Conservation and Endangered African Wild Dogs (*Lycaon pictus*) in Western Tanzania: A Call for Research and Action

P. Wilfred
Department of Life Sciences, Faculty of Science, Technology and Environmental Studies, Open University of Tanzania
paulo.wilfred@out.ac.tz, paulo.wilfred@yahoo.co.uk

Abstract*: The African wild dog is among the most endangered carnivores. Yet, the remaining populations are small and patchily distributed as a result of factors like human persecution, poaching, diseases, habitat loss, loss of prey and competition from other predators. Regrettably, research has paid little attention to the effectiveness of local conservation measures in tackling these challenges in some small wild dog populations especially in east African ecosystems. This paper focuses on the Ugalla ecosystem of western Tanzania as it outlines the pressing conservation need to conduct research and explore the influence of anti-poaching patrols and participatory conservation on the prey abundance and habitat availability for African wild dogs. Wildlife poaching in Ugalla is likely to bring about local prey depletion. Furthermore, unsustainable agricultural practices, illegal settlements and logging are important causes of wildlife habitat loss. There is a critical need for wildlife researchers to address these challenges and put forth handy recommendations in the context of anti-poaching measures and participatory conservation owing to the urgency of wild dog protection and the fact that the species is wide-ranging.*

Key words: wild dogs, western Tanzania, prey abundance, habitat loss, anti-poaching, participatory conservation

INTRODUCTION

The African wild dog, *Lycaon pictus* (Temminck, 1820) is one of the most endangered carnivore species that require focussed and productive conservation actions to prevent their extinction (Fanshawe *et al*., 1991; Gascoyne *et al*., 1993; Gorman *et al*., 1998; Hayward, 2006; IUCN, 2012). Sub-Saharan Africa has been acknowledged for its relatively high abundance of wild dogs (Fanshawe *et al*., 1997; Creel and Creel, 1998). Out of the 39 countries that used to have wild dogs, only 14 still have the species (Woodroffe *et al*., 2005), and only 6 of these contain viable populations (Fanshawe *et al*., 1991), namely South Africa, Tanzania, Kenya, Botswana, Zambia and Zimbabwe (Creel and Creel, 1998) . The remaining populations are patchily distributed (Gusset *et al*., 2008) and protected areas ('clearly defined geographical spaces recognised, dedicated and

managed through legal or other effective means to achieve the long term conservation of nature with associated ecosystem services and cultural values' [UNEPWCMC, 2008]) are considered to be strongholds for wild dogs (Gascoyne *et al*., 1993; Hayward, 2006). Protected areas with viable populations include Kruger National Park (South Africa) (Lindsey *et al*., 2005), Moremi Game Reserve (Botswana), Hwange National Park (Zimbabwe), Serengeti National Park, Ngorongoro Conservation Area and Selous Game Reserve (Tanzania) (Creel and Creel, 2002).

The overall population is fragile; it contracts and expands following changes in ecological, biological and conservation related factors (Vucetich and Creel, 1999; Creel and Creel, 2002). For example, Fanshawe *et al*. (1991) reported around 6,000 individuals remaining and Sillero-Zubiri *et al*. (2004) reported 5,750 individuals. Elsewhere in west and central Africa, wild dogs were extirpated as a result of poor conservation measures, negative attitudes among local communities, human persecution, poaching of prey species (illegal hunting for subsistence use) and habitat encroachment (Croes *et al*., 2012). Researchers have highlighted these, and a variety of other factors threatening the survival of wild dogs including, but not limited to, habitat destruction, diseases, competition from other predators, food availability, the size of a protected area, human populations and their unsustainable livelihood activities around conservation areas (Fanshawe *et al*., 1991; Lindsey *et al*., 2004; Carbone *et al*., 2005; Hayward, 2006; Jackson *et al*., 2007; Gusset *et al*., 2008; Hayward and Kerley, 2008; Romañach and Lindsey, 2008). Although commendable work is being done by scientists to control these challenges in popular ecosystems such as Serengeti, further attention needs to be paid to remote and isolated small populations in other ecosystems.

The present paper focuses on the Ugalla ecosystem of western Tanzania as it outlines the pressing conservation need to conduct research and explore the influence of conservation measures, especially anti-poaching patrols and participatory conservation, on the habitat and amount of prey available for wild dogs. If, for example, conservation measures determine the extent of wildlife poaching and habitat loss, which in turn affect wild dogs and their prey, this can have profound consequences for our understanding of the status of wild dogs, and can improve the way in which they are protected. The paper begins by presenting challenges facing the conservation of wild dogs, and efforts made to tackle those challenges. Finally, it shades light on research needs for conservation in Ugalla ecosystem in view of the wild dog conservation literature.

WHY AFRICAN WILD DOG?

Increasing isolation of wild dog populations in Africa presents a serious conservation problem, precisely because the species ranges widely and usually finds itself in a human-dominated hostile environment outside protected areas (Woodroffe *et al*., 2005; Woodroffe *et al*., 2007; Woodroffe, 2011; Winterbach, 2013). For example, in Maasai Mara a pack can cover over 650 km^2 outside Maasai Mara Game Reserve (Kat *et al*., 1995). In the Okavango Delta of northern Botswana, wild dogs are said to range over 3000 km^2 including the area beyond the core conservation area (McNutt and Silk, 2008). While the survival and ecological requirements of wild dogs can be met in an area of about 10,000 km^2 (Woodroffe and Ginsberg, 1999), human activities affect wild dogs even in larger areas (Creel and Creel, 1998). On the other hand, it has been suggested that a typical conservation area should be at least 3500 km^2 to ensure the survival of wild dogs (Woodroffe *et al*., 2005).

Broader ranges of wild dogs make them vulnerable to diseases, human-wild dog conflicts, and persecution. Diseases like rabies and canine distemper are transmitted between wild dogs and domestic dogs when the two species interact with each other (Gascoyne *et al*., 1993; Kat *et al*., 1995), but other findings suggest that the rate of interaction between the species is very low (Woodroffe and Donnelly, 2011). Human-wild dog conflicts reside on game animals and livestock predation (Lindsey *et al*., 2005; Woodroffe *et al*., 2005) and local negative attitudes towards wild dogs (Lindsey *et al*., 2004; Gusset *et al*., 2008), situations that often bring about wild dog persecutions (Gusset *et al*., 2009).

Livelihood activities are also known to jeopardise wild dog survival because the species is extremely sensitive to human disturbance (Ray *et al*., 2005). For instance, expanding human settlements and agricultural activities near conservation areas devastate wild dog habitats and increase their isolation (Woodroffe *et al*., 1997; Woodroffe *et al*., 2007). Wild dogs require substantial amounts of food (Hayward, 2006) and game hunting for commercial and subsistence purposes reduces prey availability (Woodroffe *et al*., 2007). When food is scarce they spend a lot of time and energy searching for prey (Gorman *et al*., 1998; Woodroffe *et al*., 2009); consequently, they expand their range and allocate little time for taking care of their cubs (Hayward and Kerley, 2008). Poachers' snares cause incidental deaths in wild dogs (Lindsey *et al*., 2004; Hayward and Kerley, 2008). Human presence intensifies wariness or anti-predator behaviour among prey species (Frid and Dill, 2002; Setsaas *et al*., 2007). This can interfere with wild dogs' breeding, reproduction and hunting efficiency

(Woodroffe *et al*., 2009). Intraguild predation and kleptoparasitism (other predators stealing food from wild dogs) are widely recognised as important factors influencing wild dog population dynamics (Creel, 2001; Caro and Stoner, 2003). Lions (*Panthera leo)* and spotted hyaenas (*Crocuta crocuta)* are the principal kleptoparasites (Gorman *et al*., 1998; Saleni *et al*., 2007). McNutt (2008) recorded some cases showing predation on wild dog pups by lions and hyaenas in northern Botswana. Of the two competitors, lions pose more serious threats to wild dogs' survival (Vucetich and Creel, 1999; Webster *et al*., 2011). Kleptoparasitism is a function of habitat condition, prey density, competitors density and the ability of wild dogs to defend their kill. For example, fragmented habitat leads to isolation of sub-populations, thus intensified kleptoparasitism due to reduced source-sink dynamics in prey populations (Creel, 2001). Vegetation cover and density influence both kleptoparasitism and hunting efficiency. Dense vegetation reduces prey detectability by wild dogs (Buettner *et al*., 2007). Conversely, open habitat intensifies competition from kleptoparasites (Gorman *et al*., 1998; Hayward, 2006); because wild dogs live at low densities (Mills *et al*., 1998) and in most cases packs can hardly defend their kills (Courchamp and Macdonald, 2001; Rasmussen, 2009) depending on the number of kleptoparasites at carcasses and their ability to locate wild dog kills (Creel and Creel, 1998). Prey density is a trade-off between kleptoparasitism and food intake (Creel, 2001). As prey density increases, competitors density also increases thereby intensifying kleptoparasitism. For instance, prey densities in Selous Game Reserve are lower compared to Serengeti and Ngorongoro, but the density of wild dogs in the reserve exceeds the other protected areas (Creel and Creel, 1998).

WILD DOG CONSERVATION EFFORTS

Wildlife scientists and managers have devised a variety of approaches to minimise species declines. In the case of wild dogs, broad conservation objectives have been threefold: to protect and maintain existing populations, to augment populations, and to promote gene flow among isolated populations (Vucetich, 1999). Protection entails managing populations of prey species such as Kirk's dik-dik (*Madoqua kirkii)*, impala (*Aepyceros melampus)*, common duiker (*Sylvicapra grimmia)*, bushbuck (*Tragelaphus scriptus* and *T.sylvaticus)* and greater kudu (*T.strepsiceros)* (Woodroffe *et al*., 2005; Hayward, 2006; Woodroffe *et al*., 2007), promoting positive changes in attitudes towards wild dogs and managing human-wild dog conflicts (Lindsey *et al*., 2004; Woodroffe *et al*., 2005; Gusset *et al*., 2008). Additionally, every effort is being made to ensure that local communities appreciate tangible economic values accrued from wild dog conservation for them to be willing to participate in conservation (Lindsey

et al., 2005). For example, wild dogs have the potential for ecotourism and resultant revenue can significantly contribute to conservation at a local level (Lindsey *et al*., 2005). Population maintenance encompasses 'demographic' and 'genetic' conservation approaches carried out in captivity (Frantzen *et al*., 2001) and connectivity conservation to maintain gene flow between isolated, usually small, populations (Vucetich and Creel, 1999). Connectivity conservation is integral ingredient of metapopulation dynamics (With, 2002).

Active management of metapopulations is being carried out to sustain the availability of immigrants, without which isolated populations are at higher risk of becoming extirpated (Vucetich and Creel, 1999, Lindsey *et al*., 2004). In southern Africa, wild dog metapopulation management through re-introductions and translocations is being practiced to mimic natural biological and ecological processes (Lindsey *et al*., 2004; Gusset *et al*., 2008; Davies-Mostert, 2012), but it has been argued that the exercise is not cost-effective and its long-term practicability is questionable (Gusset *et al*., 2006). Thus, *in situ* conservation remains the most effective approach to ensuring the survival of wild dogs (Lindsey *et al*., 2005). Pack augmentations to maintain populations has been suggested (Somers and Maddock, 1999). This is done through, for example, managed *in situ* adoptions of orphaned pups by free ranging wild dog packs (McNutt *et al*., 2008).

Generally, the conservation of wild dogs is a challenging task that is often locality specific (Vucetich and Creel, 1999; Woodroffe *et al*., 2007), and extinction risk factors may vary from ecosystem to ecosystem.

THE PERILS OF WILD DOGS IN UGALLA ECOSYSTEM

Western Tanzania hosts a small, isolated and poorly studied population of African wild dog (TAWIRI, 2009) (IUCN endangered species Category 2a(i) ver. 3.1, (5)) in Ugalla Game Reserve (UGR) (5,000 sq. km, Figure 1). The reserve is the main part of Ugalla ecosystem, bordered by partially protected game controlled areas and forest reserves. It is characterised by miombo woodland vegetation containing highly valuable timber species of the genera *Brachystegia*, *Julbernardia* and *Isorberlinia*. Numerous mammal species, for example hippopotamus (*Hippopotamus amphibious)*, giraffe (*Giraffa camelopardalis)*, African elephant (*Loxodonta Africana)*, topi *(Damaliscus korrigum),* hartebeest (*Alcelaphus buselaphus),* African buffalo (*Syncerus caffer)* and impala *(Aepyceros melampus)* are also found in the area (UGR, 2006). The ecosystem is also known as one of the most important bird areas in the country (BI, 2016). The management of Ugalla ecosystem is administered by the Wildlife Division of Tanzania through its

offices namely, Zonal Anti-Poaching Unit and Ugalla Game Reserve Project Office based in Tabora Municipality, western Tanzania.

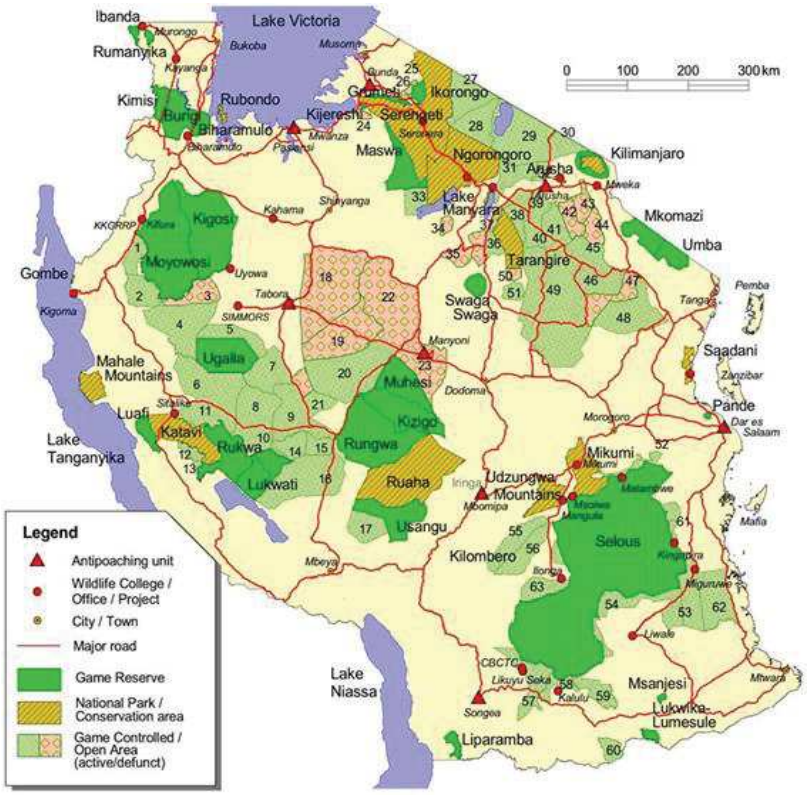

Figure 1. Map of Tanzania showing the location of Ugalla Game Reserve (bordered by partially protected game controlled areas (GCA) & Forest Reserves (FR)). Numbers 4 = Luganzo GCA, 5 = North Ugalla FR, 6 = Msima GCA, 7 = Ugunda GCA & 8 = Inyonga GCA.

The loss of wildlife and wildlife habitats as a result of logging, bushmeat hunting and other unsustainable livelihood activities in the area cannot be overstated (URT, 1998; Hazelhurst abd Milner, 2007). Indeed, this has started signalling the uncertainty of future Ugalla conservation success. To appreciate this, we should first realise that in order to support the sustainability of 'protected areas' under extractive or consumptive use, our conservation efforts must achieve certain crucial goals. Examples include the reduction of wildlife poaching in the hunted areas, improving connectivity between hunting and non-hunting areas to provide refuge for severely exploited species and regular monitoring to assess impacts of hunting (Damm, 2008). Unfortunately, these are yet to be achieved in western Tanzania although they would undoubtedly ensure the availability

and sustainable use of wildlife resources for both conservation purposes and local livelihoods. Recent research, for example, indicates that the majority of the animals in Ugalla ecosystem are removed through poaching (Wilfred and MacColl, 2014). Additionally, trends in trophy hunting and legal subsistence hunting have reached the point where individuals targeted are not old enough and hunting quotas are hardly realised (Wilfred, 2012).

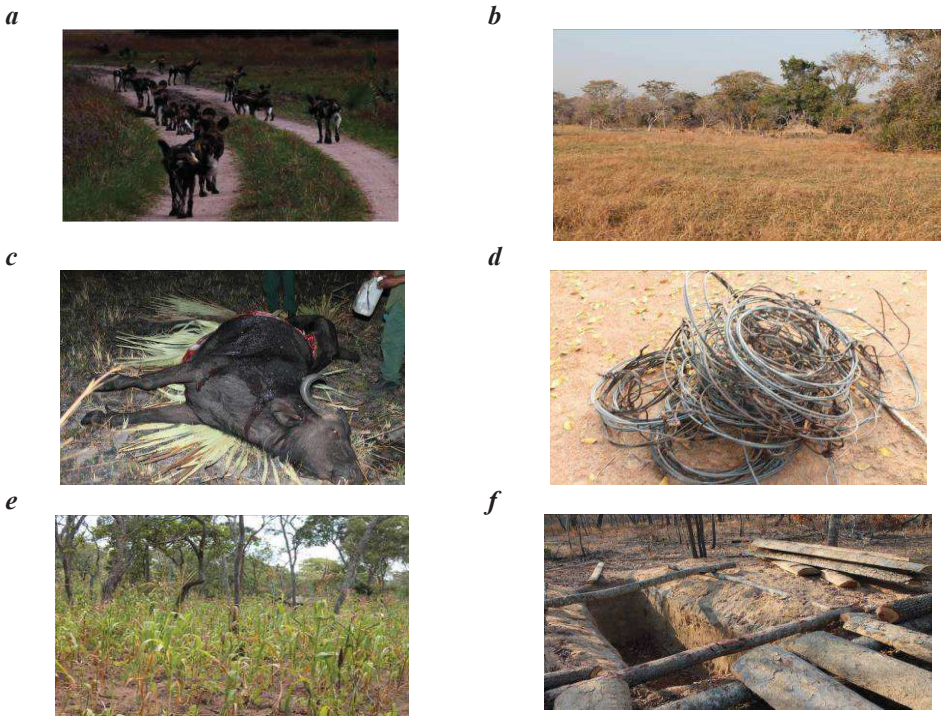

Figure 2. Photos of some illegal activity and wildlife in western Tanzania. a- Wild dogs in Ugalla (photo taken in 2009); b- Group of impala in Ugalla Game Reserve (2013); c- Buffalo shot by poachers, carcass being destroyed by game rangers (2013); d- Confiscated wire snares (2014); e- Human settlements and agricultural farms in game controlled areas (2016), f- Illegal pitsawing (2013). Photos a and d by Ugalla Game Reserve Project Office.

This is a dangerous situation as it can soon bring about diminution of the prey species hunted by the wild dogs. Furthermore, unlike many other conservation areas in Tanzania, Ugalla is isolated in the sense that there is no national park (strictly non-hunting area) immediately nearby, which could act as a wildlife 'refuge' for exploited species. Yet unsustainable agricultural practices in the game controlled areas and forest reserves, especially in the form of extensive slash and burn to create space for farms, grazing areas and settlements continue unabated (*see* Figure 2*e*). Combined

with widespread tobacco farming, which is also important for local livelihoods, this gradually creates not only 'empty forests' but also empty landscapes (UGR, 2006; Hazelhurst and Milner, 2007; Yanda, 2010; Wilfred, 2012).

KNOWLEDGE GAPS AS REGARDS UGALLA WILD DOGS

We know little about the extent to which conservation efforts influence factors that determine the survival of wild dogs. For example, it is well known that bushmeat hunting is a huge problem in Africa and can accelerate wildlife depletion in protected areas (Davies and Brown, 2007). Thus, we need to know how much effective efforts to reduce bushmeat hunting influence prey availability for wild dogs are. In the same vein, future wild dog research and conservation should not ignore illegal activities that alter, destroy and disturb habitats. Activities such as illegal pitsawing and logging, and encroachment of forest reserves and game controlled areas can substantially reduce vegetation cover thereby affecting abundance and distribution patterns, and tradeoffs between foraging and interspecific kleptoparasitism risk.

Since wild dogs cannot be confined within state-owned wildlife areas due to their wide-ranging behaviour (Woodroffe, 2011; Jackson *et al*., 2012), active involvement of local communities has been acknowledged as key to addressing human-wild dog conflicts and other conservation problems (Lindsey *et al*., 2005; Dalerum, 2008; Gusset *et al*., 2008). But, our knowledge of the extent and constraints of community-based wildlife management in Ugalla is still limited.

Hurt and Ravn (2000: 304) noted that 'the future of wildlife in Africa rests in the hands of its indigenous people...' Given that wild dog conservation initiatives in Africa are costly and largely depend on donor funding, not all known wild dog populations will benefit from them. So, cost effective initiatives that utilise locally available resources (e.g. land, financial and human resources) should be promoted to guarantee sustainable management of wild dogs. Again, conservation efforts have paid too little attention to the feasibility of such initiatives as regards capacity building needs, appropriate incentives and wild dog conservation education and awareness.

THE FUTURE

For effective and sustainable conservation of wild dogs– and of course other wildlife species–in Ugalla, we should pay attention to the following aspects:

Current status of wild dogs: we need to know the abundance and distribution of wild dogs in Ugalla. This is important as it will enable local conservation authorities to take pragmatic and cost effective approaches to monitoring their population trends as done elsewhere (Croes *et al*., 2012; Davies-Mostert *et al*., 2012).

Anti-poaching patrols: effective anti-poaching patrols ensure adequate prey for wild dogs since wildlife poaching removes large numbers of animals most of whom are main prey species for wild dogs. In addition, increased presence of poachers and their activities disturb wild dogs, affect their reproductive success, hunting success and bring about psychological stress. While research has already established that rigorous assessment of the efficiency of anti-poaching/patrolling efforts is a crucial ingredient in promoting conservation (Holmern *et al*., 2007; Milner-Gulland and Rowcliffe, 2007; Keane *et al*., 2011), there has been no attempt to estimate the anti-poaching effort required to promote optimal deterrence of poaching in Ugalla ecosystem. We need to quantify the effort devoted to anti-poaching patrolling in relation to the intensity of poaching in spatial and temporal contexts. Specifically, research must address the following questions: 1) What are the nature, distribution and characteristics of poaching activities in relation to activity patterns of wild dog? 2) How much anti-poaching effort is devoted? 3) How are the temporal, seasonal and spatial distribution patterns of the current anti-poaching effort? 4) How can the effectiveness of the anti-poaching effort be improved to achieve the desired level of conservation for sustainable wild dog conservation?

Participatory conservation: participatory conservation aims to create or increase conservation awareness amongst local communities, which is significant in promoting wildlife as a valuable land resource (Emerton and Mfunda, 1999). This strategy was adopted to address problems associated with local resentment towards conservation triggered by the isolation of people from the natural resources on which they depend (Songorwa, 1999; Chatty and Colchester, 2002).

Extensive wildlife poaching and negative attitudes among local people towards the conservation of Ugalla Game Reserve began in the 19th century

when the Wagalla people were forced to leave the area because of health reasons, mainly due to the spread of sleeping sickness (URT, 1998). Presently, the most worrying issue is a rapid increase in the human population density (URT, 2013) coupled with an intensified poverty. This tends to push more people into exploiting the natural resources for both food and income generation (URT, 1998; UGR, 2006). Active participatory wildlife conservation is thus paramount. Currently this is being practiced through two wildlife management areas (Ipole and Uyumbu), but on a relatively small scale. If the WMAs are efficiently and effectively managed towards achieving their intended objectives, they can be a potentially useful platform for addressing people's wildlife-based livelihood needs while ensuring sustainable conservation of wildlife and their habitat (IRA, 2007; Wilfred, 2010). It is therefore entirely reasonable that new WMAs are created in game controlled areas and forest reserves, with attention to the considerable involvement of local communities who are often affected by conservation decisions.

CONSERVATION IMPLICATION

This paper has suggested conservation issues that need urgent research and conservation attention to save a small population of endangered African wild dog in the Ugalla ecosystem of western Tanzania. The fact that wild dogs can at least be seen in the area acts as suggestive evidence that the area can provide suitable habitat for the species. As a result, there is a desperate need for research geared towards enhancing the ability of local conservation practitioners to reverse trends in prey population decline and habitat loss through more rigorous conservation measures. Figure 3 presents a theoretical framework highlighting the nature of the relationship between conservation measures and protection of wild dogs. Here, conservation measures entail wildlife law enforcement (usually through anti-poaching patrols) and participatory conservation. Local participation will create a sense of belonging to conservation activities among local communities that will promote conservation awareness, positive attitudes towards conservation and sustainable livelihood activities (e.g. environmentally-friendly settlements and farming techniques). These are vital elements in the management of human-wildlife conflicts, and thus improved wild dog conservation. Participatory conservation should go hand in glove with effective law enforcement. The latter will deter poaching and also ensure prey abundance. Further, it will reduce the impact of poacher activities, such as snaring and logging, on wild dogs, other wildlife species and wildlife habitat. Availability and abundance of prey for wild dogs is partly the result of local people's sustainable ways of living especially when they stop illegal hunting of wild ungulates. Prey

availability also minimises conflicts resulting from livestock predation by carnivores. Improved conservation of wild dogs will reflect effectiveness of conservation measures because, as suggested by (Dalerum *et al*., 2008), carnivores are conservation flagships as their presence inspires conservation efforts.

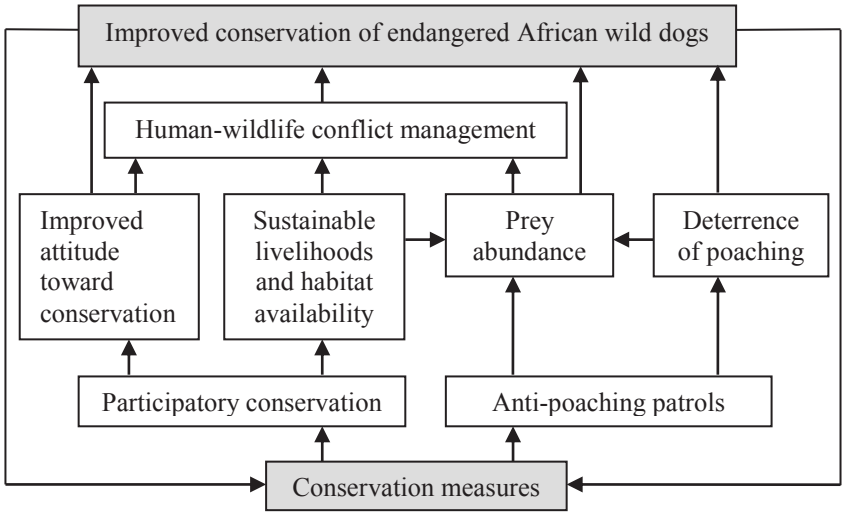

Figure 3. Theoretical framework showing relationships among some key factors in the management of wild dogs, triggered by conservation measures.

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