmeat conservation, its success in West-Central Africa may be limited.

#### Management and Monitoring

Local hunters and traders are more familiar with the ecosystems surrounding them than any other authority, giving them an important role in the management of bushmeat species. Their detailed knowledge of the region is essential for the development of appropriate bushmeat management plans. However, the problem arises of the capacity of locals to synthesize this knowledge in order to effectively manage the delicate balance of their surrounding ecosystem. The ability to constantly monitor and adapt to the inevitable changes in species’ status is essential for bushmeat management, yet the lack of available resources makes this task near impossible for many communities in West-Central Africa. Without accurate data, bushmeat harvests may be established outside sustainable limits and management plans could continue to reduce bushmeat populations (Bodmer & Puertas, 2000; Milner-Gulland, 2001). Without necessary resources and information, community management plans can be potentially ineffective, or worse, detrimental to wildlife populations.

#### Property Rights

For communities to invest in their environment, they need to feel a sense of ownership and responsibility to that environment (Bowen-Jones et al., 2002; Bodmer & Puertas, 2000; Brown et al., 1999). Devoting resources to conserve and protect that which is not rightfully owned could be viewed as a waste of those resources. If local communities do not ‘own’ their surrounding environment, then they recognize and fear that any investment will result in benefits that may be acquired by outsiders. To work towards the protection of bushmeat, only to have it exploited in the end by someone else, does not leave much incentive to protect bushmeat. It is difficult to justify investing in a resource when receipt of the benefits is not guaranteed.

In most of West-Central Africa, governments are the proprietors of forest systems. Though rural populations have access to non-timber forest products of these forests,

they do not have ownership of them (Bowen-Jones et al., 2002). Without ownership of local forest resources, locals will not have incentives to invest in the long-term well being of those forest resources. Without these incentives, successful conservation of bushmeat species will be difficult to achieve (Millner-Gulland, 2001).

### Community and Boundary Issues

When executing community based wildlife management, challenges arise in defining communities and the area those communities are responsible for maintaining (Bowen-Jones et al., 2002). Who will be included or excluded from the 'community' designation? What communities will be responsible for community management? What communities will benefit from community management? Once a community is defined, community management boundaries may be obscurely and inconsistently delegated, perhaps by proximity, ethnic majority, or traditional boundaries (Bowen-Jones et al., 2002). These ambiguities could lead to social inequality and perhaps even to conflict. Management areas themselves pose additional problems. The size of the area designated for community-based management is not always sufficient to accommodate the habitat ranges of bushmeat species. Without ample space, community management plans will be ineffective (Brown, 2003). In addition, the presence of clear boundaries hardly negates the difficulty in designating propriety over wildlife resources that migrate across community management boundaries. These challenges are difficult to overcome, particularly in the presence of poor governance and weak institutions. Faced with these obstacles, West-Central Africa does not currently demonstrate the conditions necessary for successful community wildlife management (Brown et al., 1999; Wilkie & Carpenter, 1999).

### *Market Controls*

#### Bushmeat Alternatives

It may be possible that decreasing the demand of wild bushmeat by providing alternative protein sources could alleviate hunting pressures. It is essential for any policy, if it is going to remove the availability of a major food source, to provide an alternative if it is going to be at all successful. Two major alternatives have been presented.

#### Alternative Protein Sources

Domestic meat can serve to replace bushmeat as a protein source, particularly if it is made available to locals at a cost lower than bushmeat (Bowen-Jones et al., 2002). However, this alternative seems to be an inadequate solution by itself for many reasons. Locals tend to prefer bushmeat to domestic animals, and are subsequently willing to pay higher prices for bushmeat (Bowen-Jones et al., 2002; Wilkie & Carpenter, 1999). In addition, throughout the West-Central African region, domestic animals are generally kept as insurance or savings rather

than as a food source (Wilkie & Carpenter, 1999). Finally, increasing availability of protein sources alone does not directly result in decreased hunting rates (Bowen-Jones, 2002).

#### Domestication of Bushmeat

Domestication of preferred bushmeat species will, in theory, satisfy local demand for bushmeat without depleting the wild population of that species. This will only be a successful alternative if there is a higher rate of return on captive breeding than on game hunting. This alternative will only be worthwhile if it requires less time, money, or resources to yield the same amount of product that hunting would (Wilkie & Carpenter, 1999). Critics have argued that even if this was a plausible option, those bushmeat species that adapt well to captive breeding have already been domesticated; what has not already been domesticated is therefore not able to be domesticated (Bowen-Jones et al., 2002). This alternative can also have detrimental consequences. Increasing the availability of bushmeat species can drive the demand for bushmeat higher, increasing the number of bushmeat consumers and increasing the quantity they consume (Milner-Gulland, 2001; Rose, 2001). Though the intent of captive breeding is to reduce demand and hunting pressure on bushmeat species, this alternative may have an opposite effect.

#### Taxation and Transport Fees

Increasing the cost of bushmeat in the market system through taxes and transportation fees has been proposed as a method of decreasing the market supply of bushmeat. Demanding a tax at roadblocks will increase the market price of bushmeat, hopefully above consumers willingness-to-pay, limiting the market for bushmeat (Milner-Gulland, 2001; Wilkie & Carpenter, 1999). In some cases, this may prove to be an effective deterrent to bushmeat sale. "As trader's costs increase with taxation (even if the guard steals the money) profits will fall as they attempt to keep rising prices from driving down demand" (Wilkie & Carpenter, 1999, p. 945). This regulatory measure requires little investment from the state to limit the trade of bushmeat, which makes it an attractive option (Mullner-Gulland, 2001). In addition, these taxes can be species-specific, which is particularly useful when attempting to limit hunting of endangered species (Milner-Gulland, 2001).

This solution is promising as long as taxation is consistent and permanent and cannot be evaded (Milner-Gulland, 2001). Since taxation occurs at the point of trading or transfer, taxation does little to prevent domestic bushmeat consumption, or local sales that do not require transportation or involvement of a bushmeat trader. Imposed taxes will also need to be sufficiently high in order to raise the prices above consumers willingness-to-pay (Wilkie & Carpenter, 1999). With high taxation, rather than decreasing overall availability of bushmeat,

this tactic may only make it unavailable to those who need it most yet still available to elite classes.

### *Changing Social Norms*

“The rational constructs of supply and demand are not capable of wielding chain saws and firing shotguns” (Rose, 2001, p. 60). Seeking solutions within the supply and demand of the market system may only exacerbate hunting pressure on bushmeat species, particularly when bushmeat is only valued when dead. Rose purports that the best solution is the revival of the traditional link between nature and man and its value in rural communities, not in creation of financial or economic incentives (2001). “For most African hunters, moderation and respect for the natural world is grounded in a profound emotional and spiritual identification with the living world, unrelated to calculated benefits ...” (Bowman, 2001, p. 78). If effective, lasting change is sought, we must look beyond market incentives and attempt rather to understand and work within the social constructs that surround bushmeat exploitation.

Hunters appear to feel little sense of obligation or responsibility to their forest resources. They also do not seem to feel a sense of control of the overall health and abundance of forest products such as bushmeat. God provides the forest and its goods, and there is little connection between the quantity of resource use and its subsequent depletion (Bowman, 2001). If rural populations do not feel that their actions affect the abundance or dearth of bushmeat harvesting then they will not likely limit those actions regardless of market forces, forest ownership, or law.

Changing values and attitudes towards bushmeat is relatively inexpensive and results will prove to be long-lasting (Milner-Gulland, 2001). Approaches to changing the role of bushmeat could include social marketing, education, or appealing to religious paradigms (Bowman, 2001; Rose, 2001; Millner-Gulland, 2001). When successful, changing values or attitudes can prove highly effective (for instance the changing role of women over the last century) however, this is much easier said than done.

Working within the needs and social constructs of a community to change its members’ long-held views is certainly no small feat. Since bushmeat is basic sustenance for many Africans, shifting values of wildlife will be especially difficult (Wilkie & Carpenter, 1999). Even if a successful approach is found, results are difficult to quantify and occur gradually. Slow-response solutions may not be sufficient for some species directly threatened by the bushmeat crisis. A successful, long-term shift in attitudes towards bushmeat will be futile if it arrives in the absence of the species it was intended to protect.

### **Conclusion**

It is evident that each solution alone fails to sufficiently address the bushmeat crisis. However, understanding

the limitations of each helps us to better understand the incredibly complex dynamics of the entwined relationship of rural populations and their wildlife resources. Understanding these limitations can also enable researchers, development practitioners, community members and national and local officials to develop practical, realistic solutions to this problem that threatens not only ecological systems, but also the very livelihoods of rural Africans. Future research on successful applications of these solutions, and combinations of them, will be helpful for improved understanding of this issue and its resolution.

A great deal of socio-economic and ecological variation exists within the vast region of West-Central Africa. Because of these variations, no one solution or combination of solutions will lead to a universal answer to the bushmeat crisis (Wilkie & Carpenter, 1999). Though many aspects of the bushmeat crisis can be generalized, its manifestations and threats vary between regions, nations, and even villages (Kormos & Bakarr, 2001). Each case presents unique circumstances. If a community’s economy is timber-resource based, then a large portion of the community will have access to remote wildlife populations. If a community’s economy is agriculture-based they may have extra incentives to hunt pest species. If the community is close to a major urban center, the market demands for bushmeat may be significantly higher than if the community is quite some distance from an urban center. Some local or national institutions may be amenable to and capable of implementing wildlife management programs while others may not. Solution-seekers will have to consider the distinct conditions that surround each case and adapt solutions that will appropriately suit each individual context.

Before this can be accomplished we must completely understand the contexts to which the solutions will be adapted and applied. At this time, information on the bushmeat crisis is incomplete. Research has been limited, and much of the literature calls for further study on all dimensions of the bushmeat crisis. Information germane to the bushmeat crisis, from species population numbers to wildlife policies, has been largely anecdotal (Bowen-Jones et al., 2003). Future research needs to focus on filling in these gaps in knowledge in order to completely understand each aspect of the bushmeat trade in its relevant context. Only when our knowledge is enhanced will we be able to arrive at realistic, feasible solutions to this human-wildlife conflict.

Many details of the bushmeat crisis remain unknown; however it is certain that at this stage many wildlife populations cannot bear further pressure. Until the bushmeat crisis is acknowledged and addressed as a major development and conservation issue, damages on bushmeat resources will only intensify. Bushmeat populations will vanish – resulting in loss of invaluable biodiversity and a significant natural resource base that many depend upon. There is too much at stake for this issue to be overlooked. From local to international

levels we need to increase our efforts to find effective approaches to alleviate the bushmeat crisis.

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