SESSION DESCRIPTION

Session ID: B7

Title of session:
Exploring the complex relationship between ecological, farming and human systems to boost ecosystem services in rural landscapes

Hosts:

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Organisation</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host</td>
<td>Dr. Louise Willemen</td>
<td>ITC University Twente, Fellow Ecoagriculture Partners</td>
<td><a href="mailto:l.l.willemen@utwente.nl">l.l.willemen@utwente.nl</a></td>
</tr>
<tr>
<td>Host</td>
<td>Dr. Fabrice DeClerck</td>
<td>Bioversity International</td>
<td><a href="mailto:f.declerck@cgiar.org">f.declerck@cgiar.org</a></td>
</tr>
<tr>
<td>Co-host</td>
<td>Dr. Salman Hussain</td>
<td>UNEP-TEEB</td>
<td><a href="mailto:salman.hussain@unep.org">salman.hussain@unep.org</a></td>
</tr>
<tr>
<td>Others involved</td>
<td>Sarah Jones</td>
<td>Bioversity International</td>
<td><a href="mailto:s.jones@cgiar.org">s.jones@cgiar.org</a></td>
</tr>
<tr>
<td>Others involved</td>
<td>Dustin Miller</td>
<td>UNEP-TEEB</td>
<td><a href="mailto:dustin.miller@unep.org">dustin.miller@unep.org</a></td>
</tr>
</tbody>
</table>

Abstract:

ES dynamics play a central role in agricultural practices in rural landscapes. Globally, agricultural systems face the dual challenge of increasing food production to meet a growing global population, and to reduce the negative impact of agricultural production practices on the environment. The latter goal highlights the tremendous impact that agriculture has had as a driver of ecosystem degradation. The ecosystem service paradigm however, presents an opportunity to reverse this pattern by recognizing the key contribution of healthy ecosystem to agricultural production. There is a growing interest to move agriculture of the 21st century beyond a singular emphasis on yield to healthy rural landscapes that provide multiple ecosystem services to society (e.g. CGIAR Research Program on Water Land and Ecosystems, TEEB for Agriculture and Food, the SDGs etc.).

In this session we aim to learn from diverse actions aiming at minimizing trade-offs between land uses and exploring opportunities for synergies to improve overall benefits, and synthesize their evidence of impact. These actions could include restorations efforts, improved agricultural practices, local and international governance frameworks, and/or market incentives. We will feature research tools that have been used to guide decision-making, and highlight cases where communities are actively engaged in integrated landscape management for ecosystem services in rural landscapes. We invite participants to contribute to a growing community of practice for sharing evidence, experience, and methods for putting ecosystems for work for a food secure and sustainable future.

Format (Proposed duration, methods, (technical) requirements):
This session on ES in Rural Landscapes will consist of two parts:

A. A 2 hour morning block on TEEB for Food and Agriculture, hosted by UNEP–TEEB, will present the results and case studies of the TEEB for Food and Agriculture Rice, Livestock, and Fisheries reports. Perspectives on the complex relationship between ecological, farming and human systems will be given. A panel discussion will synthesize lessons learned from the TEEB studies. This part of the session is not open to voluntary contributions.

A 3.5 hour afternoon block on “Research Advances and Ecosystem services: evidence and action”. This second part of the session is open to voluntary submissions to feature different perspectives of ES action in rural landscapes, resulting in an overview of the current state of theory and practice. We seek high quality cases and research projects on action and evidence on improved ecosystem services in agricultural landscapes. Priority would go to studies that focus on the landscape scale, and which have progressed beyond the assessment phase of landscape planning, moving into the planning and intervention stages with novel institutional arrangements for the co–management of ecosystem services. Each presenter will be asked to specifically address key questions that will be the focus of session discussion. We will close the session with ample of time for discussion and dialogue on research priorities.

This session is organized in collaboration with:

- The Economics of Ecosystems and Biodiversity (TEEB)
- CGIAR Collaborative Research Programme on Water Land and Ecosystems
- Landscapes for People Food and Nature Initiative
- Bridging Agriculture and Conservation Initiative
- The “Making-ecosystems-count” NCEAS working group

Planned output:

- Strengthening the a research community on ES and in rural landscapes
- Joint publication of papers presented in the session in a Special Issue (eg. Food Security, Ecosystem Services)
- Editorial or perspectives piece co-authored by session participants reflecting on critical directions for ecosystem service based approaches in agricultural landscapes
- A dedicated Science Writer will attend the session to prepare an Editorial or Perspectives piece for submission in a pre–authorized journal

Voluntary contributions accepted:

Yes

SPEAKERS

Invited speakers and panellists

<table>
<thead>
<tr>
<th>First name</th>
<th>Name</th>
<th>Organization</th>
<th>Title of presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luke</td>
<td>Brander</td>
<td>VU University Amsterdam and Hong Kong University of Science and Technology</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alistair</td>
<td>McVittie</td>
<td>SRUC</td>
<td></td>
</tr>
<tr>
<td>Salman</td>
<td>Hussein</td>
<td>UNEP–TEEB</td>
<td></td>
</tr>
<tr>
<td>Fabrice</td>
<td>DeClerck</td>
<td>Bioversity International</td>
<td></td>
</tr>
</tbody>
</table>
### Oral presentations

<table>
<thead>
<tr>
<th>First name</th>
<th>Name</th>
<th>Organization</th>
<th>Title of presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fanny Valerie</td>
<td>Boeraeve</td>
<td>University of Liège</td>
<td>Rural landscape design: think local and involve locals</td>
</tr>
<tr>
<td>Leah</td>
<td>Bremer</td>
<td>University of Hawaii, Manoa, The Natural Capital Project</td>
<td>Ecosystem services and socio-ecological resilience under land use and climate change in Kona, Hawai’i</td>
</tr>
<tr>
<td>Bart</td>
<td>De Knegt</td>
<td>Alterra</td>
<td>Hotspots for nature based solutions, a case study for a more sustainable agriculture in the Netherlands</td>
</tr>
<tr>
<td>Rosalien</td>
<td>Jezeer</td>
<td>University of Utrecht</td>
<td>Agroforestry coffee plantations in Peru – a double dividend for biodiversity and farmers?</td>
</tr>
<tr>
<td>Stephanie</td>
<td>Larson</td>
<td>University of California</td>
<td>Evaluating ecosystem services provided through conservation easements</td>
</tr>
<tr>
<td>Vinay</td>
<td>Nangia</td>
<td>ICARDA</td>
<td>Agricultural water management and ecosystem services in the Aral-Syrdarya watershed, Kazakhstan – Searching for novel ways to share water and improve ecosystem services in Kazakhstan</td>
</tr>
<tr>
<td>Kiran</td>
<td>Paudyal</td>
<td>The University of Melbourne</td>
<td>Indicators of biodiversity and ecosystem services in community forestry: insights from Nepal</td>
</tr>
<tr>
<td>Samson</td>
<td>Foli</td>
<td>CIFOR</td>
<td>The contribution of forests and trees to food production in the tropics: a systematic review</td>
</tr>
<tr>
<td>Chawapich</td>
<td>Vaidhayakarn</td>
<td>USAID LEAF Thailand</td>
<td>Payment for Ecosystem Services (AURA-PES) scheme under Private Sector and Rural Community Partnership to Restore a Degraded Watershed Landscape in Northern Thailand</td>
</tr>
<tr>
<td>Louise</td>
<td>Willemen</td>
<td>ITC– University of Twente</td>
<td>Introduction to boosting ecosystem services in rural landscapes: perspectives on actions and evidence</td>
</tr>
</tbody>
</table>
## Poster presentations

<table>
<thead>
<tr>
<th>First name</th>
<th>Name</th>
<th>Organization</th>
<th>Title of talk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bart</td>
<td>De Knegt</td>
<td>Alterra</td>
<td>Hotspots for nature based solutions, a case study for a more sustainable agriculture in the Netherlands</td>
</tr>
<tr>
<td>Lelani</td>
<td>Mannetti</td>
<td>Stellenbosch University</td>
<td>Expanding the Protected Area Network in Namibia: Institutional development for rangeland management surrounding Etosha National Park</td>
</tr>
</tbody>
</table>
The urge to involve stakeholders from the start of ecosystem service (ES) assessments is increasingly addressed in literature (e.g. 1–3). This is even more the case when studying rural landscape planning for which impacts on ES have proved to be highly context specific (4–6). Despite the growing amount of social ES valuations, few studies integrate them to a biophysical ES assessment.

To fill in this gap, we developed a methodology where the social ES valuation directly serves the biophysical ES assessment. By combining components of the Delphi and the focus group methods, our approach allows to provide good insights on the preferred ES within the studied locality. Thanks to the deliberative phase, it also provides information on the divergences and convergences among the social values held by local stakeholders. The underpinning aim of the exercise is to reach a consent within the group. Conversely to a consensus where the decision must be unanimous, a consent seeks decisions where nobody has fundamental opposition to it. We believe that applying such approach has the potential to:

– guide the biophysical ES assessment towards ES which are relevant to the study area and important in the eyes of local stakeholders;

– create opportunity for collective social learning;

– identify networks of influences and/or social interdependencies related to ES;

– empower local stakeholders while enhancing the democratic process of decision-making.

The presentation will first introduce the backbone of the methodology. Two case–studies in which we applied the innovative approach will then be presented. The first case study relates to local ES assessment carried out in agroecological and conventional farms in a Western locality in Belgium. The second case–study relates to a land consolidation scheme project. Outcomes of the approach applied in both cases will be put forward, and adaptation of the methodology for the distinct purposes and contexts will be elucidated.
References


Keywords: Social valuation, rural contexts, deliberative, empowerment, social learning
Ecosystem services and socio-ecological resilience under land use and climate change in Kona, Hawai‘i

Presenting author: Leah Bremer
Other authors: Lisa Mandle, Tamara Ticktin, Kimberly Burnett, Natalie Kurashima, Clay Trauernicht, Pu‘ala Pascua, Heather McMillen, Thomas Giambelluca, Cheryl G. Geslani, Shimona Quazi
Affiliation: University of Hawai‘i, Manoa, The Natural Capital Project, United States of America
Contact: lbremer@stanford.edu

Identifying land–use strategies that can enhance sustainability and resilience of socio–ecological systems is critical, particularly in the face of climate change. This is especially important in the Pacific Islands, where climate change is expected to result in major threats to food and water security, and where the vulnerability and isolation of these islands mean that enhancing food and water self– sufficiency is a fundamental element of building resilience. Yet, few studies have simultaneously evaluated the socio–ecological, economic, and cultural costs and benefits of varying land management systems in the context of climate change in the Pacific Islands. To address this gap, we evaluated ecosystem service and socio–ecological resilience outcomes of stakeholder developed land–use scenarios (pasture, native forest restoration, agroforestry, and coffee) crossed with statistically downscaled climate change projections in Kaʻūpūlehu, a dry ahupua’a (traditional Hawaiian biogeographic land units) in Kona, Hawai‘i Island. In particular we consider synergies and tradeoffs of land management in terms of groundwater recharge, carbon storage, fire frequency, ecological diversity, economic value, and cultural ecosystem services in the context of climate change. We find the greatest potential for maximizing ecosystem service and ecological resilience through native forest restoration or through agroforestry, but management costs and the cultural value of pastoral systems suggests that it may not be practical or desired to do this at a large scale. Given the diversity of land uses that are valued by people in the region, our results suggest a mixture of pasture, agroforestry, and native forest systems may maximize ecosystem service production and socio–ecological resilience in the face of climate change. Our results also point to the importance of access in influencing the cultural benefits of different types of land management.

Keywords: Resilience, climate change, land–use change, islands, agroforestry, forest restoration, Hawai‘i, cultural services, hydrologic services
Type of submission: Voluntary contribution

B7 Exploring the complex relationship between ecological, farming and human systems to boost ecosystem services in rural landscapes

Hotspots for nature based solutions, a case study for a more sustainable agriculture in the Netherlands

Presenting author: Bart de Knegt
Other authors: Dirk-Jan van der Hoek
Affiliation: Alterra, the Netherlands
Contact: bart.deknegt@wur.nl

In the Netherlands, current agricultural practice is not sustainable. Dutch policy objectives aim at making Dutch agriculture more sustainable. Part of the solutions are offered by nature based solutions by making better use of ecosystem services. For example agricultural pests could be controlled by making more use of natural predators instead of using pesticides and pollination of crops by wild insects could be increased instead of using technical alternatives.

The present study was meant to answer the following practical questions that Dutch policymakers addressed: what is the current use of ecosystem services that support agricultural production? How big and where is the mismatch between supply and demand of these ecosystem services? What are the options to increase supply, to meet the current demands, and thus enhance nature based solutions?

The current situation and the potential to make better use of nature based solutions was investigated by mapping current as well as potential supply and demand of natural pest control, pollination, erosion prevention and natural soil fertility. This resulted in nationwide detailed maps with bottlenecks, where there is a mismatch between demand and supply and where management options could offer a solution for this mismatch. Because the agricultural sustainability problem is part of multi-sectoral challenges, we also took other ecosystem services such as green recreation, conservation of our natural heritage, carbon sequestration and flood prevention into account.

The study delivered maps with hotspot areas where the potential for a better use of ecosystem services for nature based solutions is high, with a high spin-off in benefits for other ecosystem services. These maps help policymakers to implement policies and procedures in order to make better use of nature’s capacities and thus to meet their policy targets on sustainable agriculture.

Keywords: Science–policy interface, nature based solutions, mapping, potencies, hotspots
The ecosystem services that can be provided by shade trees strengthen the promise of tropical agroforestry systems to reconcile biodiversity conservation with rural development. Evidence of these double benefits is however lacking, as multidisciplinary studies to quantify ecological– and socio-economic performance are rare. Therefore, we studied relations between farm biodiversity, total farm productivity and pest incidence of small scale coffee plantations in the San Martin region, Peru, in relation to both management characteristics and landscape composition. We conducted interviews amongst 150 farmers and collected farm data for small-scale conventional- and agroforestry coffee management systems, representing a wide range along the intensification gradient. Our database includes information on: I) vegetation and soil characteristics; II) costs & benefits; III) management characteristics; IV) tree and butterfly biodiversity; V) microclimate and; VI) pest incidence. Additionally, landscape scale data on land use was collected from satellite images. Regression analyses were conducted to test the effect of different management systems on biodiversity- and economic performance. Our results showed significantly higher butterfly diversity for agroforestry systems compared to conventional systems, reflecting the potential of agroforestry systems to contribute to conservation of biodiversity. Though coffee productivity was higher for more intensified, conventional systems, total revenues and benefit–cost ratio were higher for shaded, agroforestry systems, due to lower costs and additional income from other products (e.g. firewood, timber, fruits). Furthermore, these agroforestry plantations had higher above-ground carbon stocks. Landscape level analyses revealed lower damage due to pests on plantations with higher proximity to natural forests. All together, these findings suggest that agroforestry plantations show large potential to combine biodiversity conservation and local development. This is not only relevant for smallholders, local government and certification bodies, but also for the private sector, as it shows a strong business case for biodiversity-friendly businesses in developing countries.

**Keywords:** Agroforestry, ecosystem services, coffee, biodiversity, resilience
Conservation easements are voluntary agreements between landowners and government or non-profit organizations that limit landowner actions in return for financial and lifestyle benefits. While easements are often used to purchase the development rights of a property, conservation easements could also be used as payments for ecosystem services. Conservation programs could be developed or existing ones modified, to provide measurable conservation benefits while preserving working landscapes for future generations. Among existing land conservation programs in California, the Williamson Act, is by far the most popular. However, the Williamson Act is an agricultural land conservation program and is not focused on measuring increases in ecosystem services. To better understand the potential of integrating payments for ecosystem services into a conservation easement program we evaluated the current value of ecosystem services provided by rangeland in Sonoma County, CA. Sonoma County is influenced by a Mediterranean climate characterized by long dry summers and mild winters. We developed an assessment tool, using InVEST®, to map and value the goods and services from rangelands for four ecosystem services, carbon storage and sequestration, sediment retention, water purification and scenic value. We evaluated these services over lands with and lands without easements, as well as lands with different easement types. For each module/typology combination, we calculated the biophysical supply of the ecosystem service provided. We compared current ecosystem services across land typologies to identify differences in services provided by easement and non-easement properties. Results might well support the structuring of future conservation easements, taking into account measurable increases in ecosystem services. Results incorporated into ecosystem service payments; conceivably might increase landowner participation. Results also provide tools for public and private agencies to prioritize properties for conservation easements. This tool can be used by both private and public lands owners to assess the incremental value received by conservation easements.

Keywords: Conservation easements, payments for ecosystem services, working landscapes
Agricultural water management and ecosystem services in the Aral–Syrdarya watershed, Kazakhstan – Searching for novel ways to share water and improve ecosystem services in Kazakhstan

Presenting author: Vinay Nangia
Other authors: Simon Charre, Anna Inozemtseva, Srinivasan Raghavan, David Mulla
Affiliation: ICARDA, Jordan
Contact: v.nangia@cgiar.org

Initiated in 2014, this current study was set to identify key drivers for water use in the low Syr Darya River basin and their economic impact on water users. With community participation, a baseline assessment was carried out and stakeholders mapped. Based on scenarios proposed by farmers and women groups, data on water resources, land resources and crop management were fed into a SWAT model to simulate scenarios of modified water management. Then the RIOS model was applied to identify best investment options giving maximum returns to water resources users.

Information thus generated will be used to understand the water usage patterns and model ways of making the most efficient usage of water resources. Through the valuation, trade-offs can be negotiated.

Keywords: Aral Sea Basin, agricultural water management, SWAT, RIOS
Community forestry (CF) is becoming an increasingly popular approach to forest management globally. Community-managed forests (CMF) support biodiversity and provide a broad range of ecosystem goods and services (EGS) to nearby communities and beyond. However, the role of CMF is often undervalued due to a lack of understanding of the interactions between ecological processes, the provision of EGS and biodiversity in CMF under changing land uses. Knowledge of appropriate indicators for biodiversity and ecosystem services (BES) at local level enhances understanding of such interactions and supports communities and policy makers in identifying gaps and adopting an ecosystem services approach in CF management. This paper examines how and to what extent CMF delivers a wide range of EGS to local communities. More specifically, the study identifies local level indicators to assess BES from CMF. These indicators are tested in three CFM projects representing three ecological zones in central and western Nepal. A combination of participatory approaches, focus group discussions, key informant surveys, expert opinion consultations and geo-spatial tools, was utilised. The study proposes a bundle of indicators at local scale for BES applicable to wider ecological regions. The paper also explores the strengths and weaknesses of the chosen indicators and indicates how they can be used for effective assessment and monitoring of BES CMF landscapes, where relevant data are poorly available. By developing an innovative participatory approach to identify and assess BES at local level, this study not only informs stakeholders about the role of community forestry in providing BES in Nepal, but also the approach can be utilised to assess BES in government-managed forests in Nepal and other developing countries.

**Keywords:** Ecosystem goods and services, biodiversity, assessment, monitoring, land use change, trade-off
Despite an exponential rise in research related to the broad topic of ecosystem services over the past three decades, in-depth understanding of the contribution of forests and trees to food production remains limited. This review attempts to assess and synthesize the current evidence base examining the contribution of forest and trees to agricultural production in tropical landscapes. Using systematic review methodology, three specialist bibliographic databases were searched for relevant publications using a predefined search strategy combining terms relating to forests, agroforestry, ecosystem services and agriculture. Further searches were also conducted in Google Scholar and relevant research institutional websites to measure the comprehensiveness of the original searches. Pre-determined inclusion criteria and screening strategy were employed to filter studies for relevance. The review identified 58 relevant publications investigating the effect of forest or tree-based ecosystem service provision on a range of outcomes such as crop yield, biomass, soil fertility and income. Preliminary results suggest that the majority of studies were conducted over short temporal and small spatial scales. Wide variation in results were reported. These included, improved soil fertility but depressed crop yield. However, instances of reduced crop yields were often sufficiently compensated for through gains in overall biomass and subsequent associated income from sales of timber, food, or resins from associated tree species. Overall, proximate forest or tree presence was reported to have a net positive effect in 32 of the 58 studies sampled. Evidence from our review indicates gaps in the current knowledge that demonstrate a need for larger-scale, longer term research to better understand forest and tree-based ecosystem services and their associated impacts on food production.

*Keywords:* Ecosystem services, forests, agroforestry, food security, food production
Payment for Ecosystem Services (AURA–PES) scheme under Private Sector and Rural Community Partnership to Restore a Degraded Watershed Landscape in Northern Thailand

*Presenting author:* Chawapich Vaidhayakarn  
*Other authors:* Somsak Soonthornnawapat, Kridtiyaporn Wongsa  
*Affiliation:* USAID LEAF Thailand, Thailand  
*Contact:* diddking@hotmail.com

Partnership between private sector and rural community can foster the sustainable approach to restore the forest ecosystem that benefits both ecosystem services–dependent stakeholders. This article demonstrates the development and implementation of the Payment for Ecosystem Services (PES) as collaborative agreement between Tipco Food Public Company Limited and Pong Khrai community in an intensively degraded watershed of Northern Thailand. Tipco Foods PCL. operates a factory that primarily depends on forest ecosystem in the Pong Khrai subwatershed, provides water regulation and provision services to produce bottled mineral water under a brand ‘AURA’. The company has approved a two years (2015–2017) monetary support to Pong Khrai community under pilot–PES scheme known as ‘AURA–PES’, to restore a degraded forest by using The Framework Trees Species Method of Forest Restoration. The AURA–PES scheme was set up through negotiated–based mechanism and implement under the established AURA–PES committee, with intermediary agency, local administration authorities, and technical support organizations, mediated the transaction between ecosystem services buyer and provider. The mechanism underline roles and functions of each stakeholder, activities plan, financial arrangement, performance indicator for monitoring and verification on each step of forest restoration activities to ensure the scheme’s effectiveness, accountability and transparency. AURA–PES is one of the first fully functioning PES scheme in Thailand where payment from ecosystem beneficiary is directly allocate to service providers with an outstanding engagement of community and business corporation to improve forest ecosystem. This pilot–scheme is expected to create lesson learned and provide institutional framework that scaling–up the partnership between private sectors and rural communities to support the research, conservation, and co–management of ecosystem services in the watershed landscape.

*Keywords:* Payment for Ecosystem Services, AURA–PES, forest restoration, negotiated–based mechanism, Northern Thailand.
Type of submission: Voluntary contribution

B7 Exploring the complex relationship between ecological, farming and human systems to boost ecosystem services in rural landscapes

Introduction to boosting ecosystem services in rural landscapes: Perspectives on actions and evidence

Presenting author: Louse Willemen
Other authors: Fabrice DeClerck
Affiliation: ITC- University of Twente, Biodiversity International, the Netherlands
Contact: l.l.willemen@utwente.nl
Hotspots for nature based solutions, a case study for a more sustainable agriculture in the Netherlands

**Presenting author:** Bart de Knegt

**Other authors:** Dirk-Jan van der Hoek

**Affiliation:** Alterra, the Netherlands

**Contact:** bartdeknegt@yahoo.com

In the Netherlands, current agricultural practice is not sustainable in time and space. For example the application of pesticides and fertilizer are costly and have detrimental effects on the environment, water extraction and irrigation causes desiccation in nearby nature areas etcetera. This study presents the evaluation of the current situation and investigates the potential for using nature based solutions to make Dutch agriculture more sustainable.

Dutch policy objectives aim at making agriculture more sustainable. Part of the solutions can be nature based by making better use of ecosystem services. For example pests could be controlled by making more use of natural predators instead of using pesticides and pollination of crops by wild insects could be increased. The present study was meant to answer the following practical questions that Dutch policymakers addressed: What is the use of ecosystem services in the current situation? How big and where is the mismatch between supply and demand of ecosystem services? What are the options to increase supply, to meet the current demands, and thus enhance nature based solutions?

The current situation and the potential to make better use of nature based solutions was investigated by mapping present as well as potential supply and demand of the above mentioned ecosystem services. This resulted in maps with bottlenecks, where there is a mismatch between demand and supply and where management options could offer a solution for this mismatch. As the agricultural sustainability problem is part of current multisectoral challenges in which other ecosystem services such as green recreation, biodiversity, carbon sequestration and flood prevention also play a role. We also took those services into account.

The study delivered maps with hotspot areas where the potential for a better use of ecosystem services for nature based solutions is high, with a high spin-off in benefits for other ecosystem services. These maps could help policymakers to adapt policies and procedures in order to make better use of natur capacities and thus to meet their policy targets on sustainable use (increasing sustainability of agriculture).
Keywords: Nature based solutions, mapping, potencies, hotspots, science–policy interface
Type of submission: Poster

B7 Exploring the complex relationship between ecological, farming and human systems to boost ecosystem services in rural landscapes

Expanding the Protected Area Network in Namibia: Institutional development for rangeland management surrounding Etosha National Park

Presenting author: Lelani Mannetti
Other authors: Karen Esler, Ulrich Zeller, Thomas Göttert
Affiliation: Stellenbosch University, South Africa
Contact: lelani.mannetti@gmail.com

Protected areas are among the most important refuges of biodiversity and are crucial for the conservation of species threatened by land-use change and habitat loss. Increasingly, these areas are becoming isolated in the landscape while their objectives have grown from ecosystem protection to also improving human welfare. Efforts to integrate protected areas into the broader landscape call for a contribution on their part to broader social–ecological resilience, requiring protected areas to adapt to changes in their surrounding social and ecological conditions. A need lies in better understanding the interactions governing social–ecological systems, particularly those pertaining to the different stakeholders who influence, and are influenced by ecosystem and natural resource management in and surrounding protected areas.

Applying an institutional analysis and development framework we (aim to) illustrate how different stakeholders in the landscape interact in the social–ecological system comprising Etosha National Park and its surrounding farms and conservancies. This will highlight points of strength and weakness in institutional development efforts currently promoting rangeland management in the area. It may also provide insight into the mechanisms and conditions that influence management and policy outcomes, especially for marginalised communities or individuals. The social–ecological system concept is progressively being applied in studies relating to the interlinked dynamics of environmental and societal change. Advances are being made in understanding the interdependencies of humanity and nature. Our findings potentially contribute insights into the interactions among power relations and ecosystem stewardship/management, factors that have a decisive impact on whether attempts to enhance social–ecological outcomes succeed or fail.

Keywords: Social–ecological systems, governance, conservation, human well-being