



List of publications (+abstracts)

2011

- ▶ **Baudron, F., J.A. Andersson, M. Corbeels and K.E. Giller, 2011. Failing to Yield? Ploughs, conservation agriculture and the problem of agricultural intensification An example from the Zambezi Valley, Zimbabwe, *Journal of Development Studies* (forthcoming)**

ABSTRACT - Agricultural intensification, or increasing yield, has been a persistent theme in policy interventions in African smallholder agriculture. This article focuses on two hegemonic policy models of such intensification: (1) the 'Alvord model' of plough-based, integrated crop-livestock farming promoted in colonial Zimbabwe, and; (2) minimum-tillage mulch-based, Conservation Agriculture (CA), as currently preached by a wide range of international agricultural research and development agencies. An analysis of smallholder farming practices in Zimbabwe's Zambezi Valley, reveals the limited inherent understanding of farmer practices in these models. It shows why many smallholder farmers in southern Africa are predisposed towards extensification rather than intensification, and suggests that widespread CA adoption is unlikely.

- ▶ **Baudron, F., M. Corbeels, J.A. Andersson, M. Sibanda and K.E. Giller, 2011. Delineating the drivers of waning wildlife habitat: The predominance of cotton farming on the fringe of protected areas in the Mid Zambezi Valley, Zimbabwe, *Biological Conservation* (forthcoming)**

ABSTRACT - Zimbabwe's Mid-Zambezi Valley is of global importance for the emblematic mega-fauna of Africa. Over the past 30 years rapid land use change in this area has substantially reduced wildlife habitat. Tsetse control operations are often blamed for this. In this study, we quantify this change for the Dande Communal Area, Mbire District, of the Mid-Zambezi Valley and analyse the contribution of three major potential drivers: (1) increase in human population; (2) increase in cattle population (and the expansion of associated plough-based agriculture), and; (3) expansion of cotton farming. Although direct effects of land use change on wildlife densities could not be proven, our study suggests that the consequences for elephant and buffalo numbers are negative. All three of the above drivers have contributed to the observed land use change. However, we found farmland to have expanded faster than the human population, and to have followed a similar rate of expansion in cattle sparse, tsetse infested areas as in tsetse free areas where cattle-drawn plough agriculture dominates. This implies the existence of a paramount driver, which we demonstrate to be cotton farming. Contrary to common belief, we argue that tsetse control was not the major trigger behind the dramatic land use change observed, but merely alleviated a constraint to cattle accumulation. We argue that without the presence of a cash crop (cotton), land use change would have been neither as extensive nor as rapid as has been observed. Therefore, conservation agencies should be as concerned by the way people farm as they are by population increase. Conserving biodiversity without jeopardizing agricultural production will require the development of innovative technological and institutional options in association with policy and market interventions.

- ▶ **Pleijte, M., M. Schut and R. During, 2011. Reflexivity in action research: two spatial planning cases, in: A. van Paassen, J. van den Berg, E. Steingröver, R. Werkman, and B. Pedroli (eds), *Knowledge in action. The search for collaborative research for sustainable landscape development*. Mansholt Publication Series, Wageningen Publishers, Wageningen, pp.221-243.**

ABSTRACT - The purpose of this chapter is to discuss reflexivity in action research, because a lot of action researchers do not pay attention to reflexivity and we find it crucial not only for understanding the position of an action researcher, but also for understanding the process and results of action research. Reflexivity refers to the capability of a researcher to detach from the scientific disciplinary paradigm of his/her discipline and take a different perspective. We start by describing two concepts necessary to understand reflexivity: performativity and self-referentiality. Performativity refers to the way that actors redirect and reconstruct their activities to fit a theoretical model. Self-reference can be defined as the process of reasoning, in which new information in communication is reframed by means of predefined concepts. Two studied cases, Noordwaard and Wieringerrandmeer, demonstrated how citizens mobilized research and researchers to strengthen their negotiating position, because they were marginalized. The action

researchers primarily provided action-oriented knowledge, but from their perspective raised very interesting scientific questions about democracy and science. Concerning democracy the issue was raised as to whether planning procedures contradict the inclusiveness that is required to respect the intentions and knowledge that ground alternative plans.

At a more scientific principal level the question can be posed if action research can be free of normative positions towards the issue of developments that are preferred or considered inappropriate. The danger of an action researcher who limits his focus to the performance of his knowledge contribution and therefore contributes to self-referentiality can be opposed by reflexivity. We consider it a mission impossible if both positions are equally balanced by one researcher. A first level of reflexivity can be organized by a second action researcher if he/she at least includes a similar theoretical framework. Reflexivity based on a competing theoretical framework should be organized in a secondary analysis.

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- ▶ **Ramoelo, Abel, Andrew K. Skidmore, Martin Schlerf, Renaud Mathieu and Ignas M.A Heitkönig. 2011 Water removed spectra increase the retrieval accuracy when estimating savanna grass nitrogen and phosphorus concentrations, *ISPRS Photogrammetric and Remote Sensing Journal* DOI: 10.1016/j.isprsjprs.2011.01.008 (forthcoming)**

ABSTRACT - Information about the distribution of grass foliar nitrogen (N) and phosphorus (P) is important to understand rangeland vitality and to facilitate the effective management of wildlife and livestock. Water absorption effects in the near infrared (NIR) and shortwave infrared (SWIR) region pose a challenge for nutrient estimation using remote sensing. The aim of this study was to test the utility of water removed (WR) spectra in combination with partial least square regression (PLSR) and stepwise multiple linear regression (SMLR) to estimate foliar N and P, compared to spectral transformation techniques such as first derivative, continuum removal and log transformed spectra (Log(1/R)). The study was based on a greenhouse experiment with a savanna grass species (*Digitaria eriantha*). Spectral measurements were made using a spectrometer. *D. eriantha* was cut, dried and chemically analyzed for foliar N and P concentrations. WR spectra were determined by calculating the residual from the modeled leaf water spectra using the non-linear spectral matching technique and observed leaf spectra. Results indicated that WR spectra yielded a higher N retrieval accuracy than a traditional first derivative transformation ($R^2=0.84$, $RMSE=0.28$) compared to $R^2=0.59$, $RMSE=0.45$ for PLSR. Similar trends were observed for SMLR. The highest P retrieval accuracy was derived from WR spectra using SMLR ($R^2=0.64$, $RMSE=0.067$), while the traditional first derivative and continuum removal resulted in lower accuracy. Only when using PLSR did the first derivative result in a higher P retrieval accuracy ($R^2=0.47$, $RMSE=0.07$) than the WR spectra ($R^2=0.43$, $RMSE=0.070$). It was concluded that the water removal technique is a promising technique to minimize the perturbing effect of foliar water content when estimating grass nutrient concentrations.

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- ▶ **Ramoelo, A., M. Cho, R. Mathieu, A.K. Skidmore, M. Schlerf, I.M.A. Heitkonig and H.H.T. Prins, 2011. Integrating Environmental and in situ Hyperspectral Remote Sensing Variables for Grass Nitrogen Estimation in Savannah Ecosystems, *34th International Symposium on the Remote Sensing of Environment (ISRSE 2001), Sydney, Australia, 10-15 April 2011.***

ABSTRACT - Information about the distribution of grass nitrogen (N) concentration is crucial in understanding rangeland vitality and facilitates effective management of wildlife and livestock. A challenge in estimating grass N concentration using remote sensing in savannah ecosystems is that these areas are characterized by heterogeneity in edaphic, topographic and climatic factors. The objective is to test the utility of integrating environmental variables and in situ hyperspectral remote sensing variables for predicting grass N concentration along a land use gradient in the greater Kruger National Park. Data used include i) environmental variables, ii) measured grass N concentration and iii) in situ measured hyperspectral spectra. Non-linear partial least square regression was used. Results showed that several environmental variables were important for N estimation. Integrating environmental variables with in situ hyperspectral variables increased grass N estimation accuracy. The study demonstrated the importance of integrated modeling for savannah ecosystem state assessment.

- ▶ Ramoelo, A., A.K. Skidmore, M. Cho, R. Mathieu, M. Schlerf, I. Heitkonig and H.H.T. Prins. 2011. Towards regional mapping of grass nutrients using remote sensing in Greater Kruger National Park, *9th Kruger Network Meeting, Skukuza, South Africa, 13-18 March 2011.*

ABSTRACT - Regional maps of grass nutrients are important to inform decision making regarding the management of savanna ecosystems. Grass nutrients plays a crucial role in understanding the distribution, densities and feeding patterns of both wild herbivores and livestock. Grass nutrients have rarely been mapped at the regional scale because of the lack of satellite-based sensors that sample reflected light in the red-edge region which is sensitive to foliar chlorophyll and nitrogen (N). Medium resolution satellites are also generally ill-suited to discriminate grass and tree signals in heterogeneous and patchy savannas. The emergence of high resolution multispectral sensors with red-edge information such as RapidEye provides new avenues for rangeland resource quality assessment at regional level. The objective of the study is to estimate and map grass N at regional scale using vegetation indices derived from RapidEye images. The study area covers Kruger National Park (KNP), SabiSands and Bushbuckridge communal rangelands. Grass samples were collected in the field and were chemically analyzed for foliar N concentration. RapidEye images were collected at the same time then the field data collection. The red-edge normalized difference vegetation index (NDVI) and the conventional NDVI were compared. The red edge NDVI yielded higher estimation accuracy as compared to the conventional NDVI. The study exhibited the potential to map grass nutrients at a regional scale to inform the decision makers (farmers, resource and park managers) for effectively managing the savanna ecosystems.

2010

- ▶ **Bos, S., W. Leonardo, A. Lerner and M. Schut. 2010. *Assessing the potential of bioenergy production in smallholder farming systems: The case of Nhambita community*. GTZ-ProBEC and Wageningen University and Research Centre, Maputo, p.47.**
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- ▶ **Ramoelo A, M. Cho, R. Mathieu, A.K. Skidmore, M. Scherf, I. Heitkonig, H.H.T. Prins and G. Asner. 2010. *Hyperspectral remote sensing techniques for grass nutrient estimations in savannah ecosystems, 8th Kruger Network Meeting, Skukuza, South Africa, 8-12 March 2010*.**

ABSTRACT - Information on the distribution of grass quality (nutrient concentration) is crucial in understanding rangeland vitality and facilitates effective management of wildlife and livestock. The spatial distribution of grass nutrient concentration occurs at various scales such as local, regional and global scale. Traditional field techniques to measure grass nutrient concentration have been reported to be laborious and time consuming. Remote sensing techniques provide opportunity to map grass nutrient contents at various scales. An unprecedented challenge in grass nutrient estimation in savannas is that these areas are characterised by heterogeneity in soil and plant moisture (greenness), soil nutrients, grazing pressures, temperature and human activities. The aim of this study is to explore the following questions. (1) Which in-situ variables are important in modelling ecosystem state (nutrients concentration)? (2) How in-situ variables and remote sensing data can be used to develop a robust model to predict nutrient concentration? The study area consists of a land use gradient ranging from the Kruger National Park (KNP, Tshokwane area. Private Game Reserves (Sabie Sabie and Mala Mala) to Communal land (Bushbuckridge area). The data used include in-situ measured grass nutrient concentrations (N, P, K, Na, Ca, N:K, Mg, Zn, Cu, B, Mn), geology and soil types, rainfall, temperature and land-use as well as analytical spectral device (ASD) field-measured hyperspectral remote sensing data sets collected in March 2009. The ASD field data were re-sampled to Carnegie Airborne Observatory (CAO) hyperspectral image data using CAO spectral response function. Statistical techniques were used to integrate in-situ variables with remote sensing to predict nutrient concentrations at field and synthetic CAO hyperspectral data. Several environmental variables contributed to the good performance of the grass biochemical models. Improved results were acquired when integrating environmental and remote sensing variables to estimate grass biochemicals, e.g. N.

- ▶ **Schut, M., M. Slingerland and A. Locke. 2010. *Biofuel developments in Mozambique. Update and analysis of policy, potential and reality*. *Energy Policy* 38(9), 5151-5165.**

ABSTRACT - Climate change, rising oil prices and concerns about future energy supplies have contributed to a growing interest in using biomass for energy purposes. Several studies have highlighted the biophysical potential of biofuel production on the African continent, and analysts see Mozambique as one of the most promising African countries. Favorable growing conditions and the availability of land, water and labor are mentioned as major drivers behind this potential. Moreover, the potential of biofuel production to generate socio-economic benefits is reflected in the government's policy objectives for the development of the sector, such as reducing fuel import dependency and creating rural employment. This article provides an overview of biofuel developments in Mozambique and explores to what extent reality matches the suggested potential in the country. We conclude that biofuel developments mainly take place in areas near good infrastructure, processing and storage facilities, where there is (skilled) labor available, and access to services and goods. Moreover, our analysis shows the need to timely harmonize current trends in biofuel developments with the government's policy objectives as the majority of existing and planned projects are not focusing on remote rural areas, and – in absence of domestic markets – principally target international markets.

Keywords: Biofuels, development, Mozambique

- ▶ Schut, M., C. Leeuwis and A. van Paassen. 2010. Room for the River – Room for Research? The case of depoldering De Noordwaard, the Netherlands, *Science and Public Policy* 37(8), 611-627.

ABSTRACT - This paper explores the role of research in the context of the Dutch spatial planning procedure 'Room for the River'. We start from the idea that research is strategically used to create space in negotiation processes, where stakeholders often have competing claims on natural resources. Multiple data collection techniques allowed us to reconstruct and understand critical events that led to the decision to de-polder De Noordwaard. Within each critical event we describe and analyse how research and other resources were mobilized by policy makers and other stakeholders to open up or close down negotiation space. By doing so, this paper contributes to insight into the factors that influence the effective mobilization and contribution of research towards exploring sustainable solutions to complex environmental problems.

Keywords: Research, policy making, negotiation, competing claims, space for change, room for the river

- ▶ Schut, Marc L.W., S. Bos, L. Machuama and M.A. Slingerland, 2010. *Working towards sustainability. Learning experiences for sustainable biofuel strategies in Mozambique*, Wageningen University and Research Centre, The Netherlands in collaboration with Cepagri, Maputo, Mozambique, 103p.

Download: www.dgis.wur.nl/NR/rdonlyres/BD79EDD8-AC7D-4EED-BDE8-D86C5A6CAA79/103522/Schutetal2010Workingtowardsustainability.pdf.

Executive summary (8p.) download: <http://dgis.wur.nl/NR/rdonlyres/BD79EDD8-AC7D-4EED-BDE8-D86C5A6CAA79/103523/Schutetal2010ExecutiveSummaryWorkingtowardsSustain.pdf>

ABSTRACT - Climate change, rising oil prices and a concern for future energy supplies, have led to a growing interest in the use of biomass for energy purposes. Several studies have shown the potential for liquid biofuel production on the African continent. According to analysts, Mozambique has favourable growing conditions, and the availability of land, water and labour that may contribute considerably to the continent's biofuel production potential. Moreover, biofuel production in African countries could be a driver for technological, economic and rural development. However, the production of biomass energy crops can also result in negative environmental and socio-economic impacts, such as changing land-use patterns and competition with food production. In order to deal with these impacts, some countries (UK, Netherlands), multi-stakeholder platforms (Roundtable for Sustainable Biofuels) and supra-national institutions (European Commission) have developed sustainability guidelines for biofuel production. The implementation of such biofuel sustainability criteria will have clear consequences for African countries, and in response, the Mozambican government has requested to explore such criteria, and to think about how they could be operationalized to fit the Mozambican reality.

As a response, the Mozambican government defined the necessary steps to develop their own national biofuel sustainability framework to guide biofuel investments and production in the country. To elaborate on this, a National Biofuels Taskforce was formed, which includes a subgroup on 'Sustainability Criteria and Development Models'. One of the objectives of this subgroup is to develop a national strategy for sustainable biofuel production that reflects the Mozambican reality and long-term market-requirements for developing a sustainable biofuel sector.

This study seeks to support the work of this subgroup by providing learning experiences in three distinct ways. Firstly, we provide experiences from biofuel production in Brazil. Secondly, we looked at other commodities produced in Mozambican, which apply sustainability criteria and/or certification systems such as FSC, GlobalGAP and fair-trade. Thirdly, we provide an overview of biofuel developments in Mozambique and analyze to what extent reality fits to the suggested potential in the country, and the (sustainability) objectives of the Mozambican government and international institutes. Data was gathered through analysis of literature, by doing field visits and by conducting semi-structured interviews with investors, farmers, extension-workers, researchers, NGO-representatives and policy-makers.

We found that the biofuel sector is characterized by high uncertainty and heterogeneity. When analyzing our case study experiences from a sustainability point of view, our major concern was not so much whether or not the Mozambican biofuel system is or could be sustainable, but more if and how multi-stakeholder objectives can become compatible. To accommodate the debate we distinguished between operational (short-term) and strategic (long-term) sustainability at different scale-levels. It is important that operational sustainability objectives contribute towards developing a strategic sustainable biofuel sector in

Mozambique, but also that long-term sustainability does not restrict the development of the sector on the shorter term.

The Mozambican national biofuel policy and strategy (Resolution 22/2009), formally approved in March 2009, covers some of the concerns raised in this study. It stimulates the development of the domestic market, focuses on certain feedstock, adopts national blending targets, promotes local processing capacity to add value, biofuel tax to the build up of the sector and land approval in designated agro-ecological zones. A major challenge will remain how to deal with heterogeneity in the sector and specifically how a sustainability framework could responsibly stimulate the integration of smallholder farming and rural development in general while remaining economically competitive. One of our recommendations is the establishment of Community- Private-Public partnership as a platform to facilitate learning within the sector.

▶ **Keywords:** Mozambique, sustainability, biofuels, potential, policy, reality, certification, Brazil

2009

- ▶ **Baudron, Frédéric, Ken E. Giller, Marc Corbeels and François Monicat. 2009. Cotton expansion and biodiversity loss in African savannah, opportunities and challenges for conservation agriculture: A review paper based on two case studies, *Biodiversity and Conservation* 18: 2625-2644.**

ABSTRACT - We review agricultural impacts on biodiversity and the potential of conservation agriculture in developing productive and environment-friendly cropping systems. We then analyse experiences from two African landscapes of global importance for conservation: the Mid Zambezi Valley in Southern Africa and the periphery of the "W-Arly-Penjari" complex in West Africa. In both areas, expansion of cotton farming, considered as one of the most polluting forms of agriculture in the world, drives major land use change and loss of biodiversity. In both areas, various forms of conservation agriculture have been developed and tested. We highlight the potential benefit of conservation agriculture in controlling negative environmental effects traditionally associated with agriculture and reducing the need for land conversion through increased biophysical resource use efficiency, turning agriculture from a threat to an opportunity for conservation. Finally, we raise a number of issues that constitute challenges for the widespread adoption of these technologies by resource-poor farmers, and formulate recommendations for the development, evaluation and diffusion of conservation agriculture technologies for smallholders in semi-arid Africa.

Keywords: Cotton, Smallholders, Productivity, Sustainability, Biodiversity.

- Ramoelo A., M. Cho, R. Mathieu, A.K. Skidmore, M. Schlerf, C.A.J.M. de Bie, I.M.A. Hietkonig., H.H.T. Prins, G. Asner. 2009. Exploring various spectral indices for grass biomass estimations along a land use gradient in greater Kruger National Park, 7th Kruger Network Meeting, Skukuza, South Africa, 19-24 April 2009.**

ABSTRACT - Knowledge on the distribution of grass biomass is crucial in understanding rangeland productivity and facilitates effective management of wildlife and livestock. The spatial distribution of grass biomass differs in space at local, regional and global scale. Conventional field techniques to measure grass biomass have been reported to be laborious and time consuming to cater for these various scales. In the past few decades, advent in remote sensing provided avenues to map grass biomass at various scales. Several remote sensing techniques using spectral reflectance and spectral indices (normalized difference vegetation index-NDVI, SAVI-soil adjusted vegetation index, SR-simple ratio etc.) were applied. Most studies reported successes and failures of these techniques in estimating grass biomass both in dry or wet season. A main challenge in grass biomass estimations in and around Kruger National Park (KNP) is the fact that these areas are characterized by differences in moisture, nutrients, grazing pressures, temperature and human activities (cultivation, etc). The aim of this study is to explore several techniques used in estimating grass biomass at field and airborne level along a land use gradient. The question is whether conventional vegetation indices are adequate to characterize grass biomass in this dynamic regions. If not, what type of techniques could be developed to characterize grass biomass? What assumptions would be put in place for such model developments? The study area consist of a land use gradient starting from Kruger National Park (KNP)-Tshokwane area, Private Game Reserve (Sabie Sabie and Mala Mala) and Communal land (Bushbuckridge area). The data used include in situ measured grass biomass and CAO (Carnegie Airborne Observatory) hyperspectral data both collected in April/May 2008. Partial least square regression (PLSR) was used to develop models to estimate grass biomass. The results showed that the PLSR model explained 42% of the grass biomass variation, while as expected, vegetation indices did not performance well. The study demonstrated the possibility of estimating grass biomass during dry season.

- ▶ **Schut, Marc L.W. 2009. Bioenergy initiatives in Mozambique, An analysis of policy, potential and reality, CERES Summerschool 2009, Nijmegen, The Netherlands, 3 July 2009.**
Presentation available at: <http://np-net.pbworks.com/f/20090703++Presentation+Marc+Schut-1.pdf>.
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- ▶ Schut, Marc L.W. 2009. **Blending perspectives on sustainability**, *Second Annual Africa Bioenergies Conference, Addis Ababa, Ethiopia, 16-18 June 2009*.

Presentation available at: <http://library.wur.nl/WebQuery/wurpubs/lang/381766>.

ABSTRACT – Over the past years several administrations have developed sustainability criteria as a way of dealing with emerging competing claims around bioenergy production. The implementation of such bioenergy sustainability criteria will have clear consequences for African countries, as well as for the private sector. The presentation draws on data collected in Mozambique between December 2008 and June 2009. A general overview of bioenergy developments in Mozambique will be presented. Subsequently the presentation will zoom in on different sustainability schemes, what it means to implement them in practice, what obstacles can be expected and how to deal with them. Objective of the presentation is finding an answer to the question: ¿How to blend different ideas and perspectives on sustainable bioenergy production in the African context¿, taking government, private sector, investment banks, NGO and science perspectives into account.

2008

- ▶ Giller, K.E., C. Leeuwis, J.A. Andersson, W. Andriess, A. Brouwer, P. Frost, P. Hebinck, I. Heitkönig, M.K. van Ittersum, N. Koning, R. Ruben, M. Slingerland, H. Udo, T. Veldkamp, C. van de Vijver, M.T. van Wijk, & P. Windmeijer. 2008. 'Competing claims on natural resources: what role for science?' *Ecology and Society* 13(2): 34. [online] URL: <http://www.ecologyandsociety.org/vol13/iss2/art34/>

ABSTRACT – Competing claims on natural resources become increasingly acute, with the poor being most vulnerable to adverse outcomes of such competition. A major challenge for science and policy is to progress from facilitating univocal use to guiding stakeholders in dealing with potentially conflicting uses of natural resources. The development of novel, more equitable, management options that reduce rural poverty is key to achieving sustainable use of natural resources and the resolution of conflicts over them. Here, we describe an interdisciplinary and interactive approach for: (i) the understanding of competing claims and stakeholder objectives; (ii) the identification of alternative resource use options, and (iii) the scientific support to negotiation processes between stakeholders. Central to the outlined approach is a shifted perspective on the role of scientific knowledge in society. Understanding scientific knowledge as entering societal arenas and as fundamentally negotiated, the role of the scientist becomes a more modest one, a contributor to ongoing negotiation processes among stakeholders. Scientists can, therefore, not merely describe and explain resource-use dynamics and competing claims, but in doing so, they should actively contribute to negotiation processes between stakeholders operating at different scales (local, national, regional, and global). Together with stakeholders, they explore alternatives that can contribute to more sustainable and equitable use of natural resources and, where possible, design new technical options and institutional arrangements.

Keywords: agricultural science; conflict; ecology; level; methodology; natural resource management; scale; social science; sustainable agriculture

- ▶ Heitkönig, Ignas M.A. and Jens A. Andersson, 2008. Disentangling humans and wildlife on the road towards the Great Limpopo Transfrontier Park. *Paper presented at the 6th Kruger Network Meeting, Skukuza, 20-25 April 2008.* http://www.sanparks.org/parks/kruger/conservation/scientific/noticeboard/science_network_meeting_2008/Friday/heitkonig.pdf

ABSTRACT – The establishment of the Great Limpopo Transfrontier Park (GLTP) and its neighbouring Conservation Areas is aimed at enabling large-scale, international eco-tourism across three neighbouring countries in one of the world's largest conservation areas. Dr Anton Rupert's 1990 idea behind peace parks was that "the parks could make a fundamental difference to Africa, using eco-tourism as a vehicle - by addressing one of its most pressing problems - abject poverty. Africa's biggest asset is its people and its natural beauty. Furthermore, Africa has an increasingly scarce commodity - space. Dr Rupert believed that the success of peace parks rested on four pillars, namely: space, management training, accommodation, and accessibility" (Peace Parks website), all related to wildlife-centered tourism. Indeed, all three neighbouring National Parks, i.e. KNP (South Africa), Gonarezhou (Zimbabwe) and Limpopo National Park (Mozambique) provide considerable populations of animals that are attractive to tourists, with a spacious and "wild" landscape. Much effort is currently undertaken to improve tourism facilities such as accommodation, and some local people are trained to address this issue. However, the main challenge remains the issue of abject poverty, particularly in the areas directly neighbouring the GLTP, where support for the GLTP is most needed and least achieved. To protect these communities from potentially dangerous or damaging animals (such as baboons, lions and elephants), villages should be spatially segregated from wildlife, fences would need to be created or recreated, and damage control mechanisms need to be instated in all three countries. Ironically, fences would re-enforce spatial segregation also among related villages, particularly within the Shangaan community, which now encompasses most of the entire GLTP area. To alleviate poverty, economic development is needed, preferably linked to the eco-tourism engine, although economic benefits from this source likely remain inadequate. In this paper, we further explore the concept of "hard" boundaries and fences to achieve benefits for tourism-centered stakeholders, versus "fuzzy" boundaries usually perceived by the poor local communities and by wildlife.

- ▶ **Milgroom, Jessica & Marja J. Spierenburg. 2008. 'Induced Volition: Resettlement from the Limpopo National Park, Mozambique', *Journal of Contemporary African Studies* 26 (4), 435-448.**

ABSTRACT – This paper focuses on the resettlement process taking place in the context of the creation of the Limpopo National Park in Mozambique, which is part of the Great Limpopo Transfrontier Park. About 27,000 people are currently living in the park; 7000 of whom are meant to be resettled to areas along the margins of the park. The Mozambican government and donors funding the creation of the park have maintained that no forced relocation will take place. However, the pressure created by restrictions on livelihood strategies resulting from park regulations, and the increased presence of wildlife has forced some communities to 'accept' the resettlement option. Nevertheless, donors and park authorities present the resettlement exercise as a development project. In the article we describe how the dynamics of the regional political economy of conservation led to the adoption of a park model and instigated a resettlement process that obtained the label 'voluntary'. We analyse the nuances of volition and the emergent contradictions in the resettlement policy process.

Keywords: resettlement; (transfrontier) conservation; development; Mozambique

- ▶ **Milgroom, J. and L.J. Shaffer, 2008. A New Look at the Landscape Consequences of Population Resettlement from Protected Areas. Paper presented at the 6th Kruger Network Meeting, Skukuza, 20-25 April 2008. http://www.sanparks.org/parks/kruger/conservation/scientific/noticeboard/science_network_meeting_2008/Thursday/milgroom.pdf**
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- ▶ **Schut, Marc. 2008. Mobilization of knowledge in competing claims context. A research proposal for studying: Space for change in complex societal negotiation processes over natural resources. 8th European IFSA Symposium, Clermont-Ferrand, France 6-10 July 2008.**

ABSTRACT – Problem solving in land-use planning and Natural Resource Management has long been based on linear models of both policy and science application. The role of science in such endeavours was to provide unequivocal, predictive knowledge about the functioning of social and agro-ecological systems that would allow for rational planning. Since the 1980s, this notion has rapidly eroded and has been replaced by the idea that it is essential to deal with multiple realities in societal problem solving efforts. With the introduction of participatory research and methodologies, we sought for consensus among stakeholders about desired policy directions and innovative solutions by creating common sense of a situation and engaging in a joint learning process. While negative experiences with participatory approaches were often attributed to incompetence, unwillingness or 'bad practice', constraints were often due to a lack of attention for dynamics of power, negotiation and conflict. Moreover intervention projects were still organized with a narrow focus on the local level, whereas local level developments are often constrained by what happens on higher levels. In the platforms where stakeholders from different levels meet and negotiate, knowledge has become a 'weapon' in the struggle to protect interests and pursue or impose certain problem definitions and solutions. This positions negotiation processes central to land-use planning, NRM and other decision-making processes. This theoretical paper starts from the premise that sustainable solutions may emerge when negotiation processes in and between multi-level networks lead to a balancing of local, regional, national and global developmental interests. The theoretical perspective explores the role of knowledge in complex, societal negotiation processes over natural resources, as well as the methodology for studying how multi-level stakeholders mobilize scientific and other knowledge to protect their interests, pursue their goals and create space for change.

Keywords: Natural Resource Management, land use, negotiation, knowledge, space for change

- ▶ **Tapera, Kuvawoga Phillip. 2008. *Spatial distribution of Wildlife-Livestock Conflict around Gonarezhou National Park area*, MSc thesis, Department of Geography and Environmental Science, University of Zimbabwe.**

ABSTRACT - In this study the main objective was to explain the spatial distribution of livestock predation by the African Lion (*Panthera leo*) and spotted hyena (*Crocuta Crocuta*) in relation to environmental factors. It is hypothesized that the spatial distribution of livestock (i.e., cattle goats and donkey) predation is largely a function of environmental factors, for instance varying levels of green plant cover, predator habitats and range distribution and availability of other resources like water, food and cover. Results show that there is a significant relationship ($p < 0.05$) between cattle, goat and donkey predation by lion and hyena in relation to NDVI (green cover), and distance from woodlands. The results also show that, distance from streams and distance from Gonarezhou National Park (GNP) boundary significantly ($p < 0.05$) explain the spatial distribution of livestock kills by lion. The results indicate that areas close to the GNP experience high probability of hyena and lion predation. The thesis contributes to a wider societal debate on policy and planning decisions that aim to attain a mutually beneficial wildlife- livestock co-existence in areas adjacent to protected zones. Using NDVI, distance from streams, woodlands and GNP boundary the spatial distribution and probability of presence of livestock kills by lion and hyena in the Gonarezhou area is reliably predicted.

- ▶ **Zengeya, Fadzaï. 2008. *Predicting the spatial occurrence of imbrasia belina* (mopane worm) using remote sensing in the Southeast Lowveld of Zimbabwe, MSc thesis, Department of Geography and Environmental Science, University of Zimbabwe.**

ABSTRACT - The main objective of this study was to assess the applicability of remote sensing in predicting and mapping the spatial occurrence of *imbrasia belina*. The study particularly assessed the relationship between remotely sensed vegetation index, SAVI and environmental factors such as mean monthly decadal rainfall and tree density. MODIS satellite imagery from 13th October 2007 to 4th March 2008 were used to calculate the vegetation index (SAVI). This is a period that coincides with the outbreaks of mopane worm. Binary logistic regression was used to spatially predict the probability of occurrence of mopane worm as a function of the soil adjusted vegetation index, SAVI and environmental factors particularly rainfall and tree density. Results showed that there is a significant ($p < 0.05$) relationship between mopane worm occurrence and SAVI in December. This indicates that mopane worm occurrence can be predicted after the outbreaks using the strong flush that results from vegetation biomass recovering from the defoliation. The results also indicated that in December there is a significant ($p < 0.05$) difference between areas with and without mopane worm. Those areas that had outbreaks of mopane worm had higher vegetation biomass in response to the effect of defoliation on mopane trees compared to those areas that had not had outbreaks. In addition, results also indicated that SAVI is significantly positively ($r = 0.385$, $p < 0.01$) correlated to environmental factors particularly tree density. There is also no significant ($r = -0.075$, $p > 0.01$) correlation between SAVI and rainfall. Thus, rainfall was regressed against mopane worm presence this resulted in a significant inverse ($p < 0.05$) relationship between mopane worm presence and mean monthly decadal rainfall. A multivariate logistic model of rainfall and SAVI was constructed; the results indicated that it had a low predictive power as compared to the prediction using SAVI. The results of the study indicate that remote sensing and GIS can be used to predict as well as map the spatial distribution of mopane worm, the main purpose being to provide baseline data towards sustainable utilization of the biodiversity resource as required by the Convention on Biological Diversity and the Environmental Management Act of Zimbabwe (EMA) (Chap 20: 27).

- ▶ **Zisadza, Patience. 2008. *Spatio-temporal dynamics of land cover in the South-East Lowveld of Zimbabwe*, MSc thesis, Department of Geography and Environmental Science, University of Zimbabwe.**

ABSTRACT - The main objective of this study was to assess landcover changes and analyse spatial and temporal variations in selected administrative units (wards 11, 12,13,14,15 and 22) of Chiredzi district, Southeast Lowveld of Zimbabwe using remotely sensed satellite imagery. Landsat (MSS) for 1972; Landsat TM for 1989, Landsat ETM+ for 1999 and 2000 and MODIS image for 2007 were used. The proportions of landcover classes (woodland, wooded grassland, cultivation and bare area), NDVI (1972 to 2007) and landscape patch metrics (Patch Size and Patch Numbers) were all calculated and analysed in a GIS. We explained the changes in landcover as a function of human population density from 1972 to 2000. The results indicated that there were significant ($p < 0.05$) changes in proportions of landcover from 1972 to 2007. The results also indicated there were significant ($p < 0.05$) spatial and temporal differences in green vegetation, as measured by NDVI. There were significant ($p < 0.05$) spatial and temporal differences in the landcover fragmentation (landscape patch metrics) of woodlands and wooded grasslands.

There were significant ($p < 0.05$) negative relationships ($r = -0.77$) in 1972, ($r = -0.56$) in 1989, ($r = -0.86$) in 1999 and ($r = -0.84$) in 2000 between area covered by woodland and human population density. Significant ($p < 0.05$) negative relationships ($r = -0.59$) in 1972, ($r = -0.73$) in 1989, ($r = -0.75$) in 1999 and ($r = -0.89$) in 2000 were also noted for wooded grassland versus human population density. As human population density increases, it reduced the area covered by both woodlands and wooded grasslands. However, there were significant ($p < 0.05$) positive relationships ($r = 0.94$) in 1972, ($r = 0.92$) in 1989, ($r = 0.80$) in 1999 and ($r = 0.89$) in 2000 between human population density and cultivation. The relationships between human population density and bare area were weak and positive ($r = 0.26$) in 1972, ($r = 0.33$) in 1989, ($r = 0.25$) in 1999 and ($r = 0.21$) in 2000. Therefore as human population density increases, area under cultivation also increased. The relationships between population density and bare area were not significant ($p > 0.05$).

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ABSTRACT – In academic and policy thinking, competing claims on land are often viewed in terms of conflicting interests over productive resource use. Within this line of theoretical argumentation tenure security is a prerequisite for increases in productivity, while a lack of it is assumed to be a major impediment to the development of African smallholder agriculture as such farming usually takes place under communal land tenure regimes. This paper challenges this generalized perspective, arguing that the role of agriculture - including its productivity - in the livelihoods of rural people should be understood in relation to other sources of income. Land has different meanings; it is not always the basis of rural livelihoods or a productive resource in which to invest. Land has multiple uses and is valued for both productive and non-productive considerations. Building on empirical material from South Africa and Zimbabwe, it is hypothesized that despite rural peoples' dependency on natural resources and the omnipresence of farming activity in communal areas, few depend centrally on farming for their livelihood. Productivity increases in communal area agriculture are therefore not likely to result from tenure reform alone. Rather than focusing narrowly on tenure reform and agricultural productivity, agricultural research should adopt a wider perspective on land use, and focus on peoples' land use practices and the different meanings of land in rural livelihoods. Thus, better insight is gained in different stakeholders' - including smallholder farmers' - claims on land, which enable more meaningful scientific contributions to agricultural policy and more productive and/or equitable land-use options.

Keywords: land tenure, rural livelihoods, remittances, Zimbabwe, South Africa, agricultural research

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- ▶ **ABSTRACT** – The establishment of the Great Limpopo Transfrontier Park (GLTP) and its neighbouring Conservation Areas imposes complex questions on how to control contagious livestock diseases, such as foot-and-mouth disease, Anthrax, and Bovine Tuberculosis a.o., while also enabling largely unrestrained movements of game, and soliciting broad support from local stakeholders. To achieve the first, fences would need be (re)created, but to achieve the second, they need to be removed, and to achieve the latter, detailed and complex negotiations with various stakeholder categories are required. Wildlife transmission of diseases to livestock limit access of livestock products to international markets. Disease reservoirs are often found in border areas between countries with susceptible species and infected reservoir animals - both wildlife and livestock - continuously crossing the border. Limited fence removal between KNP and neighbouring areas was effectuated (APNR, Mozambique), without compromising South Africa's livestock industry and meat export to foreign markets, but a greater challenge lies to the North, where KNP

neighbours Zimbabwe's South Eastern Lowveld across the Limpopo River. Current mixed land use in that area is a.o. characterised by a very high risk of disease transfer, complicated by land tenure intricacies. We argue that the implementation of the GLTP requires an exploration of changes in drivers such as future meat and tourism markets. China's animal protein demand is likely to surpass that of the European Union, and tourism - although a driver with less certainty - is likely to both diversify in terms of demand (quality) and local tourist pressure (quantity). We also argue that current or future policy implementation requires a much larger active co-operation among stakeholders, particularly at the local level, for which mechanisms are proposed, and which form part of a newly started international applied research programme.

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