AHEAD-GLTFCA Working Group - 10th Meeting

Record of the 10th Meeting held on the 24-26th February, 2010

Casa do Sol Hotel & Conference Centre
(Hazyview, Mpumalanga, South Africa)

NOTE: PDFs of most of the Powerpoint presentations given at this meeting are available at:
http://www.wcs-ahead.org/gltfca_february2010/agenda_february2010.html

1. OPENING REMARKS AND WELCOME

Dr. Hector Magome, Director of Conservation Services in SANParks, welcomed participants to the 10th AHEAD-GLTFCA Working Group Meeting. He recalled that the AHEAD initiative for the Great Limpopo Transfrontier Conservation Area (GLTFCA) began at the World Parks Congress in September 2003. It has remained an informal, multidisciplinary network and forum that has grown over the years. The Wildlife Conservation Society (WCS) has supported the initiative since its inception. SANParks has also been committed to the "One Health" approach, and over the last three years SANParks has supported the post of coordinator, which was held by Nicky Shongwe until December 2009. Markus Hofmeyr is now taking on the role of coordinator, with support from several members of SANParks. We are, of course, grateful to donors (such as WCS, the Rockefeller Foundation, the MacArthur Foundation, USAID, USFWS) that have supported this very worthwhile programme over the years. He noted how the size of the Working Group Meetings had grown, with a record attendance again this year, and he again extended a warm welcome to all.

Introductions: Following the Opening Remarks and the Keynote Address delegates introduced themselves. The number attending the meeting exceeded that of the previous meeting, with more than 120 delegates in attendance.

2. INTERDISCIPLINARY TFCA SYMPOSIUM (Moderator David Cumming)

2.1 *Keynote Address*: One Health – A Global Perspective. Jakob Zinsstag

Swiss Tropical and Public Health Institute, PO Box, CH-4002 Basel, Switzerland

The history of integrative thinking on human and animal health is briefly reviewed from early history up to the beginning of comparative medicine at the end of the 19th century. In the 20th Century, Calvin Schwabe coined the concept of "one medicine." It recognizes that there is no difference of paradigm between human and veterinary medicine and both disciplines can contribute to the development of each other. Considering a broader approach to health and well-being of societies, the original concept of "one medicine" was extended to "one health" through practical implementation and careful validations in different settings. Given the global health thinking of the last decades, ecosystem approaches to health have emerged. Based on complex ecological thinking that goes beyond humans and animals, these approaches consider inextricable linkages between ecosystems and health, known as "ecosystem health." Despite these integrative conceptual and methodological developments, large parts of human and animal health thinking and actions still remain in separate disciplinary silos. Evidence for added value of a coherent application of "one health," compared to separated, sectorial thinking, is however now growing. Integrative thinking is more and more considered in academic curricula, clinical practice, ministries of health and livestock/agriculture as well as in international organisations. While conceptual thinking moves towards system dynamic approaches to health in social-ecological systems, there remains a large unfinished agenda of "one health": for example, better communication between the public health and veterinary sectors or joint surveillance of zoonotic diseases, enterobacteriaceae and antimicrobial resistance in conservation,

rural and urban contexts of developing and industrialized countries, would not only save money but also improve livelihoods and public health.

Discussion:

1. ***Q:*** What is the sustainability of interventions such as vaccination programmes? ***A:*** A key to sustainability is the full engagement of both the communities and authorities involved and for them to come to a clear understanding of the problem and its solution. For example, milk production in Mali was being affected by its contamination on the way to the market. Once this was recognised by all involved they introduced quality tests and solved the problem themselves.
2. ***Q:*** Why not combine the functions of doctors and veterinarians in a single practitioner? ***A:*** No! The physicians and vets need to be separate - I would not like to be treated by a vet. We should not confuse "One health" with specialisation. The sectors need to work together. For example, human and animal health workers tend to travel separately and independently to the field whereas they could combine their visits and tackle animal and human health problems in a more holistic manner.
3. ***Q:*** Is the western world looking to Africa for leadership in a "One Health" approach? ***A:*** We are moving from northern-led to southern-led networks and, because institutions in many African countries tend to be weak, there is greater willingness to work together. In the West, Canada is taking the lead in integrating the faculties of medicine and veterinary science at the University of Calgary. There is a need to train vets in public health and doctors in animal health and this will require curriculum reform.
4. ***Q:*** Who pays in the end? ***A:*** There are two aspects. Firstly there has been successful cooperation in financing the control of major human diseases such as malaria, TB and HIV/AIDS, through support and contributions to the WHO. There is a need for a stronger global movement to deal with animal health. It is in the interests of industrialised nations to control zoonoses but the modalities for paying for these services would need to worked out by economists and involve both governments and the private sector.
5. ***Q:*** Have you presented these ideas to donors to encourage them to fund North-South partnerships? ***A:*** There is a web site in Switzerland devoted to north-south partnerships. There is a need for a code of conduct to guide relationships. The Wellcome Trust has taken a progressive approach to integrating human and animal health. Many development agencies take the view that we don't need more research but that we need more action. I don't accept that. There is a need to move away from short-term consulting to solid long-term research and analysis, and to strengthen science and development partnerships.

1st Session: Emerging and Transboundary Diseases

Note: Abstracts throughout this Record of the 10th *AHEAD*-GLTFCA Working Group Meeting appear largely as they were provided by presenters, and have not been copy-edited.

2.2 *Keynote Review Paper*: Emerging and transboundary diseases in southern Africa. Roy Bengis

Abstract not available.

Discussion:

1. Peoples' perceptions of wildlife diseases are coloured by the viruses transmitted by bats. These viruses tend to infect humans where bat habitats have been altered or, in the case of large fruit bats, where they are eaten.
2. Contact between humans and wild animals is increasing, particularly in isolated, remote areas. But new technologies are also continually being developed for detecting disease, which may partly account for observed increases in frequency of diseases.

2.3 Emerging and transboundary diseases in the GLTFCA region - current research results and ongoing management challenges. Markus Hofmeyr[1]*, Peter Buss[1], Roy Bengis[2], Lin-Marie de Klerk[2], Louis van Schalkwyk[3], Chris Foggin[4], and Agostinho Nazare[5]

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The Great Limpopo Transfrontier Conservation Area covers an area of approximately 100,000 km^2. A wide range of land uses is present in the landscape, giving rise to numerous interface areas between humans, livestock, agronomy and the ecosystem and its wild inhabitants, which poses various challenges related to disease transmission, control and impact. The major diseases of concern are HIV, human TB, nutritional deficiencies and internal and external parasites causing disease conditions, rabies, foot & mouth disease, anthrax, Newcastle disease, bovine TB, corridor disease, distemper and brucellosis. Environmental pollution is also a concern. Many of the diseases are well known and wildlife disease knowledge is improving constantly. For example, our understanding of BTB in wildlife has improved although little can be done currently to deal with the infection in wildlife species. There are many obstacles that limit our abilities to manage current and future disease risks in the GLTP. Resource shortfalls in all three countries and relevant government structures result in marked differences in capacity to monitor, manage, and prevent disease. Knowledge gaps exist with regard to the true contact rate and disease transmission rates between wildlife, livestock and humans. This makes risk assessments difficult, resulting in disease management actions either being absent or focused on the wrong priorities. Basic health care in humans and livestock is marginal in many areas of the GLTFCA, especially in resource stressed Zimbabwe and Mozambique. Water pollution due to upstream activities is impacting on ecosystem health and has been recently highlighted by the die-off of crocodiles from pansteatitis (underlying cause still to be determined) in two rivers in the GLTP. The impact of water pollution on humans and livestock is still unclear but endocrine disruptive disorders may be linked. Other global environmental change effects will influence disease impact and the drivers of disease will become more variable. The focus of future research and resource allocation should be directed to improving basic health monitoring and establishing baseline disease knowledge for wildlife, domestic stock and humans in the GLTFCA. Practical comparative risk assessments will assist greatly to focus interventionist strategies to improve overall ecosystem health.

Discussion:

1. With the opening of the fence between Kruger and Limpopo National Parks, FMD and BTB are inevitably going to spread in Mozambique and corridor disease (Theileriosis) is already having a high impact on households within the Limpopo National Park following the movement of buffalo from Kruger. Villagers no longer have draught power with which to plough. Other tick borne diseases (heartwater, anaplasmosis and babesiosis) are also likely to spread. There is a need for more effective surveillance.

2.4 Using the community of pathogens to infer inter-specific host epidemiological interactions at the wildlife / domestic animal interface: a tool for exploring emerging disease processes in their hot spots. Caron A.[1,2,3], Morand S.[2,4], de Garine-Wichatitsky M.[1,2]

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The incidence of Emerging Infectious Diseases (EID) in human and domestic species has been increasing during the last decades. Zoonoses, and domestic animal pathogens linked to wildlife, constitute a quarter of the list of pathogens in these studies. The sanitary surveillance is concentrated on human, domestic, and a few wildlife flagship species. As a result of this bias in surveillance the majority of EID events remain unnoticed. From Jones et al., the emergence of infective diseases can

be described as a two-step process, 1) Emergence *sensus stricto* and 2) Amplification. We will concentrate on the first step, characterised by hot spots of biodiversity in tropical habitats where new pathogens emerge at the wildlife/domestic interface, in target species. The study of EIDs in these hot spots is difficult in practice: the necessity to work with multiple-host systems, in remote areas, requires multidisciplinarity (epidemiology, ecology, social sciences). The lack of governmental investment in animal and public health add to the difficulties. How does one prepare to predict EID events in such conditions in these areas where emergence is likely to occur but when the spillover to target species has not yet happened?

We define the concept of Epidemiological Interaction (EI) as any ecological interaction resulting in the transmission of a pathogen between two hosts. EIs are defined by their frequency, intensity and direction. The use of host population dynamics, movements and contacts to determine *a priori* EIs has already been presented. Here, we suggest a different "pathogen approach" based on the shared community of pathogens between populations or species in a particular ecosystem as an *a posteriori* indicator of EIs. The study of prevalence data and molecular phylogeny of pathogen strains can highlight EI and help define a network of EI between host populations. We explore this idea through the recent emergence of bovine tuberculosis (BTB) on the Zimbabwean side of the GLTFCA. Can some ecological and epidemiological data about other pathogens (FMD, brucellosis, tick-borne diseases, RVF, etc.) in this ecosystem help stakeholders to predict the spread of BTB in this ecosystem? If yes, in a resource-limited environment, the surveillance and control options can be targeted. We conclude by investigating the possibility of identifying ubiquitous pathogens, which could be indicators – patho-indicators – of the EI network in a given ecosystem.

Discussion:

1. Mycoplasmas have been isolated from earwax. They have a very short viability outside of that environment but may provide an additional indicator along with *E. coli* of transmission potential.

2. ***Q:*** Do food webs provide relevant information on transmissions routes? ***A:*** Yes, we are looking at the interaction between predators and parasites and there is a large potential for expanding this field of enquiry.

3. ***Q:*** What are the criteria for selecting parasites and tools? Commensals in one species may be harmful parasites in another. ***A:*** This work is placing more emphasis on transmission processes than on a disease-centered approach. We are attempting to examine common properties and modes of transmission in order to provide a basis for predicting when and where and under what conditions new diseases may emerge.

2.5 International animal health policy & *One World, One Health™*: Current incompatibilities & potential solutions.

Gavin Thomson[1], Mary-Lou Penrith[2] & David Parry[3]

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The 'One World, One Health' concept is increasingly accepted as a means of improving human and environmental health through recognition of the interdependence of human, animal, plant and ecosystem health. Biodiversity within and between ecosystems is an important element of environmental health and its conservation is therefore increasingly accepted as vital. Maintenance of biodiversity requires conservation of the 'connectedness' between biota, and transfrontier conservation initiatives are aimed at precisely that.

Conversely, policies and conventions associated with managing the health of animals, especially when it comes to high-impact infectious diseases, are based on a contrary premise, i.e. the importance of separating infected animal populations from those that are uninfected so as to interrupt spread of infection. This has resulted in a preoccupation on the part of animal health managers with disease eradication, locally or, if possible, more widely (i.e. the infection status of geographic locations – essentially countries & zones). However, sub-Saharan Africa is confronted with a much

wider array of infectious diseases than any other part of the world as a result of agents that co-evolved with the enormous number and diversity of wildlife with which the subcontinent was originally blessed. Some of these agents are capable of causing high impact disease in domestic animal populations. Furthermore, as will be demonstrated in this presentation, very few if any of these diseases are eradicable. This means that in sub-Saharan Africa generally and southern Africa specifically we have to learn to live with these diseases through managing their impact.

One of the major impacts of animal diseases, and more particularly their management, is on access to international markets for commodities and products derived from animals (both wild & domestic). In this respect, animal disease and biodiversity conservation management are presently incompatible. This paper focuses on the history and nature of this problem and options for its solution. It will be pointed out that there are more appropriate ways of managing high impact animal diseases in southern Africa than those generally adopted currently.

Discussion:

1. ***Q:*** This is an important issue - can you provide us with a brief synopsis of commodity-based trade? ***A:*** Yes, the safety of products or a commodity is assured by managing the risk posed by the commodity itself and not where it has come from. For example, de-boned beef with lymph nodes removed poses minimal risk of transferring the FMD virus because the drop in pH in the maturation process kills the virus. Cheese is the same and does not transmit the virus. Appropriately processed products from healthy animals pose minimal risks of disease transmission even though they may come from an area in which the disease is present. The perception that such products may come from diseased animals is incorrect.

2. The problem is often more one of general hygiene than of disease transmission. Pasteurization kills pathogens but milk needs to meet basic standards of hygiene before it is processed. Bovine tuberculosis poses a risk around big cities and it makes sense to focus control on high transmission areas before going beyond that. Agreed, but the problem here is that we are regarded as "infected" if one herd of cattle in the country has FMD and therefore the country cannot export animal products of any kind. The argument is for equivalent standards, not lower standards.

3. In plant protection and in dealing with alien invasive species it is now recognized that, for many species, it will be impossible to eradicate them and the vocabulary has changed from "eradicate" to " manage." A similar shift is appearing in relation to diseases.

4. In many parts of the world there are societies that aim to be free of risk and it was suggested that this might be a part of the problem. The World Trade Organisation has realized that zero risk is not possible and that appropriate levels of protection involving ideas of acceptable or minimal risk are required.

2nd Session: Ecology, Land-Use Mosaics and Transboundary Natural Resource Management

2.6 Keynote Review Paper: Scale issues in the trans-frontier management context: Effects on conservation, natural resource management and livelihoods

. Harry Biggs[1], David Cumming[2] and Edwin Muchapondwa[3]

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Ecological or environmental scale is usually first understood as the grain and extent of compositional elements in space, such as the grain and extent of the mix of conservation and farming land. In practice these need to be considered along with particular juxtapositions of these elements, for instance, the positioning of corridors of conservation land intended for, say, animal migrations or seed dispersal. Although this applies initially to the geography of land-use mosaics, the same

metaphor can thus be seen to easily apply to ecosystem processes and the production of goods and services. It can further be extended to the distribution across the landscape of certain geographically-linked social phenomena such as tenure systems, or perhaps fashionable activities related to say, lifestyle villages. All of these types are also subject to temporal scales, with short- and long-term horizons, and they are often characterised by spurts of activity. With a bit of thought, this scale idea can be still further expanded to what some authors prefer to call *levels* of organisation (such as local village, municipality, nation, region, …). This paper deals with the imperative of improving particularly the relationship between, on the one hand; the ecological and social time and space scales, and on the other, the multiple interacting levels of governance being applied. It does this with a special focus on conservation, natural resource management and livelihood outcomes.

The paper first presents some brief working theory on bioregionalism, on scales and levels, on institutionalisation and governance, and finally on livelihoods, embedding all these in a social-ecological view. This view, which includes the so-called "panarchy concept" (helping to visualise cross-scale dependencies) assumes that all systems we deal with in TFCAs, are, or should be, strongly coupled (i.e. have two-way feedbacks in social and biophysical relationships), and considers it desirable that favourable configurations should be made as resilient as possible.

Using this theory as a basis for analysis, we then review several illustrative cases where scale issues in the southern African TFCA context are either being dealt with sensibly, or where (often deleterious) mismatches occur. These analyses will include governance of transboundary waters at international, regional and local levels; meat and crop subsidies; elephant management; fire management; and disease risks; and will include systemic interrelationships between these cases. We conclude that while some hopeful directions have been taken, we will need to become far more nuanced in our understanding of scales and levels if our initiatives are to produce sustainable outcomes which are also societally acceptable.

Discussion:

1. There are two issues concerning communication between different levels. One concerns the motivation and why one group should want to speak to another and the second concerns the capability of different groups or levels to communicate, e.g. technical people wanting to talk to politicians but not speaking the same language.
2. The decentralisation of some services, e.g. health services, can save money and work more effectively. Tanzania decentralised health planning and reduced childhood mortality significantly. It is very important to involve communities and a decentralised approach is essential. Communities in Mali, for example, can recruit health service workers and dismiss them if they do not perform as required.

2.7 Ecosystem productivity in relation to land tenure and land use in the GLTFCA.

Godfrey Pechavo and Amon Murwira,

Department of Geography and Environmental Science, University of Zimbabwe, Harare Zimbabwe

In modelling net above ground production (NPP) we used the Monteith Equation (Monteith, 1977) based on the micrometeorological approach as established by Rahman, *et al* (2004). We describe how remote sensing (RS) methods are being developed to estimate "continuous field" light use efficiency (LUE) with simpler measures based on xanthophyll cycle. We present results on how we estimate NPP over the GLTFCA terrestrial ecosystems using a freely available MODIS imagery, as well as GIS shortwave radiation model derived using the absorbed photosynthetically active radiation (APAR) term as a pre-requisite in the modelling of NPP in this study. Thus MODIS satellite data from year 2000 have been assessed using the Monteith equation for the purpose of this study. The NPP was measured in grams of dry biomass per square metre per day ($gm^{-2}day^{-1}$). Statistical comparisons were made to explore the spatial and temporal variations in NPP across the GLTFCA landscape. Significant spatial and temporal variations in NPP were observed within and between the various land use areas in the GLTFCA. However, the study is still in progress.

Discussion:

1. NPP needs to be corrected for soils and geology if it is to be meaningful and this aspect is still being worked on with geo-referenced ground truthing. It would also be useful to look at the fire data.

2. The data includes NPP for all vegetation types and does not distinguish between woody vegetation and grass. Irrigated crops and sugar cane plantations are all included.

3. Rainfall gradients across the study area and for different months have been taken into account, as has the precipitation index for the region.

4. While only short-term data have been presented here, the data for an extended period are being examined.

2.8 Catchment health, rivers and the GLTFCA. Steve A. Mitchell[1], Danny Govender[2] and Danie Pienaar[2]

[1] Bufo Technology cc, South Africa, [2] SANParks, Skukuza, South Africa.

Large scale mortality of crocodiles in the Olifants River Gorge has been attributed to pansteatitis. General deterioration in environmental water quantity and quality is seen as a contributor to this condition. Worldwide, freshwater ecosystems are the most threatened, and the fact that Southern Africa is generally dry exacerbates this condition. South Africa, in particular, is water scarce and the increasing demands on the water resource from an increasing population with increasing expectations of improved quality of life place increasing demands on the resource. All sectors of the economy need water but the declining capability in the treatment of effluents leads to an overall deterioration of water quality. The SADC Protocol on Shared Watercourse Systems recognises the need to maintain the aquatic environment within the concept of integrated Water Resource Management in order to ensure sustainability of the resource, and both South Africa and Mozambique subscribe to this. Priority in both countries is given to water for livelihoods and development, and South Africa allocates water to the environment. A number of economic sectors are active in the Olifants Basin upstream of the Greater Limpopo Transfrontier Conservation Area (GLTFCA) and this has influenced the quantity and quality of the river water reaching the GLTFCA. The Department of Water Affairs has conducted routine monitoring in the Olifants Basin for some time and although it is known to be polluted, no serious attempt has been made to address this. In response to symptoms attributed to pesticides and endocrine-disrupting compounds in humans and livestock, a more thorough investigation was conducted and this revealed accumulations of toxins adsorbed to, and in the interstitial water of, the fine sediments which are deposited in the upper reaches of dams. While further analyses will refine our understanding of the problem, something needs to be done quickly to prevent further deterioration of the environmental quality in the Olifants Basin. It will need the support of government and stakeholders alike.

Discussion:

1. Climate change is likely to lead to major changes in rainfall patterns and evaporative losses but, so far, planning in catchment management has not included this factor. Not all economically active sectors recognise the importance of climate change and they continue to use water as they have in the past. Clearly this needs to change soon as South Africa is running out of water.

2. With so many agencies and tools available to manage water resources where is the enforcement? Can conservation be used as a lever? There is little, if any, enforcement in South Africa and indeed in the region. Both conservation agencies and parts of the private sector are trying to sensitise water users to the issues. However, in South Africa, for example, there are 1,000 sewage works of which only 3% meet the laid down effluent standards for discharge into rivers.

3rd Session: Economics and TFCAs: Livelihoods and conservation and issues and costs

2.9 **Tourism in transfrontier protected areas and poverty reduction.** Anna Spenceley, Ritah Tusabe and Straton Habyalimana.

Transfrontier Conservation Areas (TFCAs) have become effective tools to conserve biodiversity, and foster regional economic and political dynamics based on regional cooperation. The extent to which TFCAs contribute to distributing tourism benefits to local communities, and the role the latter can play in successful TFCAs, has attracted attention from a number of researchers in tourism and conservation. This paper considers research carried out in Africa on the economic impact of tourism around TFCAs, and in particular highlights examples of the Kavango-Zambezi, Great Limpopo, and Virunga Massif TFCAs. The benefits from local ownership, employment, procurement, and revenue sharing systems are reviewed. The paper concludes that although there are financial benefits to local people from tourism in TFCAs and that this contributes to poverty reduction, the often-low levels of skill in rural areas within local populations limit likely returns. In addition, it is not possible from these case studies to demonstrate whether there is a synergistic effect of a transboundary conservation area, over individual protected areas.

Discussion:

1. There have long been recommendations on how to increase tourism in TFCAs but these have for the most part not been implemented. There is a need to look back at these plans and recommendations and implement them. An important component of this involves branding and making it easier, and less costly, for visitors to move between countries in the region and within TFCAs.
2. The question that needs to be asked is whether people will be better off as tourist operators or as farmers. The trade-offs of alternative land uses need to be carefully examined and particularly the costs to local farmers. In the Limpopo National Park some farmers have lost all of their cattle to disease and effectively lost their jobs. Initial projections for the Limpopo National Park were of the order of 300,000 visitors a year but this is very unlikely to materialise given the nature of the landscape and wildlife populations in the park.
3. Tourists do have a role to play in rural development and part of the equation is to change attitudes and to include a greater focus on communities in place of a single focus on wildlife. For many travellers to Africa meeting and interacting with local rural populations is high on their list of priorities.
4. There is also a need to value natural resources and ecosystem services - revenue from tourism is not the only benefit to be derived from TFCAs.

4th Session: Forum - Back to *One Health*: How do we bring it all together?

2.10 3 minute overview of key points from the Keynote Speaker and Keynote Review Paper Presenters (or selected rapporteurs), followed by an open, facilitated discussion.

The following brief overviews and points of view were provided by keynote speakers and rapporteurs:

(a) ***Jakob Zinsstag***: It is clear that we are dealing with complex systems and therefore need to take a systemic approach. However, we can't understand everything. Nevertheless there is need to take a cross-sectoral approach to the development and management of TFCAs within the context of a "one health" paradigm. The second important need is for participatory research and development, particularly at the local community level in respect of poverty reduction and especially in the provision of social services. The third is the need to develop decentralised governance on a case-by-case basis.

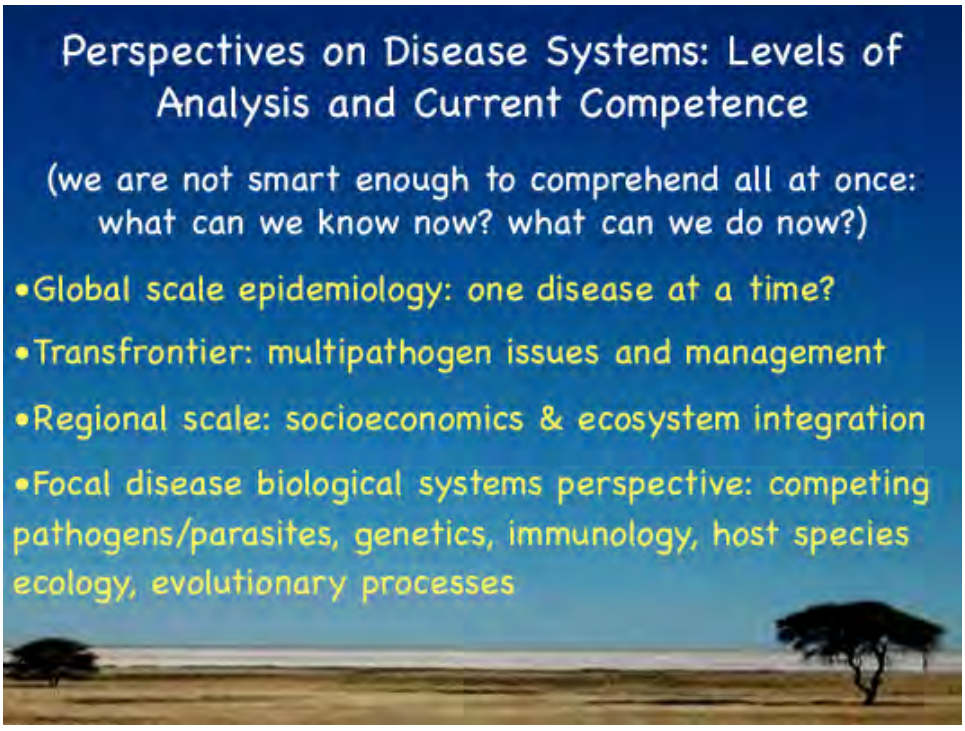
(b) ***Harry Biggs***: There has been a discernable trajectory in increasingly shared mental models in the development of the AHEAD programme. Ideas and models have moved closer together and with more overlap. In dealing with complex systems there is no optimal solution and we need to

pay more attention to solutions that are "good enough" and sustainable, and avoid attempts to optimise for one sector or area at the expense of others.

(c) ***Roy Bengis***: The complexities of the systems we are dealing with are very obvious. In the development of TFCAs there has been a lack of adequate planning and communication between the different tiers involved in the development process. There has also been a lack of understanding and consideration of the consequences of developments such as the dropping of fences. The problems of one country can rapidly spread through the whole system and issues of modularity and connectivity within these larger systems being created by TFCAs require much more attention. Not least because they have a bearing on system resilience. The differences between Euro-centric and Afro-centric views result in a dichotomy in the goals of different interest groups and it is gatherings such as this meeting that can contribute so much to resolving these differences.

(d) ***Jessica Milgroom*** (social issues): We are, as previous speakers have indicated, dealing with complex systems that require multi-disciplinary, and multi-scale approaches. The drivers of change are cross-scale and there is a need to develop, in rural communities, the capacity to respond and adapt to changes. The "community" is in many senses a black box that needs to be unpacked and this is difficult because of the different languages involved between researchers of different disciplines, developers, and those living in rural communities. It is necessary to use participatory approaches to bring people together and for facilitation to bridge the different groups for effective policy dialogue. For conservation to succeed it is imperative that communities benefit from conservation.

(e) ***Wayne Getz*** (diseases): Harry Bigg's paper on a systems perspective indicates that we have come a long way. However, I am less optimistic than Harry. We can't comprehend everything at once. We need to consider (a) what can we *know* now? and (b) what can we *do* now? This involves different levels of analysis (Slide 1 below) from a global scale of dealing with one disease at a time to focal diseases in a biological system of competing pathogens, parasites and bringing a ranges of disciplines to bear on the problem - such as in Alex Caron's paper and as illustrated in a current study of anthrax employing a bio-community perspective in Etosha National Park in Namibia.



(f) ***John Hanks*** (ecology and conservation): A much greater effort is needed in the fields of ecosystem evaluation and the costs and benefits of alternative land uses. In the 1960s fencing off and isolating protected areas was acceptable. Since then new ideas and approaches such as community based natural resource management (CBNRM), biodiversity conservation, and the development of transfrontier conservation areas (TFCAs) have emerged. These are all new concepts and TFCAs in southern Africa are little more than a decade old and will take time to develop. There is a need for improved communication between all levels (political, technical, private sector, and communities) and technical people need to be engaged in lobbying and advocacy to make things happen. There is also a need for real champions of TFCAs in each country and for a "silver-backed gopher" to continually communicate with and press responsible agencies and individuals to move the process forward and to take technical information to politicians in an understandable form. Technical reports need to be in a form that both the politicians and the public can understand.

Open discussion:

1. The issue of the costs and benefits of TFCAs has been highlighted several times. There clearly are problems and more in-depth analyses of the trade-offs are required.
2. Communication and information on TFCAs needs to be improved - is there a web site for the GLTFCA, and for other TFCAs?
3. The development of TFCAs in southern Africa seems to have lost steam. No one seems to have stepped up to take the place of people such as Anton Rupert who was so effective at driving the process at a high political level. Atrophy of institutions further contributes to the problem and attention needs to be given to reversing this process. In part, arranging meetings that include politicians, officials and communities is vital. Communities must be able to confront politicians with their problems in order to counteract problems.
4. The "One World, One Health" concept needs to be extended to decision makers and politicians and the AHEAD-GLTFCA Working Group should invite some key politicians to the next meeting.

3. REPORTS FROM SEED GRANTEES

5th Session: AHEAD-GLTFCA Seed Grant Final Reports

3.1 Skills development for disease monitoring in the Great Limpopo Transfrontier Conservation Area (GLTFCA) – capacity building for wildlife disease diagnostics

Emily Lane[1], Mary Louise Penrith[1], Rosa Costa[3] and John Lawrence[4]

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This presentation reports progress made in the past year regarding building veterinary diagnostic capacity in the GLTFCA. The 1st Practical Wildlife Disease Investigation Course was held at the Faculty of Veterinary Science (FVS) from the 30th March-3rd April 2009. Thanks to Dr Leon Venter's efforts the 13 candidates viewed the course as a success. Funds provided the opportunity for three vets from Mozambique, three from Zimbabwe and seven from South Africa to attend the course. A second course is planned by the FVS for 22-26th March 2010 in a continuing effort to improve wildlife disease investigative capacity in the region. An extension of the funding period has been granted to allow two more vets from Mozambique and Zimbabwe to attend the course. Thirteen necropsy kits were purchased and distributed to three Mozambican, three Zimbabwean, and six South African veterinarians and one kit to the Agricultural Research Institute (ARI), Maputo. An extension of the funding period has been granted to purchase a further necropsy kit for the Eduardo Mondlane University, Faculty of Veterinary Science, Maputo (EMFVS), for field trips. Dr John Lawrence (FVS) and Dr Mary Lou Penrith of the National Zoological Gardens (NZG) have developed the two-week experiential wildlife pathology course. Students attend necropsy and biopsy sessions, review selected teaching slides, photographs and reference materials at both institutions. Students also

receive an "*Atlas of pathology of important infectious diseases of southern Africa at the interface of wildlife with man and domestic animals*" developed by Dr Lawrence for the course. Two pathologists each from the Agricultural Research Institute and the Faculty of Veterinary Science in Maputo attended the course in 2010. Such visits foster the development of a network of wildlife pathologists in the region, who in close communication and cooperation, can better monitor wildlife disease in the GLTFCA. This collaboration is expected to continue in the following and subsequent years. Reference materials were handed over to the ARI and Faculty of Veterinary Science in Maputo. An extension of the funding period has been applied for in order to purchase these materials for the EMFVS as well as three copies of "*Fundamental of Toxicologic Pathology*" by W Haschek et al (2nd edition published late last year) and to allow one additional pathologist to attend the course in 2010. Sampling materials have been purchased by the ARI and NZG for the purposes of processing 17 diagnostic cases. An extension of the project period has been granted to process further cases that are likely to be presented to both laboratories in the future. One collaborative journal article on the identification of Bovine Tuberculosis in African Buffalo in Zimbabwe has been submitted for publication to *Emerging Infectious Diseases*. Further case reports and/or journal articles are expected. This initiative involves disease monitoring in wildlife that will, should funding allow, continue for many years. This initial phase is expected to begin to build capacity in wildlife disease investigations, and to increase the quality and quantity of samples from the GLTFCA and other wildlife areas in the three countries. This in turn is expected to improve wildlife disease information stored in electronic databases from the GLTFCA, larger stores of wildlife samples and data for prospective and retrospective research projects, develop better collaboration between wildlife vets and veterinary pathologists in the subregion, and improve the understanding of key disease issues in the GLTFCA.

3.2 Zoonosis at the interface: lion (*Panthera leo*) bovine tuberculosis overview and analysis workshop.

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Bovine tuberculosis (BTB) caused by *Mycobacterium bovis* has been diagnosed in a number of mammal species in the Kruger National Park (KNP). Historically, the primary concern for South African National Parks (SANParks) has been determining and monitoring disease prevalence, incidence of new infection and spatial and temporal spread of tuberculosis in the main wild maintenance host, the Cape buffalo (*Syncerus caffer*). As the primary predator of buffalo in the region, lion (*Panthera leo*) experience high levels of exposure to BTB and this, together with their social structure, may facilitate transmission of the disease within and between lion prides. Concern has been raised as to what impact BTB will have in the medium to long-term on the lion population of the KNP, one of the last strongholds of lion in South Africa. This workshop, the first of its kind, aimed to determine appropriate strategic directions to address the knowledge gaps and determine the impacts of BTB on the lion population of the KNP.

A modelling approach was used to inform the decision making process. Three modelling tools were used, namely INFECTOR, OUTBREAK AND SIMSIMBA. The INFECTOR model determined the transitioning of disease from one state to the next, in this case, transitioning of hosts from exposed to

infected to diseased (infectious) states. Parameters were determined for the three sources of infection (exposure groups): i) within-group (intrinsic); ii) between-group (extrinsic) and iii) predation on infected prey, as well as for initial frequencies of both infected and diseased animals. These parameters were then used to model the transition of the disease within each exposure group. OUTBREAK is a BTB epidemiology model used to determine minimum and maximum durations of both infection and the diseased state, as well as the proportion of permanently infected individuals and mortalities. The SIMSIMBA lion biology model provided the parameters for a number of demographic variables including social structure for the KNP lion population.

The baseline disease model predicted a more drastic decline in the lion population than has been observed. This was most likely due to unrealistic values being assigned to one or more of the parameters, and suggested that more accurate data for BTB disease epidemiology and ecology are required to reduce levels of uncertainty. In addition, demographic sensitivity analysis was conducted using the disease parameters with uncertain estimates. The model showed the greatest sensitivity to predation exposure rate, between-group transmission rate and within-group transmission rate and this should guide priority-settings for future research and / or management activities. A full KNP population analysis was conducted using lion demographic, movement and disease parameters. The initial model data suggested that large-scale lion mortality should already have occurred, which is not supported by field data, suggesting that the disease parameters were unrealistically severe. A second model with a reduced value for within-group transmission produced a more realistic model. This highlights the importance of assumptions made when assigning values to parameters, particularly those shown to be most sensitive. The process of populating the models with data brought to light that there are large baseline knowledge gaps. Subsequent research studies could inform and validate input values before the model is reassessed.

3.3 Pathogens, parks and people: Assessing the role of disease in transfrontier conservation area development

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Disease is a major burden for conservation and regional development in sub-Saharan Africa. Many countries struggle to control human infectious diseases like tuberculosis and HIV / AIDS, while the introduction of exotic zoonotic pathogens, like bovine tuberculosis, can impact on wildlife conservation (Bengis, 2005), agriculture, trade and human health. Zoonotic diseases that pass between animal and human populations account for up to 75% of human infections (Taylor, 2001) but are often under-reported in rural areas where there is poor access to medical and veterinary healthcare.

Trans-frontier conservation areas, like the Greater Limpopo TFCA are designed to facilitate wildlife conservation and local economic development in marginalised areas through wildlife and culture-based tourism. However, the subsequent amalgamation of national parks, conservancies, private and communal lands across former private and international borders alters the movement and potential contact between wildlife, people and livestock across a broad landscape. Of particular concern is the potential for disease to be transmitted across species and between these groups into areas currently regarded as 'disease free.'

Covering 100,00km^2 across three countries, many people and animals within and adjacent to the GLTFCA reside in remote areas with poor access to health care. The introduction or increase of disease in these areas poses a threat to rural community health and livelihoods, where people rely heavily on livestock for food and financial security. And, as many of these communities are at an increased risk of zoonotic infection due to the high levels of HIV/AIDS and tuberculosis in southern

Africa, it is essential that the links between animal and human health are acknowledged and used to prevent disease impinging on the success of the TFCA development (Kock, 2005).

As there are currently no formal guidelines for disease management in the GLTFCA (Cumming 2003), this project aims to support policy development through identifying practical risk factors for zoonotic disease transmission in GLTFCA communities. Here, we will present details of research conducted in three communities neighbouring Gona-re-Zhou National Park within the GLTFCA in southern Zimbabwe. We will discuss the practical risk factors of disease transmission between wildlife, livestock and human populations based on local farming, agricultural and natural resource use activities; and provide feedback from local focus groups on their perceptions of disease and other issues relating to their proximity to the GLTFCA.

3.4 Improvement of village poultry health and production by communities in the Limpopo National Park support zone in Gaza Province, Mozambique.

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Newcastle disease has been identified as one of the major constraints to rural poultry production in Sub-Saharan Africa. The high mortality in flocks due to Newcastle disease (ND) can be reduced by introducing convenient vaccination methods and by using the thermotolerant I-2 ND vaccine in conjunction with community-based training and education activities.

The main objectives of the *Improvement of village poultry production by communities in Limpopo National Park support zone* project was to contribute to food security, poverty alleviation and wildlife conservation through the improvement of husbandry practices and disease control related to village chickens.

The project activities focused on implementing an effective Newcastle disease control program to increase chicken numbers, increase household purchasing power, increase home consumption of chicken products, increase decision-making power for women as well as decrease bushmeat hunting.

Experience has shown that an effective Newcastle disease control program is comprised of the following five essential components:

1. An appropriate vaccine and vaccine technology;
2. Effective extension materials and methodologies that target veterinary and extension staff as well as community vaccinators and farmers;
3. Simple evaluation and monitoring systems of both technical and socio-economic indicators used by both communities and supervising agencies;
4. Economic sustainability based on the commercialization of the vaccine and vaccination services and the marketing of surplus chickens and eggs; and
5. Coordination of activities.

Increased productivity, brought about through empowering local people with additional knowledge and tools for village poultry production and community-based animal care, will in turn have positive impacts on the health and welfare of both the people themselves and the wildlife populations living alongside them. The improvement of village poultry production by communities living inside Limpopo National Park will make a vital contribution to the long-term conservation and development success of this core Mozambican section of the Great Limpopo Transfrontier Conservation Area.

3.5 Balancing ecotourism and livestock production: Implications for livelihoods and the environment.

Chaminuka, P[1] and McCrindle, C[2]

[1]University of Limpopo, South Africa & Wageningen University, The Netherlands,
[2]University of Pretoria, South Africa

The AHEAD seed grant was used to finance two specific objectives of a bigger study. With the grant we were able to generate two research reports with the abstracts below

Tourist and community preferences for ecotourism development in rural communities next to Kruger National Park

Ecotourism development is an important flagship of the proposed Greater Limpopo Transfrontier Conservation Area, and contributes towards achieving objectives of biodiversity conservation and rural development. The main objective of this study was to determine the willingness of rural communities to engage in ecotourism and to determine whether tourists had an interest in ecotourism-related activities in communities adjacent to the KNP. Data were collected through focused group interviews and community workshops with farmers, youth and entrepreneurs in the study area, as well as through structured interviews with 324 randomly selected tourists visiting the KNP between 2008 and 2010. Engagement of rural communities revealed that there are differences in the level of community support for ecotourism projects. Suggested projects in ecotourism included village craft markets, lodges and cultural tours. Tourist preferences are analyzed via stated choice models. Three major attributes of ecotourism namely; *village accommodation*, *crafts* and *village tours* are combined to make hypothetical alternative holiday packages from which tourists were asked to choose the most preferred. Included in each of these choice sets was a price-additional fee. Results show that 52% of tourists had an interest in village tours and had a marginal willingness to pay of R51/person for a tour, and 60% were interested in visiting village craft markets. Only 45% of the tourists would consider using accommodation facilities in the villages, even if these were comparable to KNP in standard and prices.

Modelling land-use alternatives in rural communities next to Kruger National Park

Emerging interest in tourism-related livelihood opportunities at the wildlife/livestock interface can create conflict and competition for land. We investigated competition for land between livestock- and tourism-based livelihoods in the buffer zone communities. Three workshops and twelve focused group discussions and household surveys were conducted to identify alternative scenarios of livestock and ecotourism as livelihood options. These scenarios were analyzed using a spatially explicit bio-economic model whose main parameters and structure had been developed in consultation with the community. Preliminary results indicate preference in some community groups for diversified livelihoods towards communally owned game parks where sustainable harvesting of game is allowed and livestock grazing is shifted further from the KNP boundary. Farmers and older people were less likely to support ecotourism than youth, especially where it involved reallocation of land from existing land uses. It is argued that it is possible to shift at least 20% of the land currently under agriculture to ecotourism-related projects, without compromising livestock-based livelihoods.

3.6 Q & A and discussion on Seed Grant work: Where to next? What important questions (and / or answers) have arisen, etc.?

1. *Question to Claire Geoghegan*. What is the perception of the TFCA process in communities and what would the best benefit be? *Answers:* (a) The answer would come from participatory fora and studies but was not part of the questionnaire survey on health issues. (b) The likely eco-tourism benefits at the moment are largely theoretical but are likely to emerge from the development of tourist lodges but there is little capacity to build them or manage them at a community level. *Further comments*: The list of game meat included springbok, which do not occur in that area but it was explained that the term covered a range of antelope species. Meat, such as elephant meat, was largely derived from animals legally hunted as part of safaris. Interpreters were used in administering questionnaires. Coping with medical terminology sometimes required referring to one's own body parts.
2. *Question to Petronella Chaminuka*. Tourists are not interested in village-based accommodation but what is the scope for other markets and for private operators? *Answer*: Although a cost-benefit analysis on wildlife-based tourism developments is positive the options chosen are probably not viable for communities because of a lack of capacity to develop and manage them. *Further comments:* Situating community lodges within the park could be explored.

3. *Question to Tanya Radosavljevic* : Will improvement in poultry production reduce bushmeat consumption and were the poultry interventions perceived as being linked to the GLTFCA? *Answer:* Newcastle disease vaccinations result in an increase in flock size and should reduce the demand for bushmeat but that has not been measured and nor were perceptions relating to the GLTFCA but we used the correct branding for the project. A discussion of the use of behavioural incentives to link interventions related to food security [such as in the COMACO (Community Markets for Conservation) Program (http://www.itswild.org)] and conservation objectives ensued.
4. *Comment to Peter Buss*: The modelling of BTB in lion and buffalo was very interesting and focused on food-borne transmission. It may be rewarding to develop a multispecies transmission model that would provide a more complete picture.
5. *Emily Lane*. A new wildlife disease investigation course is being developed, which is not restricted to veterinarians. The Seed Grant was a small part of a larger capacity building programme.

6th Session: AHEAD-GLTFCA Seed Grant final reports (continued)

3.7 A comparative study of institutional arrangements for small-scale livestock farmers in communities in the Great Limpopo Trans-frontier Conservation Area (GLTFCA) in Zimbabwe and Mozambique. Jeanette Manjengwa and team

Centre for Applied Social Sciences, University of Zimbabwe

Small-scale livestock farmers in the GLTFCA have different levels of institutional organisation and support, monitoring, management and disease control activities. The management of livestock and wildlife diseases within the envisaged larger trans-boundary landscape remains unresolved and is an issue of major concern to other economic sectors in the region. This study provides insights into the various institutional arrangements and capacity in small-scale livestock farmers in the GLTFCA to manage livestock and control livestock diseases so as to enhance production and marketing. A better understanding of animal husbandry practices and examination of current practices, particularly in relation to disease prevention and problem animal control, will assist in the development and introduction of mitigating strategies by the stakeholders. The study highlights a number of problems and a few opportunities arising from the situation of small-scale livestock farmers within the GLTFCA.

Using four study sites, two in Zimbabwe (Gezani and Malipati) and two in Mozambique (Macaringue and Combomune Rio), an interpretive approach was used with a combination of qualitative and quantitative research techniques which provided in depth information and more nuanced understanding of the issues. Feedback workshops were held with the small-scale farmers which facilitated engagement with various stakeholders, including veterinary technicians and development agencies, raising awareness on the importance of improved livestock management and more effective control of animal disease in the GLTFCA.

Across the GLTFCA cattle tend to be the major source of income even though they are not managed optimally. Cattle have multiple uses including a form of savings, draught power, cultural ceremonies, milk production and occasionally for meat. There is no management system regarding off-take and the farmers generally hold on to their cattle and only sell them when they are no longer in prime condition and consequently do not command a good price. There is minimal grazing management and cattle rustling is rife. Cattle numbers are usually limited by available grazing land which becomes scarce in the dry season. Watering of livestock is usually not a problem.

The study found that there is a large gap between policy and practice regarding livestock management and disease control. Despite sound policies and structures being in place, which are particularly well developed in Zimbabwe, practice on the ground is weak and ineffective.

Although most farmers were aware that they were near a protected area, few knew about the Trans-frontier Park, and levels of awareness about the GLTFCA were negligible. Attitudes towards wildlife were negative as the farmers perennially experience destruction of crops and loss of

livestock by wildlife. In cases where ancestral land has been lost due to the formation of protected areas for wildlife there is still much bitterness.

Discussion/Comment:

1. Negative attitudes to the TFCA exist amongst rural communities and a key question is "How can this be changed?" One potential solution is to ensure they are able to receive wildlife-linked incentives and benefits including direct payments in the form of dividends such as happened in some districts in Zimbabwe from CAMPFIRE.
2. Dip Tank Committees with office bearers that run themselves are one form of local institution formed by livestock owners.
3. Farmers will use traditional medicines for livestock if they are far from a veterinarian but it was difficult to get information from farmers on this topic.
4. A difficulty in introducing scenario planning to communities is that expectations can inadvertently be raised and there is thus a need to use up-to-date figures and realistic projections for tourism revenues when developing plans and to be aware that tourism is a fickle industry.
5. There is a huge divide between policy and practice. Did you involve government and authorities and establish a tripartite interaction between authorities, researchers and communities? *Answer:* An objective of the scenario-planning project is to link communities with decision makers and to facilitate such engagement. It is however difficult to evaluate how valuable such interactions are.

3.8 Exploring future ecosystem services: a scenario planning approach to uncertainty in the South East Lowveld of Zimbabwe

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Problems related to natural resource management are typically complex and require integration of information across several scales and disciplines. This is particularly evident where there are multiple stakeholders with different interests and appealing to different planning horizons. In such cases, scenario analysis is a useful tool for exploring key uncertainties that shape the future of social-ecological systems characterised by high unpredictability. Scenario planning is most useful for dealing with uncertainty when we lack sufficient information about the probabilities that different events will occur. Here we explore the methods, benefits and costs of developing scenarios based on observations in three wards in the South East Lowveld of Zimbabwe. Empirical observations show that generating local scenarios with semi-literate communities is time-consuming, requiring strong commitment from social scientific researchers with strong facilitation skills. Scenarios were mainly concerned with exploring possible futures for ecosystem services and human well being in the Lowveld. To this end, we investigated the various domains of drivers ranging from technological, environmental/nature, political, human, institutional and economic in order to try and extrapolate the impacts of changes in their relationships, extending to 2030 as the Great Limpopo Transfrontier Conservation Area unfolds. Our intention was to develop loosely linked scenarios that can be used to influence stakeholder decisions in formulating robust resource governance regimes. Generally, developing scenarios is resource intensive, particularly when the aim is a top-down and bottom-up iterative cycle. Stakeholders should be typically involved in multiple workshops to ensure that the scenarios are credible and impart a sense of ownership. Most importantly, scenario planning allowed communities in the Lowveld to transcend the constraints of the here-and-now mindset which often characterise their livelihood decisions and place renewed emphasis on engagement and communication with decision makers so as to devise strategies that enhance their benefits within the GLTFCA. Despite such novelty, we contend that the policy environment, which we seek to influence, is highly complex and dynamic, and is characterised by numerous uncertainties, which

makes it difficult to speculate whether we, as researchers, will have a significant influence in the policy arena.

Discussion/Comment:

Q: What criteria do you use to decide when self-organisation has been achieved?

A: I look at existing organisations such as TFCA committees, the existence of mechanisms to air grievances, and the ability to engage with potential partners in developing safari hunting opportunities.

3.9 Alternative sustainable futures for post-resettlement in the Limpopo National Park, Mozambique.

Ken Giller and Jessica Milgroom,

Wageningen University, The Netherlands

Population resettlement commonly leads to impoverishment in the absence of efforts to rehabilitate livelihoods. This AHEAD seed grant project aimed to improve food security through improving seed security in a post-resettlement situation for one village resettled from the Limpopo National Park (LNP), and for their host village. The project was composed of four components: 1) continued research on the impact of resettlement on livelihoods, 2) increasing awareness of the importance of local agricultural seeds and varieties and improved seed conservation, 3) on-farm testing of improved varieties, and 4) capacity building for farmers and extension agents in local level seed production. Results from each activity are described below.

The biggest difficulty for resettled residents is access to land for agriculture, as they are forced to borrow fields with insecure land tenure. Until now, they have also been denied access to irrigable land by the host village, despite being promised the opportunity for irrigation by the LNP and the provision of a water pump. Livestock theft has led to a change in livestock management, requiring closer accompaniment of animals, either by children who therefore cannot go to school, or by hired labor that imposes an extra cost on the family. Access to forest resources is limited due to traditional rules; there is also a scarcity of firewood and building materials. Some families have taken advantage of improved opportunities for market integration by selling commodities, and many have engaged in wage-labor.

We collected seeds of 27 types of nine crops inside LNP, samples of which were deposited in the National Germplasm Bank in Maputo. A seed fair was held and prizes were awarded to the farmers with the best quality and greatest diversity of seeds. Seed companies were also invited to sell their seed at the fair. Farmers were taught how to build an improved granary made from local materials to improve seed conservation, primarily to prevent weevil attacks. Challenges to working with both local seeds and improved seeds arose regarding conflicting development models and required careful attention to the learning process of the group, including farmers, extension agents, researchers and trainers.

The first round of variety tests was carried out under irrigation with 11 varieties of five different crops. Farmers evaluated the varieties at harvest and post-harvest (taste tests). Later interviews confirmed farmers' preferences, and seeds from the preferred varieties were multiplied for distribution. Based on interview results we added 13 varieties of three additional crops for the second round. Evaluations and harvest will be done shortly. Varieties tested in the first round have already been planted by farmers outside of project activities, indicating preliminary adoption. Additionally, small amounts of seed were handed out to 75 farmers to test on-farm under rain-fed, local conditions.

Pivotal in the learning process was a farmers' opportunity to visit variety trials at a private company and on the local station of the national research institute. Training sessions were held with farmers on local level seed production, and then on associated key issues such as cooperation, leadership and gender. Extension agents were taught how to teach farmers about local level seed production, then two newly trained extension agents taught a course for innovative private farmers in Massingir. In an attempt to create synergies between the formal and informal seed system to improve local level seed

security, a seminar was held that brought together representatives from all sections of the seed chain. Debates and group work from this seminar and from training sessions illuminated key problems in the seed chain and potential alternatives for local level seed production. This material was documented, and on the basis of this a proposal is being written for future work.

Other unforeseen outcomes of the project include certified seed multiplication initiatives by one agricultural association and four private farmers in Massingir, with the support of a seed company, through sub-contracting and inspection by the National Seeds Department of the Ministry of Agriculture. The question of whether or not this work has contributed to improving food security can only be answered in the future, but we believe that the host village benefitted more than the resettled residents because of difficulty in integration between the two villages and lack of access to irrigation by the resettled village.

Discussion/Comment:

1. *Q:* Are the impacts of resettling people offset by the gains in terms of conservation? *Ans:* That is a difficult question to answer and depends very much on whose values prevail and at what scale (e.g. village, regional, national) you examine the question. It is, however, difficult to keep people in a national park.
2. *Q:* Would communities with restricted areas of settlement within the park be better off than if they were resettled outside the park? *Ans:* Any solution can work if enough resources are invested in negotiation and reaching agreement.
3. Seeds are stored in small barrels due to weevil attacks. The problem is that a lot of seed is needed.

3.10 Land use alternatives and livelihood viability in ecosystems at risk of emergent animal diseases. Brian Child, Gregory Parent and Jessica Musengezi,

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Wildlife utilization is a land use option that has seen rapid increase on the private lands of South Africa. Private use has developed under market forces to create a system that can provide key insights into the potential for wildlife utilization and its environmental and economic desirability relative to alternative uses of commercial agriculture and subsistence farming. Private game ranches represent an important avenue for contributing to economic growth and conservation of natural habitat. This study aims to better understand the financial and economic profitability of commercial wildlife use on private land; and to identify key attributes of game ranches. In-depth interviews of ranch managers and financial records from fourteen private game reserves in the Lowveld region of Limpopo province were collected. Preliminary results from these case studies indicate diversity in wildlife enterprise type and positive returns with varying profitability. Game ranches face challenges from an uncertain policy environment and extensive government bureaucracy associated with wildlife utilization. Understanding the characteristics of private game ranches provides information on the incentives for wildlife utilization and its contribution to the wider economy.

However, in the community areas that border Kruger National Park in South Africa, there exist few livelihood alternatives outside of rainfed agriculture and livestock husbandry. The lack of viable alternatives to rural households increases livelihood vulnerability as the local ecosystem becomes progressively dryer and more unpredictable in terms of rainfall. Poverty and associated behaviour of households cannot be simply explained by entitlements and factor endowments that affect a households' income level, constraining consumption-production decisions. To fully understand the potential benefit of any policy aimed at poverty alleviation, such as CBNRM, an understanding of rural vulnerability with its associated influence on household decisions is crucial. Vulnerability to risk events itself is a factor in the poverty equation. Vulnerable households face significant uncertainty that often results in the alteration of production/consumption choices away from maximizing benefit towards the mitigation of risk.

To assess community vulnerability researchers conducted a survey of five rural communities along the border of Kruger National Park. The questionnaire consisted of five modules: household

demographics; water, market and health services access; formal and non-formal household income and production; household consumption; and an extensive module on shocks and coping strategies. The two areas evaluated along Kruger's border show distinct differences in household livelihood structure, vulnerability and coping mechanisms. The northern households rely more on natural resources and show higher levels of vulnerability compared to those of the southern community. Additionally the southern community utilizes a broader array of primary coping mechanisms, partly a product of improved market access. The ability to access differing coping mechanisms is believed to be a key factor in the reduced vulnerability of southern communities.

Discussion/Comment:

1. Livestock theft is a part of the vulnerability assessment and will be included in the full report.
2. While the government may have done a great deal to assist in the development of game ranching in South Africa, those farmers dealing in animal products and live sales were very negative about government bureaucracy.

3.11 Community theatre as a communications and outreach tool to support local level scenario planning initiatives within the GLTFCA. (A report submitted by the ResourceAfrica Trust, Pretoria, to accompany the play that was performed following the afternoon session)

*Project Background***.** The project which ran for 6 months (February 2009 to July 2009), seeks to promote the use of theatre and related artistic media in bridging the communication gap between policy makers, public and non-governmental institutions, the private sector and local communities, in the context of conservation, sustainable use of natural resources, climate change and scenario planning in the GLTFCA. The Bennde Mutale community lives in an arid area and close to the geo-political boundary zone of Madimbo Corridor, which is a very remote, poor and marginalized area within the GLTFCA. This project, through theatre, aims to help the Bennde Mutale community to articulate their needs, aspirations, challenges and successes.

Two important decision levels were targeted in this project:

- ⇒ The production of local messages, to be achieved through research at a local level, refined through performances for local audiences and feedback through facilitated discussions
- ⇒ Communicating emerging issues to policy and decision makers involved in the planning of the GLTFCA and management officials at the Makuya Park.

The overall goal of this project was to contribute to themes on human health, livelihoods, land use and ecosystem goods and services within the GLTFCA.

Process and training. Development of Actor-Facilitators and Scripts/Plays

Auditions were held, and they were characterized by a large attendance of women compared to men. The transparent selection process involved a board made up of widely respected members of the community including a school-teacher and a volunteer development worker. Out of 60 participants five were men and the rest women. From this exercise we managed to select the final six actor / facilitators that included four women and two men who were selected and trained from the community of Bennde Mutale in theatre, research and facilitation techniques. Following training and identification of key issues and drivers of change the Bennde Mutale Theatre Group has developed various scripts and plays. Beyond the direct training and theatre processes, the overall initiative contributed significantly to the development of intra-community cohesion and conflict reduction with the neighbouring Makuleke community. The initiative also experimented with additional 'arts' tools for local scenario planning through piloting 'photo stories' as a mechanism for the community to express views on drivers and plausible futures. The community of Bennde Mutale provided the 6 actor/facilitators. These individuals had never been involved in performing arts ever and it was their first opportunity to participate in such a project. They initially had no knowledge about scenario planning, sustainable use of environment and climate change.

Performances. The group managed to perform the shorter version of the play six times to neighbouring communities. This was to extract issues from the community and build up a full-length 45-minuter. The finale version of the 45-minuter was first performed for the Bennde Mutale community on the dates below.

- 3rd and 17th May performances for the Bennde Mutale community;
- 7th May 2009 - Nwanedi Game reserve at a local stakeholders meeting for the Limpopo Transboundary Programme organized by IUCN/CESVI;
- 21st May 2009 – Birchwood Hotel-Johannesburg at the Climate and Equity Advocacy Workshop for Southern Africa organized by Norwegian Church Aid and ResourceAfrica and attended by a range of NGOs and donors involved in climate change and community adaptation.
- 14th July 2009 – Bennde Mutale at the Official Lighting of electricity before a record attendance of 5,000 people organised by the Local Government;
- 21st July 2009 – Protea Manor Hotel – Pretoria – CBNRM Regional Training Workshop; organised by the University of Florida (WWF SARPO, Namibia, NGOs in CBNRM in Mozambique, Zambia, Botswana, Zimbabwe)

Inter-regional performances to share experiences, and to discuss drivers and changes, were also carried out by the group in Mozambique and Zimbabwe. The performances were targeted for communities adjacent and around the GLTFCA.

- 24th June 2009 – Canhane Village Massingir – Mozambique;
- 26th June 2009 - Zongoene Community, Gaza Province, Mozambique
- 27th June 2009 - Combomune Rio villages – Gaza Province (TFCA) Mozambique;
- 30th June 2009 – Chipinda Pools neighbouring communities – Zimbabwe organised by Zimbabwe National Parks in conjunction with Frankfurt Zoological Society;
- 1st July 2009 – Malipati/Chikwarakwara area communities (Chief Gazani Kraal) – Zimbabwe in conjunction with CASS, University of Zimbabwe, Scenario Planning Project (and RDC Chiredzi)

Development of sustainable future for the BTG. With a trained Bennde Mutale Theatre Group (BTG) now formed and active, the next steps are to identify and market the BTG to undertake further research and theatre/arts initiatives to both provide longer term livelihood options for the team and ensure that their skills and plays can contribute to development and planning options in the South African GLTFCA process and others.

So far, after their 6-month project contract expired with ResourceAfrica, ResourceAfrica has continued to drum up more support and resources for the BTG. RA has managed to connect BTG to three high-level meetings and workshops in Johannesburg and Pretoria. From all these performances BTG have received positive feedback. The only challenge is getting funds to maintain the coordinating office to follow up and establishing new contacts. Currently BMG is working in Mokopane with Anglo Platinum and FFI to research on issues relating to human health, livelihoods, land use and the growing communications rift between the mine and communities.

The six actor/facilitators: Ramabannda Daniel Naledzani, Siphuga Voster, Munzhelele Esily Elelwani, Chauke Gloria Mthabeni, Hlungwane Mavis Sheluzdani and Munzhelele Caroline Thingahangwi.

4. OFFERED PAPERS AND PROGRESS REPORTS FROM THE FIELD

7th Session:

4.1 Foot and Mouth Disease (FMD) outbreak and response in the GLTFCA region. Bjorn Reininghaus and B. J. A. Du Plessis,

Mpumalanga Veterinary Services

The Nsikazi communal grazing area is adjacent to, and west of, the southern part of the Kruger National Park (KNP), with which it shares a fenced boundary of 69 km, and is home to 17 300 cattle (Aug 2009), distributed amongst 32 diptank and or inspection points. Due to its proximity to naturally FMD-infected African Buffalo (*Syncerus caffer)* in the KNP, and thus part of South Africa's only permanently FMD infected zone, the Nsikazi area falls into the FMD Buffer zone with vaccination, entailing weekly cattle dippings and inspections, monthly small stock inspections, veterinary movement control and regular biannual cattle FMD- vaccinations in April and October, in conjunction with F-branding of vaccinated animals.

Since October 2006 a trivalent vaccine imported from the Botswana Vaccine Institute (BVI), based on FMD strains from Botswana, is being used, after the vaccine produced by the Onderstepoort Veterinary Institute (OVI-TAD), which was based on local FMD strains from South Africa, became unobtainable. Comparatively lower and shorter seroprotectivity of the BVI vaccine against the local strains in South Africa, due to apparent topotype mismatch, has been observed and given cause for concern.

The veterinary fence along the boundary between Nsikazi and the KNP was erected in the early 1960's, re-aligned in 1968, upgraded and electrified in 1998, flood damaged in 2000 and repaired in 2001. Lack of functional electrification for large parts of it, due to e.g. theft, as well as problem zones over waterways with the resulting permeability for cattle and buffalos, pose continuous challenges.

The two previous FMD outbreaks in this area date back to 1977 and 1960 respectively.

On the 7th of September 2009 FMD was diagnosed clinically, serologically and virologically isolated (SAT- 1 serotype) in cattle at the Makoko communal diptank, being situated in eastern Nsikazi, State Vet Nelspruit area, Mpumalanga Province, South Africa.

All veterinary permits for movements of cloven-hoofed animals within and out of Nsikazi were stopped as of 07/09/2009.

The immediate set up of veterinary operational and joint operational committees resulted in six roadblocks being operational within 36hrs of laboratory confirmation of the diagnosis. Intensive disease surveillance, by way of intensified inspections, 10% cattle mouthing and bleeding, at all other diptanks/inspection points started as of 08/09/2010, with no signs of clinical spread as of 15/09/2009.

Cattle FMD vaccinations commenced as of 11/09/2009, with all diptanks/inspection points in Nsikzai being vaccinated by 15/09/2010, and a total of 83% coverage being reached in this first vaccination round by the first week of October. Two further rounds of cattle FMD vaccinations and serological surveillance were carried out in Oct/Nov 2009 and Jan 2010, which yielded a coverage of 76% and 71% respectively. To increase vaccination output, cattle absent at the inspection points, were inoculated at the kraals with pole syringes.

Forward tracing of four cases was carried out, yielding negative results.

A biosecurity protocol/guideline for field personnel was set in place, with the potential or known exposure of field officials to virus having to be continuously addressed with their respective local deployment. Extension was done to enhance awareness, to encourage cooperation in respect of control measures and reporting of suspected cases of disease.

Small stock surveillance and goat FMD vaccinations commenced on 22/09/2009.

Campaign areas were set up according to distance from the clinically positive diptanks and other geographical attributes, namely, the area infected, the vaccination area, and the surveillance area

On 18 September 2009 spread of the infection to cattle at the adjacent Phameni diptank was clinically detected and virologically confirmed, necessitating expansion of the infected area, retreat of the veterinary cordon and increase in the number of veterinary roadblocks from five to seven. Violent civil unrest and riots in the vicinity of the infected area resulted in the withdrawal of all veterinary roadblocks by 25 September 2009 and their replacement with veterinary vehicle patrols, which were continued until 12/02/2010.

Donated lick blocks and feedstuff/maize chaff was made available at the two clinically infected diptank areas, to prevent migration of cattle to pastures of neighbouring unaffected diptanks.

A 100% mouthing exercise of all cattle presented at the diptanks and inspection points was undertaken in November 2010, and a respective F-Branding round in Dec 2009.

In the absence of clinically active disease in any other than the neighbouring Makoko and Phameni cattle herds, positive PCR results on EDTA-blood samples indicated a spread of the infection to one other diptank within the same ward, as well as to a further diptank on PCR-positive probang samples, on the eastern part of the adjoining Legogote ward.

According to serological results, the infection *probably spread* [(non-structural protein) NSP- and (liquid-phase blocking) LPB-ELISA positive) to five further cattle diptanks in the Nsikazi area during September 2009, seven further diptanks by October 2009 and to another four diptanks by January 2009. Serology also indicated a *possible spread* (NSP weak positive and LPB positive) to two diptanks in September 2009, as well as one each in October 2009 and January 2010. A *potential spread* (NSP positive, LPB negative) can be assumed to two other diptanks in September and October 2009, while an *unlikely spread* (NSP weak positive, LPB negative) must be postulated for a further diptank, leaving eight diptanks of the Nsikazi area with no serological indication of infection.

The situation in goats, indicated a *probable spread* (NSP and LPB positve) at Makoko during September 2009 and Phameni by October 2009, as well as a *possible* and *probable spread* to two further DT areas by October and September 2009 respectively.

The infection *probably spread* to pigs at Makoko during September 2009 and *potentially* to pigs from a further DT by October 2009.

Epidemiological investigations revealed a very close relationship between the isolated SAT-1 virus and viruses previously isolated from KNP buffalos in close proximity to the Makoko and Phameni diptanks areas. Analysis of titers from the serosurveillance in comparison to previous vaccination dates, documented a decline of protective serological antibody titers after vaccination with the BVI vaccine in the following months, causing a larger proportion of cattle to have insufficient antibody titers five months after the last vaccination, which in this case coincided with the outbreak in Makoko in September 2009 and led to a rescheduling of the biannual vaccinations with a 4-monthly FMD vaccination schedule in the SV Nst area.

Despite the flimsy movement control in the absence of roadblocks, the rapid, extensive and repeated vaccinations did appear to have prevented a spread of clinical diseases, with the obtained sampling results indicating though a likely spread of infection to other diptanks within Nsikazi without clear clinical disease manifestations, which could be explained by a suppressive effect of the vaccine.

While the localised origin and containment of the outbreak did safeguard the FMD disease free status of South Africa, it clearly documented that certain issues, like vaccine insufficiency, fencing improvements, and constructive involvement of other needed governmental bodies in animal disease contingency campaigns need to be further addressed.

Discussion/Comment:

Amplification of FMD by impala and kudu appeared not to have been taken into account. However, there were very few impala in the area but many buffalo. The impala that were sampled were found to be negative.

4.2 Activities of the Research Platform - Production and Conservation in Partnership (RP-PCP) on wildlife-livestock interface in the SE lowveld of Zimbabwe: an overview and update on disease prevalence and contacts between wild and domestic ungulates

. de Garine-Wichatitsky M[1], Caron A[1,2], Murwira A[3], Zengeya F[3], Zvidzai M[3], Dube T[3], Gomo C[4], Pfukenyi D[4], Zisadza P[5],

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Harare, Zimbabwe, [5]Gonarezhou National Park, Zimbabwe Parks and Wildlife Management Authority, Zimbabwe

Within the framework of the research-platform "Production and Conservation in Partnership" (CIRAD, UZ, NUST and CNRS), several studies have been conducted since 2008 on disease transmission at the wildlife-livestock interface in the South-East Lowveld of Zimbabwe. The objectives are to evaluate the prevalence of the main diseases in livestock and wildlife, and to identify potential pathways for their transmission between wild and domestic ungulate populations. We formulate the hypotheses that the communities of pathogens hosted by ungulates are mainly determined by two factors: i) the species composition and dynamics of wild and domestic herbivore communities; ii) the distribution and (direct or indirect) contacts between wild and domestic herbivore populations.

Several studies have been initiated to monitor disease prevalence, to characterize the interface, to and quantify interactions in contrasted sites of the Chiredzi District in Zimbabwe: i) disease surveillance in selected wildlife and livestock populations; ii) monitoring movements of buffalo and cattle in Malipati/Mabalauta area using GPS collars; iii) distribution of wild and domestic herbivores at water holes and along road transects at selected sites in Gonarezhou National Park/Mabalauta and in neighbouring communal lands.

We give an update on the main results obtained since the last AHEAD meeting in 2009: i) survey on BTB in wildlife (confirmation of the first cases of infected buffaloes from Gonarezhou NP) and livestock (no confirmed cases; 480 cattle sampled from 4 different sites); ii) serological survey on brucellosis in wildlife (0 positive: 47 buffalo, 33 impala and 16 kudu tested) and livestock (prevalence 5-12% depending on sites; 1135 cattle sampled); iii) serological survey on Rift Valley Fever in wildlife (2 positive/38 buffalo sampled, 0/23 impala and 0/22 kudu) and livestock (prevalence 3-19%; 124 cattle sampled); iv) preliminary results on movements of livestock and wildlife across the western boundary of Gonarezhou NP; v) preliminary results on movements and contact rates between radio-collared buffalos and cattle in Malipati/Mabalauta area.

4.3 Vulnerability of crop-farming households in drought-prone south-eastern Zimbabwe.

C. Murungweni, E.M.A. Smaling, M. van Wijk, and K.E. Giller

Wageningen University, The Netherlands

Crop farming is not advised for people living in dry regions especially those designated for livestock and wildlife production. But 41% of households in south-eastern Zimbabwe still depend on crop farming. These crop farmers have tried to adapt to drought by encroaching on wetlands. We investigated whether cropping on these wetlands results in better harvests than cropping on uplands and whether some crops or varieties are better suited to one type of landscape than others. This was done by determining the extent to which drought affects the establishment and yield in each of the identified landscape types: lower flood plain, upper flood plain and upland as identified and described by the local people. Eleven experimental plots measuring 35m x 20m were randomly selected; five were in upland, three in upper flood plain and three in lower flood plain. Each of these eleven plots was divided into two equal halves, one half with ten sub plots measuring 5m x 5m and planted with manure at 15 tonnes per ha and the other half also with ten sub plots measuring 5m x 5m and planted without manure. The ten experimental treatments included five open pollinated varieties of maize: Local variety called Chibhubhani or Gopane, ZM309, ZM401, ZM421 and ZM521; three varieties of sorghum namely Gangara, Chihumani and Chibedlani; local variety of millet and natal common variety of groundnut. No varietal differences were observed on establishment of sorghum but Gangara yielded better ($P < 0.001$) than both Chibedlani and Chihumani with yield of 2.4 tonnes per ha for Gangara, 1.8 t/ha for Chihumani and 1.6 t/ha for Chibedlani. However, locals prefer these varieties in reverse order because they put greater emphasis on taste, colour and grain storage properties than on yield *per se*. Manure had no effect on sorghum establishment but increased sorghum yield by 23.5%. However, because the general belief is that manure is bad for crop, an insignificant number of households use manure in their fields. Maize crop establishment had a positive relationship with yield on lower flood plain $R^2 = 82.5\%$ and upper flood plain $R^2 = 65.9\%$ but not in upland crop. Maize varieties ZM309, ZM 401 and Chibhubhani performed better on the lower flood plain, yielding above 3 tonnes per ha. The other two varieties,

ZM 421 and ZM 521 yielded less than 1 t/ha. Maize yields poorly on upland with average yield below 0.5 t/ha. Groundnut had higher ($P < 0.05$) yields of 0.7 t/ha in lower flood than in upper flood plain (0.3 t/ha) and upland (0.2 t/ha). Manure had no effect on groundnut yield in all three landscape types. Despite good establishment and growth characteristics, yield of millet was greatly reduced by birds resulting in yields not exceeding 0.5 t/ha. It can be concluded that groundnut and maize varieties ZM309, ZM 401 and Chibhubhani should be planted in wetlands and sorghum on uplands. Business innovations promoting best agricultural practices are needed to reduce vulnerability of crop farming to drought in south-eastern Zimbabwe.

Discussion/Comment:

1. Dry land crop production in arid areas tends to focus on stream banks where conservation measures are most needed. There is a need to promote zero tillage and other conservation farming methods.
2. In Malipati some farmers do not use manure or fertilisers because this is considered to predispose crops to water stress during dry spells.

4.4 Drivers of Fence Permeability in Kruger National Park.

K. Ferguson, L. Adam and F. Jori

Mammal Research Institute, University of Pretoria

Introduction. Fence Interface Research and Monitoring (FIRM) seeks to identify the patterns and processes that drive large mammals to cross fences and cause damage that allows potentially infected wildlife to leave protected areas in southern Africa. Our study area is on the western boundary fence of Kruger National Park (KNP), South Africa.

Methods. Our research fence line spans approximately 90km in length (from the Luvuvhu River in the north of KNP to the Olifants River further South) along the northern-western KNP boundary fence. The topography along the fence line is generally flat and the dominant vegetation type is Mopane (*Colophospermum mopane*) shrub and bushveld. Habitat 'inlets' of a diverse array of other vegetation types (various sandveld habitats) occasionally intrude along the fence.

Along this perimeter we encountered five types of fence which have been erected at various times.

Our adaptive monitoring strategy is intended to provide accurate data via our novel, cost-effective and simple fence permeability monitoring/profiling system.

Currently we have trained over forty Department of Agriculture Forestry and Fisheries (DAFF) fence workers in the methodology of the Fence Incident Surveillance System (FISS).

Fence workers are requested to attach to the fence strips of plastic tape inscribed with one (or more) of five symbols that denote elephant (*Loxodonta africana*), lion (*Panthera leo*), hyena (*Crocuta crocuta*), buffalo (*Syncercus caffer)* and human theft fence incidents (respectively: X = lion; ● = elephant; ▲ = buffalo; √ = hyena; and ╫ = fence theft) and each symbol is indicative of whether the recorded species has crossed and/or damaged the fence. A sixth symbol, a question mark, (?) allows the fence worker to indicate that he is unsure of which species has challenged the fence. Additional symbols (↑= out of park and ↓ = into park) denote whether the fence worker deems that an individual of a particular species has exited or entered the park. Fence workers largely use spoor, scrape marks at the base of the fence, hair on the fence and the general state of the damaged fence to determine which species is considered to have been responsible for the fence damage and/or a species 'excursion' event.

Pocket PC (personal computer) trained fence workers then geo-reference their own data on to a pre-programmed (using Cyber-Tracker™ Software) format for later downloading on to the laptop spreadsheet of a mobile senior fence worker. The latter then downloads this spreadsheet on to the PC of the State Veterinarian with GIS responsibilities in Skukuza (KNP DAFF/ HQ). Permeability maps for each type of fence and its species interactions and a dedicated database are created at this point. The Fence Incident Surveillance System therefore facilitates an unbroken chain of electronic fence data. In the event of a Pocket PC's malfunctioning, the fence workers can leave the barrier tape hanging from the fence, for later geo-referencing (the 'lifespan' legibility of ink on the tape can be up

to several months; pers. obs.). Training protocols have been produced in the local language - XiTsonga (explaining instructions for operating the tape/symbol system and the use of the Pocket PC and Cyber-Tracker™ software).

ARCView™ GIS was used to record and map species-specific fence incident permeability and to attempt to discern the potential correlation between species with regard to patterns of fence related movement. Our profile maps accumulate data over time allowing the managers of the fence to detect recurrent patterns of fence damage and to rectify their fencing deterrent strategies as necessary.

Results. Fence Profiling in KNP: Results per species per type of fence. Within our study area, incidents statistics per type of fence are presented as are temporal FISS data collected over the duration of the field study for three of the target species. We concluded that none of the fence types are 100% effective.

The highest numbers of fence incidents were recorded in the older fences where electric power was very irregular or nonexistent or the structure of the fence was weak (2.4 m old fence and 1.8 m rail post fence), ranging between 9 and 17 incidents per km. Incidents were much lower in those sections of the fence where electricity was maintained and also in the I-Beam fence (dropping to 3.3 and 2.8 incidents per km).

Elephant accounted for the highest number of incidents causing damage and/or crossing through the fence, with a rate of 6.4 incidents per km of fence. While buffalo caused the lowest number of incidents with only 2.3 incidents recorded per km of fence during the study period.

Carnivore crossing incidents recorded were 16.8 and 10.6 incidents per km for hyena and lion respectively.

Of those species monitored, buffalo were by far the species that caused the lowest number of incidents with only 2.3 incidents recorded per km of fence during the study period.

There was a clear increase in the number of fence incidents caused by elephants in the months of February and March. The other species monitored did not show a specific temporal trend of fence incidents (see graph 1).

Discussion/Comment:

1. A major cause of seasonal fence breaking by elephants is to reach marula fruits in areas neighbouring the KNP. Solutions could involve removing the trees or harvesting the fruits early.

4.5 OIE Collaborating Centre for Integrated Training in Livestock and Wildlife Health and Management

JAW Coetzer, P van den Bossche, E Webb, J Kirsten, R Burroughs, T Musoke, J Paveska, M Modisane

University of Pretoria (Centre for Veterinary Wildlife Studies, Department of Animal and Wildlife Sciences, Department of Agricultural Economics, Extension and Rural Development); Onderstepoort Veterinary Institute (OVI), SA; Animal Health Department of the Institute of Tropical Medicine (ITM), Antwerp, Belgium; National Institute for Communicable Diseases, SA; National Department of Agriculture, SA

Since May 2009, the World Animal Health Organisation (OIE) has recognized the Department of Veterinary Tropical Diseases (DVTD) and its consortium partners [University of Pretoria (Centre for Veterinary Wildlife Studies, Department of Animal and Wildlife Sciences, Department of Agricultural Economics, Extension and Rural Development); Onderstepoort Veterinary Institute (OVI), SA; Animal Health Department of the Institute of Tropical Medicine (ITM), Antwerp, Belgium; National Institute for Communicable Diseases, SA; National Department of Agriculture, SA] as a Collaborating Centre for Training in Integrated Livestock and Wildlife Health and Management. One of the major roles of the Collaborating Centre is to assist the OIE in developing and offering training in the management and health of livestock and game, with special emphasis on sub-Saharan Africa. The training will follow an integrated approach linking animal and human

health, animal production, marketing and trade of animals and their products, land-use options, rural development, conservation and environmental health.

The information used for the training will be partly based on the material currently used in the successful web-based MSc programme in Veterinary Tropical Diseases that is organized jointly by the DVTD and ITM's Animal Health Department. This training material will be re-packaged in appropriate formats to support undergraduate and postgraduate training as well as Continuing Professional Development (CPD).

To improve access to important veterinary information, the training material will be presented on an interactive electronic delivery platform called "VetHub," which includes blogs, interactive course material, videos, quizzes and discussions. The information will be presented at both an introductory and more detailed expert level, all being accessible free of charge. Where accreditation for CPD is required (implying involvement of experts in evaluating quizzes and rewarding credit points) people will have to be registered and pay a fee.

Moreover, to support animal health management, up-to-date synthesized information on outbreaks of specific high-impact diseases or important research developments will be provided and made accessible to field personnel in the form of quarterly or 4-monthly electronic bulletins.

The VetHUB currently uses an Open Source Content Management System called Joomla for the Information Sharing part and an Open Source Learning Management System, Moodle.

The VetHub is currently being developed and it is envisaged that it will be opened at the end of 2010.

Discussion/Comment:

1. *Q:* This is a very exciting development. However, the course seems to have separate boxes for wildlife and for livestock production systems, should they not be more closely integrated? *Ans.* Students can choose modules across packages and they are only shown separately for convenience.

8th Session: Offered Papers / Progress Reports from the Field (Continued)

4.6 Beyond livestock: broadening FAO's approach at the livestock / wildlife / human health interface.

Susanne Munstermann[1], and Scott Newman[2]

[1]FAO ECTAD, Gaborone, Botswana, [2]EMPRES, Wildlife Unit, FAO, Rome, Italy

With the onset of the Highly Pathogenic Avian Influenza threat of a global pandemic starting in 2003, the international donor community, in collaboration with technical agencies such as FAO, has reacted in an unprecedented manner to collectively fight this threat. For this purpose, FAO created a new department, *Emergency Centre for Transboundary Animal Diseases (ECTAD)* which was set up, together with units of OIE (World Animal Health Organisation) and AU-IBAR in *Regional Animal Health Centres (RAHC)*, strategically placed next to the *Regional Economic Communities (REC)*, such as the *Southern African Development Community (SADC)*, based in Gaborone. From these Centres, regions were supported in their fight to either control the disease in areas where there were outbreaks, or to prevent the incursion of the disease in regions such as SADC, which remain to date free of the disease.

Early in the evolvement of HPAI, the critical role of wild birds was recognized and, as a consequence, FAO also strengthened its *Emergency Preparedness Program* (EMPRES) by forming a wildlife unit.

The two units together, ECTAD and EMPRES/Wildlife, provide a wealth of expertise to the region and other collaborating partners, such as AHEAD. The report summarizes activities and proposals in the following areas:

- Training and capacity building

More than 1000 people in more than 100 countries in the Caribbean, South America, Europe, Africa and Asia were trained on HPAI with emphasis on wild birds by EMPRES/Wildlife, whereas ECTAD

engaged in training on recognition of the disease in domestic birds and trained 440 livestock agents in the SADC region. Technical training manuals for wild birds and domestic chickens were produced, translated into many languages and widely distributed.

- Surveillance and tracking of wild birds

Worldwide EMPRES and partners engaged in tracking of wild birds and analyzing data in relation to outbreaks. Many scientific publications resulted from these activities and surprising information on the distances covered by tracked birds.

- Risk assessment-based surveillance

ECTAD on the other hand, investigated the spatial and temporal spread of other TADs such as African Swine Fever (ASF), Foot and mouth disease (FMD), Rift Valley Fever (RVF), Anthrax, Rabies, etc.

- Wildlife / livestock interface investigations

In collaboration with CIRAD, ECTAD engages in investigating the absence or presence of diseases at the interface between buffalo / cattle and possibly humans in the south-western part of the KAZA TFCA. Collaboration with AHEAD is being proposed.

- Crisis Management Centre (CMC) – an introduction

The CMC has also been formed to strengthen FAO's capacity to respond to emergencies. This intelligence Centre is equipped to provide experts to countries upon their request within 72 hours.

Current existing Alliances and Partnerships were also listed and the meeting participants, through AHEAD, were invited to collaborate with FAO in their endeavor to support the ongoing efforts to integrate livestock into the TFCA discussion.

4.7 Incorporating climate change into conservation planning for the SADC Region: perspectives of a climatologist working in conservation. Anton Seimon,

Wildlife Conservation Society, New York, USA

Climate change confronts the Southern African Development Community with a variety of mounting stresses that have the potential to reverse past successes in conservation and development throughout the region. The ecological contexts of conservation into the future will be characterized by increasing disruption among the myriad complex interactions of ecosystems and the species contained therein. Terms such as *range shifts*, *migrations*, *disequilibria* and *asynchronies* are increasingly applicable to characterize the disruption of ecological systems in years to come, relative to past experience that has shaped our understanding to date. Consequently, long-term conservation success cannot be achieved without comprehension of present day climatic variability, and climate changes now ongoing and forthcoming.

In this presentation I will offer a relatively uncommon perspective on this challenge, that of a climatologist working in biodiversity conservation in sub-Saharan Africa and elsewhere. Critical to anticipating climate change impacts upon ecosystems, human livelihoods and socioeconomic development is holistic understanding of how climatic means, variability and extremes exert control over ecology. In the absence of such understanding, climate model change projections for the future cannot be properly evaluated in relation to environmental conditions. Despite this, understanding of climatological baselines is frequently taken as a given in conservation and development projects without assessment of how well the climatological context is incorporated. Using the example of the Albertine Rift Climate Assessment, an ongoing study conducted by the Wildlife Conservation Society in equatorial eastern Africa, I will demonstrate an approach on how climate science can potentially inform conservation practice to more effectively identify the challenges – and also the opportunities – of climate change across a region, the Virungas, which is of comparable conservation significance to the SADC region.

Discussion/Comment:

1. In the Virungas there are marked differences between two reserves in terms of fluctuations in rainfall. Topography can have a marked effect on atmospheric flows and thus on rainfall but we do not have enough detailed data to predict how increasing temperatures will change these rainfall patterns over time.
2. Increasing temperatures can have a profound effect on malaria life cycles. A 5% increase in temperature can halve the incubation time of the parasite. People at higher altitudes were formerly safe from malaria but this is no longer the case, e.g. in Kenya. Increased dryness will not mitigate the effects of global warming on malaria during wet periods.
3. Overcoming political inertia on climate change is very difficult and may need to include the development of regional associations that will speak with a common voice. Increasing water shortages will also become an important transboundary problem and political awareness should be raised.

4.8 Can BTB hide in the beef and game meat we eat?

Maretha Van der Merwe[1] and Anita Michel[2]

[1] *City of Tswane Municipality, P. O. Box 1401, Lyttleton 0140, South Africa.* [2] *University of Pretoria, Faculty of Veterinary Science, Department of Veterinary Tropical Diseases, Private Bag X4, Onderstepoort 0110, South Africa.*

Infection of humans with the bovine tubercule bacillus (*Mycobacterium bovis*) is generally referred to as zoonotic tuberculosis. Prior to the implementation of official control programmes for bovine tuberculosis and the pasteurization of milk, *M. bovis* was responsible for a significant percentage of tuberculosis cases in humans, especially in young children. In developing countries this zoonotic risk from *M. bovis* exists unchanged owing to husbandry practices and a lack of control in the cattle population. However, the ability of *M. bovis* to survive the cooking and drying processes has been unknown. The consumption of undercooked meat and biltong (from beef and game meat) has been a concern in veterinary public health[2].

We have conducted two studies to investigate the longevity of *M. bovis* in (i) spiked bovine organ and muscle tissue and (ii) in naturally occurring infected organ and muscle tissue of game animals subjected to the same cooking and drying process. Cooking was applied for 10 and 20 minutes, respectively, in accordance with recipes used in restaurants. The procedure for drying meat (biltong making) deviated slightly from commercial protocols as smaller cuts were used which could be dried under biosafe conditions in the laboratory.

The results showed that *M. bovis* could not survive the drying process of muscle nor the cooking process in spiked lung tissue but was well isolated from especially heart and muscle tissue and to a lesser extent from liver and lymph nodes. A possible explanation for the findings is the higher density of muscle tissues as compared to soft tissues like lung. In naturally infected tissues from buffalo and greater kudu neither the drying nor the cooking process applied permitted the survival of any detectable levels of *M. bovis* while it was possible to culture *M. bovis* from the untreated organ samples. However, non-tuberculous mycobacteria (NTM) were isolated from kidney, liver, heart and lymph nodes of 4 out of 7 kudu. While NTM occur predominantly in the environment and are mostly non-pathogenic, some species can cause or contribute to disease in individuals with immuno-suppression[3]. Although it is not possible to determine the significance of these findings in terms of veterinary public health risk as the NTM were not speciated, they certainly provide reason for concern. The study has shown that NTM cannot only occur in high numbers in game meat but that they can survive in food after cooking.

In summary, the consumption of cooked meat from animals infected with *M. bovis* is considered to pose a minimal risk for infection of humans with this organism, but the recovery of NTM surviving the cooking process warrants further investigation.

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Discussion/Comment:

1. BTB is now present in 14 species in Kruger National Park, including buffalo, kudu, warthog and lion.
2. Dried biltong is being exported to the USA.

NOTE: The 9th Session on Community Outreach involved a performance at the end of the afternoon by the Bennde Mutale Theatre Group. The summary report on their work can be found placed under the Seed Grant Reports - see section 3.12 above.

5. POSTER PAPERS: ABSTRACTS

5.1 Progress and challenges experienced in the establishment of TFCAs Livingstone Maluleke

No abstract available

5.2 Land claims in government-owned conservation areas: the Matshakatini Nature Reserve, Madimbo Corridor (South Africa). Clara Bocchino

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Land policy in South Africa has always been driven by economic, social and, to some extent, security issues that the country has been facing both in pre and post-apartheid governments. Up until 1994, the key piece of legislation had been the 1913 Native Land Act, which aimed at providing white farmers with suitable land for extensive agriculture, whilst serving the governmental policy of resettlements, in order to create Bantustans (Ntsebeza and Hall, 2007). These were portions of the national territory allocated to the black ethnic groups in order to reorganise the state so as to maintain racial separation. Communities were driven to marginalised lands that were unfavourable to agriculture and often located on the borders of the country, thus acting as buffer zones. During the border conflicts which saw South Africa engaged on the north-eastern borders since the independence of Mozambique, and the rise of liberation movements nationally and in Zimbabwe, security issues mingled with another national policy, particularly conservation. The extension of Kruger National Park to the Limpopo River, at the border with Mozambique and Zimbabwe, and the establishment of the Matshakatini Nature Reserve alongside the Limpopo River are clear examples of such interconnectedness. This is not simply evident from the military occupation during the conflicts, which resulted in lack of access to tourists (the key users of national parks), but also from the present exclusive military use of the Matshakatini Nature Reserve for military training purposes.

The post-apartheid governments, in trying to redress the legacy of land expropriation, have passed in 1994 the Restitution of Land Rights Act (amended in 2003), which establishes the legal instruments for the reclamation and restitution of land that had been unlawfully taken from communities for both private and public use. In relation to conservation activities, two areas were the subject of claims that were lodged as the law was implemented: the Nama for a portion of the Richtersveld National Park and the Makuleke for the northernmost part of the Kruger National Park. Although both resulted in the establishment of Contractual Parks within the existing protected areas, the land use plans were rather contrasting: the Namas were granted access for grazing and collection of natural resources (Glacovic, 1996), whereas the Makuleke decided to maintain full conservation status and nature-based tourism (Reid, 2001). The two communities that were removed from the Madimbo Corridor for the establishment of the Matshakatini Nature Reserve have also lodged and won a land claim,

which has still to be finalised despite the existence of a Land-use Plan and a Community Property Association (Linden, 2004).

This post doctoral research proposes to evaluate the effectiveness of the land restitution process involving protected areas for rural communities, using the Madimbo Corridor as a case study. The analysis will begin with a study of the body of law which led to the expropriation of communal land during the apartheid regime, through the establishment of the Matshakatini Nature Reserve to the successful land claim by the Tshikundemalema and Mutele communities. It will also look at the legislation applicable to the area for the drafting of a participatory land use plan, which takes into account community expectations and governmental objectives in the context of the Great Limpopo Transfrontier Conservation Area.

The post doctoral research will last initially for one year and may be renewed for a further two years, depending on research progress and findings.

References:

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Reid H. 2001. Contractual Parks and the Makuleke Community. *Human Ecology*, 29 (2):135-155.

5.3 Diseases and Food Safety Issues at the Wildlife / Livestock Interface

. Cheryl M E McCrindle[1], Petronella Chaminuka[2] and Shashi Ramraj[1]

[1]Dept Paraclinical Sciences, Faulty of Veterinary Science, University of Pretoria, [2]Dept of Agricultural Economics, University of Limpopo

The Kruger National Park in South Africa is bordered by low-income rural communities where poor soil and low rainfall leaves no option other than extensive livestock production for subsistence farmers. Within the conservation area, the presence of game animals provides income from tourism and sales of wildlife. In the case of private game reserves where game is culled, income is also achieved through sale of game meat. For the livestock farmer at the interface, the presence of game results in increased exposure to transboundary diseases carried by wildlife that can result in deaths or production losses. These include, among others, foot and mouth disease, corridor disease, snotsiekte, anthrax, Rift Valley fever, heartwater, bovine tuberculosis, brucellosis, West Nile fever, Congo fever and African swine fever. Biting flies, mosquitoes, midges, ticks, and certain helminth species cannot be well controlled in wildlife systems and most of these parasites will also affect livestock. Some also pose a threat to human health and food safety. It is proposed that a systems based approach and participatory risk analysis be used to estimate the risk of transmission of zoonoses via parasites, informal slaughter and consumption of both game and livestock products at the interface.

5.4 Endemic anthrax in the herbivores of Etosha National Park: a disease and movement ecology perspective focusing on zebra, elephants, and scavengers

. Wayne M. Getz[1,7], Steve Bellan[1], Justin Brashares[1], Carrie Cizauskas[1], Zepee Havarua[2], Holly Ganz[1], Peace Imologhome[2], Pauline Kamath[1], Werner Kilian[4], Martina Küsters[3], Henritha Sibanda[2], Orr Spiegel[5], Wendy Turner[1], Russell Vance[1], Royi Zidon[6]

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Anthrax (*Bacillus anthracis*) is an aerobic spore-forming bacterium that is transmitted primarily to mammals and largely through ingestion. It is endemic in Etosha National Park, Namibia, and its hosts include springbok, zebra, and elephant. Annually, towards the end of the wet season typically 50-150 plains herbivores die from anthrax, while elephant mortality from anthrax (typically 5-20)

occurs primarily towards the end of the dry season. With contrasting endemic disease dynamics in elephants versus other plains herbivores, the Etosha system provides an ideal model system for exploring the role of environmental and host factors in sustaining anthrax. Transmissibility of anthrax is seasonal and depends both on the movement ecology of individuals and on their relative susceptibility. The latter is influenced by the following: body condition, nutritional status, stress level, and immune status; genotype with respect to MHC loci, a toll-like receptor R2, and an anthrax toxin receptor; and seasonally varying intensity of co-infection by gastrointestinal (GI) parasites, primarily species of strongyle nematodes and coccidia of the genus *Eimeria*. In this poster we outlined the various genetic, immunological, and ecological studies that we are undertaking to provide insight into the timing and intensity of anthrax outbreaks.

5.5 The SANParks People Objectives – Research and Management. Louise Swemmer.

Scientific Services, South African National Parks, Phalaborwa louises@sanparks.org

SANParks Mandate: "*To acquire and manage a system of national parks that represents the indigenous wildlife, vegetation, landscapes and associated cultural assets of South Africa, for the joy and benefit of the nation*"

The ultimate measure of effective protected area management is the degree to which biodiversity has been successfully conserved for the benefit of current and future generations. Historically, conservation areas have influenced human society in a multitude of ways. These impacts, both positive (including economic and financial benefits through job creation and ecotourism opportunities) and negative (including restricted access to natural resources, conflict with damage causing animals and exposure to human and animal disease and health issues), are still evident today and continue to operate over a range of spatial and temporal scales. In order to strive towards achieving sustainability in conservation it is important for SANParks to prioritise understanding these impacts in order to use the most effective tools to realize and maximize the benefits, while acknowledging and minimizing the disadvantages. In SANParks, the adaptive management approach is used whereby management objectives are articulated in various degrees of detail in the form of an objectives hierarchy. Targeted research programmes inform the evaluation of the degree to which each objective is successfully being achieved, using appropriate measuring tools which ultimately guide the adjustment of the objectives and measurables throughout the learning process. By working together with external research collaborators from various institutions and networks, the SANParks Social Science Research Programme aims to improve our understanding of how people are influenced and impacted on by their environment, how this affects their societal relationships and ultimately how this affects human well being and conservation practice in order to promote the effective management of protected areas for the benefit of people. Through collaboration with the AHEAD programme, a priority objective pertaining to challenges at the interface of wildlife health, livestock health and human health and livelihoods is being addressed.

5.6 Value of *Neorautanenia amboensis* (Schinz) as feed for cattle during drought in southeastern Zimbabwe. C. Murungweni, J.A. Andersson, M. van Wijk, I. Gwitira, K.E. Giller and E.M.A. Smaling

Wageningen University, The Netherlands

Cattle play an important role in rural livelihood systems of drier regions, but cattle are increasingly facing starvation and death during drought years because of limited feed options. In southeastern Zimbabwe, *Neorautanenia amboensis* (Zhombwe in vernacular) was recently discovered by local farmers under Chief Sengwe to be an important dry-season feed option. Zhombwe is not yet properly characterised as livestock feed. In this research, Zhombwe was characterised by determining its feeding value and by describing its occurrence. Feeding value of Zhombwe was determined by examining its chemical composition, digestibility properties and antihelminthic value. Proximate analysis was done on 20 tubers that were randomly selected from four different sites in Sengwe communal area to determine chemical composition of Zhombwe. Digestibility properties were determined using *in vitro* Tilly and Terry methods. To determine antihelminthic value of Zhombwe, two treatments were used on two groups of 7 young female goats. Treatment 1 was the positive

control treatment, composed of the recommended dosing strategy using the dosing chemical called 'Closavet'. Treatment 2 was the test treatment composed of farmers' practice of feeding Zhombwe to goats 4 times a week. Occurrence of Zhombwe was described in relation to land disturbance, vegetation cover and soil type.

From general observation that Zhombwe occurs more in cultivated or previously cultivated areas, cultivated fields in the study area were digitised from an Aster image of 2007 in a Geographic Information System environment. The area of cultivated fields in each ward was calculated in order to determine the area to be sampled for Zhombwe counts. The sampled fields were then converted into points that were then selected randomly in a GIS using the random point selector in ArcView 3.2. In the field the location of each field was navigated to using a GPS and for each point, quadrats of 30m by 30m were used to count the number of Zhombwe plants. In order to find out the occurrence of the plant in undisturbed areas, quadrats of similar size were also used 50 metres away from the cultivated field and the number of Zhombwe occurrence were counted East, West, South and North of the selected field. Zhombwe was found to meet minimum requirements for maintenance of cattle in its chemical composition. Roundworm infected goats on Zhombwe treatment reduced load of roundworms in similar way to the conventional closavet treatment in affected goats. The percentage occurrence of Zhombwe in quadrats was over 50% (on average) in eutric vertisols, around 20% in chromic luvisols, eutric fluvisols and eutric leptosols but below 10% in ferralitic arenosols, leptosols and eutric cambisols.

5.7 The presence of *Cryptosporidium* spp. in wild mammals in the Kruger National Park, South Africa.

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Prevalence of *Cryptosporidium* spp. oocysts in faecal samples from three wildlife species - elephant (*Loxodonta africana*), buffalo (*Syncerus caffer*) and impala (*Aepyceros melampus*) - from the Kruger National Park (KNP) and an adjacent private game reserve (Sabi Sand) was determined using the modified Ziehl Neelsen staining technique (ZN). All samples that tested positive with ZN were confirmed with a direct immunofluorescent antibody test (IFA) and a real time PCR (q PCR) technique.

A total of 446 faecal samples from wildlife were collected in three different areas of the park during the dry season in May/June 2008. Two of the study areas (Skukuza and Sabie Sand) were in close proximity to the western boundary fence and the third study area (Tshokwane) was located in the center of the KNP.

Overall prevalence in wildlife was 11.8% (33/278) when tested with the ZN technique and 6.5% (18/278) after confirmation with IFA test or PCR. *Cryptosporidium* spp. prevalence was highest in elephants using both the ZN technique (26.3%, 24/91) and the IFA or PCR (14.3%, 13/91). They were followed by buffalo (ZN 5.5%, 5/9; IFA/PCR 2.2%, 2/91) and impala (ZN 4.1%, 4/96; IFA/PCR 3.3% ; 3/96).

A significantly higher prevalence of *Cryptosporidium* spp. ($P = 0.01$) was observed in the two study areas adjacent to the western boundaries of the KNP: Skukuza (8.5%) and Sabie Sand (7.3%), compared to the area inside the park: Tshokwane (3.3%).

This study demonstrates for the first time the presence of *Cryptosporidium* spp. in wildlife in South Africa, particularly in elephants living in the areas adjacent to rural communities. Our results suggest that transmission of this parasite between wildlife species, domestic animals and humans is a plausible hypothesis.

5.8 Key perceptions and needs of communal livestock farmers in the Bushbuckridge district adjacent to the Greater Kruger National Park, South Africa. Van Rooyen, J.[1]; Vandamme, E.[2]; Madder, M.[2]; Webb, E. C.[3], Coetzer, J. A. W.[1]; Van den Bossche, P.[1,2] and Kriek, N. P. J.[4]

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The Mnisi Community Programme is aimed at improving the livelihoods of livestock farmers and the general community within the traditional boundaries of the Mnisi Traditional Authority. The study area comprises approximately 30 000 ha in the most northern corner of the Bushbuckridge district adjacent to the Greater Kruger National Park.

Five focused group discussions with livestock owners were used to collect qualitative data about major perceptions of livestock farmers in general. Perceptions about the adjacent game parks (mainly Andover and Manyeleti) were generally rather negative. Most farmers (4/5 groups) felt that the reserves should be used for grazing and farmers in two of the five groups believed that disease transmission from wildlife to cattle, when grazing together, will not be a threat.

Quantitative data were collected by means of a comprehensive questionnaire-based survey targeting cattle owners in the study area. Results indicated that 58% of the respondents (N=140) had a problem with the surrounding reserves. Fifty percent of respondents felt that reserves could help the community in the form of job creation. In contrast to the focused group discussions only 8% of respondents stated that the reserves could help by allowing farmers to graze their cattle in the reserves during droughts.

The study identified the major perceptions of livestock owners in the community and provides conservationists with a better understanding of the perceptions of the surrounding communities and how to best interact with communal farmers. Results further emphasized that qualitative data on people's perceptions should be substantiated with quantitative data.

5.9 Population trends of large herbivores in the Gonarezhou National Park and surrounding communal lands, southeast Zimbabwe, between 1989 and 2009. Edson Gandiwa [1, 2], Ignas M.A. Heitkönig [1], Herbert. H.T. Prins [1], Amon Murwira [3] and Cees Leeuwis [4]

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The understanding of population changes is a central issue for managing large herbivores. We collated aerial census data collected from 1989 to 2009 for large herbivore populations in the Gonarezhou National Park (GNP) and communal lands surrounding the park in the southeast lowveld of Zimbabwe. The long-term aerial survey data revealed that some large herbivore populations, for example, elephants (*Loxodonta africana*), buffalo (*Syncerus caffer*), kudu (*Tragelaphus strepsiceros*) and zebra (*Equus burchelli*), in the GNP and communal lands surrounding the park have significantly increased since the 1991/92 drought. In contrast, other large herbivore species, for example, giraffe (*Giraffa camelopardalis*) and impala (*Aepyceros melampus*), did not show significant population increases after the 1991/92 drought. Additionally, we present some critical notes on (i) aerial survey methods used in large herbivore counts, and (ii) the impact of top-down direct human activities, i.e., bushmeat hunting, on large herbivore populations particularly inside the GNP. Our preliminary findings suggest the need for the following: (i) continued and consistent monitoring of large

herbivore populations and (ii) concrete and appropriate conservation efforts to favour sustainable large herbivore population increases inside the GNP and communal lands surrounding the park within the southeast lowveld of Zimbabwe.

5.10 Just like medicine but fun – a 'One Health' medical and veterinary student interaction in rural South Africa. Greg Simpson and Mosa Moshabela

The University of Pretoria's (UP) Veterinary Faculty and the University of Witwatersrand's (Wits) Medical Faculty have been involved in a practical and theoretical based interaction with their respective students in the rural district of Bushbuckridge, Mpumalanga Province, South Africa for the last year. This poster is a description of their activities, the lessons learned and the future possibilities. The interaction involves lectures on "Ecology and Health" and "One health – for health students," a guided visit to a primary health care clinic and animal health care centre, a talk by a traditional healer, practical work at a diptank and a health assignment after game viewing in the Kruger National Park. Students and lecturers see the interaction as enjoyable and educational. The medical students have an increased awareness of the veterinary science discipline and diseases shared between humans and other animals. The veterinary science students gain from having greater understanding of the public health system, exposure to public health programs and clinical human medicine. The objective of the interaction is to improve the ability of future health practitioners to control disease on a multi-species level and to work at a multi-disciplinary level. The need to document the response to the interaction and its possible impact will be looked at this year.

5.11 A progress report: wildlife rabies vaccination campaign in the Orpen State veterinary area. Ferreira du Plessis

During the period 1977 to mid 2008 twenty-three cases of rabies were confirmed in the Greater Kruger Conservation Area. Except for the one side-striped jackal, all of the cases were in stray domestic dogs. In 2008 rabies spread from the endemic Nkomazi area via Nsikazi to the Bushbuckridge (BBR) area. Unlike Nkomazi, both Nsikazi and Bushbuckridge border the Greater Kruger Conservation Area. To the north and south of Bushbuckridge are found private and provincial nature reserves on the western boundary of Kruger National Park. In the first two months of 2009 nine out of eleven stray dogs were confirmed rabid and two lions were destroyed after killing a rabies positive dog. These reserves rely on tourism and have a large predator population. A predator vaccination campaign started in March 2009 focusing on lion, leopard, wild dog, hyena and where possible jackal. Fortunately the jackal population is not high. Animals were darted with drop out darts that delivered 1.5 ml of a killed rabies vaccine intramuscularly. This was followed up a month later with a booster. Some animals were marked and immobilized after 30 to 40 days post first vaccination to measure seroconversion. Of the 56 stray dogs, 52 were tested of which 41 positive in this particular reserve for the year 2009. Furthermore there were nine confirmed cases where lion, leopard or hyena killed or wounded rabid dogs.

5.12 Waterhole use patterns by wild and domestic herbivores in a savanna semi arid environment. Mark Zvidzai[1], Amon Murwira[1] and Michael Degarine Wichatitsky[2]

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In arid and semi arid environments, resource managers have long assumed that surface water is a primary limiting factor for both wild and domestic herbivore species (Rosenstock 2005). Availability of water varies spatially and temporally due to meteorological and soil factors as well as the intensity of use by wild and domestic stock. Consequently, this determines spatial and temporal drinking patterns of wild and domestic herbivore species. Surprisingly, despite the significance of water holes in structuring savanna ecosystems, the spatial and temporal waterhole use patterns that may characterize interactions between wild and domestic herbivore species have received little previous study. With wild and domestic stock sharing the same ecosystems, the landscape is changing and novel challenges are emerging.

In this study we predict that during the dry season, when water is scarce, permanent water sources are focal points where wild and domestic species congregate to access water, whereas during the wet season, the ideal free distribution theory (Fretwell and Lucas 1970, Parker 1970) can be a useful basis for explaining herbivore distributions. In exploring this hypothesis, we use data from Gonarezhou National Park and the surrounding communal areas.

Our study provides no evidence of interaction between wild and domestic stock at waterholes inside or outside the park across the seasons. However there was evidence of spatial and temporal niche use overlap between cattle and small antelopes like impala at the waterhole located at the park boundary.

5.13 Rangeland utilisation within the home range of cattle, Malipati Communal Land, Zimbabwe. Zengeya, F.[1], Murwira, A.[1] and de Garine-Wichatitsky, M.[2]

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Movement patterns of cattle, as well as rangeland utilisation, are dependent on the availability of grazing resources within the home range (HR). This becomes critical during times of resource scarcity such as the dry season. Thus, it is critical to understand how cattle utilize grazing space during the dry season in communal areas where there is limited influence by the herder. In this study we monitor dry season movement of cattle (August-October) using GPS collars placed on three cattle herds in Malipati Communal Land, which lies adjacent to Gonarezhou National Park. In addition, we characterize the land cover types within the HR and core areas of the cattle using satellite remote sensed data. We then relate the movement of cattle with land cover types within the home range and core areas. The HR of cattle was estimated using the kernel density method, where HR was defined as the 90% probability contour and the core area as the 50% probability contour. Preliminary results show that within the HR the cattle herds displayed preference for wooded grassland compared to other land cover types. However within the core areas the riparian woodlands were preferred, followed by wooded grassland, whilst the fields were less used. Considering that this is the late dry season it could explain why cattle were less frequent in the fields as there is a decline in crop residues. In addition, cattle herds also used the park as part of their HR. Thus conservation areas cushion surrounding communities during times of resource scarcity, such as during the dry season.

6. CONCEPTUAL FRAMEWORKS

10th Session: Conceptual Frameworks and Interdisciplinary / Transdisciplinary Progress in the AHEAD-GLTFCA Programme. How is the TFCA doing? How can AHEAD-GLTFCA best assist? Moderators: Markus Hofmeyr and David Cumming

6.1 AHEAD-GLTFCA Conceptual Frameworks Revisited (David Cumming)

A short power point presentation outlined the initial development of the AHEAD-GLTFCA in 2003/04 and the subsequent revised framework of 2007, which was included in the documentation for the meeting. It is also available at http://www.wcs-ahead.org/documents/gltfca_revisited.pdf. The presentation ended with two slides, one outlined the issues raised at the last Working Group meeting in March 2009, while the second raised issues to be considered in 2010.

March 2009 Issues

- Is the conceptual framework still useful?
- Has anyone here used it?
- Critical comment?
- Does it need revisiting / changing?
- How pertinent is the approach within the context of impending climate change? Or other changes?

February 2010 Issues

What needs more attention?

- Climate change and adaptive strategies
- Scale issues
- Cross-scale influences
- Policy

This was followed by comments from keynote speakers and an extended discussion.

6.2 Commentary from keynote speakers and open discussion

1. If we examine the triangle of human/domestic animal/wildlife health there has been a fair amount of work on the interface between wildlife and livestock health, but the link between human and domestic animal health has been weak. There is a continuing tendency to operate in different silos. Social issues, and particularly research on governance, need to be included.
2. How sustainable is the TFCA process when there are few tourists? We are not seeing the wood for the trees. In Zimbabwe, with very few tourists a TFCA cannot be supported - this is a fundamental issue. This comment captures the issue of cross scale influences on the development of the TFCA where national policies affect local regional development.
3. At a global level, when the threat was perceived to be great enough, as in the case of avian influenza, animal and human health professionals set up an integrated task force. There are also national avian influenza task forces that could be extended to link a wider range of human and animal disease specialists and develop the needed interdisciplinary approaches.
4. Training and curriculum development could also be revised. For example, if veterinary and medical students could share a common curriculum for the first three years and specialise thereafter, greater integration may be achieved. (This is happening in some places.)
5. The provision and management of water in relation to environmental, human and animal health (catchment health) could provide a unifying theme.
6. Taking the triangle of human, domestic animal and wildlife health we need to recognise that there has to be some compartmentalisation. The challenge is to pull these together and this is surely a primary role for AHEAD, which should position itself at the centre of that triangle or pyramid.
7. Scale mismatches were not fully considered when the AHEAD programme began. Events such as SARS have stimulated a reappraisal of approaches and thus the "One Health" concept has developed and changed. The human-animal links are still weak but have changed, particularly in the AHEAD programme. Doctors tend to work at the micro level of individual patients and there is a need to put more effort into drawing in public health professionals and epidemiologists who deal with health issues at larger scales.
8. The scope of the AHEAD Projects "Wiki" needs to be broadened to include proposals, outlines of projects, health economics, etc.
9. There may be a sustainability/leadership problem in that there is no single person in the region to actively stimulate the linkages that need to be established between the disciplines and to involve every member of the group.
10. The sustainability of TFCAs will be in doubt if they rely solely on tourism. A wide range of additional "products" from these areas are possible, including protein production from wildlife and integration of livestock into multispecies systems.
11. There is a misconception that TFCAs refer only to wildlife and that wildlife in these areas will support those living within them. TFCAs necessarily encompass a wide range of land uses and the potential contribution of ecosystem services from these areas to human livelihoods has been neglected. This also raises the issue of who pays for ecosystem services and the need to involve the private sector.

12. Cattle are an important component of the livelihoods and culture of people living within the TFCA and there is a need to find ways of accommodating both livestock and wildlife systems within these areas, i.e. the development of multispecies systems. An example is the integration of wildlife and livestock in Laikipia in Kenya.
13. The focus of the AHEAD programme is on health of the system rather than on disease *per se*, which is a factor within the programme rather than a driver. The programme is looking at health in relation to the development of healthy systems. WCS has recently reviewed public health impacts of ecological degradation and the document ("Illustrative Bibliography for Exploring Health as an Ecosystem Service": January 2010 Compilation) will be circulated to participants and is available online at http://www.wcs-ahead.org/print.html .
14. There is a new IUCN Transboundary Conservation Specialist Group that falls under the IUCN Commission on Protected Areas.
15. For most people "wildlife = lions and elephants," "livestock = cattle," and "people = communities." Whereas in reality these components are highly complex and there is a need to disaggregate them, and particularly in the case of people, who are so often lumped under "community." The role of social sciences in this respect is important and TPARI (Transfrontier Protected Area Research Initiative - see link to paper on the AHEAD website under archived AHEAD Updates or at http://www.plaas.org.za/publications/ebooks/guidelines_TPARI.pdf/view) provides guidelines for engaging with rural communities in TFCAs.
16. The widespread optimism that tourism represents a pot of gold in the development of transfrontier national parks and their associated TFCAs has not been realised. There is clearly a need to review the management plans of these areas and particularly those relating to the Limpopo National Park and the unrealistic projections for tourist numbers. Other forms of generating revenue for protected areas, such as hunting and share holdings, need to be examined, as do the trade-offs between alternative land uses and tourism options within the TFCA.
17. We need to move away from the notion that without tourism there can be no TFCAs. In KAZA, for example, the major focus can, and perhaps should, be on catchment management, which is at a level at which countries can work together to achieve larger ecological and social gaols. A focus on catchment management provides a strong basis for multidisciplinary work and better ecosystem management.
18. Dealing with the issue of human/wildlife conflict is crucial in the further development of TFCAs.
19. The social links between communities and government administrations must be addressed. Health is closely linked to social processes and often community priorities are not necessarily those of health. Priorities will vary from place to place and have to be dealt with at a local level. There is a need for greater investment in research around protected areas than within them.
20. In addressing the issues of scale it is necessary to recognise that resource management in communal lands occurs at the household level and interventions need to facilitate management at the local level. Management interventions at larger scales can have adverse impacts at the local level. There is an opportunity, within the AHEAD programme, to integrate across scales for local development to be positively influenced.
21. Enough time has been spent on identifying problems and questions. We now need to identify the key issues and make effective use of this pool of expertise. One of the benefits is that there are specialists within the group that can work on particular issues, focus on priorities and report back to the larger working group. In this way cross-pollination between disciplines can be achieved. A first step may be to set up working groups within the AHEAD-GLTFCA initiative and to develop short and long term strategies.

6.3 Administrative matters, MOUs, LoUs, web-based 'wiki' Projects Table, funding, AOB, next meeting (volunteer hosts?), etc.

6.3.1 ***Letters of Understanding*****.** Twenty-four letters of understanding have now been signed by organisations participating in the AHEAD-GLTFCA initiative. These are available on the website and can be used as indicators of support when submitting grant proposals.

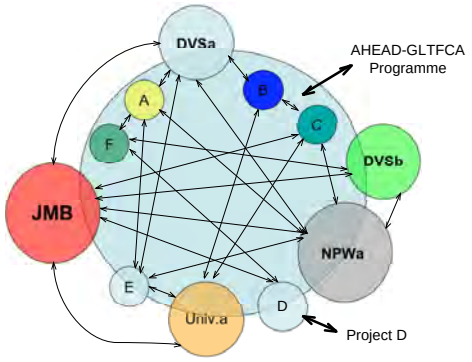
6.3.2 Projects 'Wiki' Table. A table providing information on projects being carried out within the GLTFCA has been established on the AHEAD website. The intention of the table is to maintain up to date information on research and development projects within the GLTFCA together with the contact details of those engaged in the work. Peter Lindsey developed a list of projects for the JMB two years ago. Members are welcome to add their own project to the table. If there are any problems in using it please contact Steve Osofsky.

6.3.3 Institutional arrangements for the AHEAD-GLTFCA initiative. This topic has been discussed each year at the annual working group meeting without any firm resolution to change from the status quo of being an informal collaborative network of individuals and organisations. David Cumming presented a set of six slides, which outlined previous suggestions and discussion on the topic:

AHEAD-GLTFCA: Institutional Arrangements

Building a collaborative research programme

- Collaborative Group
  - Joint letter of intent to collaborate
  - Simple MOU signed by collaborating agencies to form a collaborative alliance/partnership to cooperate in a particular research programme.
  - Signatories retain individual identity in financial and administrative arrangements and in the receipt and disbursement of funds

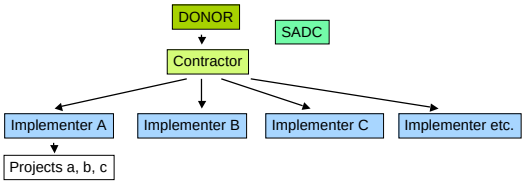


AHEAD-GLTFCA Structure – Working Group Meeting, June 2004

AHEAD-GLTFCA: Institutional Arrangements

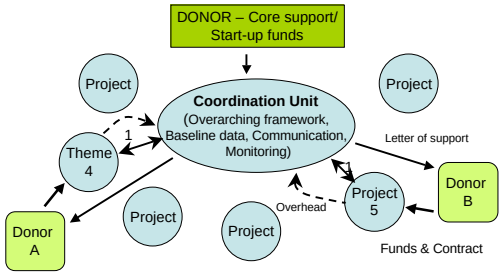
Contractual implementing partnerships with Donor(s)

- Implementing Consortium
  - Lead contracting/lead agency with donor (Institutional home?)
  - Implementing partners – formal contractual MOUs with lead agency to implement selected programme components



AHEAD-GLTFCA: Institutional Arrangements

Coordination unit + satellite themes/modules/projects

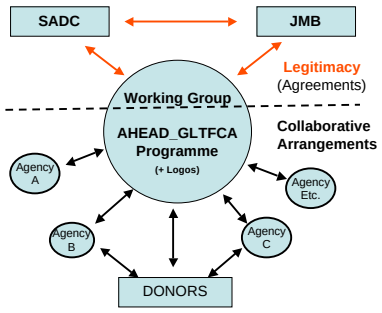


1 = letter/MOU of collaboration

AHEAD-GLTFCA: Institutional Legitimacy

Official endorsement of AHEAD-GLTFCA Programm

- SADC
- Tri-National (e.g. JMB)
- National Departments (e.g. Agric., Nat. Res., Vet. Serv.)
- National Institutions (University Depts./Faculties/Govt. Agencies)



Despite the study carried out by Peter Lindsey and the JMB's intention to establish a policy on conducting transboundary research within the GLTFCA, problems still remain in gaining permission to do so in terms of each country's requirements.

At the moment there is too much focus or reliance on the annual AHEAD-GLTFCA Working Group Meeting, which raises expectations and questions about how to take things forwards. Participants need to consider what they can do on a daily basis to take the initiative forward.

Discussion/Comment:

1. *Q:* Are the outcomes of AHEAD-GLTFCA meetings conveyed to the JMB? *Ans:* Not in a formal way. Some members of the JMB Conservation and Veterinary Sub-Committee are here and last year the JMB coordinator attended the Working Group Meeting. We do need JMB members to be here. The idea of an AHEAD-GLTFCA - JMB MOU has been discussed in the past.
2. *Q:* Why are Zimbabwe National Parks head-office not represented here? *Ans:* They receive an invitation each year, as do all of those on the Working Group mailing list. This is an open meeting and anyone who wishes to attend can do so. However, Dr. Foggin, who chairs the Zimbabwe Conservation and Veterinary Sub-Committee is here.
3. In part we are dealing with knowledge harvesting and the question of how to get information to the authorities involved. The website is clearly a help but more needs to be done. A communications strategy, as discussed last year, is needed.
4. The JMB is fortunate that the AHEAD meetings do take place and it is crucial to get the reports from the meeting to them and to involve senior people from the respective national parks organisations.
5. In Chad, as an example, the state and central government officials do not reach much beyond the capital city. It is essential to involve local officials and others such as district medical and veterinary officers. If you can't liaise centrally try local authorities at district level. It was noted that the Limpopo Transboundary Programme is currently facilitating the establishment of a transboundary forum, involving district and traditional leaders from the three countries.
6. A potential solution may be to package specific activities and initiatives within smaller core groups that can meet more frequently during the year.
7. Should we change? The present arrangement is working well and "if it is not broken don't fix it."
8. Steve Osofsky noted that it is WCS's vision to catalyse the development of AHEAD programmes in TFCAs, for these programmes to be owned locally and, once they are up and running, for WCS to step back. WCS is presently helping to establish an AHEAD programme for the KAZA TFCA and Mark Atkinson has been appointed to facilitate this effort over the next few years. SANParks did appoint a full-time co-ordinator for the GLTFCA but this position has recently fallen away. Some of the key activities that need to be taken up now by a local management or coordination team are those of grant writing and finding funds to support the network and its future development, as well as communications between members and the authorities in the three countries. For example, WCS presently does not have funding to support the next annual meeting or a continuation of the seed grants that have been so valuable. Many of the students attending this meeting were supported by a grant to WCS from the Rockefeller Foundation, for example.

   SANParks is presently continuing the coordination role with several staff involved. However, SANParks is not claiming ownership and would be happy to involve anyone interested in assisting with, or in taking on, the coordination role.

6.3.4 Next meeting. It was agreed that the next meeting should take place in Zimbabwe if possible. The nearest venue to the GLTFCA within Zimbabwe that could host the meeting was probably the

hotels at the Zimbabwe Ruins. Funding to support the meeting and the attendance of students would need to be found. It was also noted that the Casa do Sol had been an excellent venue. It was central and approximately120 people had been well accommodated in the area.

6.3.5 Thanks and closure. Markus Hofmyer expressed his thanks to Steve Osofsky and David Cumming for their respective roles in organising the meeting and the agenda and to the donors for their support for the seed grants and for the meeting itself. He also thanked the keynote speakers, those who presented papers and posters, and to all attendees for their contributions. Meg Cumming and Mary-Louise Penrith were thanked for taking notes of the discussions throughout the meeting. A special thanks was extended to Merle Whyte for her excellent handling of the administrative and logistical arrangements.

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10th *AHEAD*-GLTFCA Working Group Meeting

24-26th February, 2010

Venue: Casa do Sol Hotel & Conference Centre
(Hazyview, Mpumalanga, South Africa)

NOTE: *Listed presenters of technical topics are kindly asked to prepare a one page summary ahead of time and circulate these and any additional material before the meeting, or have materials ready to distribute at the start of the meeting. Thank you in advance for your time and contribution.*

A note on the new structure for this Animal & Human Health for the Environment And Development (AHEAD) Great Limpopo Transfrontier Conservation Area (GLTFCA) Working Group Meeting-

This year's meeting includes three components: a one-day symposium of invited scientific papers and offered poster papers; a second day of final reports on AHEAD-GLTFCA Seed Grant projects, offered papers and posters; and a final morning session on conceptual frameworks and improving interdisciplinary / transdisciplinary research and development in the GLTFCA.

The focus for the first day is on invited single- and multi-author papers that we hope to have published as a special feature in a selected peer-reviewed journal. Following an opening keynote address on Day 1, there are three Day 1 symposium sessions: **Emerging and Transboundary Diseases**; **Ecology, Land-Use Mosaics and Transboundary Natural Resource Management**; **Economics and TFCAs**; and a concluding discussion session on **One Health**. Offered posters within these topics, and breaks to view posters, are included in the Day 1 symposium.

The second day includes reports from AHEAD-GLTFCA Seed Grant projects and offered papers and reports on progress from members of the AHEAD-GLTFCA Working Group. There will also be a further opportunity to view and present posters. An evening performance is planned from the Bennde Mutale Community Theatre Group, work that has been supported by one of the Seed Grants.

The final morning includes a working session on conceptual frameworks and how, going forward, the AHEAD-GLTFCA initiative might best contribute to supporting interdisciplinary applied research and development in the GLTFCA. Administrative matters relating to the initiative will also be covered briefly.

The following draft programme is based on the above considerations.

Blue items indicate AHEAD website-available PDFs of presentations

Day One: Wednesday 24th February - Interdisciplinary TFCA Symposium

Moderator: David Cumming

0900: Opening and welcome (Hector Magome, Markus Hofmeyr)

0910: Introductions- around the room, quickly!

0930: ***Keynote Address*:** Professor Jakob Zinsstag, "One Health – A Global Perspective"

1015: Discussion

1030: Tea/Coffee break

1st Session: Emerging and Transboundary Diseases

All remaining Day 1 presenters are requested to please leave at least 5 minutes of their allotted time for questions and discussion.

1100: ***Keynote Review Paper*:** "Emerging and Transboundary Diseases in Southern Africa" (Roy Bengis)

1130: "Emerging and Transboundary Diseases in the GLTFCA region – Current Research Results and Ongoing Management Challenges" (Markus Hofmeyr, Peter Buss, Roy Bengis, Lin-Marie de Klerk, Louis van Schalkwyk, Chris Foggin and Agostinho Nazare)

1155: "Using the Community of Pathogens to Infer Inter-specific Host Epidemiological Interactions at the Wildlife / Domestic Animal Interface: A Tool for Exploring Emerging Disease Processes in their Hot Spots" (Alexandre Caron, Serge Morand and Michel de Garine-Wichatitsky)

1220: "International Animal Health Policy and *One World, One Health*™: Current Incompatibilities and Potential Solutions" (Gavin Thomson, Mary-Lou Penrith and David Parry)

1245: **Poster Viewing**

1300: Lunch Break

2nd Session: Ecology, Land-Use Mosaics and Transboundary Natural Resource Management

1400: ***Keynote Review Paper*:** "Scale Issues in the Design of Transfrontier National Parks and Conservation Areas in Southern Africa: Implications for Conservation and Natural Resource Management" (Harry Biggs, David Cumming and Edwin Muchapondwa)

1430: "Ecosystem Productivity in Relation to Land Tenure and Land Use in the GLTFCA" (Godfrey Pachavo and Amon Murwira)

1455: "Catchment Health, Rivers and the GLTFCA" (Steve Mitchell, Danny Govender and Danie Pienaar)

1520: Coffee/Tea Break and View Posters

3rd Session: Economics and TFCAs: Livelihoods and Conservation and Issues of Costs, Benefits and Trade-Offs

1610: "Tourism in Transfrontier Protected Areas as Related to Poverty Reduction" (Anna Spenceley, Ritah Tusabe and Straton Habyalimana)

4th Session: Forum - Back to *One Health*: How Do We Bring It All Together?

1640: 3 minute overview of key points from the Keynote Speaker and Keynote Review Paper Presenters (or selected rapporteurs), followed by an open, facilitated discussion

1705: **Closure for the day. Please note tomorrow's 8:30AM start!**

Day Two: Thursday 25th February - Reports from Seed Grantees, and Offered Papers and Posters

5th Session: AHEAD-GLTFCA Seed Grant Final Reports

Moderator: Steve Osofsky

0830: "Skills Development for Disease Monitoring in the Great Limpopo Transfrontier Conservation Area (GLTFCA) – Capacity Building for Wildlife Disease Diagnostics" [Emily Lane, Mary Louise Penrith (National Zoological Gardens, Pretoria); Rosa Costa (Agriculture Research Institute, Maputo); and John Lawrence (Faculty of Veterinary Science, University of Pretoria)]

0850: "Zoonosis at the Interface: Lion (*Panthera leo*) Bovine Tuberculosis Overview and Analysis Workshop" (Yolan Friedman, Brenda Daly, Markus Hofmeyr and Peter Buss, Endangered Wildlife Trust and South Africa National Parks)

0910: "Pathogens, Parks and People: The Role of Disease in TFCA Development" (Elissa Cameron, Claire Geoghegan and team, University of Pretoria Mammal Research Institute)

0930: "Improvement of Village Poultry Health and Production by Communities in the Limpopo National Park Support Zone in Gaza Province, Mozambique" (Robyn Alders and team, International Rural Poultry Centre, KYEEMA Foundation)

0950: "Balancing Ecotourism and Livestock Production: Implications for Livelihoods and the Environment" (Cheryl McCrindle and Petronella Chaminuka, University of Pretoria, Wageningen University and University of Limpopo)

1010: Q & A and discussion on Seed Grant work: Where to next? What important questions (and / or answers) have arisen, etc.? Again, with a brief summary of key points and issues by an appointed discussant /rapporteur.

1030: Tea/Coffee Break and View Posters

6th Session: AHEAD-GLTFCA Seed Grant Final Reports (continued)

Moderator: Steve Osofsky

1100: "A Comparative Study of Institutional Arrangements for Small-Scale Livestock Farmers in Communities in the GLTFCA" (Jeanette Manjengwa and team, University of Zimbabwe Center for Applied Social Sciences)

1120: "Exploring Future Ecosystem Services: A Scenario Planning Approach to Uncertainty in the South East Lowveld of Zimbabwe" [Chaka Chirozva, Cees Leeuwis (Wageningen University) and Billy Mukamari (University of Zimbabwe Center for Applied Social Sciences)]

1140: "Alternative Sustainable Futures for Post-Resettlement in the Limpopo National Park, Mozambique" (Jessica Milgroom and Ken Giller, Wageningen University)

1200: "Land Use Alternatives and Livelihood Viability in Ecosystems at Risk of Emergent Animal Diseases" (Brian Child, Gregory Parent and Jessica Musengezi, University of Florida)

1220: Q & A and discussion on Seed Grant work: Where to next? What important questions (and / or answers) have arisen, etc.? Again, with a brief summary of key points and issues by an appointed discussant /rapporteur.

1240: **GROUP PHOTO, and Lunch Break (and then on to Poster Session)**

7th Session: Offered Papers / Progress Reports from the Field / Posters

Moderator: David Cumming

1340: **Poster Session**

1410: "Foot and Mouth Disease (FMD) Outbreak and Response in the GLTFCA Region" (Bjorn Reininghaus)

1425: "Activities of the *Research Platform – Production and Conservation in Partnership* (RP-PCP) at the Wildlife / Livestock Interface in the South East Lowveld of Zimbabwe: An Overview and Updates on Disease Prevalence and Contacts between Wild and Domestic Ungulates" (Michel de Garine-Wichatitsky, Alexandre Caron, Amon Murwira, Fadzai Zengeya, Mark Zvidzai, Timothy Dube, Calvin Gomo, Davies Pfukenyi and Patience Zisadza)

1440: "Vulnerability of Crop-Farming Households in Drought-Prone South-Eastern Zimbabwe" (Chrispen Murungweni, Eric Smaling, Mark van Wijk and Ken Giller)

1455: "Drivers of Fence Permeability in Kruger National Park" (Ken Ferguson, Laura Adam and Ferran Jori)

1510: "Incorporating Climate Change into Conservation Planning for the SADC Region: Perspectives of a Climatologist Working in Conservation" (Anton Seimon)

1525: Q & A

1530: Tea/ Coffee Break and View Posters

8th Session: Offered Papers / Progress Reports from the Field

Moderator: Mike Kock

1615: "Beyond Livestock: Broadening FAO's Approach At the Livestock / Wildlife / Human Health Interface" (Susanne Munstermann and Scott Newman)

1630: "New Regional OIE Collaborating Centre for Integrated Training in Livestock and Wildlife Health and Management" (Koos Coetzer, Peter Van den Bossche, Eddie Webb, Johann Kirsten, Richard Burroughs, Anthony Musoke, Janusz Paweska and Mike Modisane)

1645: "Can BTB Hide in the Beef and Game Meat We Eat?" (Maretha Van der Merwe and Anita Michel)

1700: Q & A

9th Session: Community Outreach

1715: Community Outreach and Scenarios: Introduction by ResourceAfrica (Chunky Phiri) and performance by Bennde Mutale Community Theatre Group

1815: **Closure for the day. Please note tomorrow's 8:30AM start!**

Day Three: Friday 26th February - Conceptual Frameworks and Progress

10th Session: Conceptual Frameworks and Interdisciplinary / Transdisciplinary Progress in the AHEAD-GLTFCA Programme. How is the TFCA doing? How can AHEAD-GLTFCA best assist?

Moderator: Markus Hofmeyr

0830: "AHEAD-GLTFCA Conceptual Frameworks Revisited, & Institutional Arrangements" (David Cumming)

0900: Commentary from keynote speakers (3-5min each)

0930: Open discussion: Issues relating to interdisciplinary / transdisciplinary research and state of information-sharing within and between countries

1000: Open discussion on applying knowledge: What actions can we take to improve conservation and development outcomes with a focus on system health?

1030: Tea/Coffee Break and View Posters

1100: Administrative matters, MOUs, LoUs, web-based 'wiki' Projects Table, funding, AOB, next meeting (volunteer hosts?), etc.

1130: Closing Discussion: Ideas and Thoughts on Future Directions for the AHEAD-GLTFCA initiative (led by Markus Hofmeyr and SANParks colleagues)

1200: Thanks and closure**. Lunch on your own, departures. (Posters taken down by authors.)**

Posters Displayed:

* "Progress and Challenges Experienced in the Establishment of TFCAs" (Livingstone Maluleke)

* "Land Claims in Government-Owned Conservation Areas: the Matshakatini Nature Reserve, Madimbo Corridor (South Africa)" (Clara Bocchino)

* "Diseases and Food Safety Issues at the Wildlife / Livestock Interface" (Cheryl McCrindle, Petronella Chaminuka and Shashi Ramraj)

* "Endemic Anthrax in the Herbivores of Etosha National Park: A Disease and Movement Ecology Perspective Focusing on Zebra, Elephants, and Scavengers" (Wayne M. Getz, Steve Bellan, Justin Brashares, Carrie Cizauskas, Holly Ganz, Pauline Kamath, Werner Kilian, Orr Spiegel, Wendy Turner, Russell Vance and Royi Zidon)

* "The SANParks People Objectives – Research and Management" (Louise Swemmer)

* "Value of *Neorautanenia amboensis* (Schinz) as Feed for Cattle During Drought in South-Eastern Zimbabwe" (Chrispen Murungweni, Jens Andersson, Mark van Wijk, Issiah Gwitira, Ken Giller and Eric Smaling)

* "The Presence of *Cryptosporidium* spp. in Wild Mammals in the Kruger National Park, South Africa" (Nada Abu Samra, Samie Amidou, Ferran Jori and Peter Thompson)

* "Key Perceptions and Needs of Communal Livestock Farmers in the Bushbuckridge District Adjacent to the Greater Kruger National Park, South Africa" (Jacques Van

Rooyen, Ellen Vandamme, Maxime Madder, Eddie Webb, Koos Coetzer, Peter Van den Bossche and Nick Kriek)

* ”Population Trends of Large Herbivores in the Gonarezhou National Park and Surrounding Communal Lands, Southeast Zimbabwe, between 1989 and 2009” (Edson Gandiwa, Ignas Heitkönig, Herbert Prins, Amon Murwira and Cees Leeuwis)

* “Just Like Medicine But Fun – a ‘One Health’ Medical and Veterinary Student Interaction in Rural South Africa” (Greg Simpson and Mosa Moshabela)

* “A Progress Report: Wildlife Rabies Vaccination Campaign in the Orpen State Veterinary Area” (Ferreira du Plessis)

* “Rangeland Utilization within the Home Range of Cattle in the Dry Season, Malipati Communal Land, Zimbabwe” (Fadzai Zengeya, Amon Murwira and Michel de Garine-Wichatitsky)

* “Waterhole Use Patterns by Wild and Domestic Herbivores in and around Gonarezhou National Park” (Mark Zvidzai, Amon Murwira and Michel de Garine-Wichatitsky)

* “A Survey of Brucellosis in Wild and Domestic Animals in the South East Lowveld of Zimbabwe” (Calvin Gomo *et al.*)

Final version (March 27, 2010 for web)