The Effects of Veterinary Fences on Wildlife Populations in Okavango Delta, Botswana

BY JOSEPH E. MBAIWA and ONALETSHEPHO I. MBAIWA

Abstract: This article examines the effects of veterinary fences on wildlife populations in the Okavango Delta, Botswana. Using data from secondary data sources, findings indicate that the existence of veterinary fences in the Okavango Delta contributes to the decline of wildlife species in Botswana. Veterinary fences are erected to control the spread of livestock diseases in order to protect the European Union beef market where Botswana's beef is largely exported. Migratory wildlife species such as wildebeests, zebras, giraffes, buffalo, and tsessebes have their migratory routes blocked by veterinary fences and hence die from dehydration and entanglements in the fence. Those that get trapped by the fence often become easy kill targets for poachers. Some of the animals have been observed walking along the fence trying to cross. The erection of veterinary fences indicates that the expansion of livestock production into wildlife areas threaten the survival of wildlife in Botswana. To address the problem, an integration of wildlife production with other sectors such as agricultural development should be made a priority at national and local policy levels. This means that the principles of sustainability should be given priority in the erection of veterinary fences in wildlife areas.

Introduction

Some of the largest populations of wild animals in Africa are found in Botswana (see figure 1). These wild animals include elephants, buffalo, zebras, lions, impalas, kudu, giraffes, red lechwe, and many other small species scattered all over the country. Although Botswana's rangelands have supported a variety and abundance of wildlife resources for hundreds of years, recent studies such as those by Lomba (1991), Mordi (1991), Campbell (1995), Perkins (1996), Perkins and Ringrose (1996), and Albertson (1998) pointed out that Botswana's wildlife populations are in a constant decline (see figure 2).

Perkins and Ringrose (1996) stated that Botswana's abundant wildlife resources have been on decline since the 1960s (see table 1). Spinage (1991) also argued that

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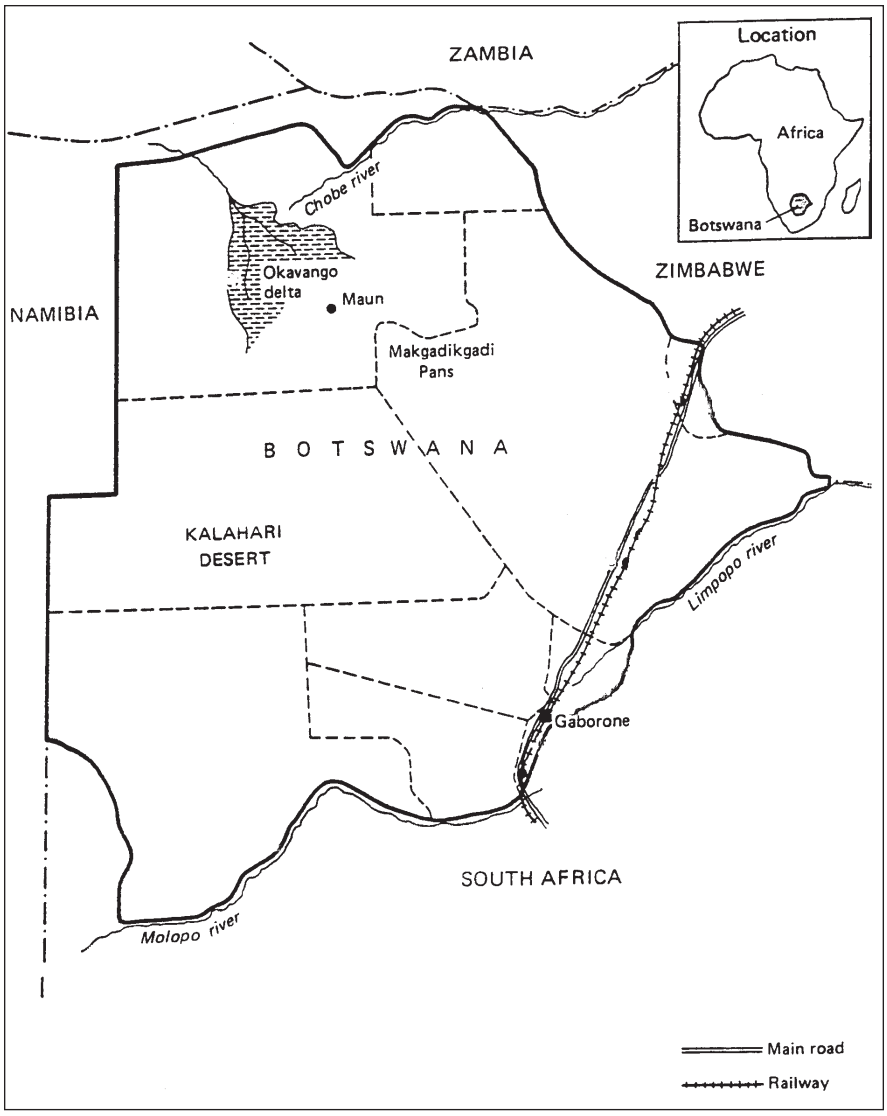

Figure 1—Map of Botswana showing the Okavango Delta (Mbaiwa 2005).

although Botswana has one of the most comprehensive game laws in Africa, there are fears about the sustainability of wildlife resource utilization, as wildlife populations are in a state of constant decline.

Figure 2—Giraffes in the Okavango Delta. Photo by J. E. Mbaiwa.

With the exception of the elephant and the gemsbok, table 1 shows that almost all other wildlife species have been declining. Species that are mostly affected include wildebeests, hartebeests, and zebras. Therefore, an investigation of factors that cause wildlife decline in Botswana is essential. Human factors such as livestock production—particularly veterinary fences—are cited as factors that contribute to the decline in wildlife populations in Botswana (Lomba 1991; Mordi 1991; Perkins and Ringrose 1996; Grag Gibson/ Environmental Investigation Agency 2004; Scott Wilson Resource Consultants 2000).

Taylor and Martin (1987) pointed out that any Third World state that aspires to export beef to international markets, especially in Europe, is required to meet high standards of veterinary hygiene and disease management. In Botswana, this is achieved through the construction of a network of veterinary cordon fences and quarantine camps that divide the country into disease control areas between which livestock movements are restricted. This strategy has resulted in Botswana being crisscrossed by a network of veterinary cordon fences. The erection of veterinary fences began in 1958 with the Kuke Fence (Perkins and Ringrose, 1996). Since then, different districts in Botswana have had veterinary fences erected one at a time over the years. This article is limited to the effects of veterinary fences on wildlife populations in the Okavango Delta region in northwestern Botswana. It discusses the effects of veterinary fences on wildlife populations based on the principles of sustainability. The aim is to analyze the role that sustainability can play in minimizing the degradation of the wildlife population in Botswana. The Okavango Delta is a classical case study because it has some of the largest concentrations of wildlife species in Botswana.

Methods

This article relied on the use of secondary data sources. Specific materials used include both published and unpublished articles and reports on veterinary fences and wildlife management in Botswana. Government policy documents on wildlife management (e.g., annual aerial wildlife surveys), consultancy reports, maps, books, and other related information on veterinary fences and wildlife populations were also used. The information obtained from these documents include wildlife statistics, the changing status

of wildlife populations, and the effects of veterinary fences on wildlife populations. Finally, data collected was analyzed qualitatively.

Results

Beef production remained Botswana's chief export product until it was relegated to second by diamond export in the late 1970s, and to third by tourism in 2004 (Mbaiwa 2005). Politicians and decision makers in Botswana consider the erection of veterinary fences necessary for the improvement of the country's economy. As a result, Botswana is being crisscrossed by a network of veterinary fences (see figure 3) to control livestock diseases. These fences are noted for having effects on migratory wildlife populations in the country.

Since this article is limited to fences in the Okavango region, it is necessary to describe wildlife migration patterns here. Wildlife migration routes are mostly between the inner (wet) and outer (dry) areas of the Okavango Delta. In wet seasons when there is water in all the parts of the Okavango, wild animals migrate to the outer parts of the wetland. In dry seasons when water becomes scarce, wild animals migrate to the permanent water source areas in the inner parts of the wetland.

The Kuke Fence

The erection of the Kuke Fence started in 1954 and was completed in 1958. It runs from the Namibian border across the northern boundary of the Central Kgalagadi Game Reserve, where the Makgadikgadi Fence joins it. The Kuke Fence has had severe impacts on the wildlife species found in the Schwelle region (i.e., the Kalahari Desert area). As DHV (1980, p. 21) put it, "The Kalahari appears to be a single system in which the Schwelle running northwest–southeast through the middle of the region forms an axis, about which are centered the greatest animal numbers." The Kuke Fence completely cuts the movement of wildlife species from northern Kgalagadi and the Schwelle region with the Northern system (Okavango Delta region). The fencing of the eastern parts of Central Kalahari Game Reserve further cuts wildlife movement from the Kgalagadi area, especially Central Kgalagadi Game Reserve and the Boteti/ Makgadikgadi system. Silberbauer (1981) stated that after the erection of the Kuke Fence, severe droughts that are endemic to Botswana, resulted in heavy wildebeest mortality and the effective exclusion of zebra from the Northern (Okavango) system. Child (1972) described the wildebeest die-offs at Lake Xau in 1964 and 1970 and the severe drought of the 1980s as attributable to the erection of the Kuke Fence. In the dry season, these wildlife species could not migrate to areas of water supply, as the fence blocked their movement.

There are, however, conflicting figures on the mortality estimates for wildebeest die-offs at Lake Xau. Owens and Owens (1980, 1983) estimate the number to be 800,000 animals, whereas Williamson and Williamson (1981), Williamson and Mbano (1988), and Mordi (1989) put the figure at 50,000 animals. According to Williamson and Williamson (1984) and Murry (1988), the wildebeest die-offs constitute a massive reduction in large herbivore biomass in the Kgalagadi system. This means the limiting effects of wildlife movement by fences, especially in drought periods when wildlife need to migrate to wet areas, negatively impacts on wildlife populations in the area.

Table 1. Changing Status of Some Wildlife Species in Botswana (Perkins and Ringrose 1996)

Species	1978	1999
Wildebeest	315,058	46,741
Hartebeest	293,462	31,114
Eland	18,832	15,163
Springbok	101,408	51,792
Ostrich	92,286	32,499
Zebra	100,295	55,406
Sable	3,636 (1987)	2,052
Roan	1,228 (1987)	884
Impala	56,773 (1987)	45,183
Sitatunga	1,541 (1987)	1,234

The Buffalo Fences

The Buffalo Fence is one of the important fences in Botswana in that it controls the spread of foot-and-mouth disease in the Okavango Delta region. The Buffalo Fence runs from the south to the north of the Okavango Delta. The fence has succeeded in keeping buffalo populations, which are known for transmitting foot-and-mouth, within the inner parts of the delta separate from cattle populations that remain in the outer parts of the country. The Buffalo Fence is divided into the Southern Buffalo Fence erected in 1982 and the Northern Buffalo Fence erected in 1996. The

Figure 3—The Southern Buffalo Fence. Photo by J. E. Mbaiwa.

Figure 4—An elephant bull walking along the northern Buffalo Fence in November 1997. The bull has been separated from the rest of the herd by the fence (Kalahari Conservation Society 2005).

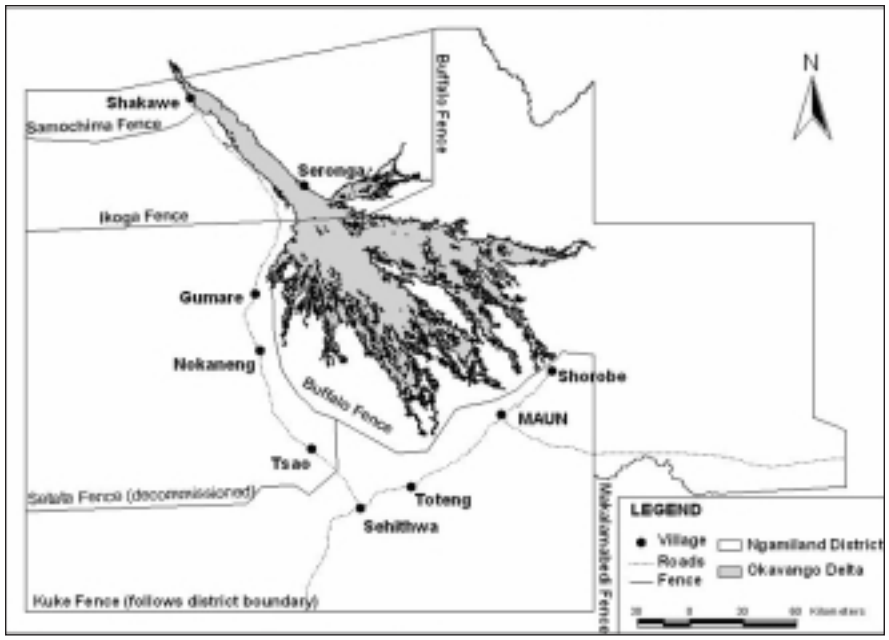

Figure 5—CBPP Fences in the Okavango Delta, Botswana (Darkoh and Mbaiwa 2005).

Buffalo Fence is reportedly one of the most destructive fences to migratory wildlife species in the region (Albertson 1998). The fence cuts across an area that is described to be a major route for migratory wildlife species to and from dry and wet (Okavango Delta) areas. Albertson (1998) stated that the Northern Buffalo Fence not only cuts off the larger migratory patterns of zebras, wildebeests, and elephants, but also fragments and restricts the movements of localized populations whose territories it bisects (see figure 4). Albertson indicated that wildlife species mostly affected are eland, roan, sables, tsessebes, and giraffes.

Veterinary fences such as the Buffalo Fence are also known for causing deaths of migratory wildlife species. Table 2 shows the deaths of wildlife species along the North Buffalo Fence in 1998. Further effects of the Northern Buffalo Fence include entanglement of species. Trapping of species and illegal poaching along the Buffalo Fence have also been reported (Scott Wilson 2000).

The CBPP Fences

The outbreak of the Contagious Bovine Pleuropneumonia (CBPP), or simply known as the cattle lung disease, in 1995 in the Okavango region led to the extension of veterinary cordon fences in the area. The CBPP is a lung disease that affects cattle and water buffalo. The disease is highly contagious, and the available vaccine is ineffective in controlling it. In fact, treated animals remain carriers of the disease. In order to control the spread of the CBPP and protect beef markets in Europe, the government erected veterinary fences that have come to be known as the CBPP Fences between 1995 and 1996. The CBPP Fences include the Northern Buffalo Fence, Setata Fence, Samochima Fence, and Ikoga Fence (see figure 5).

As the government cordoned off the whole district, about 320,000 cattle had to be destroyed as well (Scott Wilson, 2000). These measures were taken partly to assure European markets that Botswana's beef is safe and free from livestock diseases. However, CBPP Fences have proved to be destructive to migratory wildlife species, as they continue to die in large numbers along them. The visible manifestation of the fence impact is a buildup of wildlife carcasses along the fences. The fences also prevent wild animals from migrating to watering places in and outside game parks, such as Moremi Game Reserve located in the inner parts of the Okavango Delta. This limiting effect of the fence disputes the once-held belief that game parks can provide for the year-round requirements of wildlife species. As indicated earlier, migratory wildlife species generally migrate to dry parts of the Okavango during wet seasons and back into wet and inner parts of the Okavango in dry seasons.

Table 2. Wildlife Species That Died along Northern Buffalo Fence in 1998 (Albertson 1998)

Species	Number	Period
Giraffe	5	January–June 1998
Giraffe	5	July–September 1998
Buffalo	2	September 1998
Elephant (cow and calf)	2	September 1998
Roan antelope	unknown	September 1998

Table 3: Wildlife Species That died along the Caprivi Fences, 1997 (Albertson 1998)

Species	Number	Period
Kudu	5	August 1997
Eland	2	June–July 1997
Sable	1	July 1997
Roan antelope	1	July 1997
Giraffe	5	June 1997
Elephant	1	July 1997
Ostrich, duiker, steenbok	unknown	July 1997

Albertson (1998) recorded a number of wildlife species that died on other fences in the Okavango Delta area. For example, a trip along the Setata Fence on October 13, 1997, recorded the following deaths: seven giraffes, eight gemsboks, two wildebeests, two hartebeests, three ostriches, and three kudu (the Setata Fence was decommissioned and removed in 2003). As for the Ikoga Fence, a trip taken by a veterinary worker covering 20 kilometers in 1996 found the following numbers of animals killed along the fence: two kudu, one eland, and one ostrich. Table 3 shows the number of animals that were found killed along the Caprivi Fence. The Caprivi Fence is along Botswana's border with Namibia.

Albertson (1998) also records a number of wild animals that were observed either attempting to cross fences or walking along them (see figure 6). Some of the animals, particularly those that move in herds, got separated from the rest of their group by fences. Table 4 shows numbers of animals that were observed along fences either by ground or aerial observation.

Studies (e.g., Perkins 1996; Scott Wilson 1998; Albertson 1998; Grag Gibson/Environmental Investigation Agency 2004) on the impact of veterinary fences indicate that none of the fences in Botswana was erected after detailed scientific studies—particularly Environmental Impact Assessments (EIA)—were carried out. As a result, there was no prior knowledge on the part of policy makers on the possible impacts of fences on wildlife populations and wildlife habitat. Apparently, fences in Botswana are mostly erected as a reaction to some livestock disease outbreak, as was the case with CBPP in 1995–966. This reactive approach has often led to fences separating wildlife families from each other. These animals have been observed attempting to reunite with each other but are unable to do so due to fences that separate them. In addition to effects on wildlife populations, the erection of fences without EIAs has resulted in land and resource use conflicts with other stakeholders. For example, veterinary fences have become hunting areas for poachers (Scott Wilson, 2000), hence cause conflicts between wildlife managers and subsistence communities in these areas. Resource conflicts have been found to cause resource degradation (Darkoh and Mbaiwa 2001). In the case of veterinary fences, resource degradation includes the decline in wildlife populations in the Okavango Delta.

Table 4: Wildlife Species That Died along Other Fences in the Okavango Delta, 1997
(Albertson 1998, observed along different parts of the fence)

Ground Observations, Oct. 13, 1997	Aerial Observations*, Nov 9, 1997
Setata Fence 1 adult gemsbok, 1 calf (gemsbok); 4 adult hartebeests; 1 wildebeest; 4 adult ostriches; 4 adult wild dogs	4 adults (gemsboks); 7 adults, 2 calves (gemsboks); 5 adults (gemsboks); 4 adults, 1 calf (hartebeests); 3 adults (hartebeests); 1 adult (wildebeest); groups of 2–3 individual ostriches
Ikoga Fence, Oct. 21, 22, 1997 1 adult gemsbok; 1 adult ostrich	No data recorded from aerial observation.
Caprivi Fence, Oct. 24, 25, 1997 7 adults (elands), 2 adults (elands); 1 adult giraffe; 18 zebras; 2 adult kudu; 6 adult elephants, 2 subadults, 1 calf, 3 adults, 2 adult elephants	25 herds of elephants with between 2–55 animals in each observed on different parts of the fence on November 10, 1997
Northern Buffalo Fence, July 19–21, 1997 2 subadults, 1 calf (roans); 1 adult, 3 calves (roans); 3 subadult elephants, 1 adult female elephant and 1 calf; 1 adult eland and a calf; herd of 110 buffalo, herd of 62 buffaloes (July 21, 1997); herd of 50 buffalo, herd of 70 buffaloe, herd of 17 buffalo; 1 adult giraffe; 3 adult tsessebes 4 adult zebras; 1 kudu calf (Oct 1, 1997); 5 subadults, 1 adult (giraffes), 8 adults and 2 subadult giraffes (Oct. 27–30, 1997); 3 wildebeests, 2 adults wildebeest (Oct. 28, 1997); 1 adult tsessebe, 2 adult tsessebes (Oct 27, 1997); 5 adults, 2 subadults (kudu) (Oct 28, 1997)	herd of 40 buffalo, Oct. 1, 1997 herd of 20 buffalo, Oct. 1, 1997 herd of 15 zebras, Oct. 1, 1997 2 adult tsessebes, Oct. 1, 1997 several herds of elephants, Oct. 1, 1997 herd of 18 elephants, Nov. 10, 1997 herd of 30 elephants, Nov. 10, 1997 5 adult elephants, Nov. 10 ,1997 2 subadult elephants, Nov. 10, 1997 herd of 20 buffalo, Nov. 10, 1997 Herd of 18 wildebeest, Nov. 10, 1997

An integration of wildlife production with other sectors such as agricultural development should be made a priority at national and local policy levels.

The Impact of Removing Veterinary Fences on Wildlife Species

Although veterinary fences contribute to wildlife decline in Botswana, recent studies seem to suggest that a reverse in wildlife populations can be achieved if some of the fences are removed. For example, an EIA study by Scott Wilson (2000) on CBPP Fences recommended the removal of the Setata and Nxai Pan Buffalo Fences. The removal of the Setata Fence was done and completed in 2003, and the Nxai Pan Buffalo Fence was removed in 2004. Figures 7 and 8 show cables and standards from removed fences.

A recent study by the Kalahari Conservation Society (2005) indicated that "the removal of the 210 kilometer Setata Fence and the 66 kilometer portion of the Nxai Pan Buffalo Fence resulted in an immediate end to negative impacts on wildlife populations in the affected areas" (p. i). The Kalahari Conservation Society study further indicated that the removal of the Setata Fence has led to free movement of wildlife over the old fence as shown by seasonal migrations of elephants, zebras, and wildebeests. In addition, gemsbok and hartebeest populations observed in 1997 and 1998 comprised very small, scattered adults of fewer than five animals or sedentary lone adults or calves. Those herds in 2005, after the fence was removed, were typically larger and more cohesive, with numbers and age structures within normal ranges. With regard to the Nxai Pan Buffalo Fence, the study assumed that wildlife populations, particularly elephants, buffalo, and zebras, are likely to return to prefencing levels over the long term. These results indicate that wildlife populations in the Okavango Delta can be reversed if some of the veterinary fences were to be removed.

igure 6—Gemsbok between fence lines in 1998 (Kalahari Conservation Society 2005).

Discussion

Findings in this article indicate that veterinary fences have been used for livestock disease control in Botswana since the 1950s. Veterinary fences cover thousands of kilometers across Botswana, and they introduce an entirely artificial constraint upon wildlife movements that is historically unprecedented in terms of its scale, magnitude, and longevity of impact (Mbaiwa and Darkoh 2005). Migratory wildlife species depend for their survival on seasonal migration between rangelands and water sources. Veterinary fences block these migratory routes. The immediate manifestations of veterinary fences include the carcasses found along fences and the animals observed walking along it. Perkins and Ringrose (1996) stated that veterinary fences remain central to any explanation of the dramatic die-offs of migratory wildlife species that have occurred in the country in the last 20 years. Albertson (1998), Scott Wilson (2000), and Grag Gibson/ Environmental Investigation Agency (2004) argued that the effects of veterinary fences include the obstruction of wildlife migratory routes, fragmentation of wildlife populations, and the death of animals due to dehydration and entanglement on the fences. Scott Wilson Consultants stated that poaching along CBPP Fences in the Okavango is higher because of the wildlife animals that become trapped by the fences. As a result, veterinary fences have a direct negative impact on wildlife numbers in the Okavango Delta. The erection of veterinary fences in Botswana indicates that in most developing countries, immediate economic benefits for sectors such as agricultural development are often implemented to the detriment of other sectors, such as wildlife management.

The other aspect that emerges from this study is that the beef industry in Botswana is heavily subsidized

Figure 7—Cables prepared for collection (Kalahari Conservation Society 2005).

Figure 8—Standards prepared for collection (Kalahari Conservation Society 2005).

with funds by the European Union through the Cotonou Agreement (Perkins 1996; Perkins and Ringrose 1996, Grag Gibson/Environmental Investigation Agency 2004). The involvement of the European Union in Botswana's beef industry is part of globalization and international trade. Globalization and international trade are important in the economic development of any country; however, they also encourage development programs and strategies that can cause negative environmental impacts. The case of veterinary fences and wildlife decline in Botswana is one example of this phenomenon. Instead of promoting the sustainable use of Botswana's wildlife resources, globalization and international trade are thus contributing to the depletion of its wildlife resources. This problem can partly be addressed by encouraging livestock policies and programs that adhere to principles of sustainability in Botswana. This can partly be achieved through the integration of wildlife management and livestock production programs. This approach means that none of these sectors (livestock and wildlife) should be given priority to the detriment of the other, as is the case with the erection of veterinary fences.

Finally, EIA studies are essential in promoting an environmentally friendly livestock and beef sector in Botswana. This means that EIAs need to be done before the construction of any veterinary fence. EIA studies may also need to be conducted for existing fences and, where possible, some of the fences may require removal. Removing some veterinary fences has the potential of reversing wildlife populations in the Okavango Delta. The Kalahari Conservation Society (2005) study has shown that the removal of the Setata Fence and Nxai Pan Buffalo Fence has the potential of increasing wildlife populations by reducing wildlife stress, entanglements, death, and separation from each other. **IJW**

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commitment to contribute whatever I can to the struggle against its destruction. **IJW**

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DOUG WILLIAMSON was born and raised in Johannesburg, South Africa, matriculating from St John's College in 1961 and graduating from the law school of Witwatersrand University in 1966. After a brief stint of legal practice he decided to abandon the law and make a commitment to working in conservation. Having acquired appropriate academic credentials for a career in conservation, he spent a decade in Botswana, implementing research projects on the behavioural ecology of red lechwe and the ranging behaviour and habitat needs of gemsbok, springbok and wildebeest in the Kalahari, serving as the officer-in-charge of research in the Department of Wildlife and National Parks, and managing a combined cattle and game ranch in the Tuli Block. Then, after three years in the late Professor Peter Jewel's research group in Cambridge University, he spent five years managing the King Khalid Wildlife Research Centre near Riyadh in Saudi Arabia. Thereafter he spent three years as a freelance consultant before working for the Food and Agriculture Organisation of the United Nations (FAO) for ten years, firstly as a Wildlife Expert on a combined range improvement and wildlife management project in Syria, then as Forestry Officer responsible for Wildlife and Protected Area Management in the FAO's headquarters in Rome. In the course of all this experience he was exposed to problems and issues at scales ranging from the molecular (DNA analyses for taxonomic purposes) to vast ecosystems (wildebeest migration in the Kalahari) and from utterly practical problems to the most abstract policy considerations. Having reached the mandatory retirement age of the FAO, he is now once more working as a freelance consultant.

Night watch around the camp fire, wilderness trail iMfolozi game reserve. Photo courtesy of the Wilderness Leadership School.

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