

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

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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 be 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 Buss¹, Roy Bengis², Lin-Marie de Klerk², Louis van Schalkwyk³, Chris Foggin⁴, and Agostinho Nazare⁵

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The Great Limpopo Transfrontier Conservation Area covers an area of approximately 100,000 km². 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 pancreatitis (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 *sensu 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 multidisciplinary (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 HealthTM: Current incompatibilities & potential solutions. Gavin Thomson¹, Mary-Lou Penrith² & David Parry³

¹TAD Scientific CC & Verified Technologies (Pty.) Ltd, South Africa, ²TAD Scientific CC & Department of Veterinary Tropical Diseases, University of Pretoria, South Africa, ³Ecoserv, Botswana.

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 Biggs¹, David Cumming² and Edwin Muchapondwa³

¹SANParks, Skukuza, South Africa, ²AHEAD-GLTFCA and Percy FitzPatrick Institute, University of Cape Town, South Africa, ³Department of Economics, University of Cape Town, South Africa

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 ($\text{gm}^{-2}\text{day}^{-1}$). 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. Mitchell¹, Danny Govender² and Danie Pienaar²

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?

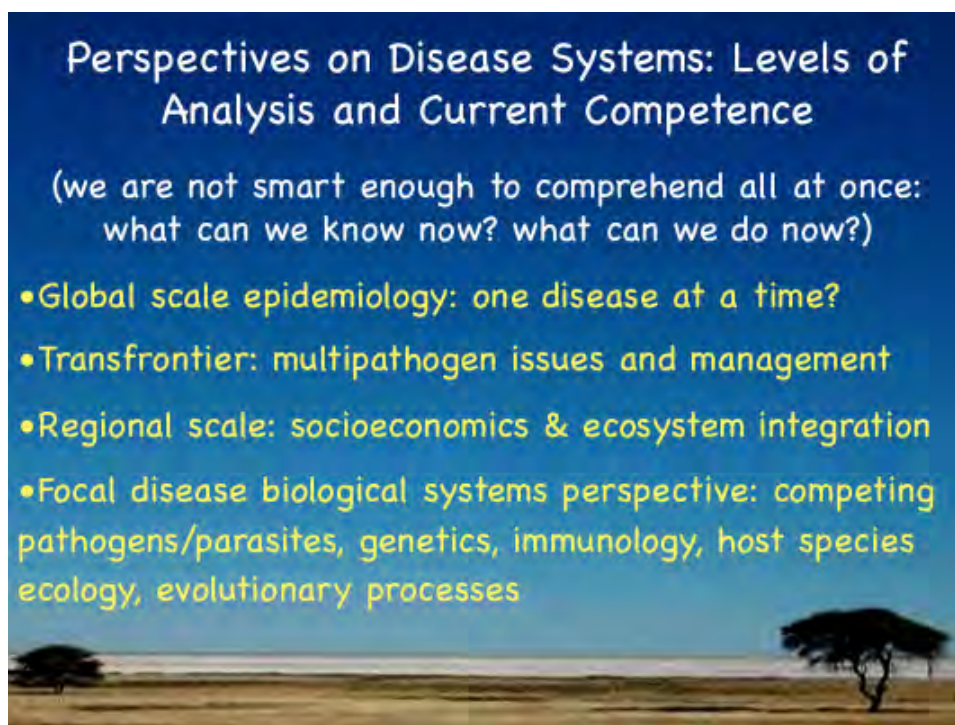
2.10 3 minute overview of key points from the Keynote Speaker and Keynote Review Paper Presenters (or selected rapporteurs), followed by an open, facilitated discussion.

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 Lane¹, Mary Louise Penrith¹, Rosa Costa³ and John Lawrence⁴

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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. Keet, D.F.¹, Davies-Mostert, H.², Bengis, R.G.¹, Funston, P.³, Buss, P.⁴, Hofmeyr, M.⁴, Ferreira, S.M.⁴, Miller, P.⁵ and Daly, B.G.⁶

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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. Claire Geoghegan^{*1}, Lovemore Mugabe², Alex Caron^{1,3}, David Cumming⁴, Wayne Getz^{1,5}, Michel de Garine-Wichatitsky³, Mark Robertson⁶ & Elissa Cameron¹

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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 100,000km² 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. Ana Zandamela¹, Tanya Radosavljevic,¹ and Robyn Alders^{1,2}

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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, P¹ and McCrindle, C²

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