2nd RP-PCP Regional Conference

« Coexisting (with) in TFCA, local perspectives »

Abstract book

Palm Tree Lodge, Chiredzi, South East Lowveld, Zimbabwe
22-26th of May 2017
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The Research Platform “Production and Conservation in Partnership”

-= 10 years of applied research in TFCAs =-

Who we are

The RP-PCP was established in 2007, formally associating the University of Zimbabwe and the National University of Science and Technology with two French research organisations, Cirad and CNRS, supported by the French Embassy in Harare. In 2016, four new universities including three from Zimbabwe Bindura - BUSE, Chinhoyi - CUT, Lupane - LSU and University of Zambia joined the RP-PCP as Associate Members. Beginning 2017, the staff involved in the activities of the RP-PCP represented an international multidisciplinary group of more than 70 senior researchers, academics and post-graduate students from a wide range of disciplines, including Social Sciences, Agronomy, Ecology, Geography and Veterinary Sciences.

Our objectives

The overall objective of the RP-PCP is to contribute to sustainable development, biodiversity conservation and improved rural livelihoods in Southern Africa, through strengthening national research capacities, multidisciplinary approaches and institutional partnerships with a focus on protected areas and neighbouring production.

The RP-PCP seeks to promote applied research on “wild-domestic interfaces” in order to address issues related to the coexistence of Man and Nature, by mitigating development and conservation activities. Our research framework seeks to understand the links between heterogeneity and sustainability of socio-ecological systems in the context of wild-domestic interfaces.

Our multidisciplinary group is organized in four broad thematic areas: Health and Environment (AHE), Ecology and Sustainability (Eco), Conservation and Agriculture (C&A) and Natural Resources Governance and Institutions (NRGI). The platform has selected 3 priority areas of activities, which include Transfrontier Conservation Areas (TFCAs) and their peripheries: Gonarezhou NP in the GLTFCA, Hwange NP in the KAZA-TFCA and the mid-Zambezi valley/Lower Zambezi-Mana Pools TFCA (see map).

Key achievements in the first decade

Since its inception, as a research platform, the RP-PCP aims at promoting applied scientific studies through support to post-graduate students. So far, more than 110 postgraduate students (MSc, MPhil and PhD) have been/still are supervised under the RP-PCP: two third of them are Zimbabwean or from the SADC region. All together, they have more than 110 scientific articles and book chapters published internationally (list accessible on your website www.rp-pcp.org).
Kulayijana, a multi-stakeholder arena to explore coexistence issues at the edge of protected areas.

**Number of participants:** 40 to 50

**Objectives of the workshop:**
The objective of this workshop is to bring together Zimbabwean and international researchers participating to the 2nd RP-PCP Regional conference and stakeholders of the Chiredzi and Hwange areas around the role-playing game “Kulayijana”. This role-playing game was developed through a 2-years participatory modelling exercise, in order to explore cattle herding strategies and coexistence issues around Zimbabwean protected areas (see leaflet attached). Through this workshop, we want to (i) present the game to international researchers, (ii) bring them to experiment (in a virtual environment) the reality of rural life and conservation at the edge of protected areas, and (iii) facilitate a moment of sharing and discussions between researchers and local stakeholders.

**Agenda:**
The workshop will last two days and will be articulated around 4 playing sessions (see table here after). Each playing session will involve between 10 and 15 participants. Most importantly, each group of participants will involve researchers, local farmers and protected area managers, in order to allow a multi-stakeholder dialogue during, and after the game. Playing sessions will be co-facilitated by organising researchers and members of the Kulayijana team.
A full game session takes 2 x half-day period (playing+debriefing). After a welcome tea (8:00 am), 2 groups of participants will play Kulayijana in the morning (8:30 am-12:00 pm) and 2 groups in the afternoon (1:30 pm- 4:00pm), with lunch provided on site (traditional Zimbabwean food). The next morning, participants will hold a group discussion for debriefing each game session. These group discussions are at the core of the Kulayijana experience: it is when participants can discuss, share their experience of the game, and put it into perspective with their real life. A specific objective of these discussions will be to use the lessons from the playing sessions to prepare the different thematic sessions of the conference. This will involve preparing introduction speeches and appointing co-chair men/women who will represent the local stakeholders during the session of the conference in Chiredzi.

**For more details about the Kulayijana role-playing game:**


# 2nd RP-PCP Regional Conference

**“COEXISTING WITH(IN) TFCAS: LOCAL PERSPECTIVES”**

## Conference program

24th - 26th May 2017, Palm Tree Lodge, Chiredzi

<table>
<thead>
<tr>
<th>Wednesday 24/05/17</th>
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<tbody>
<tr>
<td><strong>Registration</strong></td>
<td><strong>Morning</strong></td>
</tr>
<tr>
<td><strong>Transfer from Malipati (for delegates attending the workshop)</strong></td>
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<tr>
<td><strong>Opening ceremony</strong></td>
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<tr>
<td>Remarks and Introductions</td>
<td>Prof E. Mwenje</td>
</tr>
<tr>
<td>Welcome remarks</td>
<td>Hon. S. Mahofa</td>
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<tr>
<td>Remarks by traditional authorities</td>
<td>Senator Chief Charumbira</td>
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<tr>
<td>Introductory remarks</td>
<td>Ambassador of France to Zimbabwe</td>
</tr>
<tr>
<td>Guest of Honour opening address</td>
<td>Hon. O. Muchinguri-Kashiri</td>
</tr>
<tr>
<td><strong>Key-note</strong></td>
<td>Prof. Marshall Murphree</td>
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<tr>
<td><strong>Tea break</strong></td>
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<tr>
<td><strong>Thematic Performance by Malipati School</strong></td>
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<tr>
<td><strong>Session Education</strong></td>
<td></td>
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<tr>
<td><strong>Co-Chair</strong></td>
<td>Headmaster Malipati School, Prof E. Mwenje</td>
</tr>
<tr>
<td><strong>Key-note</strong></td>
<td>M. Baloyi</td>
</tr>
<tr>
<td><strong>Full-time presentation</strong></td>
<td>Mugabe, P., Paterson A., Saunders M.</td>
</tr>
<tr>
<td><strong>Poster session</strong></td>
<td></td>
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<tr>
<td><strong>Speed-presentations</strong> 3*5 minutes</td>
<td></td>
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<tr>
<td>Mashapa C., Samapodisa O, H. Ncube</td>
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<tr>
<td><strong>Dinner</strong> (Sponsor TBA)</td>
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<tr>
<td>Session 1</td>
<td>Access to natural resources</td>
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<tr>
<td>Co-Chair</td>
<td>• Local expert (TBA)</td>
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<td></td>
<td>• Prof C. Fabricius</td>
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<tr>
<td>Key-note</td>
<td>• Prof C. Fabricius</td>
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<tr>
<td>Full-time presentation</td>
<td>• Correia I.</td>
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<td>• Fritz H.</td>
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<td>• Dowo G.M.</td>
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<td>• Skinner D.</td>
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| Time      | 8:15-10:15 |

Tea break

<table>
<thead>
<tr>
<th>Session 2</th>
<th>Mitigation of Human-Wildlife conflicts</th>
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<tbody>
<tr>
<td>Co-Chair</td>
<td>• Local expert (TBA)</td>
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<tr>
<td></td>
<td>• Dr P. Chardonnet</td>
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<tr>
<td>Key-note</td>
<td>• Prof E. Gandiwa</td>
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<tr>
<td>Full-time presentation</td>
<td>• Giva N.</td>
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<td></td>
<td>• Guerbois C.</td>
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<td></td>
<td>• Murphree M.J.</td>
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<td>• Mundava J.</td>
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| Time      | 10:45-12:45 |

Lunch, Sponsor TBA

<table>
<thead>
<tr>
<th>Session 3</th>
<th>Improving livestock and crop productions by local farmers</th>
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<tr>
<td>Co-Chair</td>
<td>• Local expert (TBA)</td>
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<td></td>
<td>• Prof K. Giller</td>
</tr>
<tr>
<td>Key-note</td>
<td>• Prof K. Giller</td>
</tr>
<tr>
<td>Full-time presentation</td>
<td>• Mwembe R.</td>
</tr>
<tr>
<td></td>
<td>• van Rooyen J.</td>
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<td>• Musara J.P.</td>
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| Time      | 14:00-16:00 |

Tea break

<table>
<thead>
<tr>
<th>Session 4</th>
<th>Boundaries of protected areas</th>
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<tbody>
<tr>
<td>Co-Chair</td>
<td>• Local expert (TBA)</td>
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<tr>
<td></td>
<td>• Prof D. Cumming</td>
</tr>
<tr>
<td>Key-note</td>
<td>• Prof D. Cumming</td>
</tr>
<tr>
<td>Full-time presentation</td>
<td>• Bocchino C.</td>
</tr>
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<td>• Theron P.</td>
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<td>• Tshipa A.</td>
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<td>• Vall-Fox H.</td>
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</tbody>
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| Time      | 16:15-18:15 |

Poster session

Speed-presentations (3*5 minutes)
Kaseke TB, Mlambo C., Sibanda S.
Dinner (Sponsor TBA)
### Friday 26/05/17

<table>
<thead>
<tr>
<th>Session 5</th>
<th>Prevention and control of livestock/wildlife/human diseases</th>
</tr>
</thead>
</table>
| **Co-Chair** | Local expert (TBA)  
Prof. A. Michel |
| **Key-note** | Prof. A. Michel |
| **Full-time presentation** | Blumberg L.  
Gomo C.  
Ndengu, M.  
vан Rooyen J. |

8:00-10:15

**Tea break**

<table>
<thead>
<tr>
<th>Session 6</th>
<th>Sharing benefits generated by wildlife</th>
</tr>
</thead>
</table>
| **Co-Chair** | Local expert (TBA)  
Prof. V. Dzingirai |
| **Key-note** | Dr M. Murphree |
| **Full-time presentation** | Swemmer L.  
Petros T.  
Dervieux Z.  
Swemmer T.  
Jonga C. |

10:45-13:00

**Lunch, Sponsor TBA**

<table>
<thead>
<tr>
<th>Session</th>
<th>Policy recommendations</th>
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<tbody>
<tr>
<td><strong>Panel of decision makers</strong></td>
<td>Stakeholders (TBA)</td>
</tr>
</tbody>
</table>
| **Facilitators** | Dr C. Bocchino  
Dr M. de Garine-Wichatitsky |

14:00-15:45

**Tea break**

**Closure ceremony**
- Closing keynote speech
- Conference wrap-up, way forward
- Closing remarks
- Closing address

16:00-18:00

**Dinner Sponsored by GIZ with presentation on the SADC TFCA Network**

### Saturday 27/05/17

<table>
<thead>
<tr>
<th>Project meetings</th>
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| **RenCaRe** final Steering Committee  
*Palm Tree Lodge, Chiredzi* | RenCaRe SC + guests |
| **RP-PCP** Scientific Committee  
*Palm Tree Lodge, Chiredzi* | RP-PCP bureau + guests |

9:00-12:00
Abstracts

Session Education

• Key-note: Mr Baloyi (Malipati Primary School)

• Research Capacity Building for promoting the coexistence between people and nature in TFCAs

Full-time presentation

Mugabe, P. H., 1 Caron, A. 2, Mukamuri, B. 1, Cornelis, D. 2, Nare, L. 3, Murungweni, C. 4, Matope, G. 1, Guerrini, L. 2, Mundy, P. 3, Kativu, S. 1, Fritz, H. 5, Murwira, A. 1, Bourgarel, M. 2, de Garine-Wichatitksy, M. 2, Mwenje, E6.

1University of Zimbabwe, RP -PCP, Harare, Zimbabwe; 2Cirad, RP -PCP, Harare, Zimbabwe; 3NUST, RP-PCP, Bulawayo, Zimbabwe; 4CUT, RP-PCP, Chinhoyi, Zimbabwe; 5CNRS, RP-PCP, Hwange, Zimbabwe; 6BUSE, RP-PCP, Bindura, Zimbabwe. Email: phmugabe@gmail.com

Abstract: Transfrontier conservation areas (TFCAs) must satisfy diverse multisectoral requirements and challenges related to agriculture, conservation, animal and public health, multi-scale governance and management of natural resources, among others. In order to tackle these multidisciplinary issues, countries involved in TFCAs require skilled personnel to provide technical support and guidance to ensure that the intended benefits are realised by the rural communities living in the TFCAs as well as the full array of local, regional and international stakeholders. In 2007, the research platform “Production and Conservation in Partnership” (www.rp-pcp.com) was created by 2 Zimbabwean and 2 French research institutions to promote the coexistence between People and Nature in TFCAs (including the KAZA, Great Limpopo and Lower Zambezi-Mana Pools TFCAs) through postgraduate training and capacity building at the level of governmental services. After 10 years, the RP-PCP has supported more than 100 postgraduate students, 70% being from SADC universities, research institutions and government services. The RP-PCP has also published more than 110 scientific publications and book chapters. Examples of RP-PCP community impacts have been multiple including: ecology of wildlife with a view to its conservation and utilisation; improving the knowledge and informing government on animal diseases and zoonoses’ prevention and control; improving communication locally between intersectoral stakeholders; changing agricultural practices to control crop pests; triggering negotiation between park authorities and communities on the management of and access to grazing and water sources; mitigation of human/wildlife conflicts through a better understanding of animal movements and people perceptions and practices. We believe that this applied, community demand-driven research framework provides an efficient way to develop the research and innovation necessary for the success of TFCAs.

• Developing legal literacy and governance expertise to promote effective and equitable TFCA’s in Africa

Full-time presentation

Paterson, A. 1

1Institute of Marine and Environmental Law, Faculty of Law, University of Cape Town. Email: alexander.paterson@uct.ac.za

Abstract: Strong and well-implemented legal frameworks are critical for creating and maintaining effective and sustainable protected areas (including TFCAs), which provide fundamental infrastructure
for the conservation of biological diversity and essential ecosystem services in Africa. However, as confirmed at the IUCN World Parks Congress held in Sydney in late 2014, the legal aspects of protected area management and governance are often not well understood. There have accordingly been global calls to foster legal literacy and governance expertise to promote effective and equitable protected areas. The IUCN Environmental Law Centre, in partnership with members of the IUCN World Commission on Protected Areas and the IUCN Academy of Environmental Law, has over the past couple of years sought to address this challenge through the development of a set of educational resources for building essential capacity on protected areas law and governance (the Project). The Project has recently concluded the development of a generic curriculum and set of teaching resources for use in a wide variety of settings including training sessions, workshops, university courses and practitioner seminars. The pedagogy underlying these resources seeks to ensure that they fulfil key characteristics of modern approaches to learning, including: adopting a learner-centred approach; focusing on knowledge and skills transfer; aiming to be transformative, facilitative, reflective and empowering in their nature; and focusing on developing practical problem-solving skills. The resources are arranged into 12 interactive modules, which cover key legal aspects of management and governance of protected areas and connected landscapes, systems and processes in the terrestrial and marine context. These modules can be used individually or in combination, and include technical instructions to support potential users in adapting the materials to suit their specific circumstances or needs. The above teaching resources are complemented by a series of short videos that bring further life to the materials through interviews, animations, and other innovative techniques for engaging learners and conveying key concepts. All of the resources are freely accessible through an online platform (www.protectedareaslaw.org), which also serves as a place for users to provide feedback and upload additional content and case studies from their own regions and experiences. The lead author wishes to introduce these resources to fellow members of the SADC community engaged in forging effective and equitable legal frameworks to govern TFCAs, with a view to raising awareness about their existence, sharing insights about their potential development and use in the SADC region, and soliciting feedback. With the ultimate aim of the Project being to build legal literacy around protected areas law and governance – these resources will hopefully prove informative and useful to those tasked with contemplating and tangibly creating effective and equitable regimes governing one variant of protected areas, namely TFCAs.

**Session Theme 1: Access to natural resources**

- **Connectedness: central to the co-existence of people and protected areas**

  **Keynote Speech**

  **Fabricius, C.**

  1Sustainability Research Unit, Nelson Mandela University, George, South Africa. Email: Christo.Fabricius@nmmu.ac.za

  **Abstract:** Being connected means being joined, linked or belonging to something or someone. In landscape ecology, connectivity is the physical linkages between landscape patches. In feeding ecology it is the couplings and linkages between different parts of the food web. In common property theory, it is the strength of social capital and institutional linkages. In Actor-Network-Theory, connectedness refers to the threads that bind human and non-human objects in multiple dimensions. In institutional economics it is the links between elements of the value chain. Political scientists are interested in linkages amongst governance networks and psychologists in cognitive connections. In social-ecological resilience theory, connectedness is one of seven principles of resilience management. Connectedness lies at the heart of traditional and indigeneous knowledge systems’ portrayal of caring and nurturing, as metaphors for sustainability. Connectedness might therefore be the unexplored common ground – the bridge or unifying concept - between communities, scientists, authorities, civil society, and ecosystem management. We therefore need to analyse and understand the role of connections between people and other people; connections within nature; and between people and
Livestock access to water and natural pastures in the GLTFCA, Gaza province, South of Mozambique.

Full-time presentation

Correia, I. M. S.¹, Garrine, C. M. L. P.¹, Caron, A.¹,²

¹Veterinary Faculty, Eduardo Mondlane University, Maputo, Mozambique; ² RP-PCP, CIRAD, UEM, Maputo, Mozambique. Email: irisidique@gmail.com

Abstract: The districts of Chicualacuala and Mabalane are located in the arid and semiarid zone of Gaza, south of Mozambique and are characterized by low and erratic rainfall influencing the growth and availability of pastures and water, key factors for livestock development. This districts lost part of their agricultural and pasture lands due to the creation of the Limpopo National Park (LNP) in 2001, belonging to the GLTFCA, reducing furthermore access to natural resources. This study aims to analyze the access of resources on cattle production, comparing systems between villages with different levels of access to natural resources and proximity to the LNP. Focal groups and interviews with 124 cattle producers were conducted to collect information on cattle production and rules for access of natural resources. The mixed agro-pastoralist system was the most prevalent using natural pastures and temporary water sources, with low levels of sanitary and reproductive management and consequently low productivity and off take. The main water sources during the rainy season are waterholes (51.2%), lagoons (38.2%) and river (22.8%), while on the dry season due to decreased availability of temporary water sources, river (75.6%), lagoons (18.7%) and boreholes (16.3%) are used, being the borehole paid for. The frequency of watering also changes with seasons with farmers watering every second (22.8%) or third day (4.1%) especially in villages far from the river. In the dry season there is also a decrease in the availability of natural pastures, being common the use of crop residues (45.5%), trees and shrubs (13.8%) and straw (4.1%) as well as the use of agricultural plots (27.6%), riverine areas (17.1%) and the LNP area (6.5%) for grazing, leading to conflicts between farmers and with wildlife. The proximity of the LNP also increased the encounters with wildlife (elephants, buffalos and hippopotamus) and thus the occurrence of conflicts.

A framework to assess the role and sustainability of protected areas in buffering natural resources crises

Full-time presentation

Fritz, H.¹,²,³ & Guerbois, C.²,³

¹CNRS, LBBE, France ; ² Zone Atelier Hwange / RP-PCP, Zimbabwe ; ³ NMMU, SRU, South Africa. Email: herve.fritz@univ-lyon1.fr

Abstract: One of the underestimated strength of protected areas in improving rural livelihoods is to contribute to buffer social or environmental crises through providing ecosystem services. These services are often perceived as threats or disregarded when assessing the sustainability of protected areas themselves, though they can be a key factor in promoting the resilience of the whole social-ecological system. This is exemplified by the access to, and use of, natural resources inside protected areas. However, for protected areas to sustainably provide resources for services such as 'energy',

nature; as entry points for social-ecological sustainability. I start the paper by outlining the notion of connectedness in trans-disciplinary theory and practice in three dimensions: speed, strength, and scale. I then look at missing or broken connections, to explain the discord between people and ‘protected areas’ and explore possible reasons behind the fractures and disconnects. I then offer a few ideas about repairing broken connections as a way to improve the adaptive co-management of protected areas. Perhaps there are new gaps and opportunities for trans-disciplinary research; building bridges between communities, scientists, authorities and nature; and learning together about sustainability.
'material' or 'nutrition' their integrity shall be ensured. Consequently, there is a need for adequate frameworks to assess the level of dependency between people and natural resources inside protected areas as well as the sustainability of the buffering role of protected areas. Here we draw from our long-term social-ecological research around Hwange National Park (Zimbabwe) to develop a framework to assess trends in natural resources use, the sustainability of resource providing by protected areas and hence of its role in buffering crises. We investigated individual perceptions of natural resource trends and the contribution of protected areas in providing them. We used these metrics to define four alternative states based on the apparent sustainability of resource use and the relative resource availability inside and outside protected areas. We then describe possible pathways from one state to another and illustrate these through contrasted examples. Our results suggest that the current firewood use is beyond the sustainable buffering role of protected areas. For timber and thatch, the protected areas seem to buffer crises sustainably, whereas for game meat the sustainability can be questioned. We advocate that such approaches could contribute to understanding the role of protected area in service providing as well as assessing the possible risk for their integrity and resilience.

• Resource utilisation in the Great Limpopo Transfrontier Conservation Area (GLTFCA) and its effect on ecosystem service provision

Full-time presentation

Dowo, G.M. 1,2, Kativu, K. 1, de Garine-Witchatitsky, M 2

1TREP, Department of Biological Sciences, RP-PCP, University of Zimbabwe, Harare, Zimbabwe; 2Cirad, RP-PCP, Harare, Zimbabwe. Email: gregorymd@hotmail.co.uk

Abstract: Ecosystem services are benefits humans derive from ecosystems. Hence, ecosystem services ensure human survival and underpin livelihoods of many people especially rural communities. Loss of ecosystem services through environmental degradation threatens the livelihoods of rural communities who depend directly on natural ecosystems. Thus, there is a need for a greater understanding of ecosystem services and their ecological underpinnings. Human-environment systems are complex and hence to try and achieve a greater understanding of such complexity involves utilising a multi-disciplinary and participatory approach. The overall aim of this study was to systematically explore and understand the complex socio-ecological dynamics of hardwood utilisation as an ecosystem service at the periphery of Gonarezhou National Park (GNP) in south-east Zimbabwe so as to achieve better environmental planning, sustainable utilisation of natural resources and improved human well-being. The specific objectives of the study were: 1. to gather local perceptions on resource utilisation and access and establish spatio-temporal changes of local ecosystems; 2. to quantify offtake rates of woody biomass for firewood and construction poles and relate these to standing biomass; 3. to elicit strategies employed by local actors in the harvest and management of woody resources and model the socio-ecological system underpinning such ecosystem service provision. Hence, the study utilised several methods ranging from questionnaire surveys, focus group discussions, remote sensing and geographic information systems, plant ecological techniques as well as participatory modelling with agent based modelling at the core. Results indicated perceptions of resource use and access were influenced by proximity to park. The study also linked these perceptions to the state of woodlands in terms of biodiversity and standing biomass, past land use/cover changes and local wood use practices and incorporated these into a spatially explicit agent based model that simulates the connections within the system and the different roles played by local actors.
• **First Line of Defence: the role of communities in combating illegal wildlife trade**

**Full-time presentation**

Dublin, H.¹,²,³, Niskanen, L.¹, Roe, D.³,⁴, Rowe, W.⁵, Skinner D.³

¹IUCN ESARO, ²IUCN/SSC African Elephant Specialist Group, ³IUCN SULi, ⁴IIED, ⁵Royal Roads University. Email: diane.skinner@iucn.org

**Abstract**: The long-term survival of wildlife, and in particular the success of efforts to combat illegal wildlife trade (IWT) in high-value species such as elephant and rhino depends to a large extent on local communities that live with wildlife. While there is a growing recognition among practitioners, donors and policy makers of the need to engage communities that neighbor or live with wildlife, practical guidance on how to most effectively partner is lacking. IUCN and partners have developed a dynamic theory of change (ToC) that seeks to better understand the conditions for successful community-level interventions for tackling illegal killing and IWT of high value species as well as the links between state-led and community-led enforcement efforts. The ToC identifies four pathways for community-level actions: strengthen disincentives for illegal behavior, increase incentives for wildlife stewardship, decrease costs of living with wildlife, and support livelihoods that are not related to wildlife. To succeed the pathways all require strengthening of enabling conditions, including capacity building, fair and adequate legislation and strengthened governance. IUCN and partners are testing the ToC in three community conservancies in southern Kenya, using a dynamic, participatory action research methodology involving local communities and project practitioners. Action research engages stakeholders in iterative cycles of research inquiry and action. Its principles of engagement, inclusiveness, and democracy were found to be ideally suited to the goals of this initiative. The project is also working with the Kenya Wildlife Conservancies Association to examine critical enabling conditions and to feed lessons from fieldwork into national policy processes. Preliminary findings from two of the three sites will be presented, along with an outline of the methodology used to test the ToC. Plans to expand the use of the methodology to other socio-economic models including subsistence agro-pastoralism and peri-urban settings, particularly in southern Africa, will be presented.

• **Woody vegetation utilization and conservation practices by Mutema-Musikavanhu communities on the periphery of Save Conservancy, south eastern Zimbabwe**

**Speed presentation**

Mashapa, C.¹*, Gandiwa, E.¹, Muboko, N.¹

¹School of Wildlife, Ecology and Conservation, Chinhoyi University of Technology, Chinhoyi, Zimbabwe. Email: clayiemashapa@yahoo.co.uk

**Abstract**: The status of woody vegetation due to human disturbances is a concern in Save Conservancy and its buffer zone. This study examined local community woody vegetation utilization and conservation practices. Data were collected in February 2017 using a random sampling approach where 300 households were interviewed in communities adjacent to Save Conservancy. We also used participatory methods to predict woodland changes across the buffer zone of Save conservancy. Our results show that interviewees were selective on woody species utilization, and knowledgeable on their conservation requirements. However, results suggest that local people had inadequate knowledge about the buffer zone and its purpose. Mixed perceptions about the impact of woody species utilization on livelihoods and conservation were recorded. Use of electric fencing was frequently suggested as a solution to segregate Save Conservancy from communal areas. However, a few residents objected strongly as they were reluctant to be restricted by fences as they expressed fears of exclusion from natural resources like grazing land, fuel wood, timber, medicinal plants and wild fruits.
from Save Conservancy. Through participatory scenario forecasting on woody species utilization we managed to predict future woodland status on the boundaries of Save Conservancy. The results indicated that improving Save Conservancy-community relationships, education and awareness programmes on natural resources conservation could improve local livelihood and assist in raising the status of conservation in Save Conservancy. Thus, we recommend that the utilization of woody plant resources for livelihoods needs to be regulated by both the existing local cultural conservation norms and scientific methods through a participatory approach in order to ensure sustainability of woody plant resources. We also recommend for an integrated local rural land use planning framework which incorporates the protection of buffer zones and other areas of human livelihoods and conservation interest.

• Local ecological knowledge and status of natural resources under a changing climate: perspective from the Lower Zambezi Mana TFCA, Zimbabwe

Poster presentation

Kupika, O. L.1, Gandiwa, E.3, Kativu, S., Nhamo, G.

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Abstract: Local ecological knowledge is increasingly recognized as a source of adaptive capacity for local people as well as a crucial source of information to be incorporated into scientific understanding and policy making. In this study, we surveyed 320 small scale farmers from Nyamakate Resettlement Area and Chundu Communal land, Hurungwe, Zimbabwe. The study aimed to answer the following questions: (i) Which benefits do local people derive from natural resources? (ii) What environmental changes do local people observe, and what are their perceptions of the drivers of these changes and (ii) Which strategies are used to mitigate or cope with the changes in wildlife resources abundance? Data were collected through household surveys using semi-structured household questionnaires, key informant interviews, focus group discussions and community mapping between April 2015 and July 2016. The majority of the respondents perceived that they derived benefits from wood (n=284; 88.8%), wild fruits (n=260; 81.3%), pastures (n=277; 86.6%), water (n=294; 91.9%), wetlands but did not benefit from wild animals (n=257; 80.3%) and protected forests (n=162; 50.6%). Respondents cited decrease in crop production, water scarcity, changes in tree phenology and increase in human wildlife conflict as some of the direct and indirect impacts of climate change. Overall the majority of the respondents perceived a decrease in wild animals (n=206; 64.4%), pastures (n=192; 60%), water (n=224; 70%), wetlands (n=187; 58.4%) wood (n=198; 61.9%) and vegetation cover (n=220; 68.8%). Rainfall changes (n=245; 76.6%), deforestation (n=148; 46.3%), veld fires (n=148; 46.6%) as well as policy/institutional factors (n=134; 41.9%) were cited as some of the key drivers of natural resources decline. Selling livestock and gathering of wildlife resources were some of the strategies of coping with food shortages. Results from this study indicate that local people obtain benefits from natural resources and they are also aware of the abundance and threats to their conservation. Such knowledge on the status of natural resources under a changing climate can be combined with scientific knowledge to inform strategies for conservation.
• Modelling the distribution of Ilala palm (*Hyphaene petersiana*) using Maxent algorithms.

Poster presentation

**Mutete, P.**¹, Mazarura, U.², Kativu, S.³, Ngadze, E.², Gasura, E.², Richardson-Kageler, S.²

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**Abstract:** Species distribution modelling is widely used in the conservation of species. Here, MaxEnt was used to model the distribution of Ilala palm (*Hyphaene petersiana*) in Chiredzi District. The spatial distribution of the species was estimated using 73 occurrence records obtained from the district using a hand-held GPS device. Nineteen continuous bioclimatic variables were used as predictors. Maximum entropy (MaxEnt) was the software of choice because of its accuracy when predicting the distribution and habitats of species using presence only data. Recent reviews indicate that MaxEnt is easy to run and is able to produce relatively high predictive models using the default settings thus simplifying the process even for less experienced people. The Area Under Curve (AUC) value obtained for training data was 0.998 indicating a good fit for the model used. Jackknife results revealed that the three strongest predictors of Ilala were; mean diurnal range, minimum temperature of coldest period and mean temperature of wettest quarter suggesting that temperature fluctuations are the major range determinants of Ilala. Ilala habitats were found to be adjacent to river courses after overlaying the drainage data to the potential distribution map produced by MaxEnt.

• Local perceptions of wetland goods and services dynamics in the southeastern Kavango Zambezi Transfrontier Conservation Area,

Poster presentation

**Tarakini, T.**¹,²,³, Guerbois, C.³,⁴, Wancellius, J.⁵, Mundy, P.², Fritz, H.³,⁴,⁶

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**Abstract:** Dynamics at edges of Protected Areas (PAs) are partially driven by people’s perception of the economic, social, and infrastructural costs and benefits of PAs. In this study we assessed how indicators of rainfall and surface-water influenced perceptions of waterbirds use and we explore the resulting conservational implications. Semi-structured questionnaires and free lists were administered to 103 informants working/residing in Hwange National Park, Sikumi Forestry, Hwange and Ngamo communal areas (n=33, 10, 33, and 28 respectively). Our sample comprised of people involved in farming (24), ecological (34) and non-ecological (45) activities for their sustenance. Most respondents (98.6%) regarded rainfall patterns as changed, and 76% perceived surface water quality as having deteriorated. Most farmers (95%) used more that 2 clues to describe bad surface-water quality compared to those in ecological (62%) and non-ecological (65%). Algae, bad-smell and livestock-avoidance were mostly cited as clues of bad surface-water (Sutrop indices of 0.4, 0.16, and 0.1 respectively), while clear colour (0.54), odourless (0.35) and rich biodiversity (0.13) were used for good surface-water. Surprisingly few respondents used waterbirds as clues for bad surface-water (index of 0.01) and for good surface-water (0.02). Of the 31 cited waterbird species, 35.5% of them were perceived as experiencing trends similar those we found in literature globally. Uses of waterbirds
were significantly associated with perceived trends (Fisher's Test, $P = 0.003$), particularly those used for nutrition were decreasing while those controlling pests were increasing. Interestingly, respondents from PAs frequently cited common waterbirds while those from communal areas cited species used as meat. These findings are important not only in understanding drivers of change to wetlands goods and services but also to managers when planning enhancing programmes for locals access to these resources. It will also be useful to predict species future trends under increasing aridity in the study area.

• **Role of local Entrepreneurs' in Eco-tourism Value Chain Development in the Greater Limpopo Transfrontier Conservation Area.**

**Poster presentation**

**Zanamwe, C.**, Mukamuri, B., Muboko, N., Gandiwa, E.

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*Abstract:* Entrepreneurship is a multi-dimensional process comprising an individual, a business unit, the external environment and socio-cultural context. Of late it has been crucial for economic growth in most societies through innovation, new start-ups and job creation. It has also proved to be very important for rural communities’ local economic development. Most rural communities’ major challenge is poverty relief, that is how to emancipate themselves from the poverty cycle. This study sought to understand the role that entrepreneurs can play in developing ecotourism based value chains and how the local communities can be integrated into the global value chains. Most rural communities are left out of the tourism global value chains. There is need to integrate them into these value chains so that they can tap benefits of living adjacent and stewardship to natural resources in their areas. Case study approach used for this study in Chiredzi District, Zimbabwe, a component of the Great Limpopo Transfrontier Conservation Area. The study focused on 80 entrepreneurs in the tourism and food industry. Both primary and secondary data sources were used for this study. A semi structure questionnaire was used as the research instrument to gather data. The data collected was then analysed using excel. The study shows that entrepreneurs can be very crucial in value chain development since they can create opportunities where others do not, and attempt to exploit those opportunities through various modes of organizing, without regard to resources currently controlled. They also possess information necessary to identify opportunities and the cognitive style necessary to exploit it. Entrepreneurs’ can be utilized in other sectors of the economy to develop value chains.

**Session Theme 2: Mitigation of Human-Wildlife conflicts**

• **Human-wildlife conflicts in a changing environment**

**Keynote Speech**

**Gandiwa, E.**, Muboko, N.

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*Abstract:* Human-wildlife conflicts (HWCs) are a global problem and are particularly common at the human-wildlife interface characterised by increasing competition for available natural resources and incompatible land use practices. This article reviews the nature, drivers, impacts and management strategies for HWCs particularly in developing countries endowed with a high diversity of wildlife resources both inside and outside protected areas. Published HWC literature focusing primarily on developing counties and case studies from Zimbabwe were analysed. Results show a high diversity in
the nature of HWCs including crop raiding, livestock depredation, infrastructure destruction, injury and loss of human life, and retaliatory killing of wild animals. Main drivers of HWCs include among others land-use changes and associated habitat loss and fragmented landscapes as a result of expanding settlements and agricultural production, settlements in wild animal traditional migration routes, increases in wildlife populations in some protected areas, conservation paradigms, increasing human populations, and high climate variability. HWCs have negative impact on park–people relationships, local livelihoods (socio-economic), wild animal species conservation and attitudes of local people towards wildlife conservation. HWCs continue to be a constraint to wildlife conservation, as practitioners focus their attention on reducing negative impacts of wildlife on humans rather than on improving interactions or co-existence between humans and wildlife. Thus, HWC management need to be holistic in nature given the varied local contextual systems, local community beliefs and values. Where possible, considerations have to be made for devolving decision making and actions regarding the control of problem animals to the local community level in community based natural resources management programmes as a strategy to help reduce HWCs. Moreover, there is need to develop innovative and technologically based HWC mitigation strategies.

- **Parks with People? Action Research in Bridging Conservation and Livelihoods in Limpopo National Park, Mozambique**

**Full-time presentation**

**Givá, N.**

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**Abstract:** Reconciling conservation and people’s livelihoods has faced multiple dilemmas, particularly prominent in human-inhabited protected areas with high levels of poverty and vulnerability to climate adversities. This research examines the relationship between wildlife conservation and people’s livelihoods in a human-inhabited protected area and analyses the challenges and opportunities for reconciling the two. Drawing from the empirical case of Limpopo National Park (LNP), conceptualised from the outset with the ‘Parks with People’ paradigm, I argue that reconciling conservation and livelihoods objectives requires co-management alternatives that are flexible, context-sensitive, and adaptive. Therefore systemic action research was adopted as the methodological approach for collaborative exploration of co-management opportunities that could resonate with the local complexity and dynamics. Findings show that agricultural livelihoods and food security of the LNP residents are strongly contingent on the climatic conditions. People’s ability to cope with and overcome drought-related food insecurity has been negatively affected by wildlife incursion, since strategies to simultaneously cope with both are inconsistent. The park lacked an adequate management strategy for tackling both wildlife conservation and people’s livelihoods. The systemic action research approach demonstrated potential in engaging the multiple actors in a social learning process, which improved actors’ knowledge and understanding of their conflictual perspectives and needs. Local communities enhanced their agency towards improving their responsibility and accountability in the management of LNP, particularly regarding the 20% benefit sharing. Likewise, park staff became aware of the improvement necessary in their praxis and gained sensitivity for collaborative approaches. However, the LNP governance structure is dominated by the neoliberal and donor-driven conservation agenda which disregards the local context of poverty and vulnerability to climate adversities. This hindered the possibilities to further develop the emergent collaborative signs into long-term co-management practice. I conclude by emphasising the need for communicative spaces across all levels of governance to address simultaneously the complexity of the conservation-livelihood nexus and challenge the normalised and hegemonic neoliberal prescriptions.
• **Sustainability transformations for human-elephant coexistence: lessons from the Zone Atelier Hwange - Hwange LTER**

**Full-time presentation**

Guerbois, C.1,2,3, Valls-Fox, H.2,3,4, Perrotton, A.2,3,5, Bunding-Venter, C.6, de Garine-Wichatitsky, M.2,3,5 and Fritz, H.2,3,7

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**Abstract:** Increasing human footprint, locally overabundant wildlife and subsequent human-wildlife conflicts (HWC) have contributed and still contribute to impact the unique large mammal diversity hosted by savannas and dry forests in Africa and Asia. Protected areas (PAs) have promoted the survival of many of these large mammals’ species, but the mandate of these infrastructures has come under scrutiny, in particular their role in sustaining ecosystem services and livelihoods, such as food security. Managing human-wildlife coexistence is a worldwide challenge for conservation.

For the past 8 years, we conducted several projects to understand the coexistence between humans and elephants at the edge of Hwange National Park (HNP). To come up with a systemic lens for sustainable coexistence, we combined ecological and sociological approaches including land-uses changes and resource mapping, the analyses of elephant and cattle movement patterns and social networks, interviews around indigenous ecological knowledge, and participatory experiments and modelling.

Despite the many socio-environmental changes that have impacted the functioning of the system since the creation of HNP, communities still coexist with wildlife. We advocate that collective efforts should be put on promoting the positive services and existing collective actions rather than mitigating negative services. The socioecological system framework is a useful tool to explore the linkages between different actors and between wildlife and humans, including their livestock. Our results highlight alternative options to the conventional 'command-and-control' approach to mitigate HWC that focus on endogenous processes, social cohesion, soft-edges and adaptive co-management. The greater levy for sustainability transformation resides in enhancing adaptive governance through the definition of a collective vision for the system that would benefit both humans and wildlife, involving all stakeholders. Integrated and multi-stakeholder land-use planning, adaptive herding and farming practices through social learning could improve coexistence in conflict hotspots.

• **The evolution of the Limpopo National Park (Mozambique) – a One Health approach to understand complexity**

**Full-time presentation**

Bocchino, C.1, Burroughs R.2, Kock, M., de Nazare Maugueze, A.3, Murphree, M.4, Chauque, T.5

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**Abstract:** The Limpopo National Park was established in 2001 as the Mozambican component of the Great Limpopo Transfrontier Park. Before, the area was Coutada 16: a hunting concession of which only the northern portion was utilised by the operator Gaza Safari, surrounded by villages along the Olifants, the Shingwedzi and the Limpopo Rivers. At the time of establishment, partner countries and agencies requested that people living within the identified boundaries be resettled outside the Park. Over time, several drivers have enhanced the ecological contribution the Park is making to the TFCA, while others have been responsible for the increase in human-wildlife conflict, more precisely, to human-conservation conflict. These have resulted in the current dramatic situation whereby the Park is
still primarily reliant on donor funding to support its functions and functioning, is forced to increase its law enforcement expenditure to curb the surge in (cross border) wildlife crime, is still struggling with the completion of the resettlement process due to financial and policy constraints. The authors of the presentation have, since 2007, conducted 3 fieldwork sessions in and around the Park, discussing with local communities, local administrators and random people all issues related to the Park, the TFCA, health, education, nutrition, agriculture and livestock production, etc. Initially sponsored by the Wildlife Conservation Society’s Animal and Human Health for Environment and Development Programme (AHEAD), then by the AHEAD Great Limpopo TFCA Network (SANParks; the University of Pretoria), the Rapid One Health Assessment of the Limpopo National Park used a Scenario Planning methodology to frame the investigation and discuss the results. The presentation will discuss the role of conservation planning in creating several aspects of human–wildlife conflict and discuss the role of a new societal group born from the State vacuum and the new wealth created by wildlife crime: the Robin Hoods.

- **Wings over TFCAs**

**Full-time presentation**

Mundy, P. & Mundava, J.

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**Abstract:** Vultures soaring in a thermal, or a mass of hundreds feeding at a carcass form a formidable sight, and are a signature of the African savannah skies and plains. Of the southern African vulture species, the White-backed Vulture (W-bV) is the most abundant and therefore most conspicuous. The species occurs mostly in protected areas and private ranches, but can be seen in almost all places where food is available. Immature and juvenile White-backed Vultures especially are truly sub-continental in scale, with individuals able to fly over KAZA within a month (perhaps less). In recent times, all southern African vultures have been impacted by several threats, consequently, most species are listed as critically endangered, including the W-bV. Poisoning presents one of the major reasons for vulture mortalities. Large mammal (mostly elephant) poachers lace carcasses with poisons to mask their activities. Vultures are also killed by harvesting for use in the traditional health sector. Their parts are used mostly for clairvoyance rituals. Vultures are also affected by poor food availability (and quality), nest disturbance, powerline collisions and electrocutions, impact with wind turbines, and drowning in farm dams. If no conservation action is taken urgently, vultures could disappear from African skies with dire consequences for the ecosystem. Vultures are useful in indicating carcass location to law enforcers, an important component of successful policing in TFCAs. They provide various ecosystem services – e.g. feeding on carcasses quickly prohibits flies, as well as reducing mammal access to carcasses, thereby limiting disease transfer. They are therefore a group of species that is clearly important but often overlooked. Research priorities for vultures include updating census data, satellite tracking, as well as ongoing research on their use in traditional medicine and possibilities for mitigation. There is also a need for increased conservation education, especially in areas bordering TFCAs.
• The relative effects of cattle and wildlife on grass biomass and composition in the Chobe Enclave, Botswana.

Speed presentation

Samapodisa, O. 1, Fynn, R. 1, Van Telgen, M. 2, de Garine-Wichatitsky, M. 3

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Abstract: The Chobe enclave is a community-managed wildlife area characterised by interactions between large wildlife concentrations along the Linyanti Swamps during the dry season and by dispersed cattle posts in the eastern parts. We measured aboveground grass biomass using a disc meter along 20m small transects distributed every 300m along eight large transects which cover the different habitat types and land uses of the study area in the early and late dry seasons and the wet season. In addition to grass biomass, at each small transect the cover of all grass species was recorded in 20mx1m plots. We used Generalized Linear Mixed Models to determine the effect of season, distance to permanent water (the Linyanti Swamps), cattle post density (Kernel Density Estimator) and wildlife density (Kernel Density Estimator). The GLMM showed that cattle post density had no effect on grass biomass but that season and distance to water were significant, likely owing to the high densities of wildlife along the Linyanti Swamps during the dry season. A Detrended Correspondence Analysis (DCA) showed that grass composition was primarily determined by habitat differences (DCA1) and then by distance to water (DCA2), with cattle post density having no effect. Thus wildlife had greater effects on grass biomass and composition than cattle in the region owing to their extreme dry season concentrations. The implications are that attempts to place cattle posts along the Linyanti Swamps will result in extreme competition for forage during the dry season and associated human-wildlife conflict. Thus we suggest that current locations of cattle posts at their relatively low densities in the eastern section allow cattle and wildlife to co-exist largely through spatial separation and also through low cattle densities.

• African elephants, rangelands and agricultural practices at a semi-arid interface- community perspectives

Poster presentation

Dahwa, E. 1,2, Sebata, A. 3, Kativu, S. 3, Murungweni, C. 4, Bourgarel, M. 5

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Abstract: Based on the agricultural landscape of Malipati communal area in south eastern Zimbabwe we investigated whether and how the roaming African elephant (Loxodonta Africana) pose a threat to the local community rangelands and agricultural practices. On synthesis we look into possible influence of current agricultural practices on the future conservation of the mega-herbivore outside the protected area. To gain individual views on rangeland status, herbivore interactions, threats and possible solutions, we used semi-structured questionnaires. A multi stage sampling procedure was used with ten villages and 20 households per village selected to have an overview of farmer perspectives. Two focus group discussions were conducted in Manzini village. Discussions and individual questionnaires were designed to answer the following three pertinent questions i) How pastoralist define the current condition and change of state of the rangeland over time? ii) What is the cause and impact of these rangeland changes on elephants, cattle and livelihoods? iii) Are pastoralists
aware of how and why elephants move across the agricultural landscape? 90% of the respondents confirmed a change in rangeland quality and quantity with a subsequent change in species composition. *Accacia species* mainly associated with opening up and abandoning arable lands was pointed out to be on the increase and it’s a favorite browse for both cattle and elephants all year round. Besides water and crops, *accacia* spp also acting as an important attractant to elephants especially during the dry season. 60% of the respondents attributed the rangeland change to overstocking and droughts. Farmers are aware of forage and water resources around them which elephants and domestic stock target. Elephants normally come in groups of bulls and less in female-calf groups. They use known specific routes to enter the settlements and access resources. Why elephants roam is a controversial issue as some think its forage shortage in the park while others think it’s cropping. Development of small scale irrigation across the landscape is increasing the opportunity cost of the rangeland such that the current or future community-based wildlife management program should outweigh this cost inorder to realize conservation benefits.

**• Development and implementation of an information system for HWC based on the use of a Mobile Data Collection System in Hwange Communal Area**

**Poster presentation**

Mabika, C. T.¹, Mundy, P.², Kativu, S.³, Le Bel, S.⁴

¹ Zimparks, DREAM; ² NUST, RP-PCP; ³ TREP, RP-PCP; ⁴ Cirad, RP-PCP. Email: tcmabika@gmail.com

**Abstract:** Human wildlife conflict (HWC) occurs when wildlife requirements encroach on those of human populations, with costs both to humans and wild animals (IUCN, 2005). This calls for proper understanding of conflicts in interface areas in order to find relevant mitigation measures. It is also important that information about conflicts is communicated effectively and timeously. This project focuses on the development of an information system to monitor Human Wildlife Conflict (HWC) in nine wards in Hwange Communal Area using a Mobile Data Collection System. Five of the wards were selected on the basis of an earlier socio-economic survey carried out in these wards in 2010. Four of them were selected after consultation with local people on the areas which are mostly affected by HWC. Mobile Data Collection (MDC), the targeted gathering of structured information using devices such as smart phones and tablets (Jung, 2011), can be employed to develop a sound and effective information system. This information system begins with the training of community representatives to use mitigation measures and to use the mobile phones used in the MDCS. These representatives are provided with smartphones and airtime. The information system, in addition, involves the collection and submission of conflict information using mobile phones from the community to relevant authorities. This MDC based information system is expected to improve the way in which people select relevant mitigation measures for HWC. It is also expected to improve on timeliness and relevance of responses to reports on HWC or cases by responsible authorities.

**• Owls to the rescue**

**Poster presentation**

Sebele, L.¹, Mundy, P.², Fritz, H.³, Bourgarel, M.⁴

¹ Zimparks, DREAM; ² NUST, RP-PCP; ³ CNRS, RP-PCP; ⁴ Cirad, RP-PCP. Email: slovelater@gmail.com

**Abstract:** Rodents are the world’s third largest agricultural pest and chemical control has been the most widely used method of control and in some cases with dire impacts on the environment. Although biological control through the use of Barn owls *Tyto alba* has been successful in commercial farms in some African countries and ideal for the health of the environment, their use in communal
areas is faced with the challenge of beliefs and norms. The general belief is that a Barn owl is a witch’s bird and people do not want to be associated with them yet a pair of Barn owls with young can take out an average of 10 000 rodents in a year. Barn owls as a tool are of no cost to the farmers and thus, are ideal for the African economic landscape. The project set to investigate the possibility of using Barn owls in rodent control in communal areas in close proximity to Hwange National Park and to investigate the predator-prey relationship by determining sizes of home ranges of owls in different land use types in relation to rodent abundance and diversity. Thus, the diet of the owls in different seasons will be investigated through the use of pellets of owls nesting in all known sites within the area of study including those nesting in the provided Barn owl boxes. The ability of scientific knowledge to change attitudes is being assessed by the survival of boxes in the community and the demand for more boxes while the extent of damage by rodents and perceptions towards owls was assessed through a questionnaire. The community generally knows the species of rodents and the type of damage they cause. Most people are scared of owls and would rather keep cats to deal with the rodent problem.

Session Theme 3: Improving livestock and crop productions by local farmers

• The future of smallholder farming in Africa

Keynote Speech

Giller, K.¹

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Abstract: Smallholder agriculture is a major focus for many reasons: the opportunity for rural people to escape from poverty, the need to spare land for nature and wildlife, the need to adapt to, and mitigate, a changing climate and the drive for sustainable intensification to achieve a new African Green Revolution. We need to achieve all of this by closing yield gaps to increase production of food and other raw materials through efficient use of natural resources. Yet despite decades of participatory approaches the research and development community focuses on new whims and fashions, most recently on Agroecology, Conservation Agriculture and Climate Smart Agriculture. Much of the past and current research fails to recognize the harsh reality of rural life in marginal areas, where households often have a diverse livelihoods portfolio. To what extent does maximizing production fit within the opportunities that can be grasped in such areas as opposed to aspects of coping with risk, sharing of available labour and time across many activities. When does reinvestment in natural capital become more attractive than harvesting it?

Given current demographic developments in sub-Saharan Africa – which are unprecedented in the history of mankind – what are the implications for agricultural sector and for wild nature? Are we standing at the brink of a Green Revolution in Africa?

These are questions I hope to explore together with local representatives and other stakeholders during the workshops leading up to the conference - and those discussions will form the basis of my talk.
• Factors affecting livestock production at community wildlife interface in Kavango-Zambezi transfrontier conservation area-Zimbabwe sector: Farmers' Perception and Judgment

Full-time presentation

Mwembe, R., Sebata, A., Murungweni, C., Kativu, S.

RP-PCP, Email: rmwembe@gmail.com

Abstract: Identifying key factors affecting livestock and crop production is key to fostering sustainable development and food security in marginal areas. This is critical in crafting locally relevant strategic interventions. Factors are known and appreciated but farmer priorities are often not solicited, leading to lateral transfer of generalized interventions. In communities bordering protected areas, livestock depredation and crop raiding further affect productivity compromising livelihood sources amplifying human-wildlife conflict, a threat to biodiversity conservation. A study was carried out to identify how farmers prioritise factors affecting livestock and crop production in Hwange and Tsholotsho districts. This is critical for developing site specific interventions to improve livestock and crop production in marginal areas. Semi-structured questionnaires (n=240) were administered in eight wards. Secondary veterinary epidemiological data authenticated diseases prevalence from questionnaire data. Triangulation of information from surveys was done with key informants interviews. Farmers cultivate both cereals and pulses with choice influenced by the perception of the season. In both districts, maize, sorghum and groundnut are preferred crops during good years while millet sorghum and cowpeas are preferred when the season is perceived to be bad. Spatial variation exists within a district. Poor rainfall distribution and elephant raiding were ranked highest among climatic factors and wildlife problems affecting crop productivity. A variety of livestock species with differential production objectives are kept across the districts. Predators, diseases and drought were identified as key factors affecting livestock production. Lion and hyena are among the worst problem predators in ruminants and donkeys. Heartwater was ranked highest in Hwange while quarter evil was ranked highest in Tsholotsho. Farmers perceived rainfall and wildlife raiding as major factors affecting crop production while predators and diseases affected livestock. The ranking of specific diseases and predators had a spatial variation.

• Trade in livestock in the KAZA TFCA: A case-study of the effects of distance to markets and different foot and mouth disease control scenarios on the beef trade in the Zambezi Region of Namibia

Full-time presentation

van Rooyen, J.1,2, Coetzer, J. A. C.2, Webb, E. C.3

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Abstract: Livestock is an essential part of the livelihoods of the rural communities scattered throughout the eastern Zambezi (previously Caprivi) region of Namibia. The Zambezi is a foot and mouth disease (FMD) infected area with little formal trade opportunities for beef. Wildlife numbers are on the rise and so is the frequency of FMD outbreaks, despite conventional FMD control measures. In a project aimed at the development of export opportunities for beef from the Zambezi region the challenges and risks associated with the current supply chain, animal movement and FMD control measures were investigated. Livestock owners within three remote areas with an apparent high
risk of cattle-buffalo contact were surveyed. Spatial and temporal data of cattle numbers, movement, procurement, and carcass quality over several years were sourced from the local Meatco abattoir and state veterinary offices. Interviews with livestock owners revealed that the distance to the two quarantine camps and the time and costs associated with driving cattle on the hoof to these facilities were the most significant barriers to participation in formal trade. Spatial analyses indicated that farmers living beyond a threshold distance of approximately 55km were less likely to sell to the abattoir compared to farmers living closer. Thus, it could make farmers in remote areas more prone to high-risk behaviour, such as illegal trade with farmers in neighbouring countries. A case study of the FMD outbreak in four villages in 2012 indicated that the loss of direct income to producers from sales to the abattoir could be reduced by 86% through a commodity-based approach instead of a conventional approach to FMD control. The study emphasized the positive role non-geographic trade standards could play in making mixed wildlife conservation-livestock production land-use systems in TFCAs more compatible and household income streams more diverse and equitable.

- **The Dynamics of Constrained Sorghum Comeback in Smallholder Farming Communities of Mbire District in Zimbabwe**

**Full-time presentation**

**Musara J. P.**, 1,2, **Museumwa L.1**, **Mutenje M.3**, **Mushunje A.4**, **Pfukwa C.5**

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**Abstract:** Small grains have the potential to improve resilience against household food insecurity caused by multiple natural, socio-economic and institutional changes in rural Africa. Effects of rainfall variability and increasing temperatures in arid areas of Zimbabwe demand new approaches to developing agricultural strategies. This has been compounded by weak networks, underperforming local markets and skewed government support across crop enterprises. An immediate option is to re-embrace sorghum given its ability to withstand adverse weather conditions of low rainfall and high temperatures. Various stakeholders have singly or collaboratively made efforts to facilitate this migration from traditional cereals such as maize. The study focuses on sorghum guided by the main question as to whether sorghum can really make a comeback in rural communities. To answer this, the study identifies three hurdle layers of access to subsidy programs, networking structures and access to private markets. We use a triple hurdle methodology to examine factors that affect smallholder farmers’ inclination to participate in sorghum production. The study uses cross-sectional data from 380 households proportionately sampled from five Wards in Mbire District of Zimbabwe. We note that practitioners exploit linear and unsustainable avenues when placing smallholder farmers in vicinity of viable partnerships especially with the private sector. There is generalised consensus that efforts have failed to harness existing potential effective demand for sorghum products under current challenges of low relative productivity, pricing and policy-cultural induced biased preferences. It is therefore imminently imperative to debunk production determinants. This will enhance efficiency and equity through placing greater emphasis on anticipating and responding to present and future market failure cycles. Actors will naturally migrate towards developing and implementing rigorous integrated methods for sorghum intensification. Innovative research identifying new varieties, production systems and niche market targets for sorghum commodity use becomes an integral ingredient.
• Understanding the effects of *Sorghum bicolor*–legume intercropping systems to sorghum yield and soil fertility under conservation agriculture in semi-arid conditions

Speed presentation

**Mlambo, C.** Chikowo, R., Kageler, S., Corbeels, M., Scopel, E.

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**Abstract:** Most field crop production is practised without fertiliser application in Zimbabwe’s smallholder sector in semi-arid regions yet nitrogen is considered a critical input needed to increase productivity of field crops. Legume biological nitrogen fixation can lower the need for external N for these farmers if grown in association/sequence with cereals. This study is determining the effects of intercropping four nitrogen-fixing legumes, Cow peas (*Vignaunguiculata*) cv. CBC3, groundnuts (*Arachins hypogeae*) cv. Natal Common, velvet beans (*Mucuna pruient var. utilis*) and sunnhemp (*Crotalaria juncea*) var. ‘Tropic Sun’, with *Sorghum bicolor* under conservation agriculture (CA) on sorghum biomass, grain yield, land equivalent ratio (LER) and nitrogen benefits when legume planting dates are staggered. Two trials were established in the low veld of Chipinge District, a researcher-managed trial at Chisumbanje Experiment Station and 30 farmer-managed field trials in Wards 29 and 30 for two years. Ground mulch cover in CA is at 30%. A clean seed bed was established in conventional tillage (CT). A 2x5 split plot factorial treatment structure in a randomized complete block design is being used. Tillage method is the main plot factor while planting pattern is the sub-plot factor. Sorghum above ground biomass is evaluated in the two rows from the edge of each sub-plot three times until flowering, at leaf 7, 14 and 21. Final biomass and grain yield are being measured from the central area of 2 m x 1.8 m before calculating land equivalent ratio and assessing N benefits.

• Biotypes of *Neorautanenia branchypus* (Zhombwe) and their relevance to livestock production in semi-arid regions

Speed presentation

**Kaseke, T. B.**1, Chikwambi, Z.1, Mashingaidze, A. B.2, Murungweni, C.3

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**Abstract:** *Neorautanenia branchypus* (Zhombwe) is a leguminous tuberous plant with several factors that help ruminant livestock to survive drought. Zhombwe contains several medicinal factors of benefit to health and nutrition of livestock, for example anhelminthic, antioxidant and antibacterial factors in addition to high nitrogen, energy and ash value. Occasional drought events in the southeastern Zimbabwe have made *Neorautanenia brachypus* popular with livestock farmers because of the way Zhombwe has made their livestock survive the harsh experiences. Interviews with farmers in south-eastern Zimbabwe revealed that there are different ‘types’ of the plant Zhombwe judging from leaf shape, colour of tubers and preferences by cattle when given an option to select. The gap in knowledge on the phenotypic and genotypic studies of this ‘new’ plant was explored to unlock the plant’s potential for commercialisation. Initial examination was conducted using morphological marker analysis based on leaf shape, leaf length and width, leaf base, leaf margin and leaf apices characteristics. Morphological similarity calculations and dendogram construction were done using unweighted pair-group method with arithmetic average (UPGMA). A leaf catalogue with 7 accession types was established. This formed the basis for genetic diversity studies that was conducted through
the use of molecular markers which include random amplified polymorphic DNA (RAPD), simple sequence repeats (SSRs) and inter simple sequence repeats (ISSR). These PCR and gel electrophoresis based methods were used in data scoring by binary coding to get the similarity coefficient and for cluster analyses. The generated data linked morphological structure to genetic differences of critical importance to livestock nutrition.

- **Effect of urea treatment on the feeding value of Colophospermum mopane**

Poster presentation

**Mudzengi, C. P.¹,², Murwira, A.¹, Murungweni, C.³, Halimani, T.⁴, Fritz, H.⁵**

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**Abstract:** Poor quality cereal stovers form the bulk of livestock feeds during prolonged dry seasons of semi-arid areas of Southern Africa. Their intake is usually low, culminating in decreased animal production. *Colophospermum mopane* is an abundant, alternative supplementary browse species of good nutritive value. However, its use is restricted by high condensed tannin (CT) content. We evaluated the potential of urea in improving utilization of *C. mopane*. Firstly, we compared 0, 3, 5, 7 and 9 % urea treatment levels. The optimum treatment level was 7 %. We then determined the effect of 7 % urea treatment on chemical composition of *C. mopane*, and intake of maize stover and live weights of nine Tuli steers for 6 weeks. A complete randomized design with three replicates for three treatments was used. At 7 % urea, CT were lowest while in vitro dry matter digestibility (IVDMD) was highest. However, at 9 % both CT and IVDMD were insignificantly different ($P>0.05$) from 5% urea treatment. Crude protein increased from 8.4 % in 0 % to 25.4 % in 9 % urea. Although 7 % urea treatment resulted in significantly lower ($P<0.05$) maize stover intake than the control Beef Survival Meal (BSM), it had significantly higher ($P<0.05$) maize stover intake than in unsupplemented cattle. Supplementation with BSM maintained live weights throughout, while there was a decrease of 8 kg for urea treated dry *C. mopane* leaves. However, this decrease was significantly lower ($P<0.05$) than in unsupplemented animals (-21kg). Therefore, 7 % urea treatment of *C. mopane* improves quality, consequently improving intake and live weights.

- **Participatory Diagnosis for establishing Innovation and Communication Platforms in Trans-Frontier Conservation Areas in Zimbabwe**

Poster presentation

**Tembani, M.¹, Marimira, S.¹, Jiri, A. ², Mathe, S.³, Audouin, S.³, Mukamuri, B.⁴, Nare, L.⁵, Triomphe B.³**

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**Abstract:** A Participatory Diagnosis (PD) was conducted to gather key knowledge with respect to understanding social dynamics at local level that can be used to set up multi-stakeholder Innovation and Communication Platforms (ICPs) in Trans-Frontier Conservation Areas (TCFAs) in Zimbabwe.
The study was conducted in two districts namely; Hwange (in KAZA TFCA) and Chiredzi (GL-TFCA), where the EU-funded DREAM (develop acronym) project intends to establish ward level ICPs. The Participatory diagnosis process explored existing forms of organizations, activities, nature of problems or opportunities and challenges being faced by small-scale farmer groups at ward level in the area of agriculture and natural resource management. Such information will help to identify actors that can play an active role in an future ICPs addressing challenges or opportunities confronting famers in the two TFCAs. Data was collected using Semi-Structured Interviews (n=35) and Focus Group Discussions (n=21) and was analyzed using FLAME® statistical software to establish salience of different organizations in the wards. ATLAS.ti (version 7.5.7) was used for thematic analysis to understand conflicts and challenges affecting groups. Social Network Analysis (SNA) was conducted to show linkages between stakeholders. Results show that there are strong linkages between organizations and groups while on the other hand weak inter-group linkages exist. A priority ranking of different groups at ward level through establishing their connectivity strengths within the Actor Network (AN) was conducted to identify relevant groups and appropriate entry levels for an ICP. Groups and organisations are implementing agriculture activities that include nutrition gardening, conservation farming and goat keeping. Results show that groups and organisations are facing challenges, key among them being lack of markets, shortages of key inputs and resources and human-wildlife conflicts which poses a threat to viability of the groups. Data generated through close-ended questionnaires was analyzed using SPSS Version 21 to understand demographic characteristics and livelihood activities of group members.

**Session Theme 4: Boundaries of protected areas**

- **Boundaries of protected areas**

**Keynote Speech**

_Cumming, D. H. M._

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**Abstract:** Boundaries are ubiquitous components of the world we live in. They exist wherever there is a discontinuity between objects and their surroundings, from atoms to continents. They vary in form and structure, in how porous they are, and in the differences that may exist between one side and the other of a boundary. In landscapes it is the extent of these differences that may engender conflict. The primary drivers over the last 120 years of protected area (PA) formation and patterns of land use in the GLTFCA have been expanding capitalist economies, growing smallholder populations, and increasing conservationist concerns.

Whatever their shape or form, the existing boundaries of PAs are the core of larger, still poorly defined, TFCAs in which boundaries have seldom been static. This is well illustrated by tracing the shifting boundaries of land uses and PAs such as Gonarezhou and Kruger National Park in the GLTFCA during the last 120 years. At a more local level animal diseases and their control have, for example, both directly and indirectly influenced the siting and maintenance of fences across the region and in Zimbabwe. The rinderpest pandemic of 1895 greatly reduced the numbers of both domestic and wild herbivores across southern Africa and highlighted the need to preserve what wildlife remained. As wildlife populations recovered so did tsetse fly. The threat of trypanosomiasis (ngana) to commercial livestock production then drove game elimination programmes in livestock-free fenced corridors. These fences then provided convenient boundaries for the establishment of protected areas. The control of Foot and Mouth Disease (FMD) also played a major role in maintaining fences around PAs and in controlling the movement of wildlife and livestock across southern Africa.

The nature and siting of PA boundaries can have ecological, social and economic impacts within the social-ecological system of the TFCA in which they are embedded. These impacts include issues relating to human-wildlife conflict, competing claims on resources, the flow of ecosystem goods and
services, the dynamics of source sink systems within a TFCA, and a full range of rural development and health issues.

- **The State of TFCAs: understanding potential and actual impacts**

  **Full-time presentation**

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  **Abstract:** Transfrontier Conservation has been the object of a plethora of studies in a variety of disciplines, mostly with the acknowledgement that the philosophy underlying the concept, its implementation and sustainability are by default multi-disciplinary. Most hard and soft environmental law instruments have set the theoretical and scientific foundation for the expansion of tranfrontier conservation areas globally. The IUCN specifically has tried, in this century, to support incorporate them in their guidelines and framework, in recognition of both conservation and governance opportunities they pose. Regional and national discussion-making entities, however, have also defined their own *modus operandi* for the creation of such spaces. In the attempt to understand the progress of transfrontier conservation, this paper draws on global and regional examples to provide the principles underpinning the existence of TFCAs and the uniqueness of the Southern Africa cases.

  The concept of governance of natural resources and protected areas has, intrinsically, been linked to transfrontier conservation, due to their essence as complex socio-political environmental systems. The vastness of Southern African geography, linked to the complicated socio-economic and political history, makes the need to find innovative and vital governance system for (trans)national conservation even more crucial to the sustainability of any such process. The 1999 SADC Protocol on Wildlife Management and Law Enforcement and the more recent SADC TFCAs programme provide clear objectives for the establishment of transfrontier conservation areas, which transcend wildlife management and enter the more complex sphere of socio-economic human rights. This has been received in the Treaties establishing all regional TFCAs. Yet, after more than a decade of establishment, the question remains on how well such constructs have performed. The second part of this paper attempts to provide an overall assessment of their performance thus far.

- **Thinking about edges in the TFCA**

  **Full-time presentation**

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  This is a case study of the Great Limpopo Transfrontier Park (GLTP) and its Integrated Livelihood Diversification Strategy. The GLTP Joint Management Board commissioned the development of this strategy in 2015 to deal with rural development challenges in the “buffer zones” of the protected areas. The process that followed was the outcome of a co-funded partnership between the GLTP partner countries, Peace Parks Foundation and USAID’s RESILIM B programme. The focus of the presentation would sketch an overview of a wide range of livelihood topics. For the ‘boundaries’ theme, the case study can highlight the value of ‘thinking about edges’ when seeking maximise impacts across a vast area such as the GLTFCA. Through the strategy development process, learnings about different types of ‘edges’ translated into new approaches to be adopted in the following areas:

  - **Defining the scale:** The engagement process presented challenges as we tried to design holistic solutions at the regional level that were mindful of the local and national priorities as well. Scale was also a challenge faced when looking at who interventions are targeted at (individuals, communities or regional initiatives);
• **Defining of management nodes**: The strategy divided the whole TFCA into management nodes to allow for more granular views on livelihood opportunities and priorities;

• **Defining governance arrangements**: Cross boundary Joint Park Management Committees have been proposed to support collaboration between protected areas and countries within the TFCA;

• **Coordinated information management**: A preliminary process was undertaken to document existing livelihood interventions within the TFCA. A database was established to support a contextual understanding as well as a baseline for monitoring going forward. This serves to support the identification of and coordination of overlaps, synergies and gaps. All of these are important boundaries that need to be successfully navigated for livelihood development to be successfully achieved. A deliberate approach to managing such edges is therefore critical.

• **Revealing the partial migration of elephants in Hwange**

**Full-time presentation**

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Migration has important ecological and conservation implications in population dynamics. Migration of whole populations are rare, but in recent years it has been recognized that partial migrations, when only some of the individuals of a population migrate, are common. These can have implications for management at the scale of management units but also for larger conservation areas integrating several land uses. This will be especially true for large mammals which roam over large areas. Hwange National Park has one of the largest elephant populations in Africa yet little is known about the seasonal dynamics of this population. Our key objective was to understand the movement patterns of the elephant population in HNP. Using GPS tracking data, we reveal the partial migration of elephants in Hwange NP and discuss the management implications. We use data from 32 elephants collared in Hwange NP over several years (2010-2015). In particular, we show that (1) some elephants remain resident all year round around artificial waterholes located in the Eastern section of the Park (these elephants remain <60km of their dry season range); (2) some elephants undertake seasonal migrations to the center of the Park that usually dries up in the dry season. These elephants reached areas located between 61 and 120km from their dry season range. Further, some of these migrants have wet season ranges located in Botswana (>120km from the dry season range). At least one elephant spent significant amount of time outside the boundary of KAZA. Migratory elephants leave their dry season range when the first rains occur, demonstrating the influence of surface water in driving this migration. We question the origin of migration which would not have made ecological sense a 100 years ago, and discuss the implications of this partial migration for the transboundary monitoring and management of elephant populations. We also show that resident and migrant elephants do not differ in their habitat selection during the dry season.
• The making of an ecological trap: Are elephants attracted by recently deforested areas?

Full-time presentation

Hugo Valls-Fox, H.1, Fusari, A.1, Defontaines, J.-B.1, Lopes Pereira, C.2, Dias, J.2, Chardonnet, P.1

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Abstract: Deforestation and forest degradation are major causes of wildlife decline in tropical ecosystems. The conversion of mature forest to fields by shifting cultivation leaves behind fallow land with secondary vegetation. Paradoxically, some species like the African elephant (*Loxodonta africana*) may be attracted by secondary regrowth that provides abundant forage in comparison with mature forests. We hypothesised that deforestation around protected areas may constitute an ecological trap for elephants by attracting them towards human communities and cultivations thus aggravating Human Elephant Conflict.

The study was conducted in Gile National Reserve, Zambezia, Mozambique (16°30' S 38°30' E), an unfenced protected area including a core area of 2861 km² and a buffer zone of 1671 km² located within a belt of deciduous miombo woodland that straddles the Zambezia Province. Deforestation in and around the reserve has been monitored by remote sensing from 1990 to 2016. About 60 elephant remain in Gile National Reserve. Five individuals were equipped with GPS satellite collars, three in October 2014 (2 cows and 1 bull) and two in June 2016. To test our hypothesis, we modelled resource selection functions using the GPS data.

Elephants spend about half of their time in the core area, and half in the buffer zone where most of the deforestation occurs. Elephants neither prefer or avoid pristine forest habitats that are used according to availability. They avoid areas cleared before 1990, have no preference for areas cleared between 1990 and 2005 and prefer areas cleared since 2005. The areas elephants prefer most were cleared between 2010 and 2013.

Deforestation for illegal logging and agriculture at the edge of Gile National Reserve may act as an ecological trap for elephants that appear to be attracted by the regenerating vegetation thus increasing Human Elephant Conflict and the risk of poaching of an endangered population.

• Can Conservation Networks restore a meta-population of Elephants in human dominated landscapes?

Speed presentation

Ncube, H.1

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Abstract: The African savanna elephant *Loxodonta africana* has been increasing in certain areas and decreasing in other areas within the Kavango-Zambezi Transfrontier Conservation Area (KAZA-TFCA) biosphere (Blanc *et al.*, 2007, Chase *et al.*, 2016; Wittemyer *et al.* 2014). We employ GIS tools to delineate potential optimal dispersal corridors for elephants with minimal consequences to rural livelihoods. The research approach focuses on habitat availability and connectivity, based on resource selection function modelling and suitability (Boyce *et al.* 2002). A resource selection function (RSF) is any model that yields values proportional to the probability of use of a resource unit, predicting the location of organisms on a landscape (Boyce *et al.* 2002). Spatial maps show landscapes suitable as optimal conservation networks between Hwange National Park and Chizarira National
Park, cognisant of present and projected land use practices. Satellite imagery are used to stratify the potential conservation network corridors within different land-use type areas (demarcated forest, communal, resettlement A1 and A2 farms, private ranches) and vegetation type areas. Predictions from RSF models constructed using elephant Presence/Absence data. The development of conservation networks that include primary IUCN categories I to IV, and secondary IUCN categories V and VI, as well as communal land, private land, and other protected areas provides for an ecosystem approach to conservation.

- **A comparative assessment of wildlife habitat quality in the South East Lowveld of Zimbabwe during campfire donor and post-donor era.**

**Poster presentation**

Tchakatumba, P.¹, Mwakiwa, E.¹, Nyashan S.², Clegg, B.³, Gandiwa, E.⁴

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**Abstract**

CAMPFIRE is a programme developed by the Government of Zimbabwe, initially with assistance of donors, around the concept of managing in an ecologically sustainable way wildlife and wildlife habitat in the communal lands of Zimbabwe for the benefit of the people living in these areas. The underlying assumption is that this will provide the necessary incentives to conserve wildlife and their environment, by inducing local communities interfacing with protected areas to forego more disruptive land- and resource-use practices, and undertake forms of land use that are compatible with the continued supply or restoration of wildlife and their habitat. Although wildlife habitat quality has been assessed in the southern Lowveld (SL) of Zimbabwe, available data do not cover all districts, and no major study has been done to exhaustively assess the effect of donor withdrawal on wildlife habitat quality across CAMPFIRE areas interfacing with protected areas. To cover these gaps, this study is conducted in three districts of the SL of Zimbabwe- Chipinge, Chiredzi and Beitbridge- with use of satellite imagery data split in two periods; the donor era (1989-2003) and the post donor era (2004-2016) to detect land use changes/human encroachment during the two eras. Preliminary study results show a wildlife area loss of 22 %, during the donor era, in the district of Chiredzi. This loss can however be mainly attributed to the settlement of the Chitsa tribe in Gona Rezhou National Park in 2000. While wildlife habitat quality in Chipinge district is not expected to be affected significantly by human encroachment, given its low agricultural potential, Beitbridge district may display a more dramatic outcome mainly during the post donor era since the council set up does not provide any buffer zone between wildlife habitat and human settlement, the same area being used for both wildlife management and agriculture.
Session Theme 5: Prevention and control of livestock/wildlife/human diseases

• Infectious diseases and livelihoods: Connecting the dots

Keynote Speech

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Abstract: Infectious diseases as cause of morbidities and mortalities continue to be a more significant impediment to human health and wealth in developing countries than in developed countries. At the turn of the 21st century 52% of human deaths in sub-Saharan Africa were caused by infectious diseases while 11% were reported in developed countries. It has been stated that the poorest 20% of the world’s population experiences a far higher burden of IDs compared to the remaining 80% of the world’s population. This can be largely attributed to Neglected Tropical and Neglected Zoonotic Diseases as those primarily affect marginalised and resource poor communities in developing countries, especially in sub-Saharan Africa, where effective control in their animal reservoirs is limited or absent.

The future role of infectious diseases in human health is contentious because on the one side it is expected that increasing urbanisation will lead to a declining burden of disease from infectious causes while on the other hand increased interactions of humans at the wildlife/livestock interface are suggested to lead to the emergence of new zoonotic agents.

Livestock production accounts for up to 25% of national income in some countries in sub-Saharan Africa and infectious livestock diseases are the single largest cause of economic losses to farmers in this part of the world. They also contribute to food insecurity and impact on countries’ international trade. It is therefore fair to state that in both absolute and relative terms, infectious diseases are a massive impediment not only to animal and human health but moreover to human livelihoods in sub-Saharan Africa.

What are the inequalities compared to developed countries and how could they be addressed? Questions of effective and acceptable control measures based on the unique drivers of each disease, prioritisation of veterinary and health services, disease surveillance and vaccine development are some of the strategies for discussion.

• Preparing for the next major outbreak of an emerging disease

Full-time presentation

Blumberg, L. H. ¹

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Abstract: Over the past 15 years there have been a number of pandemics, Public Health Emergencies of International Concern (PHEICS) and large regional outbreaks. Many of these have been due to zoonotic pathogens and have resulted in high morbidity and mortality in humans and especially in healthcare workers. These have included SARS, Ebola, avian influenza, MERS-CoV Zika and yellow fever. Unavailability of countermeasures such as diagnostics, therapeutics and vaccines has been a great challenge to early identification of these outbreaks and instituting appropriate control strategies. The Ebola outbreak was a notable example which showed that the use of a ring vaccine strategy could be highly successful in protecting potentially exposed persons, but the tools were not available early enough in the outbreak to have a significant effect. Identifying the pathogens that may emerge and cause these large outbreaks and developing countermeasures timely is the focus of the WHO Blueprint a global strategy and preparedness plan. The ultimate goal is to reduce delay between
the declaration of an emergency and the availability of effective medical or other interventions in order to save lives and avoid social and economic disruption. Using a number of different approaches as well as pathogen characteristics a priority list of pathogens for R and D has been identified. These included the potential for human transmission available medical countermeasures, severity or case fatality rate; the public health context of the affected areas; the potential for societal impacts; and evolutionary potential of the organisms. The 2017 annual review determined there was an urgent need for research and development for: Arenaviral hemorrhagic fevers (including Lassa Fever); Crimean Congo Hemorrhagic Fever (CCHF); Filo viral diseases (including Ebola and Marburg); Middle East Respiratory Syndrome Coronavirus (MERS-CoV); Other highly pathogenic coronaviral diseases (such as Severe Acute Respiratory Syndrome, (SARS)); Nipah and related henipaviral diseases; Rift Valley Fever (RVF); Severe Fever with Thrombocytopenia Syndrome (SFTS) and Zika. Separate programmes address avian influenza and yellow fever. A ‘one health’ approach is important to identify emerging pathogens and to also consider where the most appropriate intervention would be to inform the research and development agenda for countermeasures. Programmes to determine causes of acute febrile illness in persons living and working at the human/ animal interface, pathogen discovery and, development of new diagnostic tests are critically important.

• **Temporal and spatial distribution of Lumpy Skin Disease (LSD) outbreaks in Mashonaland West Province of Zimbabwe from 2000 to 2013**

**Full-time presentation**

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**Abstract**: The objective of this study was to determine significant factors affecting spatio-temporal distribution of Lumpy Skin Disease (LSD) in Mashonaland West Province of Zimbabwe. A retrospective study of LSD from year 2000 to 2013 was undertaken using records from the Department of Livestock Production and Veterinary Services, Mashonaland West Province, Zimbabwe. Descriptive statistics was computed on LSD cases, treatments, vaccinations, and deaths. Analysis of Variance (ANOVA) was used to determine significant factors affecting LSD distribution across diverse farming sectors (localities), districts, months and years as from 2000 to 2013 in Mashonaland West Province. Districts bordering frequently vaccinated (foot and mouth) and game areas had significantly higher LSD outbreaks (p<0.05) than those further away. LSD cases were significantly higher (p<0.05) in resettlement (7.79±1.42) and communal (7.59±1.67) areas where there is sufficient veterinary institutional support than in commercial (6.79±620) and A2 (6.85±1.66) areas, whereas LSD cases were significantly lower (p<0.05) probably due to under reporting in A1 (3.34±0.46) and Small Scale (3.60±0.46). Hot wet season had higher (p<0.05) LSD cases than dry months as highest LSD cases were recorded in March (13.11±5.89). Above normal annual rainfall had significantly higher (p<0.05) LSD cases than normal and below normal rainfall. The study recommends strengthening of existing veterinary service structures for livestock movement and disease surveillance and vaccination to reduce further spread of the disease.
Seroprevalence of brucellosis in cattle and selected wildlife species at selected livestock/wildlife interface areas of the Gonarezhou National Park, Zimbabwe.

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Abstract: Brucellosis is an established zoonosis with human infections attributed to at least 5 of the 6 classical \textit{Brucella} species in terrestrial mammals including \textit{B. abortus}. Studies from around the world indicate that elimination of the animal brucellosis reservoir has resulted in a substantial decline in the incidence of human disease. This study was conducted to determine to the sero-prevalence and risk factors of cattle and wildlife brucellosis in selected communities at the periphery of the GLTCA. The selected interface areas represent three distinct areas of unrestricted (porous), restricted by fencing (non-porous) livestock-wildlife interface and non-interface (absent) areas. A total of 1011 cattle blood samples were collected with 46.7% from the porous (Malipati), 28.2% from the non-porous (Chizvirizvi) and 25.1% from the non-interface (Chomupani) area. A total of 161 samples were also collected from wild animals which included 111 buffaloes, 32 impala and 18 kudu. The overall the cattle seroprevalence was 16.7% with the porous interface recording a significantly ($p = 0.03$) higher seroprevalence than the non-interface area. Cows in the porous interface were more likely to be Brucella seropositive (RR = 1.5, 1.04 < RR < 2.2, $X^2 = 4.5$, $p < 0.05$) than those from the non-interface area. The non-porous interface also recorded a higher seroprevalence than the non-interface area but the difference was not significant ($p = 0.49$). An increasing trend was demonstrated between parity and brucellosis seroprevalence, with those in parity 5 and above recording the highest prevalence, but the differences were not significant ($p > 0.05$). However, cows in parity 3 and above had a significantly ($p < 0.05$) higher seroprevalence compared to heifers. The results showed a significant association between brucellosis seropositivity and cows with a history abortion (RR = 2.6, 1.9 < RR < 3.4, $X^2 = 38.5$, $p < 0.001$). However, a non-significant association was demonstrated between season and brucellosis seropositivity (RR = 1.3, 0.97 < RR < 1.75, $X^2 = 2.82$, $p = 0.093$).

All impala and kudu samples tested negative. The overall seroprevalence in buffaloes was 20.7% (95% CI: 13.9-29.7) and there was no significant ($p = 0.343$) difference between the two buffalo herds sampled. Adult buffaloes (22.6%, 12/53) recorded a non-significant ($p = 0.81$) higher seroprevalence than the sub-adults (19.0%, 11/58).

In conclusion, brucellosis is indeed prevalent in the GLTCA and highly associated with cattle abortion. The presence of the disease in buffaloes and its closer association with the interface type in cattle strongly suggests that exposure to wildlife is an important risk factor. Farmers are therefore urged to control brucellosis in cattle by vaccination of heifers, keeping closed herds and avoiding encroachment into parks in search of pastures and water sources. The Government of Zimbabwe, through the Department of Veterinary Services and the parks and wildlife management authority should ensure FMD fences are re-erected where vandalized to avoid livestock-wildlife contact and consequent spread of diseases. The department of veterinary services should also increase brucellosis surveillance and awareness programmes for the protection of both human and livestock and for biodiversity conservation.
• **Herding for Health: Empowering communal livestock farmers through traditional risk mitigation strategies that enhances wildlife-livestock compatibility and market access**

**Full-time presentation**

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**Abstract:** Landscapes where pastoralist communities and wildlife interact symbolise a complex of challenges and opportunities of significant importance to conservation in Africa. This wildlife-livestock interface represents multiple risks to all present: the spread of transboundary animal diseases and important zoonotic pathogens; various forms of human-wildlife conflict, such as predation and poaching; competition for natural resources, like grazing; and silo-structured governance systems that need to interact at multiple levels. These risks hinder both the development of a robust wildlife economy that is compatible with agricultural practises and rural development, and the successful establishment of transfrontier conservation areas. The recent development of new trade standards (Article 8.8.22, TAHC-OIE) for beef produced in FMD infected areas allows for non-geographic, commodity-based trade (CBT) approaches in beef. We argue that an integrated value chain approach to CBT can serve as a catalyst to align efforts at multiple levels by multiple stakeholders to address wildlife-livestock compatibility, but must include all farmers and must be tested. As such, the Herding for Health model aims to empower communities through collective action and traditional risk mitigation (herding and kraaling) to comply with prerequisite programs and biodiversity conservation agreements. Trade standards are addressed through integrated risk management along the red meat value chain. Market access is facilitated by mobile abattoir technology and conservation-community collaboration in the form of access and benefit sharing models which also promote sustainable enterprise development linked to ecosystem services. This community-driven approach unlocks incentives for conservation-community-government involvement at the wildlife-livestock interface that are both pro-poor and pro-conservation.

• **Preliminary Socio-economic findings from Assessment of the Epizootic Ulcerative Syndrome (EUS) disease on finfish in Zimbabwe**

**Speed Presentation**

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**Abstract:** This abstract presents preliminary results of an ongoing study in Zimbabwe focusing on assessing Socio-economic impact of the Epizootic Ulcerative Syndrome (EUS) disease on human livelihoods, fish production, and on fish as an important component of national natural resources. A detailed socio-economic study questionnaire was developed for data collection, and currently the instrument is in the process of being administered throughout the country through Focus Group Discussions (FGDs), and face to face Key Informant Interviews (KII) of target community members and key stakeholders. In addition, the research teams collected data through making direct observations, when the situation allowed for it, with minimal intrusion. To date (January 2017), a reliable preliminary size of responses from the study survey has been received, analyzed and assessed.
The results give a general perspective of socio-economic effects of the disease on the targeted rural fishing communities. The detailed socio-economic findings and trends reveal that exact economic trends require a continued study over time, although certain fish species have declined. The total number of fish sampled during the winter sampling season of 2016 in wild capture fisheries was 3,658 of which 763 fish were diseased with EUS lesions, giving an average of approximately 21% disease prevalence. It is however important to note that a prevalence of over 90% was recorded in two distinct water bodies elsewhere in the country during the same sampling period, one within the Kavango-Zambezi (KAZA) drainage area and another outside of the project study catchment area. Seven (7) aquaculture farms were also surveyed at the same time as part of this study, and a total of 1,120 samples collected with zero disease prevalence recorded. The latter farms are culturing mainly *Oreochromis niloticus*, the Nile Tilapia species. In addition, a total six (6) EUS disease outbreaks were investigated on 13 water bodies countrywide during the 2016 field work. Out of the 19 sampled sites, that include Lake Kariba on the Binga and Kariba sides of the middle Zambezi, 12 were inland dams and rivers that drain either to the KAZA or to the Great Limpopo southerly drainage, Tranfrontier Conservation Area (TFCA) of Zimbabwe.

A number of lessons were learned during this first phase of the study. Firstly, a full review of information of effects of EUS disease on human livelihoods was hampered by lack of records by the fishing communities on the harvested fish stocks and on any historic disease events that may have been experienced since the beginning of the EUS disease outbreaks in Zimbabwe. EUS Disease was first positively confirmed by laboratory tests at the University of Zambia (UNZA) in Lusaka in 2012. Secondly, estimates of direct economic losses were difficult to establish as records of fish catches and sales of fish products were not always available for analysis. In a study carried out by Lilley, J. H. et al., 2002 in Bangladesh, reduced aquaculture and fisheries productivity could be demonstrated during times of serious EUS outbreaks, although that study could not positively determine with precision that EUS was the factor that directly caused the decline.

- **Clinicopathological findings, risk factors and seroprevalence of small ruminant diseases at a wildlife/livestock interface area with particular emphasis on brucellosis, ehrlichiosis and chlamydiosis**

**Poster presentation**

**Bhandi, S.**1,2, **Pfukenyi, D.**1, **Matope, G.**2, **Murondoti, A., de Garine-Wichatitsky, M.**3

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**Abstract:** The research is an investigation into the prevalence of small ruminants diseases on three different interface areas namely porous, non-interface and non-porous. The research seeks to investigate the effect of interface area on the prevalence of small ruminant diseases of interest which are brucellosis, ehrlichiosis and chlamydiosis. Risk factors associated with the diseases are also going to be explored at each interface area. Questionnaires were distributed to different households in all three interface areas and the data was analyzed on SPSS. Serum samples were collected from all age groups of sheep and goats and were serologically tested for the above named diseases. Wildlife serum samples were also collected from different species of ruminant wild animals which included buffaloes, impalas and kudus to investigate if they also contract the pathogens in questions and to also check if there is any spillover of pathogens and maybe try and establish the direction of flow of pathogens. The research also investigates the gross and microscopic pathological changes noted on post mortems to evaluate the traditional method versus scientific methods of diagnoses of diseases. Results for chlamydia and brucella are being analyzed.
**• A sero-survey of foot and mouth disease (FMD) in cattle around the Lower Zambezi Mana Pools Trans-Frontier Conservation Areas of Zimbabwe**

**Poster presentation**

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**Abstract:** One of the livestock diseases affecting cattle and other cloven-hoofed livestock at the wildlife interface is Foot and Mouth Disease (FMD). This viral disease is carried in the African buffalo (*Syncerus caffer*) which show no clinical signs to this disease but pass infection to cattle through direct and indirect contact. Cattle are highly susceptible and spread through cattle to cattle contact is high. The disease is of high economic importance especially in intensive husbandry systems focussing on international markets. Extensive husbandry systems suffer limited clinical disease but also experience challenges in accessing lucrative markets in disease-free areas. The study focuses on investigating whether buffalo-cattle contact patterns in the interface explain FMD serological patterns in cattle at the periphery of Mana Pools Park in Hurungwe district of Mashonaland West and Mbire district of Mashonaland Central provinces. Serum samples are being collected from cattle in a risk-based, two stage sampling study design at the interface and tested for FMD non-structural protein antibodies using Enzyme Linked Immunosorbent Assay (ELISA). The results shall be compared between cattle in a 20km radius of the game park and those from 21 to 40km from the same game park. In addition, four herds of cattle shall be selected and serologically followed over time (seasons) for FMD antibody in a longitudinal survey. Two herds shall be from an area outside the interface where no buffalo mix with cattle. The other two herds shall be from the interface where there is proof of cattle mixing with buffalo. A questionnaire shall be administered to measure selected risk factors for FMD introduction and spread other than distance from the game park. The results shall be important in planning FMD management in the Mana Pools – Lower Zambezi Trans-frontier Conservation Area and the rest of the supposedly FMD-free areas of Zimbabwe.

**• Molecular detection of *Rickettsia africae* in Amblyomma ticks collected in cattle from South and Center region of Mozambique**

**Poster presentation**

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**Abstract:** Rickettsia are Gram-negative obligate intracellular bacteria, which cause rickettsiosis in humans. The disease is transmitted by ticks of the genera *Amblyomma* and *Rhipicephalus*, which serve as vectors and reservoirs of *Rickettsia*. The epidemiology of rickettsial disease in Mozambique is little known, this emphasizes the importance of conducting studies involving the pathogen, the vectors and the hosts.

**Objective:** Detection and molecular characterization of *Rickettsia* isolated from arthropod vectors collected from cattle in Southern and Central Mozambique.

**Methodology:** Adults and larvae of *Amblyomma* ticks were collected between March and August 2013 from cattle. Larvae were collected in the Veterinary Faculty campus, Changalane and Matutuine
Amblyomma hebraeum ticks were collected in 12 districts of the Southern and Center areas of the country, while Amblyomma variegatum ticks were collected in the Govuro district. Rickettsia genes gltA, ompB and ompA were detected by PCR and sequenced for phylogenetic analysis compared to public available Rickettsia sequences. **Results:** Under the working conditions of this study, the primers used were able to detect up to $10^5$ copies of genomic DNA. In adults, 79.5% of ticks were positive for gltA, 66% for ompA and 67% for ompB detected by PCR. In larvae, 77.2% of ticks were positive for the three genes. The phylogenetic analysis revealed that samples under study grouped with R. africae for the 3 genes. **Conclusion:** Spotted fever group Rickettsia belonging to R. africae widely circulate in ticks collected in south and center of Mozambique.

- **Zoonotic aetiologies in febrile adults in the Mnisi Community, Mpumalanga, South Africa**

**Poster presentation**

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**Abstract:** Zoonoses cause infectious diseases in humans who interact with livestock, domestic animals and vectors. A high prevalence of zoonotic infections was observed in a previous study at 3 public health clinics in Mnisi. Subsequently, a community health clinic in Mnisi was established as a sentinel site for the NICD surveillance programme which allows for seroprevalence monitoring of selected zoonotic diseases in an agro pastoral rural community. From September 2014 to December 2016, consenting adult patients with fever (>37.5 °C) / history of fever on whom a malaria rapid test was done were enrolled and a questionnaire administered. Acute and convalescent blood samples were collected for laboratory testing for leptospirosis, Q fever, bartonellosis, brucellosis, arboviruses and rickettsia.

In total, 70 patients were enrolled: 46% (32/70) did not return for follow up bloods. Median age was 34 years (IQR 26-46 years); 60% were female. Median duration of illness was 2 days (IQR 1-3 days); 60% (40/67) received an antibiotic at the clinic and 11% (8/70) referred to the hospital. Twenty-four percent (17/70) of patients had no systemic symptoms, 59% (31/53) presented with only one symptom: muscle pain (67%) and respiratory symptoms (39%) were most common. On laboratory testing, 81% (54/67) of patients showed evidence of a recent or past infection/exposure for at least one of the zoonotic diseases: 73% (49/67) for tick bite fever, 19% (13/67) for Q fever, 19% (6/31) for arboviruses, 1/70 for leptospirosis and zero for bartonellosis or brucellosis.

Compared to the previous study, fewer patients tested positive for leptospirosis (1% vs 7%), Q fever (19% vs 42%), but more tested positive for TBF (73% vs 65%) and arboviruses (19% vs 4%). Possible reasons for these differences may include: i) patients were enrolled from only one community clinic, ii) the demographic may be different, iii) there was a drought and iv) fewer patients returned for a follow up visit.
• Assessing the Circulation of Bovine tuberculosis in Cattle Herds at the Livestock-Wildlife Interface of the Chobe National Park, Botswana

Poster presentation

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**Abstract**: Bovine tuberculosis (BTB) is an infectious zoonotic disease with potential to infect a wide range of animal species. This disease has never been reported in Botswana but has been reported in some neighboring countries like Zambia, Zimbabwe and South Africa. Since Trans boundary conservation areas (TFCA’s) allow free movement of wild animals across borders, the risk of BTB introduction into Northern Botswana from neighboring infected regions is a plausible hypothesis that requires regular monitoring of animal populations in this region.

The objective of this study was to assess the potential circulation of BTB in cattle herds at the livestock-wildlife interface of the Chobe National Park (CNP), Botswana. A total of 467 animals from eight crushes, at the edge of CNP, were sampled and tested for serum levels of interferon gamma with interferon gamma assay. A total of 6 animals were considered positive for this screening test. Among those with positive results, only four animals were available to be investigated further by post mortem examination. A visual inspection of lymph nodes, tonsils, pulmonary tissue and both thoracic and abdominal viscera was carried out to identify potential lesions consistent with BTB infection. Samples of lymph nodes, tonsils and pulmonary tissue were collected for histopathology, culture and bacteriology. No granulomas were observed from all carcasses. All animals had enlarged peripheral lymph nodes and three of them, one in Chobe east and two in Chobe west had some oval growths on the surface of these lymph nodes. The growths appeared not attached to the parent tissue beneath. No evidence of *M. bovis* infection was found by histopathological examination or PCR analysis of tissue samples nor was *M. bovis* isolated.

Since our sampling effort was limited to a specific location, more surveillance for BTB needs to be conducted among a wider sample of cattle herds within the Chobe District. The proximity of Zambia makes the Chobe District a high risk spot for the transboundary spread of BTB. Similar studies should also be conducted in susceptible wildlife in the region to widen the scope of vigilance against the disease and these should be combined with awareness efforts among relevant stakeholders. We recommend that periodically structured BTB surveillance programs for some areas in Botswana bordering infected countries should be carried out to detect the disease early in case it emerges.

• An assessment of the constraints and opportunities of existing livestock production systems at the wildlife-livestock interface in the Limpopo National Park, Mozambique

Poster presentation

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**Abstract**: A Participatory Rural Appraisal (PRA) was conducted with livestock farmer between November and December 2016 in the Limpopo National Park (LNP), to identify and describe
constraints and opportunities experienced by communities at the wildlife-livestock interface in the LNP with regards to livestock health and production. Data collection involved sixteen focus group discussions (each 8-12 farmers) in 8 villages out of which 3 inside the park and 5 in buffer zone, key informant interviews (55) and direct observation. The results indicate the diseases and other problems that affect livestock farmers living inside and outside of the park. The comparison between these two groups of farmers is outlined and provides explanation to why residents inside the park are not willing to move to outside the park. The results of the study may contribute to the establishment of improved health management and disease control strategies.

- The pattern and impact of Bacillus anthracis infections (anthrax) in wildlife – livestock –human interface areas in Zimbabwe.

Poster presentation

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Abstract: A retrospective study was carried out on the pattern and impact of anthrax at three interface sites in Zimbabwe: Mana Pools National Park and surrounding communities, Hwange National Park and communities (part of Kavango –Zambezi Transfrontier Conservation Area, KAZA TFCA) and the Zimbabwean side of the Greater Limpopo Transfrontier Conservation Area (GLTFCA). It was evident that anthrax was occurring with increasing frequency across animal species but impact not precisely documented especially in wildlife. About 68.83% of anthrax outbreak at the interface was attributable to spontaneous disease outbreaks in wildlife which spilled over to domestic livestock, while 38.17% was due to spontaneous disease outbreaks in domestic livestock of which 3.86% spilled over to wildlife. In foci of outbreaks 21.32% of households lost up to 10% of their livestock, while 23.12% lost more than half their livestock with extreme cases of 75-100% being recorded thus exposing affected households to lasting near destitution. About a third of anthrax outbreaks in animals involved a human case, with the cutaneous form dominating at 32.20% and 0.54% developing the often fatal enteric form of anthrax. It is argued here that anthrax be recognized as a neglected tropical disease in developing countries contributing to poverty and also potentially harming wildlife conservation efforts, than a neglected zoonosis for which it is recognized by WHO.

Session Theme 6: Sharing benefits generated by wildlife

- Sharing the benefits of wildlife. Why? Is this not a case of “Rich man, poor man, beggar man, thief.”

Keynote Speech

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The origin of the title of this presentation is a 15th century children’s nursery rhyme. The line used for this presentation coming from A A Milne’s 1927 book Now We Are Six. One may ask what significance does a children’s nursery rhyme have with a presentation on realising the benefits from natural resources? Well as a rhyme not much at all but when you look at this particular line in the title, it almost visually explodes with the key issues that confront natural resource management, the concept of benefit sharing and the state of CBNRM today. This presentation will examine who is the rich man and who is the poor man? Why in an areas so abundant with natural capital are people so desperately
poor economically and what needs to be done to change this. The presentation will examine who is the beggar man? Is it the community? Is it the state? Is it the donor dependent conservation NGOs? Finally, the presentation will ask, who really is the thief? Is it the man who takes an impala to feed his family? Is it the state that claims the right of gatekeeper to natural resources? Is it the private sector that makes profit while indigenous people struggle to survive? Perhaps it is the NGOs in distant lands that wish to see Africa as their own “Garden of Eden”? Sharing the benefit firstly means determining who are the legitimate beneficiaries.

Note: This presentation is a further development of thinking on a thematically similar presentation delivered at the KAZA symposium in 2016.

- What is preventing the development of eco-tourism in the buffer zone of the GLTFCA? A case study of a community-owned game reserve adjacent to the Kruger National Park.

Full-time presentation

Swemmer, T.1

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Abstract: Within the GLTFCA large tracts of land are available that could support eco-tourism businesses, to the benefit of thousands of local inhabitants. Political barriers and associated disinterest from potential investors ostensibly prevent this. However the ecological nature of much of the area may also deter investors, as the game viewing potential is perceived to be substantially lower than established eco-tourism operations to the south. Which factor is the primary barrier to eco-tourism development and benefit-sharing? Would viable eco-tourism industries develop in marginal areas in the absence of political barriers? Or does low eco-tourism potential discourage investors who would find a way to overcome political barriers if they perceived the eco-tourism potential to be high?

The Mthimkhulu Game Reserve, a community-owned reserve bordering the Kruger National Park, is characterized by both political barriers to eco-tourism and an apparently low eco-tourism potential. For decades, the only economic activity conducted inside the reserve was trophy hunting, from which almost all members of the neighbouring communities received no benefits. A narrative of the politics of the area will be presented, as well as the ecological factors that may have hindered eco-tourism. The political history reveals a complicated situation, with community groups, traditional leaders, hunting operators, a non-profit organization, South African National Parks, and a provincial government department all being active stakeholders, and each with their own agenda. From an ecological perspective, an assessment of the game viewing potential of the area is provided, as well as the preliminary results of a bush-clearing trial that aims to test whether game viewing can be improved via a low-cost, labour intensive method (which itself can provide an interim benefit to neighbouring communities).
• Benefit sharing and Institutional arrangements of CBNRM initiatives in Southern Africa: a study of their impacts on CAMPFIRE and human-wildlife conflicts in Zimbabwe’s GLTFCA and KAZA

Full-time presentation
Petros, T.¹, Nyoni, C.¹, Mhlanga, W.², Mukamuri, B.³, Zanamwe, C.⁴

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Abstract: Institutional arrangements have a significant role in guiding the activities of an organisation. The study examined institutional arrangements around the Communal Area Management Programme for Indigenous Resources (CAMPFIRE) and their impacts on the CAMPFIRE programme. The research was conducted in wards 15, 16 and 17 in Dete Communal area, Hwange District and wards 10, 13 and 15 in Sengwe Communal area, Chiredzi District. Key informant interviews (with authorities from Hwange Main Camp, Hwange RDC, Gonarezhou Mabalauta Area and Chiredzi RDC), questionnaires and secondary data collection were used. Research results indicated that CAMPFIRE is manageable and produce better results when the operating group is small then when it is large. Following the results, in the two study areas, Hwange operates with CAMPFIRE wards and all costs and benefits are shared at ward level and Chiredzi operates at CAMPFIRE villages. The arrangements have adverse effects on participation as shown by the frequencies of respondents on participation in the programme. The negative impacts of institutional arrangements on CAMPFIRE are due to benefit sharing and flow to communities, unclearly defined ownership, none existence of human-wildlife conflict policy and compensation policy, political unrest leading to sanctions imposed on ivory trade by power states, unclear responsibility of problem animal control and efficiency on problem animal control. These result in reduction in local participation, increased poaching, self help problem animal control, promotes negative attitudes towards wildlife and the programme and loss of confidence and interest in CAMPFIRE. Other factors such as significance of benefits, scope of beneficiaries and culture also determine participation and attitude towards the programme. The state needs to make strong a human-wildlife conflict policy and compensation policy which clearly spells of the magnitudes of damage and the corresponding compensation to be given to victims of loss. Appropriate Authorities together with their communities are to revise, improve and practice the fundamental principles of good governance giving special attention to transparency and accountability.

• Studying lineage histories to understand local participation in north-western Zimbabwe Full-time presentation

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Abstract: Since the Ndebele invasion, in the middle of the nineteenth century, Matabeleland North has been marked by a violent history that strongly unstructured local populations and their perceptions of the territory and the environment. Those perceptions not only depend on forced human mobility but are also the result of arguable planning legislation and natural resources management. In the late 1980s, CAMPFIRE, as a community based management programme, introduced an original system of natural resources management to make local people benefit from conservation and economic incomes related to wildlife. Until the economical crisis of the 2000s, it enabled a compensation of the economic impacts of the wildlife proximity and an attenuation of conflicts between managers and local populations. However, since then the CAMPFIRE programme has been facing structural and
functional difficulties in Hwange district. Throughout the centuries, interethnic marriages as well as population movements led to a strong ethnic mixity, which allows us to question the criteria that are mobilized to define the “producer community”. How does the study of perceptions of the territory and the environment may help to understand local participation? This presentation will show how to discern CAMPFIRE participation modalities in Matabeleland North through the reconstitution of lineage histories and the significant interethnic marriages between different ethno-linguistic groups.

• Interpreting an ecosystem service framework for protected areas – through the lens of benefit sharing case studies from the Kruger National Park, South Africa

Full-time presentation

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Abstract: Protected area sustainability is becoming increasingly dependent on broad, societal support. Effective benefit sharing from conservation, can contribute to this by enabling positive impacts on human well-being. Protected area managers mostly don’t report on all benefits from parks due to a lack of an appropriate framework. We develop a framework that (1) contributes to the global ecosystem service discourse, (2) provides a tool for protected area managers to report collectively on benefit sharing and (3) identifies gaps in benefit distribution for managing cost-benefit trade-offs. We classified ecosystem services into direct and indirect processes which accrue as primary or secondary impacts. We used our framework to conduct a quantitative inventory of benefit processes for the KNP and in so doing, demonstrate the skewed nature of benefit distribution, with most beneficiaries receiving intangible benefits. The framework highlights the need to understand the impact of benefit sharing on human well-being; the importance of distinguishing between ecosystem services versus benefit outcomes; the lack of understanding of the outputs and outcomes from direct ecosystem service flows from parks; and finally the need for an understanding of the links between benefit accrual and conservation-related outcomes. Our paper goes on to explore these concepts (benefit distribution to human-wellbeing outcomes and impact on conservation) by unpacking several benefit sharing case studies from the KNP including natural resource harvesting, employment and human-wildlife conflict. We trace the processes pre, during and post implementation and conclude by exploring the tangible and intangible impacts (positive and negative) of these projects both on the beneficiaries as well as on the KNP its self.

• Exploring the impact of CAMPFIRE on community development through wildlife conservation in the Communal Areas of Zimbabwe

Full-time presentation

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Abstract: Community development projects are rarely implemented from the bottom-up, i.e. in response to problems identified by individuals, groups of individuals and villages or wards directly affected by wildlife. More often than not, action is initiated through the Rural District Council acting on behalf of wards. Due to perceptions of the structure of local government, and the way in which jurisdiction over wildlife resources is accorded to communities (Appropriate Authority is granted to Rural District Councils), there are doubts regarding the effectiveness of the Community Areas Management Programme for Indigenous Resources (CAMPFIRE), and whether it is truly benefiting rural people who live with wildlife. The issue is particularly acute when there are no safeguard systems to reduce dilution of the financial benefits which households view as their due. This paper
examines this dichotomy by briefly exploring the evolution of the CAMPFIRE Program, describing the extent of its coverage, and the impact that it has had on wildlife conservation. In order to fully examine the extent of community benefits, and benefit sharing under CAMPFIRE, the paper uses latest data based on a report “The Role of Trophy Hunting of Elephant in Support of the Zimbabwe CAMPFIRE Program” to show how much revenue the sport-hunting of key species provides and how these funds have been distributed to CAMPFIRE communities in various wards, including communities in the KAZA and GLTFCAs, providing information on the physical and human parameters of the 9 districts covered in the report, including how and on what the revenues from hunting have been utilized, and the cost of living with wildlife.

Session Policy recommendations

- Infectious causes of infertility in domestic ruminants, associated risk factors and socio-economic impact in selected human/livestock/wildlife interface areas of Zimbabwe

Policy Brief

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Background

Infections causes of abortion in cattle such as brucellosis, campylobacteriosis, leptospirosis, trichomoniasis, neosporosis and Rift Valley fever result in reduced livestock multiplication and therefore limit the extent of benefits of livestock production. In addition brucellosis, chlamydiosis and Rift Valley Fever are important zoonoses that affect humans with various clinical manifestations and sometimes mortality.

At the livestock/wildlife interface areas of Zimbabwe, livestock production is the main economic activity as often the aridity of the areas does not favour crop production. Quite often the causes of abortion are never diagnosed due to remoteness of the areas to disease diagnostic centers coupled with an incapacitated veterinary service. Several local theories as to the cause of the abortion abound but most worrying among them is the thinking that livestock are contracting the diseases from wildlife. The net effect is therefore a heightening of conflict between humans and wildlife exacerbating an already delicate relationship between Parks and Wildlife Management Authority and communities bordering the park which has had a negative effect on biodiversity conservation. Lack of knowledge on the exact causes of abortions also means that no due care is taken by the communities to avoid spread of the diseases and to protect themselves against zoonoses.

Results

- The majority of small-scale livestock owners in SEL interface area perceive wildlife as a reservoir for livestock
- A large proportion of small-scale livestock owners have poor awareness of the zoonotic risks associated
- The proportions of cattle infected with brucellosis is higher in areas with contacts with buffalos, suggesting possible transmission from wildlife-reservoir
**Uncertainties associated with the results**

Firstly, not all respondents owned cattle and therefore their knowledge of cattle abortion and zoonoses could be limited. However, all of them had owned cattle at some point and in fact some pointed to husbandry constraints and abortions as some of the reasons why they had no cattle at the time of the interviews. It can still be argued that the land tenure patterns in these communities allow common sharing of information between farmers regardless of livestock ownership. In addition, livestock and livestock products such as meat and milk are often communally shared such that the risk of human infection by livestock zoonoses may not significantly differ between those farmers that own livestock and those that do not. This is supported by our results which indicate that some households that reported consuming milk indicated neighbours as their source of the milk. The second notable source of bias is the implication of wildlife as a source of infection for cattle abortions by respondents living in the porous interface. This can be attributable to already existing conflicts between livestock owners and wildlife due to known and much publicised diseases like Foot and Mouth Disease. Lastly, not all abortions are infectious and even those that are infectious are not necessarily zoonotic. Our time frame of cattle abortions within the last five years can be a source of recall bias.

**Policy recommendations**

**Current policy on Brucellosis**

- Every person who owns a heifer between 3 and 6 months old in a specified area shall cause such a heifer to be vaccinated using an approved brucella vaccine (S19).
  - Specified areas are all land that is not communal or land purchased by the state for resettlement.
  - Specified areas are communal land or land purchased by the state for resettlement purposes on which dairy premises are situated and registered in terms of the dairy act.
- Proof of vaccination required (veterinary certificate/invoice of vaccine purchase).
- All positives to be destroyed or branded for slaughter
- Accreditation schemes mainly applicable to commercial dairy farms

**Suggested revision(s) in policy**

- Specified areas should include all land regardless of whether it’s commercial or communal
- Approved vaccine should include RB51 which is now commercially available
- All positive animals should compulsorily be send for slaughter
- Secondary policies should deal with farmer training and public health campaigns.
- All new animals should be tested for brucellosis and other transboundary animal diseases (TADs) prior to introduction onto new premises
- Quarantine places should be available to monitor diseases in newly purchased stock
- All countries sharing borders should declare their phyto-sanitary statuses with respect to TADs.

**Expected effects of the revised policy**

- The current policy is looking at dairy production at a commercial level yet majority of households in communal areas get their own milk from their own cows as supported by our findings. Limiting the vaccination requirements to the so called specified areas is a major drawback in so far as the control of the disease is concerned because current and previous research has demonstrated the presence of the infection in communal set ups where milk is even consumed raw without any further processing. Therefore the policy should encompass both commercial and communal cattle irrespective of whether they are beef or dairy breeds. In fact in most communal areas, beef cattle type breeds are being milked for both domestic consumption and local sales and milk is consumed unprocessed.
- The use of the strain 19 vaccine was advocated then because it was the only vaccine available (current legislation is from 1995). This therefore restricted the age of vaccination to between 3 and 6 months; the aim being to enforce compulsory testing from 18 months onwards when the vaccinated animals could be detected as negative. Prior to 18 months, all vaccinated heifers will react positively to the test. There has always been a misconception that the restricted age of vaccination using S19 is because cows abort if there are vaccinated later in life and as explained above, that misconception is untrue. Now a relatively new vaccine RB 51 is available on the market. This vaccine does not interfere with serologic tests for field strain brucellosis and can be given to cow or heifers of all ages without any side effects.
• Because of the financial losses to farmers associated with test and destroy policies where compensation is not available, it is in the best interest of producers to be compelled to send to the abattoirs all positive cows rather than just destroy them without compensation

• There is need for a vibrant and well resourced extension service for all farmers particularly small holder farmers on animal husbandry and disease prevention campaigns, production of quality milk and awareness campaigns on food borne pathogens of animal origin

• Vaccination and other biosecurity measures such as quarantine, game fencing and disease pretesting will ensure efficient disease control

**Waterbirds in SE KAZA TFCA: Are we conserving or losing?**

**Policy Brief**

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**Background**

Data on trends of waterbirds in the south-east Kavango Transfrontier Conservation Area (KAZA TFCA) are patchy, although the area is known as a good breeding ground for ducks (Godfrey, 1992) and being part of an Important Bird Area (IBA). Waterbirds are an important resource not only for protein provision for local people but also for generating income for local people. Sadly, waterbirds are currently threatened by human activities (e.g. hunting, dog predation, noise, grazing) which are being worsened by climate change and associated changes to natural processes. Here we present perceptions of drivers of waterbirds trends by locals in south-east KAZA TFCA in order to improve waterbird conservation while pointing to potential income sources for people in communal areas (CAs).

**Results**

**Policy recommendation**

• Currently, the National Environmental Policy (NEP) alongside the legal framework governing access to common resources advocates for promotion and equitable access to and sustainable use of natural and cultural resources with an emphasis on satisfying basic needs, improving people’s standard of living, enhancing food security and reducing poverty.

• In support of the NEP, we suggest lessening disturbances around wetlands by negotiating livestock access to selected water holes in CA (or creation of special troughs for livestock at sections of wetlands with potential to host wildfowl). We also advocate for greater enhancement of environmental awareness which is backed up by research and monitoring of waterbirds. We think that the community can organise themselves to conduct monitoring of waterfowl in (CAs) which will help management of the resource.

• **This will allow greater production of duck resources** in the south-east KAZA TFCA and potentially boost avitourism in the (CAs) while reviving the duck hunting in this area.
Managing anthrax in wildlife-livestock interface areas

Policy Brief

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Background

The pattern and spread of anthrax at the wildlife – domestic livestock interface is not understood. Anthrax occurs in both domestic livestock and wildlife at the interface and are equally affected. But it is not clear in which animal species the disease occurs more frequently and possibly spread to others. Also the impact of anthrax disease outbreaks on either domestic livestock (and hence livelihoods) or wildlife conservation is not precisely understood. In the latter, the disease is hardly documented in Zimbabwe despite anecdotal evidence of its occurrence with some frequency in some wildlife species.

Importance of the issue: Knowledge of the pattern and spread of anthrax at the wildlife-domestic livestock interface areas enables authorities to modify intervention measures to lessen disease impact through such actions as preventive vaccinations, and the local communities to also take disease preemptive measures such as adhering to strict separation of animal species at risk times of the year, among others. Similarly, conservation authorities are enabled to take informed decisions in wildlife management programs which minimize impact of diseases such as anthrax on animal species.

Results

• Result 1: Survey in Chiredzi, Hwange and Tsholothso Districts revealed that in interface areas, areas closer to wildlife management areas suffered more frequent outbreaks of anthrax in domestic livestock, than those further away. Anthrax occurred more frequently in wildlife which then spread the disease to nearby domestic livestock through shared range. There were very few cases of anthrax which starts in livestock and then shared with wildlife.

• Result 2: Overall about 40% of anthrax outbreaks in animals were investigated and confirmed by the veterinary authorities (DLVS), and very few (3%) of these also involved human infections. Also at least 16% of anthrax carcasses were salvaged for meat for human consumption, while close to a fifth of outbreaks in animals went unreported to the authorities.

• Result 3: Serological tests for anthrax in domestic dogs and lions at the interface have shown that the disease is more widespread than realized. For instance in 2015 it was detected in Hwange Communal Lands, Chomupani Communal Lands (Chiredzi District) and Hwange National Park – areas in which the disease has not been reported in recent years. Thus anthrax appears much more widespread than believed, and maybe missed because of sometimes atypically low numbers of animals affected or sub-optimal surveillance.

• Uncertainties associated with the results: The levels of cases of anthrax going unreported or anthrax carcasses consumed by human beings are most likely much higher than indicated above, given that people would not give such information easily.

Policy recommendation

Current policy

• Zimbabwe has designated anthrax endemic areas [Animal Health (Anthrax Areas) Order, 1978] where DLVS carry out annual vaccination campaigns against anthrax in cattle.

• In other areas DLVS only carries out vaccinations in the event of disease outbreaks, and only up to two years after the disease outbreak.

• During cases of anthrax outbreaks, DLVS oversees safe disposal of anthrax carcasses and decontamination of the environment by the affected communities [Animal Health (Anthrax) Regulations, 1982], and both humans and animals are prohibited from eating of meat from anthrax carcasses.
Suggested revision(s) in policy

- Review designation of ‘Anthrax Areas’ because it excludes other areas which have also become anthrax endemic spots, ands harmonize anthrax vaccinations protocols in all areas where the disease may be confirmed.
- Improve on institutional collaboration and linkages especially between the veterinary authorities and wildlife conservation bodies for better disease surveillance, monitoring and control programs in all animals.
- Improve on the enforcement of Animal Health Regulations by veterinary field personnel including cooperation from farmers and wildlife managers on disease reporting, diagnosis and control programs.

Expected effects of the revised policy

- Better surveillance, monitoring, early recognition and diagnosis of the disease in all animals so as to formulate better disease control strategies.

- Indigenous browse trees: key to sustainability at the livestock-wildlife interface

Policy Brief

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Background

Competition for natural resources at the periphery of national parks due to climate change is likely to affect coexistence between nature and people. National parks are often located in semi-arid regions where livestock production off the range is the main source of rural livelihoods. In recent years, these regions have experienced deterioration of the quantity and quality of the rangeland due to climate change and variability. At the livestock-wildlife interface of Gonarezhou National Park (GNP) in the South East Lowveld (SEL) of Zimbabwe for instance, farmers respond to grazing shortages in the communal areas by poach grazing in the park. This increases livestock-wildlife interactions, elevating probability of disease transfer between wildlife and cattle, and creating conflict between conservation objectives and rural livelihoods. Under such situations, indigenous browse species play an important role not just as fuel wood, food, medicines and in soil fertility, but most importantly as a good reservoir of protein, metabolisable energy, vitamins and minerals in livestock feed. Therefore, if used sustainably, browse species can be used to manage interactions at the wildlife-livestock interface.

Results

- **Screening key browse species in a semi-arid rangeland:** Knowledge on key rangeland resources that have capacity to increase resilience of livestock based rural livelihoods is critical for ensuring their sustainability has been produced.

- **Effect of urea treatment on the feeding value of Colophospermum mopane:** Compared to poor quality cereal stovers that form the bulk of livestock feeds during prolonged dry seasons of semi-arid areas of Southern Africa, C. mopane is an abundant, alternative supplementary browse species of good nutritive value. However, its use is restricted by high condensed tannin (CT) content.

- **Comparison of chemical analysis and farmer perceptions of nutritive value of key browse species in semi-arid areas of Southern Africa:** In livestock based rural livelihoods of semi-arid rangelands in the developing world, determination of the nutritive value of browse species is mainly associated
with farmer perceptions. Additionally, little is known on the changes in nutritive value of these species that phenologically change seasonally. Without chemical analysis to validate farmer nutritive value ranking, both livestock and rangeland production could be adversely affected.

- **Spatial distribution of three key browse species: Implication on livestock production:** Colophospermum mopane, S. persica and D. cinerea are key browse species at the livestock-wildlife interface of the SEL. They are especially important for dry season feeding of livestock. However, they are prone to overutilization, unsustainable harvesting and mismanagement due to multiple uses.

- **An analysis of human wildlife conflict in relation to perceived resource hotspots:** Overlaps in human and wildlife requirements at these human-wildlife interfaces cause human wildlife conflicts (HWC) which impede success of the TFCA initiatives. Participatory mapping of browse resources can help mitigate HWC in communal lands adjacent to protected areas. Foraging hotspots were mapped using participatory approaches.

- **Uncertainties associated with the results:** In classifying the key browse species, other factors apart from the criteria used in this study influence significance of browse species. Also, the nutritive value of the key browse species was based on the perceptions of the herders. There is, therefore, need to use criteria based on scientifically validated results. Additionally, it would be interesting to scientifically validate the ethnoveterinary efficacy of the species. There is also need for further studies on other parts of the same plant species before conclusions can be drawn on their pharmacological and therapeutic potential and to test milk quality and quantity of lactating cows fed such a diet. Further studies can also incorporate palatable agents like molasses to improve taste and smell of urea treated feeds.

**Policy recommendations**

- **Integrate scientific approaches and indigenous knowledge systems**
  Bottom-up approaches that incorporate communities in formulation and implementation of agricultural policies can yield more effective results. However, communities are often overlooked. Ethnoveterinary medicine is mostly considered an alternative for resource poor farmers. Even curricular in universities, and other veterinary and agricultural colleges do not incorporate use of ethnoveterinary medicines in animal health studies.

- **In situ and ex situ conservation of key browse species**
  There is need to establish reforestation and seed collection sites, and facilitate the creation of adequate small-scale management units of *S. persica*. Appropriate management strategies should also be employed to curb effects of invasive species like *D. cinerea* that alters structure and composition of other vegetation, making the rangeland more susceptible to shocks and disturbances, and less capable of delivering services. Adoption of these policy suggestions are expected to improve holistic management and utilization of these species, hence their conservation.

- **Support research and dissemination of agricultural technologies**
  Climate change and variability present a need for new approaches to agricultural production worldwide, which should also be embraced by the small scale farming sector. The Food and Nutrition Cluster of the Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZimAsset) is in pursuit of a new trajectory of economic development through agriculture. However, currently there is little support for agricultural research, and information sharing among researchers, government extension services, non-governmental organizations, farmers and farmer organisations. In addition to creating employment opportunities, this will also increase food security and nutrition for sustainable rural livelihoods.

- **Strengthen institutions governing use of rangelands and spatio-temporal movement of livestock at the livestock-wildlife interface**
  Concepts such as governance, co-management and decentralization that have been implemented in other countries in dealing with management of common pool resources (CPRs) such as fisheries are recommended. For better policy alignment, there is need to develop mechanisms for coordination across different departments such as police, national parks, veterinary, research and livestock production to increase coherence of food security and nutrition interventions.

- **Improve access by smallholders to credit, insurance and livestock markets**
  For local farmers, lack of markets and marketing knowledge compound these challenges. Therefore, appropriate interventions to address these problems should capacitate farmers as well as incentivize
them to destock. For instance, there should be easy access to credit without high interest rates for acquisition of feeds, drugs and other inputs. Council levy systems should be revised so that they are not prohibitive, but rather attract fair formal sales. Destocking campaigns and other such trainings should be routine programmes for small scale farmers to approach livestock production with a view for sustainable livelihoods, food security and economic development.

- **Ticks Diversity, Characterisation and epidemiology of Tick-Borne Diseases at a Wildlife-Livestock Interface Area**

**Policy Brief**

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**Background**

Tick and tick borne diseases are known to be the major impediment to livestock production with losses amounting to billions of dollars in sub-Saharan Africa. The impact of ticks and tick borne diseases is higher at the livestock/wildlife interface areas as livestock production is the main economic activity due to the aridity of the areas. Using economic damage threshold models, and the need to sustain tick-borne disease endemic stability, government controlled strategic dipping has been introduced with little variations to cater for geographic variations, tick diversity and intensity. The farmers are levied at minimal levels to complement on resources provision. To increase adherence to this strategic dipping a pierce of legislation has been enacted. This has been practiced since in all communal areas with notable inconsistences, including lack of coordination, resources and supervision of supplementary dipping. At the interfaces, livestock share common resources with a large variety and assemblages of wild animals, that they share ticks and tick borne diseases with. This further complicates tick and tick borne control and further heightening of conflict between humans and wildlife. Knowledge, perception and livestock practices is also in addition to legal enforcement of strategic dipping is also critical in control of tick and tick borne diseases.

**Results**

- A large proportion of small-scale livestock farmers have sound awareness of the ticks and their physical impact on their animals.
- There is greater awareness on the role played by wildlife as reservoir of ticks to livestock.
- However there is poor awareness of tick borne disease. Often the knowledge is not in concordance with veterinary literature.
- Uptake of government initiated dipping programme is good but not complete with high proportion of farmers doing uncoordinated and unsupervised supplementary dipping.
- In contact animals are not dipped by the majority of farmers.
- There is negative perception of the quality and reliability of the government procured acaricide.
- Tick diversity around the GNP is similar to other areas in hot arid, southern regions of the country.
- Using the bont tick model, ticks do not substructure according to host.

**Uncertainties associated with the results**

Knowledge of farmers could have been affected by the already existing negative perceptions they have for wildlife notably the buffalo, which was highly implicated in tick transmission. The negative perception of the government initiated dipping strategy could be influenced by the levy paid, and also possibly by high tick reinfections as result of communal sharing of grazing and watering points with
other farmers and wildlife. This in turn can increase tick borne diseases endemic stability and thus reducing clinical cases, and thus knowledge of tick borne diseases.

Policy recommendations

Current policy on Tick and tick borne diseases

- Government controlled cattle plunge dipping in communal areas is compulsory, enforced by legislation, and failure to bring cattle for dipping attracts a fine. Cattle are dipped 32 times, per year, weekly in rain season, bimonthly in winter and monthly in dry hot months.
- Tick infestation is defined according to the Animal Health Act (Cattle Cleansing) Regulations, 1993. In short each cow should not have more than 10 adult ticks, and 10% of the herd should not be tick infested.

Suggested revision(s) in policy

- Monthly dipping in the hot dry months assumes herbage and microenvironment is not good for tick sustenance. Yet these animals have access to the park then. So we recommend bi monthly dipping in the areas around the parks.
- Compulsory dipping should include all in contact animals that can influence tick epidemiology and abundance like small domestic ruminants.
- Supplementary dipping should be coordinated and supervised to prevent unjudicial use that can drive resistance.
- Secondary policies should deal with farmer training and economic use of resources campaigns.
- All new animals should be tested and vaccinated prior to introduction into the area for tick borne diseases.

Expected effects of the revised policy

- Monthly dipping in the hot months assumes low herbage and dry environment that will reduce tick densities in the environment. Yet these animals have good access to the park then. This would imply that the tick re-infestation would be higher than expected. In addition this also time with increased contact with wild animals. To get a win win situation, increased frequency of dipping will make cattle surrogate animals to drag ticks from the wildlife side and reduce tick burden in the wildlife. However the only set back is this would increase acaricide residue in the park with downstream effect on biodiversity. However cattle presence in the park should not be seen from a negative aspect, but a beneficial aspect in reducing tick load particularly if dipped more frequently during this time of contact.
- The current policy is looking at cattle production yet there is a high diversity of other animals kept by the farmers which are not given any attention. These animals are critical in the life circle and spreading of ticks and tick borne diseases. Most ticks seen in these areas are multi host ticks, thus failure to control these ticks in other host limits the potential benefits of the government derived animals.
- Commercial vaccines are available for major diseases like heart water. Thus strategic cattle vaccinations and vaccinations of new introductions and in contact animals may reduce the impact of tick and tick borne disease.
- There is need for a vibrant and well-resourced extension service for all farmers particularly for the control of acaricide usage and for disease prevention campaigns,