



Nature & Faune

Vol. 22, Issue 2

Conservation Beyond Boundaries

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www.fao.org/world/regional/raf/workprog/forestry/magazine_en.htm



FOOD AND AGRICULTURE ORGANISATION OF THE UNITED NATIONS

Accra, Ghana

2007

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Table of Contents

Preface	ii
Announcements	iii
Editorial <i>Alan W. Rodgers</i>	iv
News	1
Special feature Peace Parks Foundation: A decade of experiential knowledge on transboundary conservation in southern Africa <i>Craig Beech</i>	2
Articles Characterisation of wildlife movement corridors in the Zimbabwe, Mozambique, Zambia (ZiMoZa) trans-boundary area to guide mitigation of increasing human-wildlife conflicts in the Zambezi heartland <i>Patience Zisadza and Jimmiel J. Mandima</i>	6
Cross-border trade and conservation in the Sangha River Region (Cameroon, Central African Republic and Republic of Congo) <i>Ruben de Koning, Julius Chupezi Tieguhong and Victor Amougou</i>	17
Survey of elephant movement and corridor issues in western Ghana and eastern Cote D' Ivoire <i>Daryl E. Bosu, Bright Kumordzi, Kofi Moses Sam and Kingsley S. Oppong</i>	25
Fisheries cooperation in the West Central Gulf of Guinea (Liberia, Cote D'Ivoire, Ghana, Togo, Benin and Nigeria) <i>Séraphin Dedi Nadje, and Jessica Hjerpe Olausson</i>	34
Country Focus: Sudan <i>Salwa Mansour Abdel Hameed</i> gives an interview to <i>Nature & Faune</i>	40
FAO activities Central African World Heritage Forest Initiative (CAWHFI)	44
Fouta Djallon Highlands Integrated Natural Resources Management Project	45
Collaborative Partnership on Forests (CPF)	46
Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases	47
Marine Protected Areas as a Tool for Fisheries Management (MPAs)	47
Links	49
Theme and Deadline for Next Issue	51
Guidelines for authors, Subscription and Correspondence	51

Preface

Sustainable development of wildlife, forestry and renewable natural resources in general calls for approaches that include a vision of our field of operation as stretching beyond individual countries' borders. On the other hand, formulating and implementing programmes on sustainable management of wildlife and protected areas straddling political boundaries are quite challenging, especially in Africa. One reason for the challenge is that traditionally the scope of conservation activities has always been within individual countries. There was not, therefore, a concrete field basis around which inter-country collaboration could be built.

This edition of *Nature & Faune* is devoted to exploring various aspects of Trans-Boundary Conservation. The editorial by Alan Rodgers points to the fact that although planning, implementation and monitoring of natural resource conservation is a national prerogative neighbouring countries need to collaborate in achieving wise development of shared resources. The Special Feature by Craig Beech on Peace Parks Foundation argues that the establishment of transfrontier conservation areas (TFCAs) is expected to enhance job creation, biodiversity conservation, peace and stability in the region. A number of articles on transboundary conservation activities are presented, embracing examples from west, central and southern Africa.

A news item on three Foundations collaborating to conserve the threatened biodiversity of the Sahara Desert shines the spotlight on commitments “in support of conservation efforts throughout North Africa and all peoples who share the Great Saharan Desert.”

Also included in this issue's menu is a dash of multinational cooperation towards management of marine fish stocks. Séraphin Dedi Nadjé and Jessica Hjerpe Olausson reported of the countries in the West Central Gulf of Guinea area are conscious of the need for cooperation in the management of their fisheries resources. The Fishery Committee for the West Central Gulf of Guinea (FCWC) was consequently established, to facilitate cooperation in fisheries management in the subregion.

The country under focus in this edition is Sudan. It is the largest country on the African continent and has the largest freshwater wetland in Africa. In order to better understand Sudan's rich rangelands and wildlife, as well as its experiences on conservation of wildlife across national territorial boundaries, Dr Salwa Mansour Abdel Hameed, Director, Wildlife Research Centre, Ministry of Science & Technology Sudan, relates her country's story in an interview.

Under the feature FAO activities, 5 initiatives are introduced: The Central African World Heritage Forest Initiative (CAWHFI); Fouta Djallon Highlands Integrated Natural Resources Management Project; the Collaborative Partnership on Forests (CPF); Emergency Prevention System (EMPRES) for Transboundary Animal and Plant Pests and Diseases; and Marine Protected Areas as a Tool for Fisheries Management (MPAs).

This edition of *Nature & Faune* illustrates the complexities of cross-border conservation and makes sensible suggestions about how these complexities could be managed. The approaches taken here by contributing authors are of great interest to those studying and working in this area.

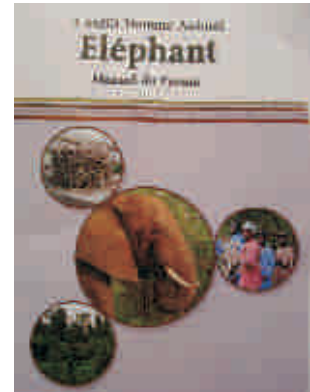
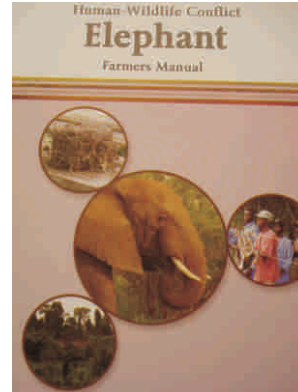
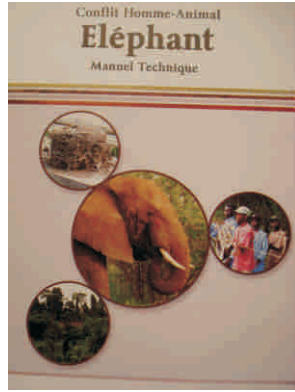
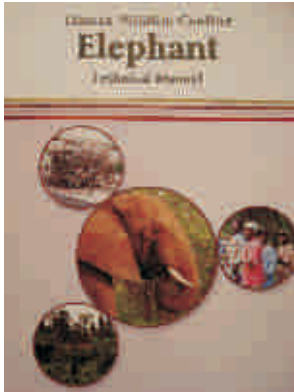
You will find this edition of *Nature & Faune* thought-provoking.

Happy reading!

Announcements

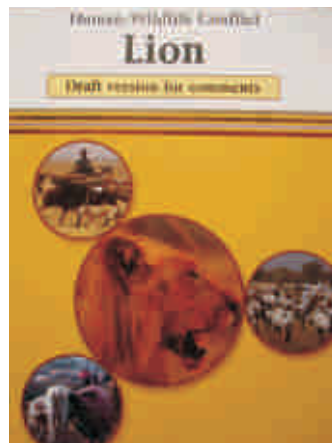
Training package on Human-Elephant Conflict Management

FAO recently completed a training package on Human-Elephant Conflict Management, consisting of a Technical Manual, Farmers' manual and a video. Please send an email to nature-faune@fao.org in order to receive a package (available in English and in French).



Draft report on Human-Lion Conflict management is available; comments are welcome!

A draft report on Human-Lion Conflict management has been written up by FAO. If interested to receive a copy, contact Rene Czudek: Rene.czudek@fao.org. Your comments will be very much appreciated.



Draft report on Human-Baboon Conflict Management is available at FAO.

A draft report on Human-Baboon Conflict Management is available for comments. For further inquiries or simply to receive a copy of this draft publication, contact Rene Czudek: Rene.czudek@fao.org



Conservation across and beyond boundaries

Alan W. Rodgers¹

“The borders of African countries rarely coincide with eco-regions or cultural boundaries. National borders were established mostly by past colonial powers in the politicized “Scramble for Africa” of the late 1800s, with little consideration for the geographic distribution of African people, and even less for the ecological divisions of the landscape”. This is the opening sentence to a discussion on cross-border conservation in the detailed assessment of Africa's eco-regions (Burgess et al 2004). Their analysis shows that of 119 distinct African “ecological-regions”, 85 cover more than one country, mostly with direct continuity across borders. At a finer scale, national borders dissect many individual ecological processes, eco-systems and large mammal home ranges; (Burgess et al 2004).

Whilst the planning and implementation of natural resource conservation is the sovereign right (and responsibility!) of every country, as stressed by, for example, the Convention on Biological Diversity; there is a shared responsibility between adjacent countries to collaborate in managing shared resources. These can be freshwater resources; such as Lake Victoria (Kenya Tanzania, Uganda) or Lake Tanganyika (Burundi, DRC, Tanzania, Zambia), and Lake Tchad (shared by Cameroon, Niger, Nigeria, Tchad); with shared biodiversity and commercial fisheries²; or they can be terrestrial resources such as the annual wildebeest migration between Tanzania and Uganda. The scale of such trans-boundary resources across the Kenya Tanzania boundary is shown in Figure 1, with three aquatic and eight terrestrial significant resource flows.

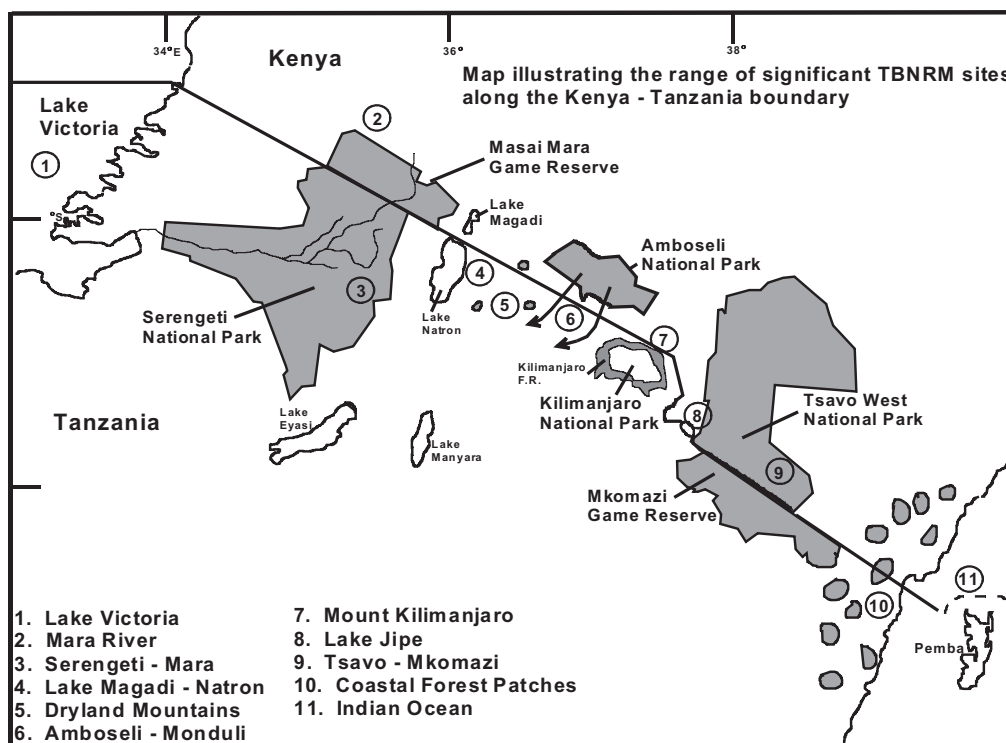


Figure 1. Trans-boundary Natural Resource Management (TBNRM) sites across the Tanzania-Kenya Border.

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² Note that FAO has been involved in creating and supporting “Regional” Lake Authorities for both lakes in the past ten years

The past few years have seen many formal trans-boundary agreements on resource management in Africa. These vary from adjacent Protected Areas (such as Kgalagadi Trans-Frontier Park between Botswana and South Africa); to landscape management (such as the Greater Limpopo Landscape between Mozambique, South Africa and Zimbabwe); to regional process such as the Yaoundé agreement of Congo Basin Countries to manage the Congo Forests. Two of the oldest transboundary sites are 1) The **Kgalagadi Trans-frontier Park**, where informal collaboration existed since 1948 between Gemsbok National Park in Botswana and Kalahari Gemsbok National Park in South Africa, with the two areas functioning as one ecological unit with free movement of wildlife. This cooperative effort culminated in 1999 with the formal declaration of the Kgalagadi Trans-frontier Park, in which the respective governments have devolved authority to the collaborating conservation agencies to make joint management decisions on their behalf. The area is now recognised as a TFCA - an undivided ecosystem with coordinated management, shared revenues, and increased freedom of movement for visitors. Secondly is the **Fouta Djallon Highlands Regional Integrated Management Programme (FDH-MP)**, involving the eight countries that depend on waters from the Highlands (Gambia, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Senegal and Sierra Leone). It was established in the 1970s. The Fouta Djallon Highlands (FDH) are a series of high plateaus concentrated in the central part of the Republic of Guinea but whose area also extends into Guinea-Bissau, Mali, Senegal and Sierra Leone. This highland area is the point of origin of a number of international rivers, notably the Gambia, Niger and Senegal Rivers, as well as a number of small water courses contributing to the characterization of the area as the “water tower” of West Africa.

Many of the lessons from such Trans-Boundary Natural Resource Management (TBNRM) or Trans-Frontier Conservation Areas (TFCAs) were documented by the Washington DC based Biodiversity Support Programme. Their initial “Study of TBNRM in Southern Africa (Griffin et al 1999); was followed by a series of case studies across Africa, summarised by van der Linde (2001). This had detailed analyses from e.g., the Virunga Mountains (DRC, Rwanda and Uganda largely for mountain gorillas), and East Africa, focusing on the Minziro - Sango-Bay forests across the Uganda Tanzania border (Rodgers et al 2001).

This latter case, derived from a GEF funded project, supported by FAO, details the complexity of institutional cooperation in managing cross border resources. This must include the necessary enabling environment from central government policies, joint management plans, District Commissioner joint security discussions, cooperation between forest and customs officers in reducing illegal timber trade, etc.

“Enabling Environments” are important at all scales from the support of village governments along borders to statements on regional / international cooperation in relevant national policies. This broader level of cooperation stems from the Convention on Biological Diversity, which spells out the need for trans-frontier and even broader interaction. Recent developments in southern Africa show how market forces around possibilities of cross border tourism, are pushing this cooperation process, bringing on board immigration and customs officials into reducing red-tape. Globalisation in general supports such trans-frontier process. This can have both positive and negative consequences on local economies (see Munthali 2007), as the rich tend to benefit and, unless carefully planned, the poor may lose out.

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Three Foundations collaborate to conserve the threatened biodiversity of the Sahara Desert

Source: *Cheetah Conservation Fund Media*

The World Deserts Foundation, the Sahara Conservation Fund (SCF) and the Cheetah Conservation Fund (CCF) met in Algiers, Algeria on 26 December 2007 to examine ways and means to jointly conserve the Sahara, with particular emphasis on its declining population of gazelles and cheetah. Also in attendance at the meeting were diverse Algerian state institutions and nongovernmental organisations.

One of the important outcomes of the conference was the signing of an accord between SCF and the World Deserts Foundation for further cooperation. The President of the World Deserts Foundation, Mr. Cherif Rahmani, who is also Algeria's Honourable Minister, of Planning, Environment and Tourism described the agreement as having great value “not just for Algeria but also in support of conservation efforts throughout North Africa and all peoples who share the Great Saharan Desert.” It is noted that Algeria is a major range state for quite a number of endangered species e.g. the slender-horned and Cuvier's gazelles, the cheetah and the houbara bustard.

For more information, please see:

- The Cheetah Conservation Fund (CCF) <http://www.cheetah.org> or write to: cheeta@iafrica.com.na
- The Sahara Conservation Fund www.saharaconservation.org or write to scf@bluewin.ch.
- The World Deserts Foundation: www.desertsdumonde.org or write to fondationdesertsdumonde@hotmail.com



The **cheetah** (*Acinonyx jubatus*) is unique for making up in speed and stealth what it lacks in climbing abilities. It is the fastest of all land animals and can reach speeds between 112 and 120 kilometers per hour.

Photo courtesy of Frederick van heerden, “the photo taker” rich.fvh@intekom.co.za
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Peace Parks Foundation: A decade of experiential knowledge on transboundary conservation in southern Africa

Craig Beech¹,

The establishment of Peace Parks or transfrontier conservation areas (TFCAs) is becoming increasingly an important instrument in linking protected areas and ecosystems across international borders. Southern Africa has taken the lead in this direction, realizing that unless a separate body was set up to co-ordinate, facilitate and drive the process of TFCA establishment and funding, these peace parks would not receive the attention that they deserve, nor would they produce the expected results of job creation, biodiversity conservation and peace and stability in the sub-region. In response to this need, Peace Parks Foundation was established on 1 February 1997 by Dr Nelson Mandela, former president of South Africa, Dr Anton Rupert, former President of WWF in South Africa and HRH Prince Bernhard of the Netherlands. The principal role of the Foundation is to facilitate the establishment of peace parks or transfrontier conservation areas (TFCAs), in southern Africa. Moreover, the development of peace parks is an exemplary process of partnerships where donors and NGOs have assisted governments and their implementing agencies. The spectacular success achieved thus far is due mainly to the dedication of the region's political leaders, the devotion of the international coordinators and government officials and the tremendous support of the donor community.

Thus far, the Foundation actively supports governments in southern Africa in various TFCAs, all of which straddle the sub continent from the arid west to the tropical belts of the eastern shoreline (see Figure 1) These include eight (8) TFCAs namely: Kgalagadi Transfrontier Park (Botswana/South Africa); Lubombo Transfrontier Conservation and Resource Area (Mozambique/South Africa/ Swaziland); Maloti-Drakensberg Transfrontier Conservation and Development Area (Kingdom of Lesotho/South Africa); Great Limpopo Transfrontier Park (Mozambique/South Africa/Zimbabwe); |Ai-|Ais/Richtersveld Transfrontier Park (Namibia/South Africa); Malawi/Zambia TFCA (Malawi/Zambia); Limpopo/Shashe TFCA (Botswana/South Africa/Zimbabwe); and Kavango-Zambezi TFCA (Angola/ Botswana/ Namibia/ Zambia/ Zimbabwe).



Figure 1: Map showing the eight transfrontier conservation areas (TFCAs), straddling southern Africa from the arid west to the tropical belts of the eastern shoreline.

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Kgalagadi Transfrontier Park (Botswana/South Africa), is Africa's first transfrontier park, which was opened on 12 May 2000 by Presidents Festus Mogae of Botswana and Mbeki of South Africa. This has since become a popular destination to tourists and 4x4 trailists wishing to experience Kalahari's tranquillity and natural beauty. The development of a joint management and tourism plan, has paved the way for the regional cooperation of this peace park as has the opening of a tourist access facility at Mata-Mata between Namibia and South Africa and the approval of a joint entrance facility at Twee Rivieren.

Lubombo Transfrontier Conservation and Resource Area (Mozambique/South Africa/ Swaziland) On 22 June 2000, five protocols towards the Lubombo's establishment were signed. World Bank funds were used to develop the Mozambican component of the Usuthu-Tembe-Futi TFCA. This development included infrastructure and accommodation upgrades, in addition to the construction of headquarters and accommodation facilities. To supplement this, a co-financing agreement between Mozambique and the Foundation for the development of Maputo Special Reserve was signed and a project implementation unit appointed. The existing boundary fence of the Maputo Special Reserve was repaired and a unique and highly successful elephant restraining line erected along the Futi River to link up with Tembe Elephant Park in South Africa. The two electrified wires run two metres above ground and thus allow communities free movement whilst protecting crops from elephants (a successful step in the right direction of mitigating animal and human conflict). Joint management, tourism, project implementation and zoning plans for the various components of the Lubombo TFCA were completed through a detailed participatory process, making extensive use of GIS during workshop sessions to detail and visualise the various options. The plans are now in various stages of implementation. Additional projects initiated in the region are the derivation of Land Cover map products. The Foundation is working jointly with the FAO on these products making use of Land Cover Classification System. The Foundation has created ground-truthing databases and methodologies, to be implemented by local representatives, empowering them in the collection and collation of verification data. The Foundation is also assisting the Mozambique government in formulating a community strategic development plan for the Matutuine district.

Maloti-Drakensberg Transfrontier Conservation and Development Area (Kingdom of Lesotho/South Africa)

The establishment of the Peace Park was initiated with the signing of a Memorandum of Understanding (MoU) on 11 June 2001 between the governments of the Kingdom of Lesotho and Republic of South Africa. Part of the Lesotho component of this TFCA is the Sehlabathebe National Park which was proclaimed on 2 November 2001. The Foundation is supporting the development of management and tourism plans, as well as infrastructural development in order to turn it into a major tourist attraction. The entrance gate and arrival centre have been completed. The upgrade of this National Park is key for the regional tourism aspect of the TFCA. A detailed GIS was derived for Sehlabathebe National Park, from which a land use plan was derived. This plan buttressed the development strategy and realignment of infrastructure within the park, ensuring that sensitive areas would not be disturbed. On 22 August 2003 the Maloti-Drakensberg Transfrontier Conservation and Development project was launched by the Ministers of the Environment of the Kingdom of Lesotho and of Republic of South Africa and the World Bank.

Great Limpopo Transfrontier Park (Mozambique/South Africa/Zimbabwe). The heads of state of the three countries signed a treaty establishing the Great Limpopo Transfrontier Park on 9 December 2002. The Giryondo Access Facility between Kruger and Limpopo national parks was opened on 16 August 2006, creating, within the Peace Park, a point of access between the countries of Mozambique and South Africa. Since its unofficial opening in December 2005, more than 17 000 visitors have entered Limpopo National Park (LNP) in Mozambique and this has earned LNP more than R1 million (approximately US \$150,000) in gate fees. The million ha LNP was proclaimed on 27 November 2001. The Mozambican government requested the Foundation's assistance in overseeing the park's development as a SADC approved project. The following key aspects have been achieved:

- Management and tourism development plans were completed and indicated that the park could accommodate 486 180 visitors per annum.
- The park was demined according to international standards;
- The boundary for the buffer zone was re-aligned through a participatory process to ensure that the communities living along the Limpopo River would have adequate space for their resource utilisation needs;
- 150 community members have been empowered with various skills and have subsequently been employed by LNP.
- Just over four thousand animals have been translocated from surrounding protected areas (most of which have come from the Kruger National Park) and that, combined with 50 km of fence being dropped, encouraged more animals, including some 500 elephants to traverse the international boundary at will;

- Detailed planning, together with the sourcing of the necessary funding has led to the Park headquarters and staff housing being built;
- The first tourism facilities were opened in September 2005 and these include Machampane tented camp, Machampane wilderness trail, Shingwedzi 4x4 eco-trail, Aguia Pesqueira campsite and the Massingir hiking trail; these offer visitors to the region a Mozambique experience.
- A resettlement working committee was established and seven communities living in remote areas inside the park have opted to relocate to areas with better living conditions.

The FAO is determined to work jointly with the Foundation in deriving land cover map products from 2008, according to the Land Cover Classification System (LCCS) standard. A methodology to assess biomass estimates and subsequently carbon sequestration potentials, will be implemented and tested.

|Ai-|Ais/Richtersveld Transfrontier Park (Namibia/South Africa) This transfrontier park was established by the two heads of state signing a treaty on 1 August 2003. The Foundation again assisted with the joint management, tourism and financial protocol plans. The upgrade of the tourism facilities included the building of an entrance gate to |Ai-|Ais Hot Springs Game Park, and the refurbishment of the pontoon at Sendelingsdrift. Furthermore the customs, immigration offices and staff housing on both sides of the Orange River were built to enable the opening of a tourism access facility in October 2007.

Malawi/Zambia TFCA (Malawi/Zambia). An MoU toward the TFCA's establishment was signed on 13 August 2004. A joint law enforcement project operating as a single unit across international borders to combat poaching was employed with resounding success in the Nyika TFCA. Thanks to this, a wildlife restocking programme of Nyika National Park and Vwaza Marsh Wildlife Reserve began this year. Again the detailed implementation of a GIS for the Malawi/Zambia TFCA, and its planning capabilities have successfully contributed to the regional planning.

Limpopo/Shashe TFCA (Botswana/South Africa/Zimbabwe) This TFCA includes the Mapungubwe Cultural Landscape, which was proclaimed a World Heritage Site in July 2003. Peace Parks Foundation, De Beers, National Parks Trust and WWF SA assisted SANParks by facilitating negotiations with landowners, and the purchase of farmland to consolidate the core area of South Africa's contribution to the proposed TFCA - the 30 000 ha Mapungubwe National Park, officially opened on 24 September 2004. An MoU toward the TFCA's establishment was signed on 22 June 2006 and an international coordinator appointed. During the course of 2007, three participatory meetings were held with representatives from the 3 countries to discuss the outline and content of drafting a joint management plan for the TFCA. The categories under discussions include, safety and security; tourism; community development; conservation issues and cultural heritage. Again a GIS is being derived to visually document these discussions drawing together disparate topics.

Kavango-Zambezi TFCA (Angola/ Botswana/ Namibia/ Zambia/ Zimbabwe) The KAZA TFCA, which is set to become the world's biggest conservation area, was incepted with the signing of an MoU on 7 December 2006. To guide its initial development the five governments commissioned a pre-feasibility study, which was facilitated by the Foundation. A secretariat to steer its development has been appointed. The foundation has been invited to assist with a spatial regional plan of the western Zambian component of the TFCA. During this phase of the project, a rapid assessment methodology of land cover mapping was tested. Land cover maps were derived from LandSat TM data of this region. An aerial game survey was scheduled for October 2007, and the Foundation was invited to test a database, derived on LCCS field verification indicators to observe and verify land cover classes from the aerial transects being flown. The database, running on a GPS integrated Tablet PC, allowed for the collection of land cover structure, physiognomy, tree height and cover abundance. The database is to be used, where possible, to verify land cover mapping, and to estimate biomass according to various classes. FAO and Peace Park Foundation (PPF) are to jointly refine this technique for implementation during 2008.

To help ensure the sustainability of peace parks, the Foundation supports the training of wildlife managers at the Southern African Wildlife College near Kruger National Park. Since inception in 1997, more than 2000 students have been trained. Linked to the college is the Hans Hoheisen Wildlife Research Station where wildlife disease research, training and certain veterinary projects are facilitated. The SA College for Tourism in Graaff-Reinet, officially opened by Mrs Mbeki in 2002, trains people in the necessary hospitality skills to work at lodges in and around the peace parks.

As a further contribution to the sustainability of the peace parks, the Foundation, in partnership with the conservation agencies of SADC countries, has identified payment for carbon offsets, generated through land rehabilitation and avoided deforestation initiatives, as a potential long-term sustainable source of income. Following a positive feasibility assessment, and again in partnership with the relevant conservation agencies and Ministries, the Foundation is developing a set of climate change mitigation projects within transfrontier conservation areas across southern Africa. It is hoped that the multiple biodiversity, financial, social and climate benefits of this win-win opportunity will be realised in the near term.

Peace Parks Foundation - FAO Collaboration

During this first decade, the Foundation set out to develop a Geographical Information System (GIS) for its facilitation role in southern Africa. It became apparent from the onset, that there was certainly a lack of standards in terms of data collection, data storage, the manner in which data is referenced and attributed. The foundation sought international standards to adopt, in order to ensure interoperability amongst systems and the sharing of datasets for regional analytical work. Through the various programmes of the United Nations Food and Agriculture Organization (FAO), much work had been done to establish and promote standards in data sharing and systems implementation. The Foundation approached the FAO to formally enter into a collaborative agreement. The Agreement entails the processing of remote sensed information and the drafting of land cover mapped products, using of the Land Cover Classification System (LCCS). Several additional FAO software packages and tools are being developed where the Foundation will ensure consistency in the collection, processing and harmonisation of these mapped products. Of the several Essential Climate Variables (ECVs),* the Foundation and FAO are endeavouring to standardise methodologies in the collection, assessment and analysis of three of these, namely Land Cover, Biomass and Fire Disturbance. The employment of these techniques and tools by the Foundation ensure that decisions taken and at the policy level reach functional implementation as they are adopted in the various transfrontier conservation areas. Furthermore, building capacity in the various countries and employing local staff to assist with these analytical and field data collection tasks has the desired harmonisation and standardisation effect both regionally and globally.

**Other ECVs include river discharge; water use; global terrestrial network for groundwater; lake and reservoir levels and volumes; snow cover; glaciers and ice caps; permafrost; albedo and reflectance anisotropy; fraction of absorbed photosynthetic active radiation; and leaf area index.*

Characterisation of wildlife movement corridors in the Zimbabwe, Mozambique, Zambia (ZiMoZa) trans-boundary area to guide mitigation of increasing human-wildlife conflicts in the Zambezi heartland

Patience Zisadza¹ and Jimmiel J. Mandima²

Summary

This study identified and characterised nine (9) wildlife movement corridors and mapped a total of 26 Human Wildlife Conflict hotspots in the River Zambezi Heartland, a landscape that straddles Zimbabwe, Mozambique and Zambia in the Middle Zambezi Valley. A Garmin eTrex Legend Global Positioning System unit was used in the field for collecting location statistics for geo-referencing wildlife movement routes and human-wildlife conflict hotspots. Other ecological attributes of the wildlife movement corridors were recorded on standardized field data sheets. Maps showing the location and connectivity of the wildlife movement routes at local and landscape levels were produced. It is expected that recognising wildlife movement corridors in land use planning will help reduce human-wildlife conflicts, while at the same time safeguarding the elephant movement routes.

1. Introduction

The River Zambezi Heartland³ has an estimated population of 600 000 people that reside in open Communal Lands and Game Management Areas, and largely depends on subsistence agriculture for livelihood. As the human population increases, more land is continuously cleared to create more fields, in the process expanding into traditional wildlife habitat. The population of elephants (*Loxodonta africana*) and other large herbivores has also been increasing at an average rate of 5% per annum (Dunham, 2004). As both humans and wildlife strive for more space in the landscape, there has been a gradual increase in human-wildlife contacts that have resulted in human-wildlife conflict (HWC) problems such as: loss of human life, crop damage, and destruction of granaries and other property by elephants. Efforts to mitigate this through problem animal control by wildlife authorities have not succeeded in resolving HWC. An added dimension is the trans-boundary movement of the elephant populations across national borders in the Zambezi Heartland. The elephants use the same traditional movement routes overtime to access the wildlife dispersal areas across the whole landscape.

Conservation and management of wildlife movement corridors from a landscape perspective is undoubtedly important because fragmentation of wildlife habitat results in reduced functional responses as exemplified by lack of refugia for animals due to land clearance for cultivation, and dispersal mechanisms compromised by infrastructure development. Wildlife movement corridors and dispersal patterns provide a special focus in situations where wildlife species move across borders. Anthropogenic activities in communal areas present serious threats to wildlife and rangeland management considering that rural people's livelihoods largely depend on natural resources as well as subsistence agriculture.

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³ The term 'Heartlands' is uniquely used by African Wildlife Foundation to refer to large cohesive landscapes that are biologically important and have scope to maintain healthy populations of wild species and natural processes well into the future while serving livelihood needs.

Linking areas of important wildlife habitat or high biodiversity as dispersal areas has become a priority in the conservation of natural habitats for wildlife. Formally protected areas alone are not adequate to sustain healthy and viable populations of wildlife, particularly elephants, and the more sensitive ungulate species such as nyala (*Tragelaphus angasii*), sable (*Hippotragus niger*) and roan (*Hippotragus equinus*) antelopes. Connectivity between such areas is critical, and this can be achieved through the demarcation and maintenance of wildlife movement corridors. Fragmentation due to human activities in and around areas occupied by wildlife and in wildlife movement corridors, is at the present time a common cause for extinction of some key wildlife species in the ecosystem.

Wildlife that becomes stranded in a high quality habitat (protected areas) which is surrounded by a sea of human development will become increasingly endangered. Protecting “patches of habitat” simply will not be sufficient to guarantee the survival of key species. In order to avoid a “patchy” habitat we need to protect a system in which interconnected wildlife movement corridors are maintained and protected, as such corridors will weave a web or network of habitats that allows wildlife and natural processes to move freely across the (entire) landscape.

Human population growth and settlement expansion are likely to continue in some parts of the landscape and the real challenge is to make sure that they happen in a planned and well monitored manner. Clearly mapping and demarcating wildlife movement corridors will support the development of land use and management plans which are more acceptable to all parties concerned, and which are conducive for human-wildlife co-existence in the Zambezi Heartland.

Recognizing that the entire landscape provides habitats for elephants and that it is essential to allow connectivity across national borders, and at the same time promote co-existence of wildlife and human beings, this study sought to characterize wildlife movement corridors and recommend selected key routes which should be secured from anthropogenic activities.

The characterization was done using a standard field data sheet with a consistent checklist of characteristics that were documented across the whole landscape while geo-referencing all key features to allow interfacing in GIS. Conflicting land uses were documented and recommendations made for adaptive management that allows for co-existence of people and wildlife.

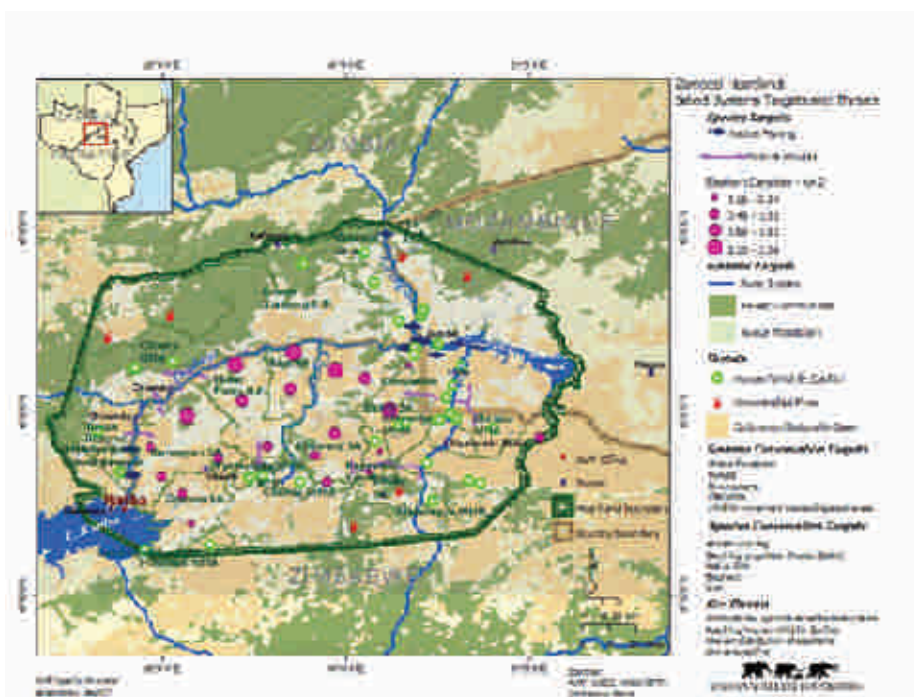


Figure 1: Map of the Zambezi Heartland, showing elephant densities, occurrence of HWC and land use.

2. Materials and Methods

The Zambezi Heartland is a three-country trans-boundary landscape that is rich in biological resources along the Zambezi River stretching from downstream of Kariba Dam to Cahora Bassa Dam (Figure 1). The trans-boundary area where Zimbabwe, Mozambique and Zambia share a common border (ZIMOZA) is shared by four districts - Luangwa District in Zambia, Zumbo and Magoé Districts in Western Tete Province of Mozambique and Mbire District in Zimbabwe (Figure 2). Appropriate authority over wildlife utilization was granted to local district authorities with viable wildlife populations and is implemented according to the philosophies embodied in Community Based Natural Resources Management (CBNRM) programs like the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe and Tchuma Tchato in Mozambique.

The work was initiated in 2003 during which the African Wildlife Foundation worked with local communities and its partners to conduct preliminary wildlife movement corridor identification. This work was then scaled up and intensified in a structured, systematic manner over a 12-month period in January December 2005.



Figure 2: The Zimbabwe, Mozambique, Zambia (ZIMOZA) Trans-boundary Natural Resources Management Area

The process of wildlife movement corridor identification was participatory and consultative with field teams consulting local communities through group discussions, key informant interviews as well as guidance from local community and wildlife authority resource monitors. The movement routes and areas of significant human-wildlife conflict were geo-referenced using a Garmin etrex Legend Global Positioning System (GPS) handset during ground truthing field excursions when teams walked and drove long distances along corridor areas to document key attributes. The later included wildlife movement corridor size (dimensions), level and seasonality of use, ecological attributes (vegetation types, other key features, etc.) and extent of human uses which were recorded on standardized wildlife movement corridor description protocol field data sheets developed by the African Wildlife Foundation and its partners in the Zambezi Heartland (see sample of field data sheet in the Annex).

The average dimensions of wildlife movement corridor (width and length) were determined through walking transects in the corridor and these measures were used to calculate the estimated total area of the corridor which was subsequently corrected using 'Xtools' extensions in Arcview 3.2a to reflect the accurate total area per wildlife movement corridor.

The average area under settlement and cultivation in each wildlife movement corridor was calculated as a percentage of the total corridor area, a measure that provided an index of corridor viability and feasibility to secure.

For data analysis, all waypoints were downloaded from the GPS unit using OziExplorer to interface with Arcview 3.2a in GIS. The GPS waypoints for each wildlife movement corridor and human wildlife conflict hotspots were the saved in Arcview. Where direct downloading was not possible, waypoint files were created in Microsoft Excel and saved as database files (dbf) and later converted to shape files (shp) in Arcview 3.2a.

3. Results

Subsequent mapping involved superimposing wildlife movement corridor layers over relevant data layers e.g. hills, settlements, roads and water points to show the relationships between wildlife and other anthropogenic activities and ecological attributes as these are key to corridor viability and extent of human-wildlife conflicts (Figure 3).

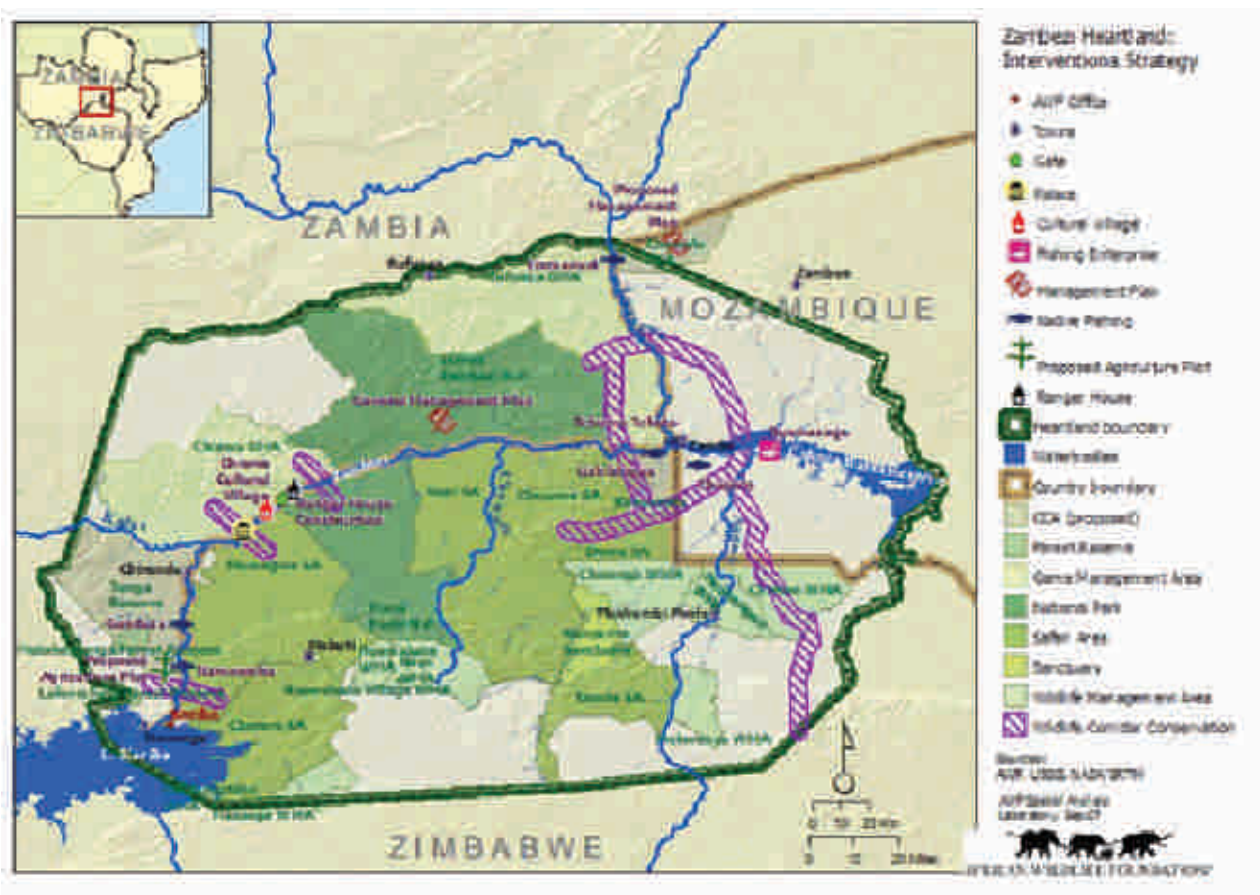


Figure 3: Relationship between wildlife movement corridors, anthropogenic activities and key biodiversity attributes in the Zambezi Heartland

Wildlife movement corridor maps and human-wildlife conflict hotspots data layers in GIS were further superimposed over land use data i.e. The cultivated region in year 1996 and year 2000 in order to demonstrate expansion into wildlife movement corridors (Figures 4a and b).

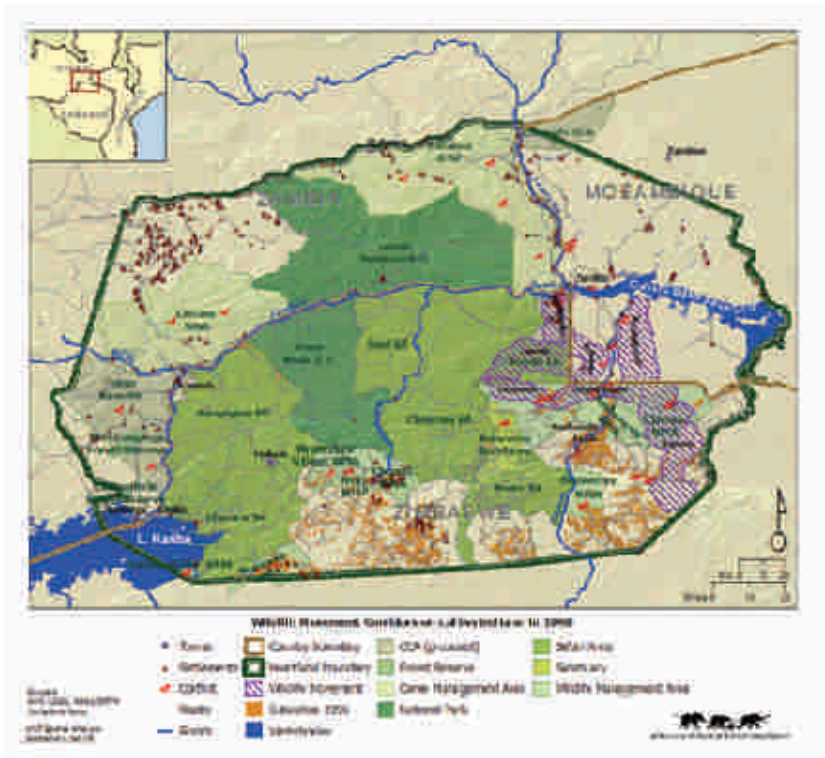


Figure (4a) Year 1996

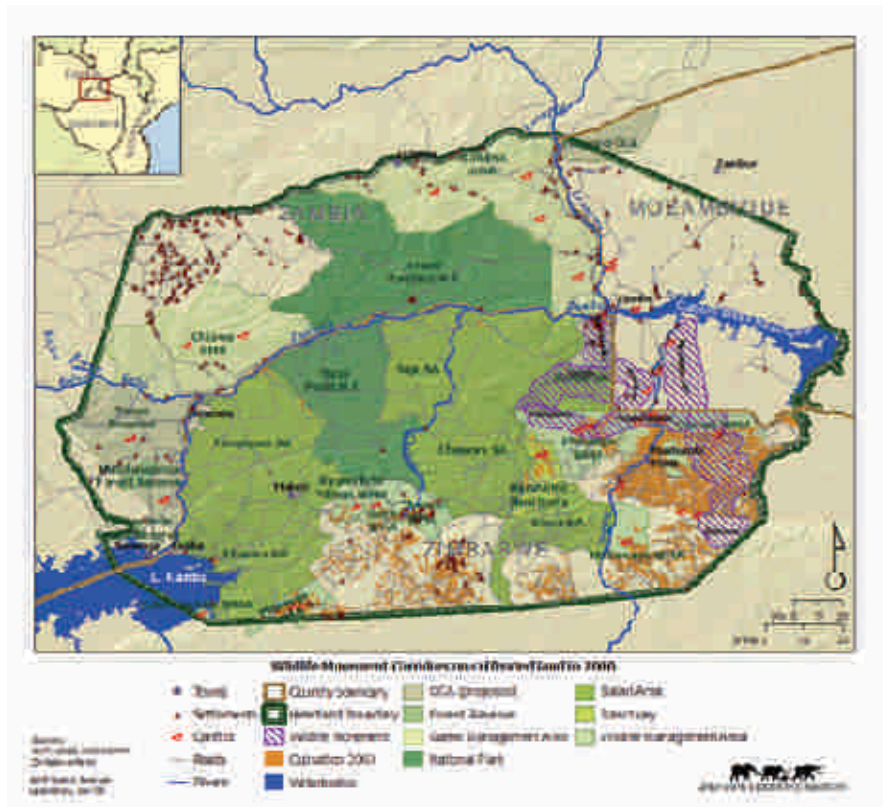


Figure (4b) Year 2000

Figures 4a and b: Wildlife Movement Corridors overlaid on cultivated land in 1996 and 2000 respectively to demonstrate encroachment and increased human-wildlife conflict.

Nine wildlife movement corridors were identified for which preliminary mapping was done based on field data collected and the attributes of the corridors are shown in Tables 1, 2 and 3.

Corridor name	Attributes of the Corridor		
	Average Width (km)	Estimated Length (km)	Estimated Total Area (km ²)
1. Manyemu	6	49	294
2. Mupedzapasi	7	18	126
3. Dande Safari Area (DSA)	5	23	115
4. Kanyemba 1	8	26	208
5. Kanyemba 2	2	7	14
6. Kafunsa	6	53	318
7. Nyakatondo	8	82	656
8. Paramunyu	6	23	138
9. Mulenzva	5	14	70
Total			1939

Table 1: Area of the identified wildlife movement corridors in the ZIMOZA area

Corridor name	Integrity ⁴	Degree of Use ⁵	Seasonality and diurnal pattern of use
1. Manyemu	Very good	Very high	wet summer, early morning, evening/night
2. Mupedzapasi	Good	High	wet summer, early morning, evening/night
3. DSA	Very good	Very high	all year round, anytime
4. Kanyemba 1	Very good	Medium	wet summer, early morning, evening/night
5. Kanyemba 2	Good	Medium	wet summer, early morning, evening/night
6. Kafunsa	Good	Medium	wet summer, early morning, evening/night
7. Nyakatondo	Very good	High	all year round, anytime
8. Paramunyu	Good	Medium	all year round, anytime
9. Mulenzva	Fair	Low	wet summer, early morning, evening/night

Table 2: Wildlife movement corridor integrity, degree of use by wildlife, seasonality and diurnal pattern of use attributes.

⁴ Corridor integrity is a composite measure given a rank of Poor, Fair, Good or Very Good, based on measures of other conflicting uses, vegetation damage, fire incidences and any other disturbance features.

⁵ The degree of use is classified as Low, Medium, High or Very High, based on measures of spoor counts, droppings and actual numbers of animals observed using the corridor.

Corridor Name	Dominant Vegetation	Estimated percentage area under Settlement & Crop Cultivation	Ecological functions and Economic Uses by Humans
1. Manyemu	<i>Colophospermum mopane</i> and Miombo complex (<i>Julbernardia spp</i> and <i>Brachystegia spp</i>), <i>Terminalia sericea</i> , Jesse bush (<i>Combretum spp</i>)	12%	-links Manyemu and Angwa rivers - building material, firewood and medicinal herbs for the local people
2. Mupedzapasi	Jesse bush and <i>C. mopane</i> , <i>Terminalia spp</i> , <i>Zizyphus spp</i> , <i>D. mespiliformis</i>	20%	-links Manyame and Angwa river - building material, fire wood, medicinal herbs
3. DSA	<i>Terminalia sericea</i> , Miombo complex (<i>Julbernardia spp</i> and <i>Brachystegia spp</i>) <i>C. Mopane</i> , <i>Combretum spp</i> , <i>A. digitata</i> , <i>Acacia spp</i> , Jesse bush.	0%	-sports hunting
4. Kanyemba 1	<i>Terminalia sericea</i> , <i>C. mopane</i> , Miombo complex (<i>Julbernardia spp</i> and <i>Brachystegia spp</i>), <i>Combretum spp</i>	10%	-links small streams to Mwanzamatanda movement of wildlife from DSA, Kanyemba, transboundary movement of wildlife from Magoé -firewood, building material, game meat for the Doma people
5. Kanyemba 2	Mixed (mopane & miombo), <i>Terminalia sericea</i> , <i>Acacia spp</i>	12%	-links to Zambezi river perennial source of water -facilitates movement of wildlife from Kanyemba communal area. -transboundary movement between Magoé and Kanyemba.
7. Nyakatondo	<i>C. mopane</i> & <i>T. Sericea</i> , <i>Combretum spp</i> , <i>Zizyphus spp</i> , <i>Sterculia spp</i>	4%	-links to Zambezi river -facilitates transboundary movement of wildlife between Guruve and Magoé -access to resources in the corridor is not restricted.
8. Paramunyu	<i>C. mopane</i> & <i>Combretum spp</i> , Riparian woodland (<i>Kigelia (Kigelia africana & Trichilia emetica)</i> , <i>Faidherbia albida</i> , <i>A. nigrescens</i> , <i>T. sericea</i> <i>Zizyphus spp</i>	3%	-links to Zambezi river -facilitates movement of wildlife between Zumbo and Magoé. -fire wood, building material
9. Mulenzva	<i>T. sericea</i> , <i>C. Mopane</i> , Riparian woodland (<i>Kigelia africana & Trichilia emetica</i>), <i>Combretum spp</i> , <i>Zizyphus spp</i> , <i>F. albida</i>	5%	-links to Luangwa and Luwaladzi rivers -facilitates transboundary movement of wildlife between Zumbo and Rufunsa Game Management Area.

Table 3: Use characteristics in identified wildlife movement corridors (i.e. habitat composition, area under human settlement and crop cultivation, ecological functions and economic uses).

4. Discussion and Conclusions

The research findings reaffirm the role of wildlife movement corridors as elements that serve as linkages between historically and functionally connected wildlife areas as suggested by McEuen (1993). Identification and description of the corridors offer a viable landscape level basis for reconciling conflicting requirements for agricultural development and wildlife conservation (Cox, 1988). The degree of development in the open areas of the Zambezi Heartland is very low as livelihoods are supported by subsistence farming, but significant habitat shrinkage is noticeable as drought resistant sorghum and cotton crops are introduced. Parts of the Manyemu and Mupedzapasi wildlife movement corridors are under threat due to expansion of human settlement and cultivation.

The wildlife species identified in all wildlife movement corridors relate to the different habitat niches existing in the corridors that exhibit habitat diversity to harbour various species, both large and small. *Colophospermum mopane* and *Terminalia sericea* are plant species present in all corridors; they are preferred habitat for elephants (Stuart and Chris, 2000).

Presence of a variety of wildlife species in wildlife movement corridors illustrates that corridors are not only used for passage of large wildlife species but that they also provide other ecological services, such as micro-habitats and food for other life forms. For example, wildlife movement corridors are usually extensive enough to constitute home ranges and dispersal areas for smaller mammalian species, reptiles and even birds. Conservation and management of such corridors therefore brings benefits not only to large mammals such as elephants but enhances biodiversity in the ecosystem, hence justifying the need to accord wildlife movement corridors high protection status as wildlife sanctuaries.

Despite human settlement and crop cultivation estimated at 20% of the total area of the Mupedzapasi wildlife movement corridor which links to Manyemu, Gonono and Kafunsa, there is significant use of the route by wildlife to reach other dispersal areas and home ranges. Drought resistant crop varieties like cotton and sorghum have exacerbated expansion into the corridor in recent years.

In Kanyemba, conflict problems are faced as a result of different needs of people and wildlife in the area, especially elephants and hippos during the wet summer season. Local community outreach is very important to describe the behaviour of wildlife and the use by wildlife of the corridors, and to make recommendations on possible long-term strategies aimed to minimise human-wildlife conflicts.

The Manyemu and Kafunsa wildlife movement corridors are settled and cultivated, about 12% for Manyemu and 8% for Kafunsa. The percentage values are fairly low in relation to total area for each corridor. Successful abatement of further human activities into the corridors will make them remain viable for conservation and human wildlife conflicts can be minimised.

The Kanyemba 1 and Kanyemba 2 wildlife movement corridors have an estimated 10% and 12% of their area under human settlement and crop cultivation, respectively. The percentages are low enough to warrant conservation of both corridors with future prospects of reducing human-wildlife conflicts in the area. Human-wildlife conflict cases are mainly reported from people settled along the Mwanzamutanda and Zambezi rivers. The Doma people settled in the Kanyemba 1 corridor present serious threats to the wildlife and habitat in the corridor. Their livelihoods are based on shifting cultivation and hunting. Considering normal human population growth and considering also the need to safeguard the viability of the wildlife movement corridors in the future, more effort should be put into sensitization, education and provision of alternatives for livelihood strategies for people living in these areas.

The fact that wildlife movement corridors link to form interconnected movement routes locally or at a transboundary level illustrates the need to conserve and manage the corridors in a broader context: the landscape approach. Harmonisation of land use plans and land tenure along trans-frontier sites may also ease the processes, reducing the dilemma of wildlife movement corridor fragmentation and, ultimately, human-wildlife conflicts.

This study concludes that conservation and management of viable wildlife movement corridors and habitats is critical if species are to survive. The ability of wildlife to thrive is directly related to the quality and quantity of the habitat and corridors on which they are dependent. It is clear that there are situations where human access or land uses come into conflict with the needs of wildlife and it is only through careful planning and management that people and wildlife can successfully coexist or the level of conflicts may be mitigated. A careful review of development and other land use in the Zambezi Heartland is therefore needed to ensure the presence of high quality and contiguous wildlife habitats and viable wildlife movement corridors, while at the same time reducing human-wildlife conflicts.

Understanding of local community perspectives and support from policy makers is key to ensuring that wildlife movement corridors are successfully conserved and managed to minimize human-wildlife conflicts.

5. Recommendations and Suggestions for further work

In order to successfully mitigate the increasing human-wildlife conflicts in the Zambezi Heartland there is need to prioritize conservation and management of wildlife movement corridors. This can be achieved by the formulation of practical land use plans that take into consideration wildlife corridors. Policy implementation will help restrict further expansion of human settlement and crop cultivation in wildlife movement corridors. This will include development of specific by-laws that will bind planning efforts in all the three countries as part of an inter-state Master Plan.

There is need to promote the cultivation of alternative cash crops, for example chili pepper, to replace a drought resistant cotton variety which is raided every farming season by elephants, buffaloes and other wildlife species. Promotion of chili pepper growing in wildlife hotspot areas, may give high returns to the community and reduce losses, as was proven in some areas.

Public education on wildlife movement corridors, sensitisation and advocating wildlife friendly developments that keep human settlement away from the corridors and dispersal areas will also help reduce human-wildlife conflicts in the long run.

It is suggested that district planning units in the respective ZIMOZA districts lead on the respective planning needed to zone areas for different uses that take cognisance of wildlife movement routes. These 'national planning units' at district level, should then build to what could be called a 'Master Plan Combination Authority': this being an inter-state planning authority recognized under a relevant Southern Africa Development Community (SADC) Protocol or the African Union Border Region Program, that will seek for harmonized planning efforts that officially recognize space for wildlife movement. This institutional set up can build on existing Trans-boundary Local Area Committees that were established to coordinate local community participation and input to the process of formalizing the ZIMOZA Trans-Frontier Conservation Area. Given the transboundary nature of the site, neutral international not-for-profit organizations like African Wildlife Foundation, WWF and IUCN among many others could play the inter-state brokering role to coordinate such a process.

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Acknowledgements

The authors wish to thank the African Wildlife Foundation Spatial Analysis Laboratory GIS team of David Williams and Ms Rose Mayienda and others that produced the maps herein included. All our Heartland wide implementing partners are also thanked for the various roles played. The Netherlands Directorate-General for International Co-operation (DGIS) and The Ford Foundation, Southern Africa are recognized and acknowledged for financial support to conduct this research work.

ANNEX

Sample of "ZAMBEZI HEARTLAND ZIMOZA AREA WILDLIFE MOVEMENT CORRIDOR DESCRIPTION DATA SHEET"

Recorder's name:..... **Corridor Name:**.....

Site ID:..... **Year:**..... **Month:**..... **Date:**...../...../..... (dd/mm/yy)

GPS reading: East:..... South:..... Altitude:.....(m)

General corridor description:

.....

Corridor attributes	Length (km)	Width (km)	Area (km ²)	Integrity ⁶	Degree of use ⁷	Other (Specify)

Habitat type: Mopane woodland Riparian woodland Escarpment woodland
 Miombo woodland Mixed woodland (mopane/miombo) Jesse bush
 F. *albida* woodland Other (Specify).....

Undergrowth If present describe briefly

Land uses: Human settlements Crop cultivation If yes, record % Area.....
 Tourism infrastructure Give detail.....
 Other uses (specify).....

Other relevant characteristics: Human-wildlife conflict If yes, what are the main problem animals?

Seasonality of corridor use: Dry winter Wet summer All year round

Diurnal pattern of use: Early morning Late morning Early afternoon
 Late afternoon Evening/Night Anytime

Other ecological functions of corridor:

Economic use(s) of resources in the corridor:

Checked by:..... **Date:**.....

⁶ This will be a composite measure given a rank of Poor, Fair, Good, Very Good based on measures of other conflicting uses, vegetation damage, fire incidences, etc.

⁷ This will be classified as Low, Medium, High, Very High based on measures of spoor counts, droppings and actual numbers of animals observed using the corridor.

Cross-border trade and conservation in the Sangha River Region (Cameroon, Central African Republic and Republic of Congo)

Ruben de Koning¹, Julius Chupezi Tieguhong² and Victor Amougou³

Summary

In Africa conservation areas are increasingly established along national borders where human activity seems low. In reality border areas are often vibrant places of economic interaction. This article looks at conservation opportunities and challenges posed by cross border natural resource trade in the Sangha River Region, which straddles the borders of Cameroon, the Central African Republic and the Republic of Congo. It argues that conservation projects and forestry administrations can and should contribute to trade liberalisation, thereby unlocking the economic potential in poor and remote forest areas. If accompanied with strict law enforcement in cases of major disruptive and illegal practices, policies in this direction can help to integrate development and conservation objectives.

1. Introduction

Because movements and distributions of animal, plant and human populations are not restricted by national boundaries, conservation planners around the world have realised the need to undertake their efforts in a trans-boundary fashion. In Central Africa, Trans-Boundary Protected Areas (TBPAs) today comprise more than half of the total area under protection. The number of TBPA's in Central Africa is only likely to grow in the future as areas worthwhile to protect are increasingly concentrated along borders where population densities and economic activities are usually low compared to coastal and central regions.

While border areas increasingly attract conservation initiatives, they also represent spaces where inequalities surface and conflicts erupt (Katere et al., 2001). In Sub-Saharan Africa border areas seem particularly vulnerable to conflict due to a lack of governance, arbitrary borders and economic marginalization. In many countries these conditions have resulted in ambiguities about citizenship, disenfranchisement of local populations from the state, and informal/criminal trading networks across borders.

This article will focus on security and conservation challenges posed by trans-boundary economic interactions in the Sangha River region a biodiversity hotspot that straddles the borders of Cameroon, the Central African Republic (CAR) and the Republic of Congo (Congo). This area forms an important transit point of goods from remote regions in CAR and Congo to Douala, Brazzaville and Kinshasa. Trans-boundary trade is of vital importance to uplift local communities' economies and to create centres of growth in interior Africa, enabling social and political stability. At the same time, some trade in natural resources risks damaging the environment and generating social conflicts.

Recognising the above linkage between trade, environment and security, we undertook two field studies in the area in 2005. These were part of a three year project by the Center for International Forestry Research (CIFOR) on the issue of forest related conflict in Cameroon. The objectives of these studies were to describe the nature of and identify the challenges to cross border natural resource trade, and

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analyse formal institutional responses to these challenges, with special reference to trans-boundary natural resource management. The main body of research consisted of individual questionnaires addressed to merchants and in-depth interviews with local administrators and representatives of development and conservation NGO's active on the Cameroonian side of the Sangha River area. Financial resources did not allow greater geographical coverage. In addition we used relevant materials and data produced by a variety of conservation and development agencies operating in the region.

2. The regional context

The Sangha River is created by a confluence of the Ngoko and Kadeï Rivers. Flowing from East to West and draining in the Sangha at Ouesso, the Ngoko forms the boundary between Congo and Cameroon. Coming from inside the Central African Republic, the Kadeï is called Sangha after congregating with smaller streams from Cameroon at Libongo.



Figure 1: Sangha River Region (From Curran, 1993)

The Sangha River Region is covered with dense semi deciduous tropical rainforest, with patches of swamps along rivers and forest clearings, locally referred to as *bais* (Steel and Curran, 2001). The forest is home to rich flora and fauna. Botanical studies in the adjoining protected areas suggest a combined total of between 1600 and 1800 vascular plant species. Large mammals include forest elephants, lowland gorillas, chimpanzees and buffaloes. Following the Sangha River up north, dense forests turn into savanna grasslands.

Forming a link between savanna and forest ecosystems, the Sangha River region has historically been an important point of human interaction in Central Africa. Long before colonial powers arrived at the scene in the late 19th century, peoples of various Central African Regions were drawn to the Region by its fertile lands, iron mining and river trading opportunities. Mobile groups of Pygmy, Bantu and Oubangian were engaged in cross-cultural interactions that were substantiated by inter-marriages, the trade in agricultural products, and the exchange of cultural expressions (Giles-Vernick, 1999).

Drastic 'foreign' induced changes started to take place during the latter half of the 19th century. The rise of the Ngaoundere's Fulbe state brought slave raids far down south, generating refugees and conflicts between tribal groups. Not much later French and German administrations began to attract people to live and pay taxes on either side of the Sangha River (Kalck, 1974). Concessionary companies competed for and forced new inhabitants into the Sangha forest as wage labourers. Colonial rubber and ivory trading companies of the Sangha River region are known to have used physical force upon local populations (Coquery-Vidrovitch, 1998).

After independence the extractive economy of the Sangha River region increasingly relied on timber and diamond exploitation. Logging towns like Bayanga, Libongo, Kika, Pokola and Kabo attracted skilled workers from outside the region who were followed by other opportunity seekers. Rather than being directly employed, most of these new migrants – some of them coming from as far as Senegal, Mali and Mauritania – made their living as traders: hunters, tailors, fishermen or mechanics. Despite its apparent remoteness to national economic and political centres, the Sangha River region still draws many people from far away, reflecting an inverse trend of urban-rural migration common in Cameroon today.

Conservation projects in the Sangha River region started in the 1990s. The three adjoining protected areas and their peripheral zones presently form one complex under the name of *Tri-National de La Sangha* (TNS)⁴. The creation of the park complex was the joint result of informal exchanges between scientists and conservation professionals during the late 1990s and the Yaoundé Declaration of 1999 by which Central African governments committed themselves to accelerating the process of creating trans-boundary protected areas. Soon after the Yaoundé Declaration, a cooperative agreement for the TNS was drafted and it was subsequently endorsed in 2000⁵. It provided for the establishment of four committees: the supervisory and arbitration committee, operating at national ministerial level; the scientific committee; the monitoring committee at local administrative levels and projects; and the planning and execution committee, including wardens and project staff.⁶

3. Cross border trade in natural resources

The Sangha River Region is an important source and area of transit for natural resource products, notably timber and bush meat but also palm oil, cocoa, gold, diamonds and raffia. Goods used to travel by water through the Sangha, Ubangi and Congo Rivers to Brazzaville, and then by rail to the seaport of Pointe Noire. As a result of civil war and related acts of robbery, corruption and infrastructure destruction in the southern part of the Republic of Congo, almost all long distance trade nowadays passes through Cameroon by road. Timber exploitation and trade is the dominant commercial industry in the Sangha Region. In Cameroon several national and international companies are active. In the other two countries logging is dominated by one international company (CIB in Congo and SESAM in Central African Republic). In remote areas smaller national operators like the Central African *Societe de Bois de Bayanga* are simply unable to be cost effective considering the high transportation costs, frequent road accidents and bribery on the route leading to Douala seaport in Cameroon – transportation costs are together estimated at over 40% of factory revenue (Personnel Manager SBB, Pers. com.).

Rather than timber, small scale entrepreneurs engage in bush meat trade. Logging roads have over the years opened up large tracts of forests rich in fauna. This, in combination with an ever growing demand for bushmeat in urban centres, has created a professionally organised business. Foreign hunters often collaborate with local pygmy populations to track down and kill big game. Bushmeat is known to be transported on logging trucks from Northern Congo through CAR just north of Dzanga-Sangha Project, and into Cameroon (Steel and Curran, 2001).

⁴ The TNS includes four reserved areas: National Park in Cameroon; Nouabalé-Ndoki National Park in the Republic of Congo; and Dzanga-Ndoki National Park and Dzanga-Sangha Dense Forest Special Reserve in the Central African Republic.

⁵ *Accord de Coopération entre les Gouvernements de la République de Cameroun, la République Centrafricain et la République du Congo, Relatif a la Mise en Place du Tri-national de la Sangha*, COMIFAC 2000.

⁶ The planning and execution committee is the primary organising body of the TNS. It is composed of representatives from four conservation projects. It meets approximately every six months to develop and implement a joint action plan.

Mineral extraction includes artisan diamonds and gold mining. Diamond extraction predominantly takes place in the northern sections of the Dzangha Sanga Reserve but recently sites have been opened north of Lobéké National Park in Cameroon. Most of the diamonds leave the region through the National Purchase Office in Bangui where diamonds are delivered by intermediary investors who organise and invest in the actual digging. Investors supply diamond camps with food, alcohol, tools, fuel and motorised pumps to drain water out of the diamond pits. The investor circuit is internationalised and is dominated by West Africans. Diamond diggers are usually local youths and youths drawn to the region from medium size towns in Central Africa's savanna regions and Batouri, Bertoua and Yokadouma in Cameroon. Wages for diamond digging youths in Cameroon add up to 80 USD per person per month.⁷

Gold is dug in the Congolese district of Souanké and is principally an individual enterprise, as it needs little investment. Gold diggers sell their gold in Cameroon in places like Kika and Moloundou, from where buyers transport it further to Yaoundé and Douala. The selling price is about 10 USD per gram, which is just below international market prices, indicating a reasonable bargaining position on the side of the diggers. The amount which individual diggers bring to the market varies between 15-30 grammes. Full time diggers may take their gold four times a month to the 'market'. Others, partly engaged in the business, manage to come four times a year.

On-farm products form yet another category of natural resources that are traded across borders. Food crops like plantains, cassava, cocoyam and sugar cane, grown in Cameroonian villages along the main axis to the south, are transported mainly to the growing towns of Ouessou (now counting about 76 395 inhabitants) and Pokola in Congo. From Congolese communities in the Sangha Region palm oil is sold in Cameroonian communities and towns at significant profits, 50-80% over the purchase price. In Cameroonian border villages with the CAR, like Mboy, Central African farmers market their foodstuffs freely without paying custom duties, but this kind of trade is very small scale.

Cocoa farming has recently become commercially interesting again after a long period of decline during the 1990's. The fact that in Northern Congo the trade has reached its production levels of the early 1980's is indicative for the sector's gradual recovery (Senga, 2005).

Duties and taxes for cross-border traders in the Sangha Region differ greatly, depending on the quantity and value of goods, and the border crossing used. At the southern border crossings with Congo, traders of fresh products of small value dispense most of their transaction cost at the border on their personal entry. The *entrée régulière* is set at the equivalent of 14 USD in local currency and is paid to customs officers of the country of entry. In absence of a passport, traders may pay a *laissez-passer* of 20 USD.

Once the value of products transported surpasses 500 USD, usually on a combination of manufactured, processed and fresh goods, traders pay at three offices in the country of entry; customs, forestry and *phytosanitaire*. Border transaction costs amount to an average of about 10 % of the value of merchandise. This percentage remains below the legally prescribed VAT of 18.7%, standardised for Central African countries within the CEMAC⁸ free-trade zone. However, one must realise that many more police, forestry and local government controls have to be passed on the way, and taxes are to be paid at markets. The total amount of taxes paid at the end of a trader's journey easily reaches and exceeds 18.7%.

Despite heavy legal and illegal taxes and payments, individual traders' prognoses for the future are remarkably positive. While 48 % of the traders perceive that cross border trading has become harder over the past five years, only 20% does not believe in the growth of their cross-border trading activities. Irrespectively of the border crossings used, the perceived easiness of trade or the quantity and value of merchandise, cross-border traders express a need for lowering taxes, for clearly defined customs duties,

⁷ The *Communauté Financière Africaine* (CFA) franc is used in all three countries. Amounts of money in the text are directly converted to US dollars.

⁸ The Central African Economic and Monetary Community comprises six countries: Cameroon, Central African Republic, Republic of Congo, Chad, Gabon and Equatorial Guinea

and for better roads. Most (57%) people are familiar with the CEMAC organisation and some know about TNS (16 %) collaboration. Those aware of these regional organisations believe that they have the responsibility to contribute towards trade liberalisation.

4. The downside of cross-border trade

Cross-border trade offers economic opportunities to remote forest populations of the area. However there are certain downsides to cross-border trade and the present rush on forest resources that have to be identified and managed. These relate to players and practices in and around the various types of concession areas in the Sangha region, *i.e.* those used for the extraction of diamonds and timber, and for conservation and hunting. Exploitation and management of these areas does not always (equally) favour human populations in the region, and may damage its natural resource base.

Diamond prospecting and extraction activities in the CAR are underwritten by foreign capital coming from large industrial companies. These companies work through intermediaries, from the whole of Central and West Africa, to invest in and extract the produce from diamond shanties that are established by a combination of immigrant and local youths. In Cameroon, large international companies have so far not set foot on the ground, but this should not be ruled out in the future. Chinese and Israelian prospectors are already active along the Central African Border.

Alluvial diamond exploitation by individual diamond diggers is by its nature a highly conflict sensitive business. Impoverished local and immigrant youths need outside investment to be employed. "You cannot make the investment, do not have the necessary connections and don't know the quality and prices", according to an informant in Mboya. But loyalty to the investors is fragile once the diamond digger proves lucky and quick richness is close at hand. Diamond theft, locally referred to as 'Tic Tac', has led to a tight system of control and punishment by the investors, creating structural tension between diggers and intermediaries. Control is exercised through hidden but generous rewards to those that betray their fellow diggers, and the latter's consequent harsh punishment or expulsion from the business. As a result of unequal power relations, young diamond diggers and local villagers feel abused both by international capital and their national agents that are given a free hand in the Sangha River region, mounting frustration in diamond shanties has the dangerous potential to lead to violent revolt and interpersonal confrontations.

Conflicts over hunting rights are manifold in the Sangha River region. They include both conflicts between communities and individuals who stand in direct competition with each other and between hunters on the one side and the state and conservation agencies on the other. In regard to people-versus-people conflicts, local Baka and non-Baka communities are confronted with an increasing number of professional hunters that easily cross over the border to each of the countries to hunt big game for meat and ivory. Villagers around the Lobéké National Park in Cameroon complain that as a result of good marketing opportunities in Cameroon, logging roads and relatively weak law enforcement, Central African ivory and big game hunters cross over to deplete their forest. Baka pygmies, who are predominantly subsistence hunters, are hit hardest by a growing number of commercial hunters and the subsequent decline in densities of bushmeat. However, it should be noted that local villagers may benefit as well from large scale commercial hunting and therefore may not necessarily oppose the penetration of foreign hunters in their forests. As noted above, pygmies are often employed as trackers and hunters, benefit from the meat left over and supply hunters and merchants with food and other necessities (Zouya-Mimbang, 1998).

More fundamental hunting conflicts tend to arise in relation to law enforcement and action by conservation agencies. Many of the local and immigrant populations do not abide to the laws and rules governing hunting practices. They illegally possess weapons⁹, do not respect protected species and hunt

⁹ During inter-militia confrontations and general chaos in Northern Congo in 1997, a number of arms depots were looted. A GTZ study shows that 76 % of all illegal weapons of war used by poachers in South-East Cameroon are smuggled in from the Republic of Congo, and that smugglers use the ferry crossing to Cameroon operated by the biggest logging company in Northern Congo as the major point of entry.

with methods forbidden by law, such as steel snares. Attempts to force back illegal hunting practices have in the whole region created a backlash of fear and hostility among people thereby ruining any further collaboration perspective in conservation activities, which continues to date (Mogba and Freudenberger, 1997).

Finally, commercial logging has generated numerous conflicts in the region. One type of logging conflict is the one arising between logging and local people's livelihoods. Disruption of local livelihood results from physical destruction of the environment in concession areas, as well as an influx of migrant workers in the logging camps who compete for bushmeat. However, most public complaints and opposition are related to the perceived unequal employment opportunities and benefit sharing. In the Republic of Congo violent demonstrations against logging companies' employment policies took place in the beginning of the 1990's, coinciding with civil war. The *Front National de la Sangha* was the main vehicle for expressing this discontent (Forest-Monitor, 2001). In the Cameroonian subdivisions of Yokadouma, Mouloundou and Gari-Gombo in Cameroun, villagers' outcries, roadblocks and other forms of sabotage lead to state intervention in 2004. Documentation of the forest department shows that the major complaints centred on forest revenues that were claimed not to be paid or not to be invested in village development.

In addition to creating people-*versus*-companies conflicts, logging operations sometimes clash with conservation interests. Such conflict has been most evident in Bayanga, CAR, where during the mid 1990's intense rivalries developed between logging companies and conservationists over management rights in forest concessions. The two sides were represented by the French firm Sylvico and the German Development cooperation GTZ, the first propagating a modernist development perspective based on extractive industries, while the second insisted on strict conservation, tourism and alternative development for the region. Both parties engaged in local patronage relations, lodged legal charges and lobbied with politicians to garner support for 'their' development agenda in the Bayanga region (Hardin 2002).

5. Conclusions and policy recommendations

Integrated Conservation and Development Projects are widely put forward as the solution to sustainable development in developing countries. Also in the TNS region, policy makers and environmental planners have frequently voiced the desire to work towards a type of park management that reconciles social and economic needs of local populations. This should lead to increased support for protected area management and reduce rampant poaching and other illegal and unsustainable practices.

This article argues that economic needs of local populations should be addressed through trade liberalisation and infrastructural improvement. Concerning trade liberalisation, it was observed that although tariffs have officially been eliminated within the CEMAC region, a number of customs duties and taxes are still levied, both officially and non-officially. As a consequence, traders are confronted with highly variable and at times exorbitant transaction costs. In addition no adequate system of VAT collection has been systematically implemented.

As much of the trade concerns natural resource products, the inter-ministerial Commission on Central African Forest (COMIFAC) and Tri-national conservation partners have a role to play in implementing free trade. Indeed COMIFAC's *plan de convergence* does prioritise support to marketing of non-timber forest products (Activity C, point f.: 3), but is silent on any other small scale trade in agricultural and mineral products. The authors of this article stress that the *plan the convergence* should allude to a responsibility to assist in achieving trade liberalisation according to CEMAC agreements. COMIFAC's particular responsibility should be to target illegitimate taxation of non-timber goods at the level of forestry checkpoints inland and at border crossings.

At the level of Tri-national cooperation, the committee comprised of local administrators during a 2005 meeting specifically recognised the need and its responsibility to stop unofficial and non-authorized controls in order to render citizens less vulnerable to abuse when they move across the border¹⁰. These good intentions should materialise in concrete action, for example in the form of training custom officials and setting up accounting mechanisms for border and roadside control posts of different administrations. TNS funds could support such initiative that must be executed by, and involve of administrators and law enforcers operating at the most local level.

Infrastructure improvement is another critical element in improving regional economic integration. If Cameroon wants to maintain its strategic position as a country of transit of natural resource products derived from Northern Congo and Western CAR, public investment is badly needed. Recently the Congolese and Cameroonian governments agreed on the construction of a road, *la route de l'integration Économique*, to connect Sangmelima and Ouesso (Senga, 2005). There is a need to investigate whether and how the remote southwest corner of the CAR could be connected to this planned road.

Opening up biodiversity rich areas for commerce and trade, as suggested above, is often feared by conservation planners, and for good reasons. Improved access to the region may unleash a rush for natural resources that runs the risk of spiralling out of control and become unsustainable. To prevent this from happening new and innovative ways should be explored to bring legal and illegal exploitation areas within responsive and shared management.

In regard to hunting and logging in the area, already some positive results have been achieved in the recent past. In Cameroon communal hunting zones, *Zone d'Intérêt Cynégétique à Gestion Communautaire*, are managed by newly created local authorities that collect and reinvest slaughter taxes and lease fees, paid by professional hunting guides that accompany tourists. In Northern Congo one promising model is PROGREPP, by which WCS, CIB and the Congolese government are jointly responsible for the creation and implementation of an ecologically and socially sound management plan for the CIB concession areas adjoining the Nouable Ndoki National Park. Notwithstanding different social and political contexts in the three countries, positive experiences gained in some areas could very well be replicated in other parts of the TNS region. Tri-national meetings form an excellent platform to facilitate communication among project managers and concerned authorities and companies.

Despite the conflict sensitivity and destructiveness of diamond mining in the region, the issue is not well attended to in regional conservation planning. Mining and trading mainly take place around uncontrolled border areas and thus fall outside active management areas for conservation and logging. For the CAR, sensitization of Central African authorities has been placed on the agenda of the Tri-national Planning and Execution committee, but little progress has been made in really changing methods, legal frameworks and market structures. In Cameroon no action has been taken by any authority or organisation. The challenge in diamond mining areas in both of these countries is to bring the business within the rule of law in a way similar to timber exploitation, *i.e.* delimiting and allocating legal concessions, drawing up socially and environmentally responsible management plans, formally employing workers etc.

The ambivalent impact of cross-border economic interactions on people and their environment requires well-defined management strategies in each branch of economic activity. While many activities presently are informal or illegal, not all are harmful. On the contrary, petty trade, regional labour migration and some artisan mining are vital livelihood strategies for people that find themselves remote from economic centres of power, and can potentially be practiced in sustainable ways. Rather than limiting these activities, development and conservation planners have to develop strategies to support these and transform them into law abiding activities. On the other hand illegal practices, like commercial elephant poaching and the criminal practices surrounding diamond mining should be targeted and stemmed in a resolute manner. In such ways natural resource trade can help in compromising conservation and development.

¹⁰ *Communiqué conjoint sanctionnent les travaux du comité technique de suivi de la Tri-national*, Yokadouma, 20-21 May, 2005.

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