Chapter 2

Transfrontier Conservation Area Initiatives in Sub-Saharan Africa: Some Animal Health Challenges[1]

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Introduction

As Africa's conservation areas come under increasing pressure by expanding human resource needs, the transfrontier conservation area (TFCA) initiatives, from a biodiversity conservation point of view, are a welcome new perspective. In addition, the integration of land across international borders, as well as the consolidation of state and privately/communally owned land in joint ventures, may generate positive economic benefits for specific regions. These initiatives are strongly supported by conservationists, ecotourism enterprises, and the public at large because they are the first tangible moves that may reverse the current encroachment being experienced by existing and established conservation areas. This encroachment has occurred when local communities have expanded their struggle to survive the onslaughts of nature's climatic fluctuations and plagues that threaten their food security. The TFCA vision explores the possibility that changing land-use practices from subsistence farming on marginal land to community participation in ecotourism-based enterprises may have sustainable economic and ecological benefits for all.

In the Southern African Development Community (SADC) region, there are currently seven TFCAs, each involving land from two or more participating countries, that have already been established (or are in the process of being established) and have political support, with international agreements currently being developed or already ratified. A further 15 potential TFCAs have been identified by the Peace Parks Foundation in the SADC subregion (Fig. 1).

It is definitely not the intention of this paper to portray these environmental conservation initiatives in a negative light. The message, however, that needs to be conveyed, is that all parties involved should enter these initiatives fully informed and forewarned of the potential animal health implications and challenges that may be expected when increasing the current geographic range of certain animal pathogens and disease vectors. Without barriers on international boundaries, and with biological bridges being formed by contiguous wildlife populations, any contagious/infectious agent or vector present in any one of the participating countries or areas will predictably eventually spread throughout the entire TFCA.

Potentially problematic infections should be identified at an early stage through surveillance and monitoring, and proactive joint containment and control measures should be established as necessary. These animal disease issues may be compounded as a result of the enlarging wildlife/livestock interface, and this may have a negative impact on adjoining communities (Bengis *et al.* 2004). This concept paper discusses some of the risk factors and identifies some of the potential animal infections and disease vectors that may become problematic in certain African TFCAs.

Risk factors

Several important animal disease risk factors have been identified with regard to the development of TFCAs. These include the following:

Environmental factors

Certain environmental factors, usually associated with geographic location and climate, such as mean temperature, rainfall, and altitude, and the resultant habitat and landscape types may be important considerations when assessing animal disease risks for an existing or potential TFCA. For example, it is probably the savannah ecosystems, with their enormous botanical and mammalian biodiversity and heterogeneity, that support the greatest variety of associated macro- and microparasites and vectors. In contrast, in very arid ecosystems with relatively low densities of specialised species, most contagious or vector-borne infections are unlikely to be maintained. Similarly, high-altitude montane habitats, which are cyclically subjected to freezing temperatures, are only seasonally – at most – suitable for certain vectors and parasites. Between these extremes, the African tropical rainforests, with their high rainfall, reduced sunlight, and canopy-bound nutrients, support only certain niche-adapted species and their parasites.

Animal species

The mix of animal species seen in the participating land areas of the TFCA may also give insight into the animal disease risk. In sub-Saharan Africa, certain key mammalian species

[1] See abstract on p.xix.

Fig. 1. Transfrontier conservation areas

Courtesy of Peace Parks Foundation.

have been identified as maintenance hosts or reservoirs of certain infectious agents and are therefore of epidemiological importance. For example, the role of the African buffalo in the maintenance of foot and mouth disease (Hedger 1972) and theileriosis (Irvin and Cunningham 1981) has been well documented, as has the association of wildebeest with alcelaphine malignant catarrhal fever (Plowright *et al.* 1960). Epidemiological links have been made between wild porcines and argasid ticks in the maintenance of African swine fever (Plowright *et al.* 1994) and between bushbuck and ixodid ticks in the epidemiology of bovine petechial fever (Snodgrass *et al.* 1975). Zebra and certain dung-breeding midges are linked to the dry-season cycling of African horse sickness (Barnard 1993). Although these infections are generally "silent" in their traditional hosts, these animals should be considered high-disease–risk species under certain interface conditions with livestock (Bengis *et al.* 2002). Similarly, certain wildlife species such as the spiral-horned antelope (tragelaphids), wild porcines, buffalo, black rhino, and elephant are preferred hosts for certain savannah and riverine tsetse flies (Morrison *et al.* 1981).

Disease status

Disease status of domestic animals adjacent to the TFCA is a major risk factor for wildlife within the area. For example, the presence of foreign animal diseases such as bovine tuberculosis (BTB) (de Vos *et al.* 2001, Rodwell *et al*. 2001) or rinderpest (Mack 1970, Kock *et al.* 1999) in adjacent cattle populations places the wildlife in the TFCA at risk. Similarly, the presence of canine distemper or rabies in domestic or feral dogs at the interface may threaten wild carnivores, especially the social species (Alexander and Appel 1994, Roelke-Parker *et al*. 1996).

Interface type

The extent and type of the interface with adjoining domestic livestock herds is also an important animal disease risk factor. The interface may be linear, as along a fence line, or patchy, reflecting habitat preferences of a disease host. It may be focal at a shared water point, or diffuse, where range and resources are shared, as in savannah pastoral societies. A diffuse interface has the greatest risk for animal disease transmission. Animal disease transmission at these interfaces may be bidirectional, with diseases traditionally seen in livestock entering wildlife populations, or indigenous wildlife infections crossing over into livestock. Both scenarios have potentially serious implications.

The Great Limpopo Transfrontier Park – a potential case study

The Great Limpopo Transfrontier Park will incorporate the Kruger National Park (KNP) in the Republic of South Africa, Gonarezhou National Park in Zimbabwe, and the Limpopo National Park in Mozambique (Fig. 2). A ratified treaty has been signed by the three participating countries, and a joint management board with supporting committees in the fields of safety and security, finances and human resources, and tourism and conservation are in place. Fences have not yet been dropped, but over 2000 head of plains game (including zebra, wildebeest, impala, waterbuck, giraffe) as well as some 75 elephant and two white rhinos have been translocated to a fenced 30,000-ha core sanctuary area near Massingiri dam in the Limpopo National Park.

Animal disease risks in this TFCA are moderate to high for a number of reasons. This TFCA lies in a low-veld savannah ecosytem. Disease is endemic in the species mix that includes maintenance hosts and reservoir species such as buffalo, wildebeest, zebra, wild porcines, and tampans. All the indigenous disease agents have also been detected in one or more of the contributing parks.

The eastern side of the proposed TFCA is unfenced, which would create a diffuse interface between wildlife and domestic livestock, while the western side of the TFCA is fenced, creating a linear interface. The disease status of domestic animals on some of the boundaries of the TFCA is largely unknown, but rabies outbreaks in domestic dogs have been recorded in the Pafuri region of Mozambique.

In addition, buffalo, kudu, and warthog in regions of the KNP compartment are infected with BTB – a foreign animal disease (de Vos *et al.* 2001, Bengis *et al*. 2001). These three species are all potential maintenance hosts of this contagious bacterial infection, and BTB has already spilled over into at least six additional incidental hosts. The BTB status of cattle and wildlife in Mozambique is unknown, but Zimbabwe currently appears to be free of BTB in cattle, based on abattoir surveillance.

A tsetse fly incursion has recently been detected in the northern part of the Gonarezhou National Park in Zimbabwe. Tsetse flies also are found north of the Savé River in Mozambique. The KNP has been free of tsetse flies for over a century, and the Limpopo National Park appears to be currently free of these nagana vectors.

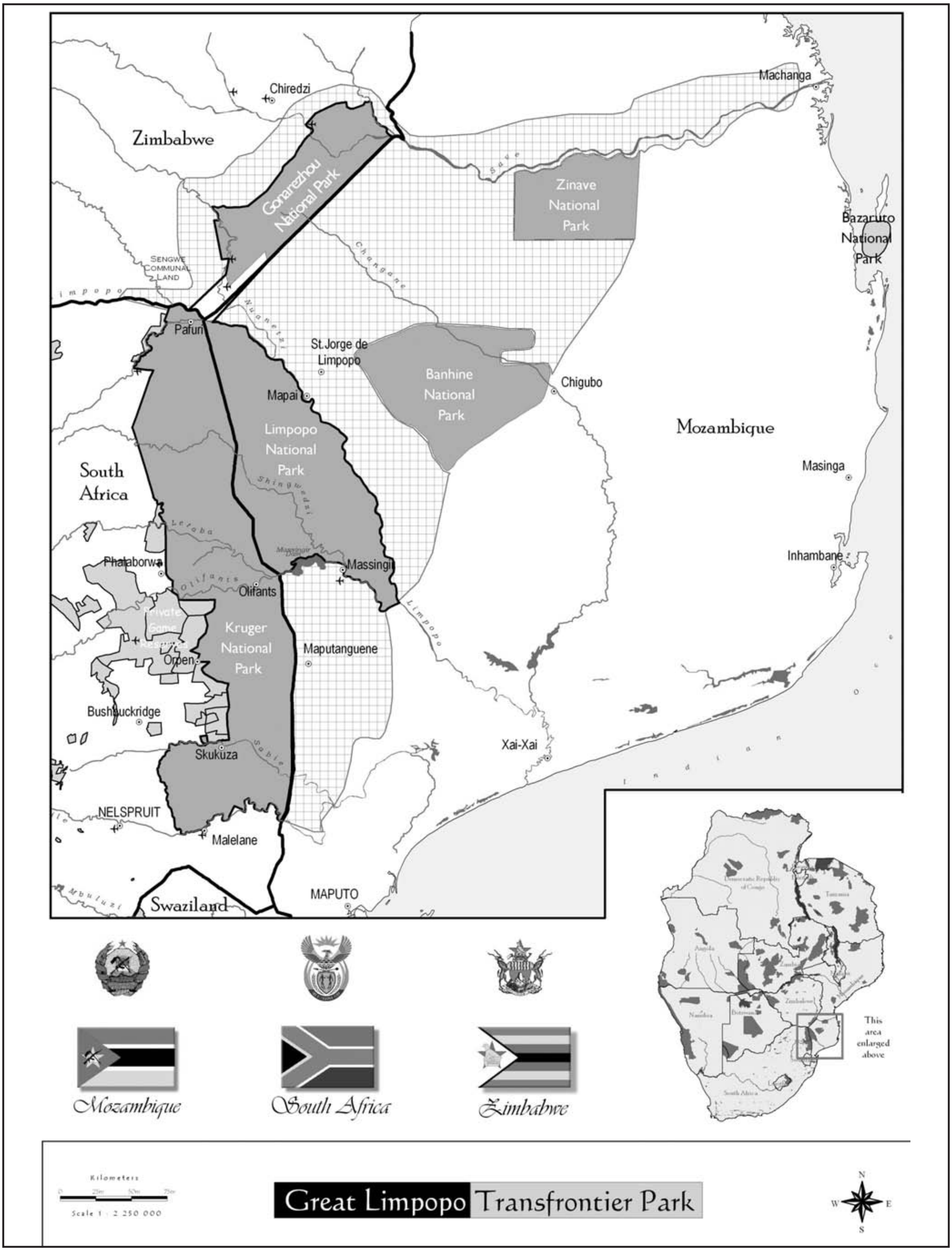
During the past decade, buffalo were introduced from Hwange National Park in western Zimbabwe into Gonarezhou National Park in the east to address a possible genetic bottleneck. These buffalo carry different topotypes of FMD virus to the local resident buffalo. New topotypes may require the use of different vaccine strains for protective coverage in vaccinated buffer zones.

Finally, rabies outbreaks have been detected in domestic dogs in the Pafuri area of Mozambique. Rabies has never been detected in wildlife in the KNP.

Conclusions

The formation of TFCAs has great potential benefits for biodiversity conservation and ecotourism, with associated regional economic "spin-offs." This land-use practice may have sustainable ecological and economic benefits for all. Participating nations should, however, be aware of the po-

Fig. 2. The Great Limpopo Transfrontier Park incorporates five anchor protected areas
Courtesy of Peace Parks Foundation.



tential animal health challenges that may arise out of these initiatives. Appropriate planning and disease management strategies should be proactively put in place, in both the TFCA and adjoining communal farming areas, as deemed necessary.

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