EMERGING AND TRANSBOUNDARY DISEASES IN THE GLTFCA REGION – CURRENT RESEARCH RESULTS AND ONGOING MANAGEMENT CHALLENGES

In context of the Great Limpopo Transfrontier Park Veterinary Committee

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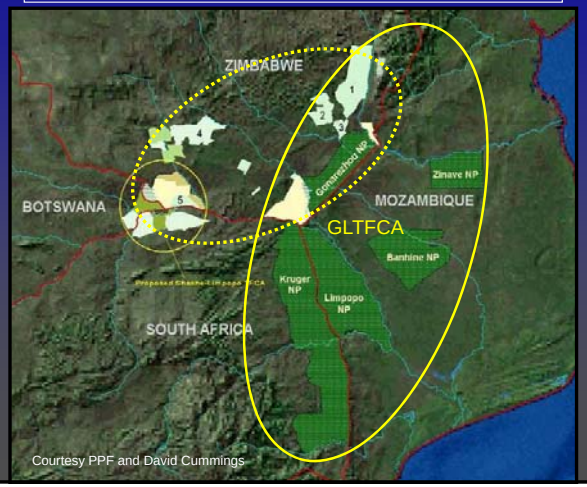
VWS - SANParks

Acknowledge Input and the Veterinary Committee Members (specifically Chris Foggin, Agostinho Nazare, Roy Bengis, Peter Buss, Lin-Marie De Klerk & Louis v Schalkwyk as co-authors of the abstract) and thanks to Mike Kock, Ken Ferguson, Dewald Keet, Danny Govender & Clair Geoghegan for some of the slides.

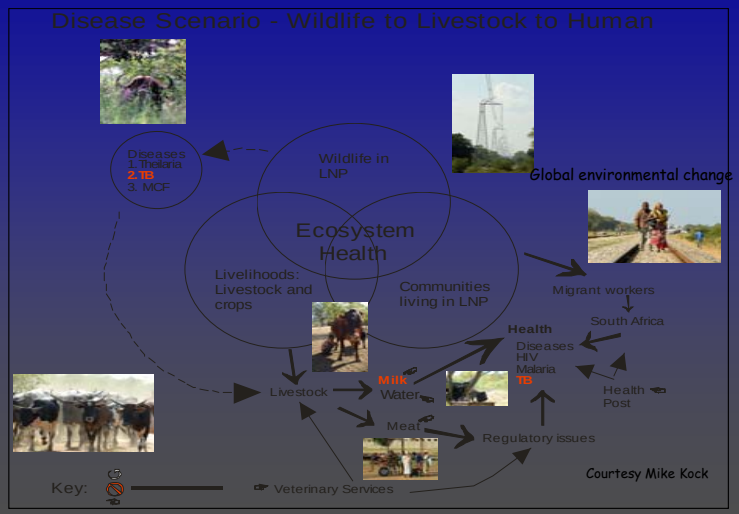
- Diverse and heterogeneous area with many different land use activities
- Multitude of interface zones between wildlife, livestock and humans.
- Capacity and logistical abilities differ across the region

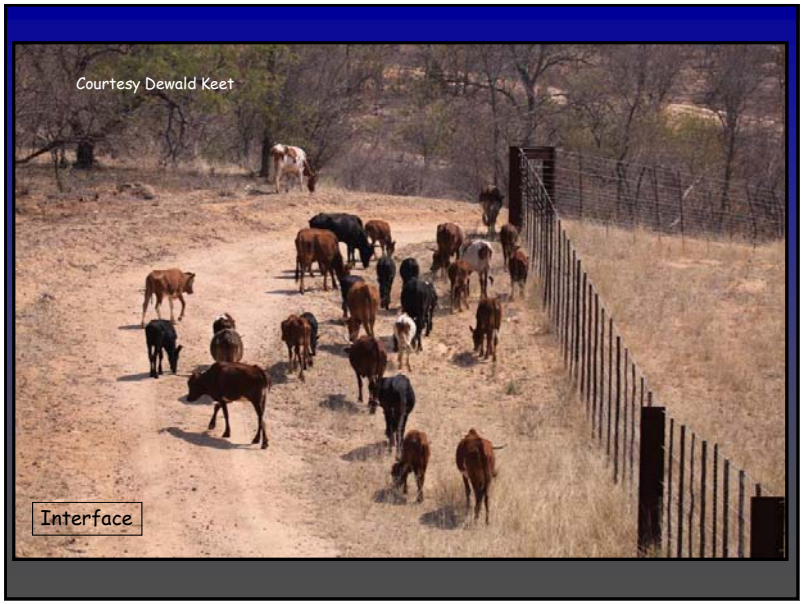


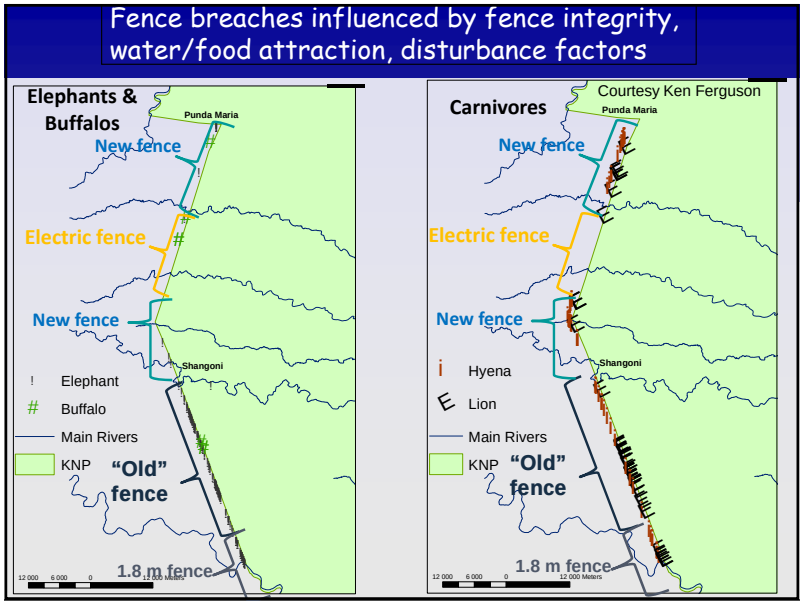
Courtesy PPF and David Cummings

GLTFCA JMB Veterinary Committee

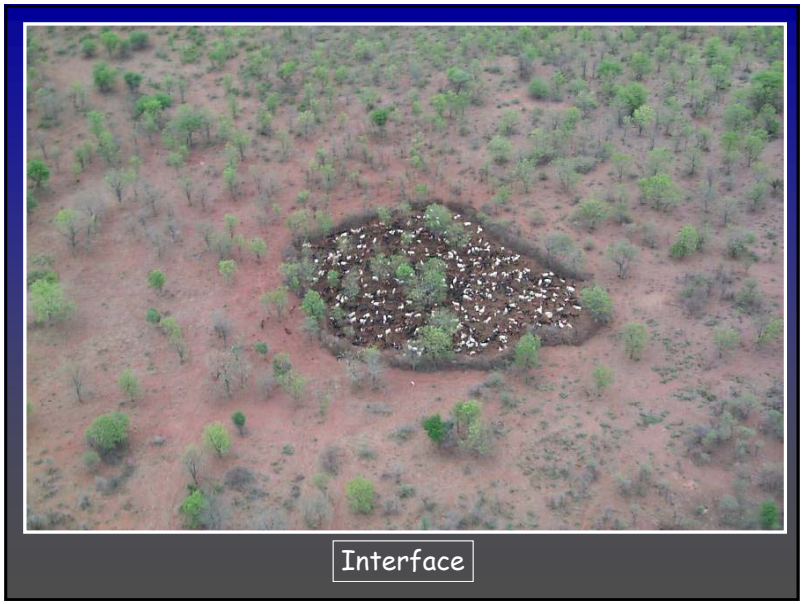
This committee's mandate includes :



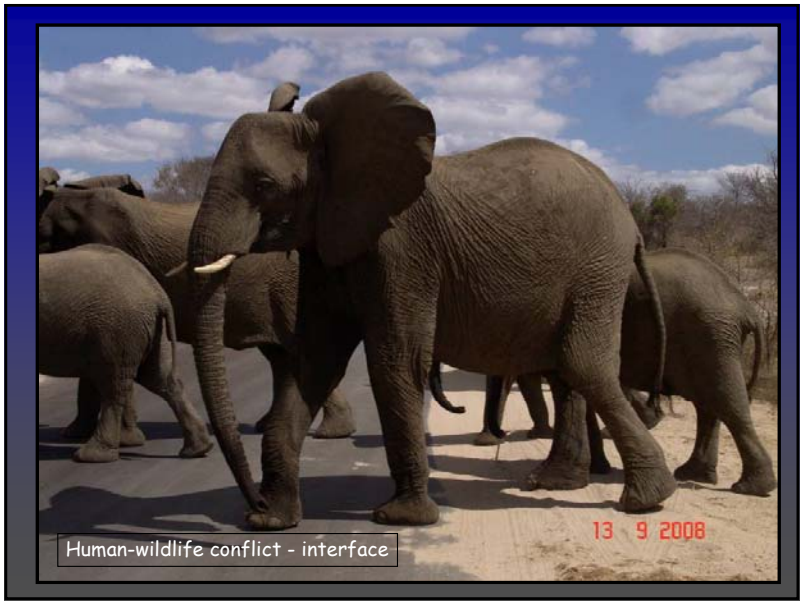

Courtesy Dewald Keet
Interface

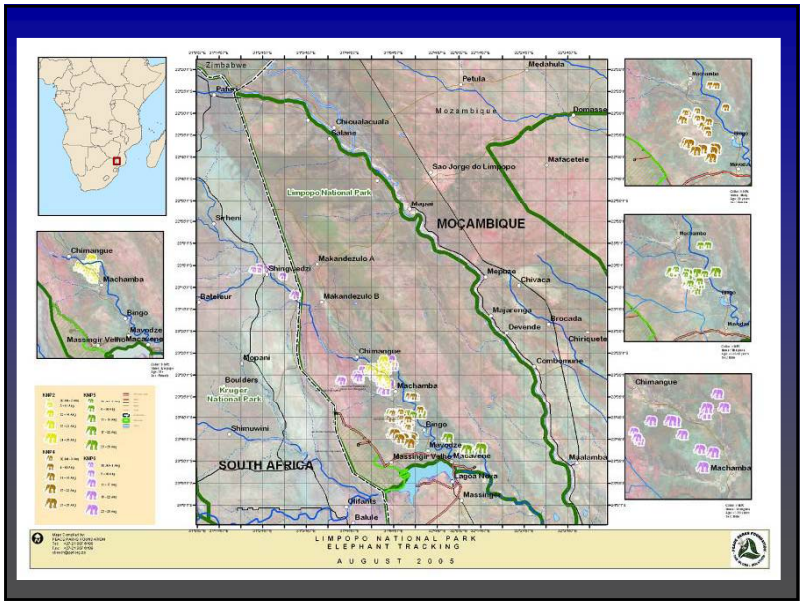

Fence breaches influenced by fence integrity, water/food attraction, disturbance factors
Elephants & Buffalos
Punda Maria
New fence
Electric fence
New fence
Shangoni
Elephant
Buffalo
Main Rivers
KNP
"Old" fence
1.8 m fence
Carnivores
Courtesy Ken Ferguson
Punda Maria
New fence
Electric fence
New fence
Shangoni
Hyena
Lion
Main Rivers
KNP
"Old" fence
1.8 m fence

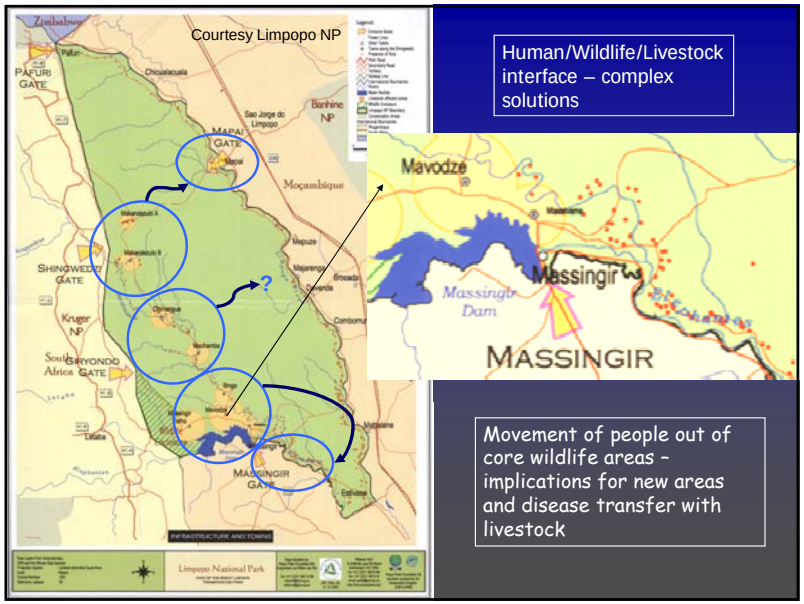

Interface
7 4 2007


Interface


Wildlife introductions – park with people living in it, introductions of new diseases? – no evidence to support this except with buffalo


Human-wildlife conflict - interface
13 9 2008


MOÇAMBIQUE
SOUTH AFRICA
LIMPOPO NATIONAL PARK
ELEPHANT TRACKING
AUGUST 2005


Courtesy Limpopo NP
Human/Wildlife/Livestock interface – complex solutions
Mavodze
Massingir
Massingir Dam
MASSINGIR
Movement of people out of core wildlife areas – implications for new areas and disease transfer with livestock

Intensification of wildlife ranching for commercial use – diseases of intensification

Private reserves with tourism and habitat manipulation influencing population dynamics

Agriculture on interface leads to human/wildlife conflict

Courtesy Mike Kock

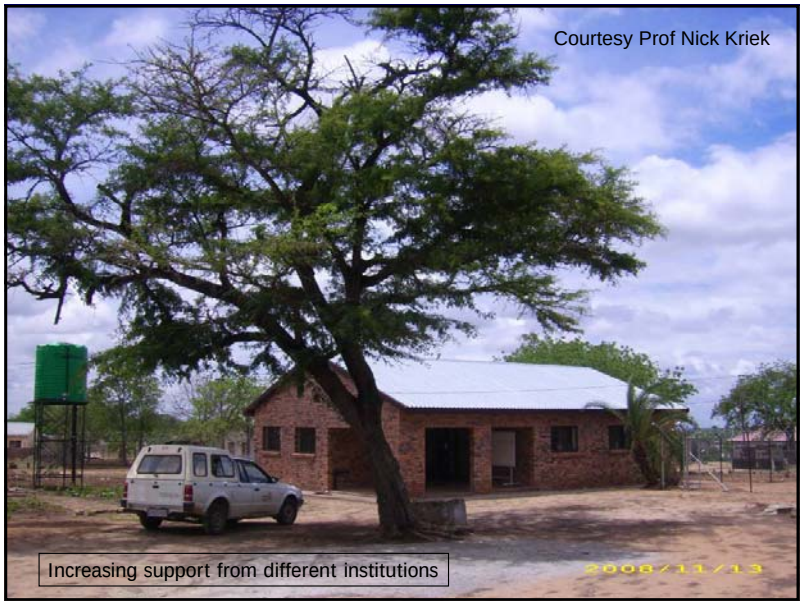
Human/wildlife/livestock interface is most pronounced at critical ecosystem services – Water is a scarce resource in this area and therefore a key interface driver

Conflict & disease transmission can occur at water but is needed by all

Risk management at the shared resource!

Vastly different and logistically challenging environment to have uniform disease surveillance and management intervention

Courtesy Lisa Marabini and Keith Dutlow

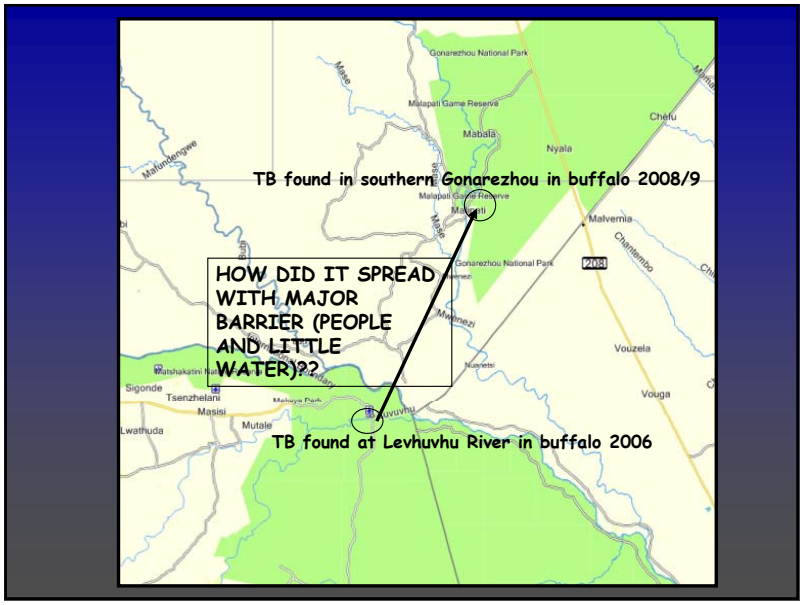


Increasing support from different institutions

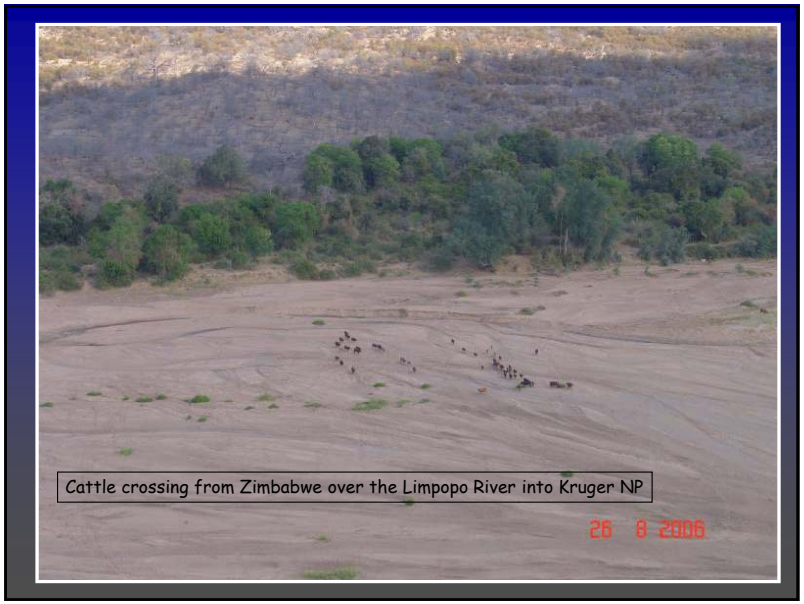
Highly technical input requiring significant budgets and expertise to execute

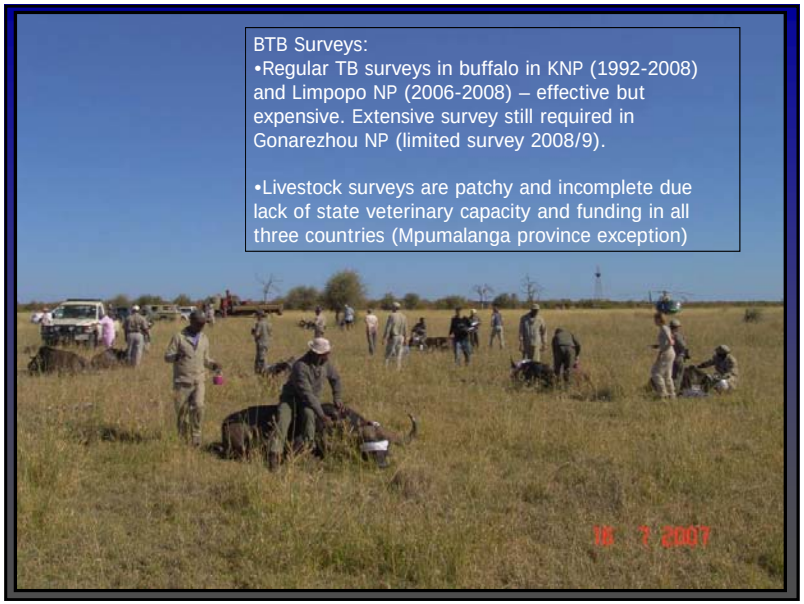
Relevant emergent and transboundary diseases in the GLTP

Bovine Tuberculosis


TB found in southern Gonarezhou in buffalo 2008/9
HOW DID IT SPREAD WITH MAJOR BARRIER (PEOPLE AND LITTLE WATER)??
TB found at Levhuvhu River in buffalo 2006
Gonarezhou National Park
Malapati Game Reserve
Mabalauta
Nyala
Chiredzi
Malvernia
Chiredzi
Chiredzi
Mwenezi
Nuanetsi
Vouzela
Vouga
Sigonde
Tsenzhelani
Masisi
Mutale
Lwathuda
Levhuvhu


Cattle and buffalo do mix
19 10 2006


Cattle crossing from Zimbabwe over the Limpopo River into Kruger NP
26 8 2006


BTB Surveys:
•Regular TB surveys in buffalo in KNP (1992-2008) and Limpopo NP (2006-2008) – effective but expensive. Extensive survey still required in Gonarezhou NP (limited survey 2008/9).
•Livestock surveys are patchy and incomplete due lack of state veterinary capacity and funding in all three countries (Mpumalanga province exception)
16 7 2007

TB Spill-over: bovine tuberculosis in lions

Workshop held in mid-March 2009 in KNP - large knowledge gaps with regards to survival parameters in lions and real impacts on population dynamics




Relevant recent TB research results

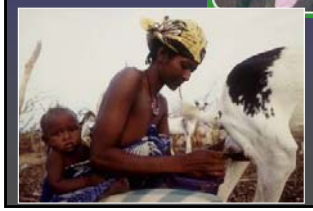
- *Journal of Applied Ecology 2009, 46* Disease, predation and demography: assessing the impacts of bovine tuberculosis on African buffalo by monitoring at individual and population levels (P.C. Cross et Al)
  - "The demographic impacts of bovine tuberculosis in the Kruger National Park remain undetectable despite 6 years of study on known individuals and 40 years of population counts"
- Cattle testing 2008 - 2009 Mpumalanga State vets >40 000 – only 5 positive reactors, 3 suspect cases and one recovered, which was culture positive – strain to be determined
- Cattle survey in the area between Gonarezhou NP and KNP – no positives
- Cattle surveys in some areas of Limpopo NP – no positives
- Dewald Keet publications on his findings of TB lesions of 170+ tb infected lions, comparison between FIV co-infected and non co-infected TB infected lions, comparative study of 10 lions each in the north and south of KNP with longer survival in the north.
- Lion research current focus: To understand the dynamics of large carnivores in various ecosystems and the factors influencing these including intrinsic density-dependence through prey and social mechanisms as well as extrinsic factors such as disease and human induced causes (S. Ferreira et al)
- Human BTB cases unknown but no evidence indicating increase in BTB prevalence in humans (human TB much more problematic) – Paul v Helden pers communication
- Rethink TB management approach – case by case risk assessment? Research focus on management rather than control?

BTB Zoonotic Risk?

Risk management!

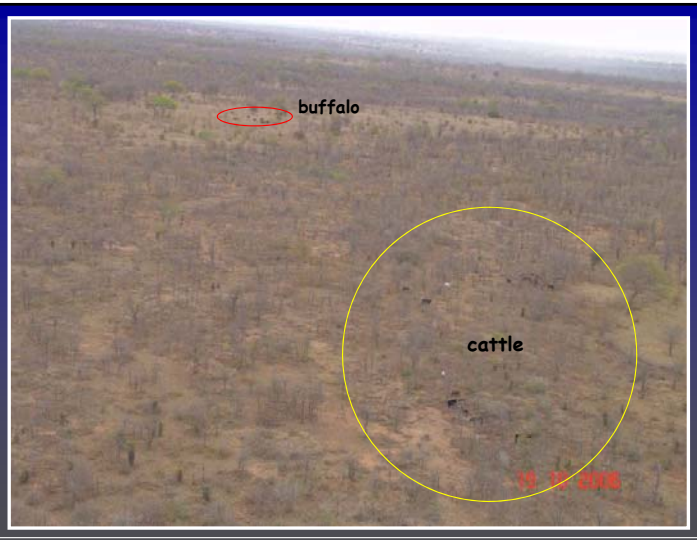
Courtesy Clair Geoghegan






Foot & Mouth Disease

Courtesy Roy Bengis



Interface issues - complex - so far no positive cattle found in this area but what are we missing?

Buffalo leaving KNP into communal areas – was cause of outbreak in 2007 in Letaba outbreak – R180 million cost to control

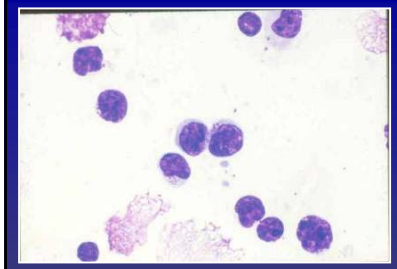
Cattle inside the park – what is the actual risk?

Current research in GLTP on F&MD

- Vaccine trail and buffalo/cattle home range overlap SE Lowveld – Cirad & Zimbabwe Vet Services
- Vaccine trail at the interface of Limpopo NP – Cirad & Mozambique vet services
- OVI vaccine trails (Chimera vaccines)
- Viral isolates to improve vaccine production
- SADC Foot and Mouth Disease Project – final report
- Further vaccine trails planned for western area of KNP
- Rapid drop in antibody titres after vaccination – practicality of current vaccine protocol (3xtwo weeks apart then 4 monthly)
- Commodity based trade needs to be further investigated and supported in the GLTP

Alternate transfer agents

- Large scale outbreaks in cattle seen in Zimbabwe in 2008 less in 2009, also Limpopo Province in 2007. Local outbreak in buffer zone SW of KNP in 2009.
- Rethink required on vaccine strategy!

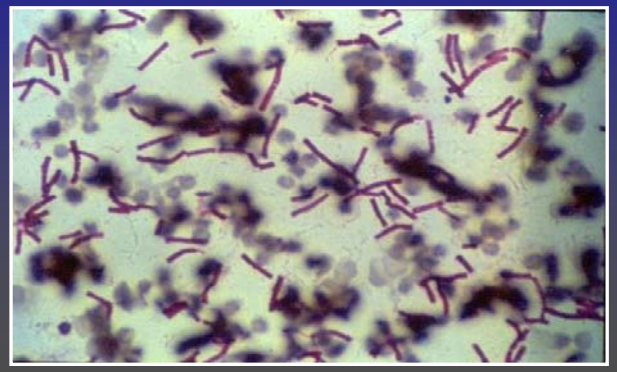


Corridor disease:

- Problematic sporadically on the south western border of KNP and possibly in Mozambique but specific diagnosis lacking
- Major advances in diagnostics (real time PCR) UP & OVI – driven by outbreaks in disease-free areas in SA

ANTHRAX

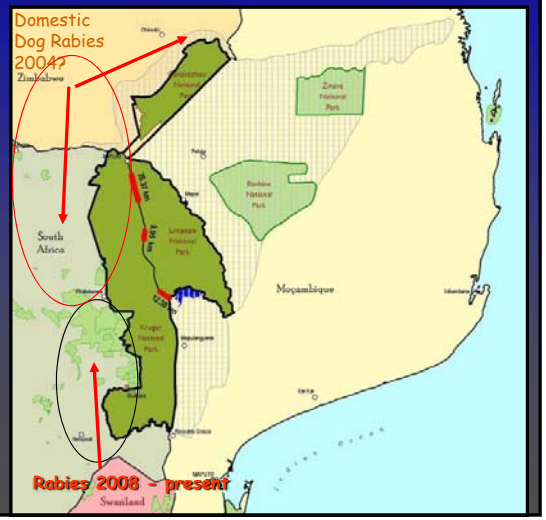
- Currently outbreak along Levhuvhu River far northern KNP (impala carcasses test positive for anthrax)
- Sporadic cases in Zimbabwe
- Vaccination of cattle in all three countries seem to be current for this disease but will be challenged should another outbreak occur



- Major outbreak in Limpopo Province & Mpumalanga in 2006/7/8/9 /10 (humans/domestic animals) –rabies strain from Zimbabwe and Mkhomazi (south of Kruger)
- First wild animal in KNP – side striped jackal in 2007
- Malilangwe lost all but 3 wild dogs in 2007
- Ongoing in domestic animals and humans in Zimbabwe

Rabies Outbreak 2005-present

- 2005/6 rabies outbreak Limpopo Province significant lag between dog diagnosis and human diagnosis – many human deaths – linked to breakdown of basic breakdown of primary health care in Zimbabwe
- Major intervention in area west of KNP but resistance to vaccination – stigma of reduced hunting prowess

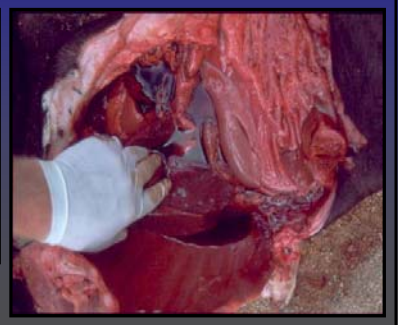


BRUCELLOSIS

- Endemic in KNP buffalo ~ 17-20% prevalence
- Not recorded in isolated Limpopo buffalo herd
- Cattle on western and southern KNP boundary are infected
- Cattle infected in the Sengwe area in Zimbabwe
- Mozambique?
- Significance - zoonosis

Rift valley fever

- Recent serological surveys in buffalo in KNP indicate endemic status
- No sign of spill over into neighbouring countries but buffalo calf & cattle deaths and seroconversion in small stock south of KNP

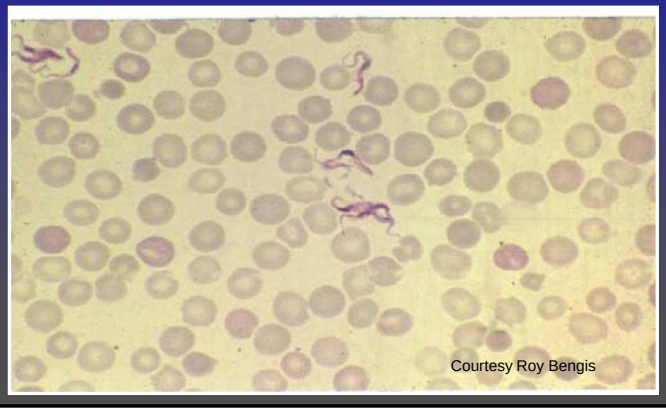


Courtesy Roy Bengis

TRYPANOSOMOSIS

Tsetse flies and Nagana
- Monitoring of tsetse fly activity and spatio/ temporal spread in Gonarezhou National Park.
- Monitor the northern KNP and LNP for tsetse fly incursion.

- **No sign of fly revival or tryps in livestock recently in GLTP**



Courtesy Roy Bengis

Cyanobacterial blooms:
- restricted to KNP currently
- worldwide phenomenon
- threat to livestock if water sources are affected

Courtesy Roy Bengis

Crocodile deaths in Olifants & Sabie Rivers

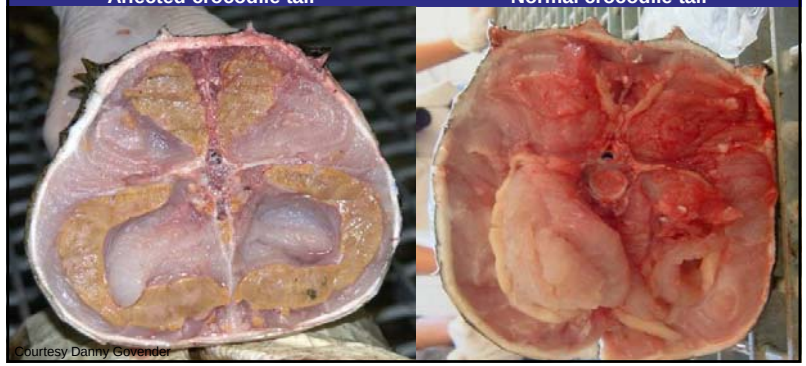
Other diseases or system health issues?

- We recognize that global environmental change is a major threat to biodiversity & human livelihoods

Pansteatitis

- Usually caused by consuming rotten and/or rancid fish
- Clinical symptoms
  - general hardening of the body fat
  - fat changing color from white to orange

Affected crocodile tail **Normal crocodile tail**



Courtesy Danny Govender

Fish pathology

Courtesy Danny Govender

Upstream pollutant effects

- Water- POPs, heavy metals, water quality parameters
- Sediment – POPs, heavy metals
- Macro-inverts - RHP
- Fish – heavy metals, pathology
- Crocodiles – POPs, heavy metals, pathology, blood
- Sabie River also had crocodile deaths due to pansteatitis
- Still no definitive cause determined
- Multidisciplinary research effort underway to monitor and research the problem

Courtesy Danny Govender

People movement – most significant human disease vector in the GLTFCA

Courtesy Mike Kock

Cholera

Cholera Outbreak 2009:

•Affected tens of thousands

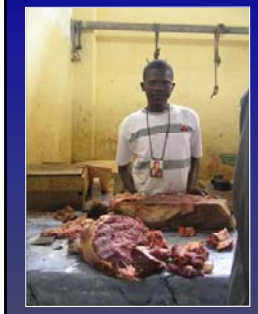
•Resulted in thousands of deaths in Zimbabwe and hundreds died in South Africa

•Rapid spread due to migrant movement (legal and illegal) from Zimbabwe

•Rivers contaminated flowing into KNP but no major outbreak in the camps due to water purification systems

•Communities to the west of the park badly affected

General health issues in humans – HIV, Human TB, GIS disturbances, Malaria, malnutrition, basic hygiene & cleanliness, food product storage and handling





Courtesy Clair Geoghegan

SOUTHERN AFRICAN SUSTAINABLE USE SPECIALIALIST GROUP

Global environmental change is going to effect the health
and livelihoods of our people , most especially the poor and,
therefore, we need to be working more closely with our communities to create adaptive strategies that mitigate negative consequences.

Courtesy Mike Kock

·TFCA's are complex heterogeneous landscapes
·Varying interfaces between humans/livestock/wildlife
·Basic health care and support in the GLTP will support conservation efforts by improving human livelihoods

The disease investigation challenges have been recognised by a number of key stakeholders and in response a practical disease investigation course for veterinary role players in Transfrontier Parks was developed

University of Pretoria, Faculty of Veterinary Science

Funders: WCS through the AHEAD seed grants & US Fish & Wildlife - Wildlife Without Borders

Courtesy Mike Kock

Agriculture Research Institute, Maputo

National Institute for Communicable Diseases

Social Sciences

Penrith National Zoological Gardens

SANParks

Members of the working group for all the input received over the last 18months

A common approach to disease diagnostics and understanding was the focus of the training course and is considered one of the solutions to overcome the disease investigation challenges facing the GLTP