

Multifunctional Landscapes

Session 1:3
25 September
15.15-17.15

Schedule

15.15-15.25	Setting the frame for 'multifunctional landscapes'	Anders Malmer & Madelene Ostwald
15.25-15.45	Comparative evaluation of two forest systems under different management regimes in Miombo woodlands, Tanzania	Lina Hammarstrand & Andreas Särnberger
15.45-16.05	Multifunctionality of Sudano-Sahelian village landscapes	Hanna Sinare
16.05-16.25	Tree biology in the African Sahel: action research strategies in the Great Green Wall for the Sahara and Sahel Initiative context	Deborah Goffner
16.25-16.45	Can better access to capital be part of the solution?	Peter Holmgren
16.45-17.15	Reflections and discussions	All

Participants

Anders Malmer

Anders Malmer's research concerns tropical forests and landscapes, especially questions related to the role of trees in improving and restoring land productivity, livelihoods, ecosystem services and climate adaptation. He is currently sharing duties as Professor at the SLU Department of Forest Ecology and Management and as research-thematic leader at SLU Global for "Restoration of degraded rural landscapes". His research group currently includes activities in Burkina Faso, Kenya, Tanzania, Costa Rica and Honduras and he is actively involved in national networks (Agri4D & Focali) as well as international ones (ETFRN & IUFRO). Own research and SLU Global activity also connect to multilateral institutes like ICRAF and CIFOR as well as to bilateral dialogues and cooperation between Sweden to Brazil and Indonesia.

Madelene Ostwald

Madelene Ostwald is an associate professor active at the Centre for Climate Science and Policy Research (CSPR) at Linköping University and at the Centre for Environment and Sustainability (GMV) at Chalmers University of Technology and University of Gothenburg. Ostwald's research includes land use and forestry focus linking to climate change and policy primarily in the tropics. Ostwald is also research leader for the national research network Focali (Forest/bioenergy, climate and livelihoods).

Lina Hammarstrand

Lina Hammarstrand is an Environmental engineer who graduated from Chalmers 2013. Hammarstrand is currently working at the Port of Gothenburg.

Andreas Särnberger

Andreas Särnberger is a Chemical Engineering student at Chalmers University of Technology. Särnberger is currently working at Akzo Nobel Surface Chemistry.

Hanna Sinare

Hanna Sinare is a PhD student at Stockholm Resilience Centre, Stockholm University. Sinare's research is focused on interactions between landscape change and livelihood strategies in northern Burkina Faso.

Deborah Goffner

Deborah Goffner is a research director for the Centre National de la Recherche Scientifique (French National Centre for Scientific Research). Geographically, Goffner is based half time in Senegal, and now half time at the Stockholm Resilience Center as a visiting senior researcher. Goffner is currently heading a series of plant-biology related projects in relation to the Great Green Wall for the Sahara and the Sahel Initiative.

Peter Holmgren

Peter Holmgren is Director-General at the Center for International Forestry Research, CIFOR, with headquarters in Bogor, Indonesia. He has a MSc and PhD in forestry from SLU and has worked internationally with forestry, food security and climate change over the past 25 years. Current priorities include to redefine forestry for sustainable development and to tear down boundaries between the green sectors towards a sustainable landscapes framework.

Abstracts

Comparative evaluation of two forest systems under different management regimes in Miombo woodlands - A case study in Kitulangalo area, Tanzania

Lina Hammarstrand & Andreas Särnberger, Department of Energy and Environment Division of Physical Resource Theory, CHALMERS UNIVERSITY OF TECHNOLOGY

The world forest is a key component in the environmental issue of global warming as it acts as one of the most important storage for carbon. This storage potential gives possibilities to mitigate carbon dioxide emissions and therefore reduce global warming. Tanzania is one country where a high deforestation rate is a major issue, especially in Miombo Woodlands, which represent most of the forestland. A number of people and communities that live adjacent to Miombo woodlands are highly dependent on the forest for their livelihood.

This study investigated the condition of two forest systems under different management regimes. One case focused on conserving the forest, named as protected forest, and one case focused on forest accessibility and usability, named as unprotected forest. Furthermore the thesis estimated how these two forests can contribute to the local peoples livelihood as well as discuss what the future potential for these forests may look like.

The parameters measured to assess the forest condition were carbon stock in above-ground biomass, below-ground biomass and carbon content in soil and tree species biodiversity. The livelihood potential was assessed by a selection of system services

most important for the local people identified through interviews. During the interviews, major threats and drivers for forest degeneration were determined and contextual parameter for these specific forest systems, such as population growth in the area and accessibility of the forests, were included to discuss the future potential of the forests in terms of carbon stock and system services.

The conclusion is that the two forest cases were quite similar for the parameters assessed in this thesis, which was a surprising result since historical studies showed that the protected forest was in a better condition. Furthermore, for some parameters, such as carbon stock and one of the system services, the unprotected forest even showed better results than the protected forest. When discussing the future potential it was concluded that there are two aspects of a forest, the global desire of preservation as well as the local need for usability and resource extraction. The ideal would be to satisfy both of these conflicting wills without further degrading the forest, meaning the extraction rate does not exceed the regrowth rate of the forest. But with the increasing pressures expected in the future it may prove difficult to meet all these demands in a sustainable way on such a small forest area. However, the study concludes that there are many factors that can be improved in the current forest utilisation to increase the forest usage efficiency.

Keywords: *Livelihood, Miombo woodlands, carbon stock, biodiversity, system services, charcoal, timber, building poles, above-ground biomass, below-ground biomass, soil organic carbon,*

Multifunctionality of Sudano-Sahelian village landscapes

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Understanding of complex and dynamic landscapes plays a key role to secure resilient flows of multiple ecosystem service benefits for rural livelihoods. Focusing on Sudano-Sahelian Burkina Faso, a region with widespread poverty and the majority of the population occupied in agriculture, this paper presents an approach to study multifunctionality of village landscapes by studying multiple ecosystem services from different units in the landscape. In a first step, multiple groups of provisioning ecosystem services and the benefits to local livelihoods they generate was analysed. A range of participatory field methods were used to identify landscape types and groups of ecosystem services with relevance to local peoples' livelihoods. This data was combined with analysis of satellite images in GIS to gain a spatially explicit understanding of livelihood contributions from village landscapes. The identified landscape types were: Depression, Homesteads, Fields, Fallow, Shrubland, Forest and Bare soil, where trees and shrubs are present in higher or lower densities in all landscape types except Bare soil, and play an important role to define them. All landscape types except bare soil generate multiple ecosystem services leading to multiple benefits to livelihoods. No service or benefit is only generated in one landscape type. Trees and shrubs in the landscape stands for the generation of 5 out of 10 groups of ecosystem services.

To include the temporal dynamics in benefits to livelihoods from the local landscape, we also studied the role of different services in strategies to compensate for crop loss during drought years. The local landscape stands for 68 % of strategies to compensate for crop loss, but the landscape must be connected to a wider social system for the

livelihood benefit to be realised, as over 80 % of this contribution is used to generate cash income. Livestock is the single most important resource when crops fail, standing for 33 % of compensation strategies, having the function of insurance. We identify potential trade-offs in case of intensification as resources to sustain livestock and crops are to a large part generated in the same landscape types. In conclusion, to understand the generation of multiple benefits to livelihoods from ecosystem services in smallholder-farmer dominated landscapes, it is necessary to analyse village landscapes in a holistic way to capture the range of benefits to livelihoods and their inter-annually changing importance. Further, landscapes must be put in a wider social context to understand what is needed for the realisation of livelihood benefits from ecosystem services generated in the local landscape.

Keywords: *Ecosystem services, livelihoods, smallholder farming, agriculture, poverty alleviation, Burkina Faso*

Tree biology in the African Sahel: action research strategies in the Great Green Wall for the Sahara and Sahel Initiative context

Deborah GOFFNER

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In response to increasing desertification in the Sahel, in 2007 eleven African nations in the Sahel region signed an unprecedented agreement: the Great Green Wall for the Sahara and the Sahel Initiative (GGWSSI). Far beyond a giant “wall of trees”, the vision is more a series of cross-sectorial actions to address issues affecting the lives of people in the Sahelo-Saharan regions. Determining the impact of GGWSSI-triggered shifts on these social-ecological systems requires expertise in scientific disciplines ranging from biological and environmental sciences to social and health sciences. Toward this end, The French National Centre for Scientific Research (CNRS) created the GGWSSI Human-Environment Observatory, an interdisciplinary “research space” designed to facilitate exchange amongst GGWSSI researchers. The OHM funds several small-scale research projects annually that fall into four categories: biodiversity, water and soils, social systems, and health.

I will focus my presentation on a project that aims to improve tree biodiversity along the GGWSSI. As a first step, we revisited tree species availability and performed ethnobotanical surveys with local populations in the Ferlo region of northern Senegal where GGWSSI tree planting is currently underway. A “short list” of highly useful, low abundance indigenous tree species was established. In collaboration with the Senegalese GGWSSI National Agency, we are currently setting up field trials and testing parameters (seed provenance, improved water use efficiency) to determine whether these species can be realistically adapted to high throughput GGWSSI planting activities, and the potential ecological and human benefits associated with their reintroduction.

Can better access to capital be part of the solution?

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Whether in agriculture, forestry or other domains, finding a way to support sustainable land use is vital for human survival. Public funds are scarce and inadequate, yet private capital has not found a way to justify assuming the perceived risk of investing in small or medium –scale practices.

CIFOR, ICRAF, The Munden Project, Chatham House and the Ateneo School of Government are collaborating to meet this challenge. We have identified a way forward that we think will intelligently leverage limited public funds to satisfy investors' return requirements in a way that drives truly sustainable outcomes on farms and forests across the globe.

Sustainable forms of agriculture, forestry and other land uses are essential for sustainable growth and for confronting long-term food security and climate change. Many consider supporting such practices with proper finance to be a public-sector problem. We disagree with this view, for three reasons:

1. Most of these practices are cash-generating, meaning that they have the potential to provide returns if aggregated properly. This suggests the potential for private funding.
2. When judged relative to their risk and combined with intelligent public support, we believe the rates of return for these practices will offer a higher profit for investors (again, if aggregated properly).
3. While vital in shielding investors from risk, public sources of finance would be completely inadequate for direct financing of these activities. They will inevitably fail to deliver the change at scale the world requires in order to meet the challenge of climate change.

At the same time, we know that private forms of finance have failed to deliver what sustainable practices need to be successful: flexible, patient investment. More simply put, the private sector has failed to seize the opportunity and we think it needs a push from the public side in order to do so.

Further, the verification of sustainable outcomes is often assumed to be technically difficult, expensive and subject to political bargaining. We are finding a way forward by combining a generic set of measureable outcomes with established monitoring approaches that have been established in strategic forestry planning for decades. The combination of long-term, fair and accessible capital and efficient verification tools can be a significant part of scaling up solutions for sustainable landscapes.