Why sustainable conservation of the remaining populations of endangered African wild dog (Lycaon pictus) is important?

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Abstract In this paper, drivers for population loss, reasons for conservation, and possible approaches toward sustainable conservation of the endangered populations of the African wild dog (Lycaon pictus) are reviewed. L. pictus populations face several threats, including habitat loss and degradation, persecution by human beings, infectious diseases, and competition with other large carnivores. L. pictus is among the top predators in the wild, which is key in limiting the herbivores' population from exceeding the ecosystem's carrying capacity. This, in turn, indirectly shapes rangeland vegetation communities and structures. L. pictus attracts tourists to Africa bringing foreign income which can be used for conservation and improving the livelihoods of the rural poor. L. pictus can be an important source of genetic materials for breeding programs to improve human and animal welfare. Given the importance of L. pictus to people and ecosystems' integrity, several measures for its sustainable conservation are suggested in this paper. These include controlling further habitat fragmentations, persecution by human beings, infectious diseases, poaching (prey losses), and inbreeding of the remaining small populations. Conservation of L. pictus needs a holistic approach in which the local people, conservation agencies, decision makers, researchers, and other key stakeholders should work harmoniously to prevent its extinction.

Keywords: African painted wolf, endangered dog species, painted hunting dogs, wild dog killings

1. Introduction

African wild dogs (Lycaon pictus), sometimes called painted hunting dogs or African painted wolf, are undomesticated dogs native to Sub-Saharan Africa belonging to the canid family. L. pictus matured body weight ranges from 17 to 36 kg, body length (76 -112 cm), and shoulder height ranges from 61 to 78 cm (Bucci et al 2022). They are social animals with observed pack sizes ranging from 15 to 60 individual animals or more (Creel and Creel 1995). L. pictus are colourful animals with skinny hairs with blotches of black, yellow and white, dark forehead, and massive round ears (Figure 1). They are generalist predators known to always exist in small population densities inhabiting diverse habitats, including savannah (grasslands), dry woodland, Afromontane forests, and mangrove forests across Sub-Saharan Africa (Woodroffe et al 1997; Creel and Creel 2002; IUCN/SSC 2007).

They occupy a wide habitat range in which packs (2 to 27 adults and yearlings) have been noticed to utilize about 1500-2000 km² mean annual home range that drops to 50-260 km² during denning in Serengeti National Park. And covering up to 40 km as the usual home range distance (Burrows 1994), and about 450-650 km² in Kruger National Park. They exhibit a specialized cooperative breeding behavior with non-breeding reproductive individuals that play babysitting, pup feeding, or den guiding roles, and only the dominant male and female within a pack breeds (Spiering et al 2010). Also, they hunt in groups and regurgitate to the puppies and the babysitters (Woodroffe et al 1997).

However, their number and geographic range have drastically declined in recent decades. The current total population of L. pictus is estimated to be 6,600 adults, with ongoing population decline. L. pictus falls under the endangered species IUCN's red list species category C2a(I), the major extinction drivers being persecution and habitat loss (Woodroffe and Sillero-Zubiri 2020).

According to Woodroffe et al (1997), the principal prey for African wild dogs are medium-sized ungulates, mainly impala (Aepyceros melampus) with about 120 kg body weight. Although L. pictus may forage from the African savanna hare (Lepus victoriae) about 1-2 kg, Kirk's dik-dik (Madoqua kirki), Thomson gazelle (Eudorcas thomsonii), to kudu (Tragelaphus strepsiceros), eland (Taurotragus oryx), blue wildebeest (Connochaetes taurinus) and young buffalo (Syncerus caffer) with about 200 kg. According to Creel and Creel (2002), the selection and preference depend of prey by L. pictus depends on prey availability, the pack size, and the presence of other large carnivores such as lion (Panthera leo), spotted hyena (Crocuta crocuta) and cheetah (Acinonyx jubatus). Unfortunately, these prey species are also highly preferred by bush-meat hunters and...
large carnivores. Thus, making African wild dogs more susceptible to persecution and accidental snaring, plus a high loss of kills to lions and hyenas (Cornhill and Kerley 2020).

This paper aims to answer the question, "why and how should we conserve African wild dogs?". The article will start by identifying the possible threats to African wild dog conservation and then identify possible solutions for intervening and resolving the threats to foster sustainable conservation of African wild dog.

![Figure 1 A pack of African wild dogs (Lycaon pictus) in Selous Game Reserve, Southern Tanzania. Top row: Wild dogs resting on and sides of a management road in an open grassed area in Miombo woodland vegetation. Bottom row: Wild dogs staring at a game rangers' patrol car (not in the photo) on and by sides of an earth road (Photo credit: Singira Ngoishye 2022).](image)

2. **Top threats to African wild dogs**

Below are the major threats to the conservation of African wild dogs.

2.1. **Eradication/persecution by human beings**

According to Rasmussen (1999), the major driver of the extinction of African wild dogs is human behavior and actions toward them. People regard them as cruel because they kill their prey by tearing it into pieces and disemboweling it. This was considered unfair to the ungulate species by game managers and a threat to livestock farmers. Thus, deliberately killing them whenever they encounter them with the intention of total eradication. Until 30 years ago in Africa, there were state-sponsored operations to eradicate wild dogs from protected areas and agricultural land (Woodroffe and Ginsberg 1999).

African wild dogs are currently extinct in West and North Africa, no longer available in 25 African countries out of 39 known to appear in the past 30 years (Figure 2). Viable populations were reported to be present in Selous Game Reserve (Tanzania) and Kruger National Park (South Africa), with 1300 and 342 individuals, respectively (IUCN/SSC 2007; Lindsey et al 2004). Selous Game Reserve and Kruger National Park are huge protected areas with low human populations surrounding them.

2.2. **Habitat fragmentation**

According to Bucci et al (2022), *L. pictus* used to occupy a vast range of habitats in sub-Saharan Africa. Currently, they are restricted only to grasslands, montane savanna, and open woodlands in Central, Eastern, and Southern Africa (Figure 2). Loss of habitat due to increased human population and development that reduce African wild dog habitats and block their migratory corridors has led the extant small populations into isolations (Creel and Creel 2002). This makes them suffer from the edge effect due to their large habitat requirements, thus posing a high risk of further population decline through direct anthropogenic mortality by shootings, snares, and poisoning when they come into contact with human activities, and indirectly...
through road kills (Lindsey et al 2004) The current wildlife populations in 10 southern Africa countries comprise about only 12% of their historical known home range, from 5 million km² to the recent less than 700, 000 km² (IUCN/SSC 2007).

![Figure 2 A map showing the geographic distribution of extant populations of African wild dog (Lycaon pictus) in the African continent (Source: IUCN 2008).](image)

2.3. Infectious diseases

Mortality due to infectious diseases such as canine distemper (Alexander and Appel 1994), rabies (Burrow et al 1994; Sabeta et al 2018), and anthrax (Kat et al 1995) is another threat to wild dogs. For example, rabies caused by a virus strain common to local dogs killed about 50-70 wild dogs in Serengeti National Park (Tanzania) in 1991, leading to its local extinction in the Serengeti-Maasai Mara ecosystem (Burrow et al 1994).

Also, wild dogs’ intense socialization life makes the whole pack vulnerable to extinction by contagious diseases like anthrax. Once infected, one member can easily transmit the disease to the whole individuals in a pack (Kat et al 1995). Moreover, Berentsen et al (2012) reported that 92% (12/13) of African wild dogs’ faecal samples collected from the Luangwa Valley in Zambia tested positive for Sarcocystis spp, indicating the possibility of the wild dogs being infected with sarcocystosis disease.

2.4. Inter-specific competition

Negative interactions with large carnivores (interspecific competition), in which they tend to avoid areas of high prey density. This might also be attributed to their usual low populations and broad home ranges that make even bigger reserves become an edge to them. When their population goes low, reproduction and hunting are affected as they lose carcasses to big carnivores such as lions and scavengers such as spotted hyenas more frequently (Darnell et al 2014; Stein et al 2015).

Attack from big carnivores, lion predation alone accounts for 26% of wild dogs’ natural deaths in Kruger. In addition, loss of dens to hyenas (kleptoparasitism) is another problem encountered by wild dogs, especially when in a small pack size (Creel and Creel 2002). Human beings indirectly accelerate impacts from big predators through habitat fragmentation and overexploitation of prey. The situation becomes worse when the reserve is fenced as African wild dogs can’t avoid lions properly due to reduced home range (Woodroffe and Ginsberg 1999).

2.5. Intrinsic factors (Allee effect)

Wild dogs’ small populations and obligate cooperative breeding behavior make them more vulnerable to extinction due to the low reproduction rate per pack (Courchamp et al 2000). As was stated by Angulo et al (2018) that, African wild dogs as specialized cooperative breeders are vulnerable to the allee effect. In particularly, the “mate-finding allee effect” which was found to be a major problem to reintroduced or dispersed individuals due to small packs in Southern Africa. Whereby, individuals were failing to find suitable mates after dispersal, the population failed to increase significantly within 25 years in the absence of human persecution and major predators (Somers et al 2008).

3. Why should we conserve the African wild dogs?

It is worthwhile to conserve the African wild dog populations for both human and the ecosystem integrity well-being. This is due to their crucial ecological role as top carnivores/predators that play a key role in limiting the herbivores/preys population from exceeding the ecosystem’s carrying capacity in the absence of human interventions (Lindsey et al 2005).
Predation on wild herbivores plays a role in shaping vegetation communities' structure and cover, as well as reducing the risks of overgrazing.

The second reason is their importance in maintaining Africa's tourism industry. Big carnivores, including wild dogs, attract people to visit Africa and bring foreign currency that can be used for both conservation and improving the livelihoods of the poor rural people (Creel and Creel 200). Rasmussen (1999) asserted that the “Painted hunting dog is a charismatic canid.

The third reason is wild dogs can be used as umbrella species due to their big home ranges and capability to inhabit diverse habitats; thus, their conservation will conserve many other species in the ecosystem (Woodroffe et al 1997). Also, it has the potential to act as a flagship for raising funds and awareness in the world on the importance of saving endangered species. For example, Kavango Zambezi (KAZA) Transfrontier Conservation Area (TFCA) (KAZA), abbreviated as the KAZA TFCA, is an area of 519,912 km² and incorporates parts of Angola, Botswana, Namibia, Zambia, and Zimbabwe. The KAZA TFCA is home to an estimated 20% of the world’s remaining African wild dog population. KAZA TFCA Secretariat (2014), among other objectives in its 2014 – 2019 strategy and action plan states "To utilize the endangered African wild dog as a flagship species for large scale habitat conservation, which in turn will benefit many other species".

The fourth reason is based on their existence value or moral value that future generations have the right to have this species on planet earth, as it is currently driven into extinction mainly by human actions; persecution is also against animal welfare.

Finally, it can act as an important source of genetic materials that can be used for breeding or genetic engineering programs to improve both human and animal welfare.

4. How to conserve the African wild dogs?

4.1. Control habitat fragmentation and promote effective in-situ conservation

Prevent further habitat fragmentation by maintaining the integrity of huge protected areas (PAs) through boundary information signs and patrols, and even fences in areas close to high human population density to halt further PAs encroachment. Expanding habitats through buffer zones, corridors to connect PAs, and encouraging wildlife conservation-friendly land use activities around Pas. For example, game ranching to maintain the dispersal areas and reduce edge effect that makes wildlife come into contact with human activities and increase the risk of being killed (Woodroffe and Ginsberg, 1999).

Woodroffe and Ginsberg (1999) also stipulated on importance of halting further habitat degradation within protected areas by controlling mass tourism and avoiding over-exploitation of wild prey by allocating sustainable hunting quota and reducing poaching. Nevertheless, improving the favorable conditions such as prey and water availability are deemed necessary for encouraging African wild dogs to remain within the protected area boundaries.

4.2. Control of infectious diseases

Direct vaccination and treatment of free-ranging wild dog populations have proven ineffective due to the high costs and difficulty accessing the animals. Indirect methods for disease control are highly recommended to save the extant population from becoming extinct; vaccination of domestic dogs (Canis familiaris) is a part of park outreach programs. As well as, controlling contact with domestic dogs and cats (Felis catus) would reduce disease threats to the remaining small populations of L. pictus (Woodroffe and Donnelly 2011).

On the other hand, reducing stress on wild dogs as much as possible is important because most wildlife diseases erupt under stressful conditions (Slingenbergh et al 2004). For example, introducing artificial watering points in small reserves and ranches and ensuring prey availability will reduce the risk of disease outbreaks.

Human intervention to vaccinate wild dogs against rabies and canine distemper diseases should be done when the population drops extremely low, or indirect methods seem inefficient in halting mortality problems. Vaccination of African wild dogs against diseases can be effective only in captive populations e.g., in zoos or in small reserve populations (Woodroffe et al 1997).

4.3. Promotion of meta-populations management techniques

Management practices involving moving wild dogs from one place to the other to re-establish sub-populations or strengthen extant populations for species restoration purposes is an excellent strategy. This is essential for saving the wild dogs from genetic problems and environmental stochastic that might wipe this species' small populations away if all individuals remain in the same area. Mixing up individuals comprising of different genetic materials and allowing them to breed strengthens the genetic status and makes them more adaptable to changing environments as it prevents inbreeding and genetic drift, i.e., loss of heterogeneity (Spiering et al 2010; Davies-Mostert et al 2015).

This can be done by conserving many viable sub-populations by establishing a network of small reserves and private ranches and even incorporating zoos that may act as asylum or refugees for the species (Lindsey et al 2004). It involves translocation and reintroduction to natural habitats or supplementation to raise the number of individuals to a viable population. Reintroduction of wild dogs in small fenced reserves has managed to rehabilitate the South African wild dog.\n
https://www.malque.pub/ojs/index.php/mr
population into viable populations (Somers et al 2008), however many reintroduction programs have also failed due to the persistence of extirpation conditions (Woodroffe and Ginsberg 1999)

Davies-Mostert et al (2015) also stipulates that any wild dog reintroduction program should ensure that threats have been eliminated as much as possible first before launching. Woodroffe and Ginsberg (1999) clearly stated that due to the huge habitat range requirement of wild dogs and the difficulty of the local people to tolerate them even after conservation education. The only viable solution is to keep the meta-populations in fenced reserves and reintroduce them in huge reserves such as Selous Game Reserve, Kruger, Serengeti, and Hwange National Parks.

4.4. Conservation education, outreach, compensation, and law enforcement

Awareness creation to local people and the general public as a whole on the biology and importance of wild dogs, including the precautionary measures to reduce livestock depredation problems, education on proper husbandry care, for example, encouraging the construction of fences to prevent wild dogs from attacking livestock at night (Woodroffe et al 1997; KAZA TFCA Secretariat 2014). Compensation for the loss of livestock, human life, or injury will help to reduce negative attitudes toward African wild dogs.

Also, the immediate removal of problematic wild dogs from human habitats by conservation agencies to prevent damage will help keep a good reputation with the local people, especially livestock keepers, including herders.

Finally, enacting and enforcing laws to prevent the unnecessary deliberate killing of wild dogs (shooting, poisoning, and snaring) should be a part of the solution. This is based on the fact that conservation education and law enforcement are advocated to go hand in hand to reduce resentment and opposition from local peoples that might aggravate conflicts (Lindsey et al 2004)

4.5. Public involvement, ecotourism promotion, and international cooperation

Active involvement of the general public and local community, among other key stakeholders, in the planning and implementing activities targeting *L. pictus* conservation is unavoidable if the initiatives are sustainable. The incorporation of wild dog habitat requirements and its conservation in land use plans is formidable if the initiatives are to be successful.

In addition, developing and deploying policies that promote wild dog-related ecotourism incomes to the local people and landowners are deemed essential to create a sense of ownership among stakeholders. Henceforth, reducing negative attitudes with the ultimate reduction of persecution of *L. pictus* both existing and reintroduced wild populations.

Nonetheless, using the payment for the ecosystem services market approach can help income generation from land devoted to wild dog conservation, thus an incentive for conservation (Lindsey et al 2005).

Finally, international cooperation is important as most wild dog habitats are cross-boundary issues. The human population is increasing rapidly in Sub-Saharan Africa, and conservation is not the major priority for many nations due to poverty, food insecurity, and political instability. Therefore, international cooperation and support are paramount in the sustainable conservation of *L. pictus*.

4.6 Control unintentional killing of wild dogs

Wild dogs use roads often for traveling and resting; accidental road kills account significantly for wild dogs’ mortality. Therefore, using road signs, bumps, and laws can help reduce accidental killing (IUCN/SSC 2007). For example, Abrahms et al (2016) reported that the selection of roads by wild dogs for traveling increases in denser vegetative environments, especially in thick woodlands, making them more vulnerable to road kills.

Accidental snaring is another problem that accelerates the wild dog population decline. For example, Van der Meer et al (2014) reported that snaring was responsible for about 25.6% cause of the mortality of African wild dogs from 1989 to 2010 inside and outside Hwange National Park in Zimbabwe.

Robust anti-poaching patrols involving the encouragement of local people to report snare encounters are essential. Promoting conservation education and bolstering the income generating projects for alternative protein sources e.g., fish ponds and poultry projects are essential. These initiatives are crucial for reducing overreliance on bush meat protein sources among the poor rural communities around *L. pictus* habitats (Woodroffe and Ginsberg, 1999).

4.7. Research and monitoring

Research and monitoring of both in-situ and ex-situ wild dog populations is still a cornerstone for knowledge sources and critical recommendations for resolving the current wild dog conservation challenges, such as negative association with big carnivores’ conservation challenge; huge habitat requirements amidst human and livestock population warranting land use changes from rangelands to croplands and settlements. Plus, the reintroduced populations must be monitored for diseases, survival, and reproductive rate. This will generate valuable information that conservationists, farmers, and policymakers can use for fostering effective wild dog conservation initiatives (Woodroffe and Sillero-Zubiri 2020).
5. Final considerations

Conservation of wild dogs needs a holistic approach in which the local people, conservation agencies, policy makers, researchers, governments, NGOs, and other potential stakeholders should work hand in hand to halt further habitat fragmentation and persecution, which are the major drivers of the extinction of wild dogs.

International cooperation is also of paramount importance due to enormous land requirements for effective wild dog conservation and based on the fact nearly 90% of African wild dog’s span across international boundaries (IUCN/SSC, 2007).

Finally, due to abject poverty, most African countries lack financial resources for supporting African wild dog conservation programs or the implementation of conservation policies. Henceforth, international cooperation can help save the species through supporting programs that foster a change in human attitude and habitat restorations towards sustainable African wild dog conservation.

Ethical considerations

Not applicable.

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Conflicts of interest

The author declares no conflicts of interest.

References


