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I. SESSION DESCRIPTION

ID: T3b

Ecological tipping points and societal transformation processes in social-ecological systems

Hosts:

	Title	Name	Organisation	E-mail
Host:		Sophie Peter	ISOE – Institute for Social-Ecological Research	sophie.peter@isoe.de
Co-host(s):		Marion Mehring	ISOE – Institute for Social-Ecological Research	mehring@isoe.de
		Markus Rauchecker	ISOE – Institute for Social-Ecological Research	markus.rauchecker@isoe.de
		Lukas Drees	ISOE – Institute for Social-Ecological Research	drees@isoe.de

Abstract:

"Ecological tipping points (TPs) can be defined as a "situation in which an ecosystem experiences a shift to a new state, with significant changes to biodiversity and the services to people it underpins, at the regional or global scale" (Secretariat of the Convention on Biological Diversity, 2020, p. 72). Natural science research on potentially interconnected TPs focuses mainly on mathematical-analytical approaches (e.g., in the climate system). In contrast, an integrative social-ecological approach can provide a holistic perspective on the nature-society interactions (Liehr, Röhrig, Mehring, & Kluge, 2017). This is demonstrated, for example, in the NamTip project focusing on possible desertification TPs in Namibia's semi-arid grasslands (Männer et al., 2021). Another current project, MORE STEP, which focuses on societal transformation processes to foresee TPs, confirms the potential of inter- and transdisciplinary research (Mehring et al., 2018). The session focuses on exchanging conceptual approaches and results on the interlinkage of ecological TPs and societal transformation processes to develop common perspectives. The exchange aims, first, to highlight the complexity of this interlinkage, as societal transformation processes can be facilitators as well as preventers of reaching TPs. And second, to get a deeper understanding of the implications for the supply-demand relationship of ecosystem services and potential disservices.

The projects NamTip and MORE STEP are hosting the session and are part of the research programme BioTip, funded by the German Federal Ministry of Education and Research. However, the session is open to all projects with the aim to exchange research ideas, to work out possible similarities but also differences and to start developing a joint product.

Reference List

Liehr, S., Röhrig, J., Mehring, M., & Kluge, T. (2017). How the Social-Ecological Systems Concept Can Guide Transdisciplinary Research and Implementation: Addressing Water Challenges in Central Northern Namibia. Sustainability, 9(7), 1109.

Männer, F. A., Schwarz, L.-M., Menestrey Schwieger, D. A., Amputu, V., Bilton, M. C., Brinkmann, K., et al. (2021). An Integrated Framework to Study Ecological Tipping Points in Social-Ecological Systems (International Grassland Congress Proceedings). The XXIV International Grassland Congress/XI International Rangeland Congress. Kenya Agricultural and Livestock Research Organization, Online Conference 25.10-29.10.2021.

Mehring, M., Batbuyan, B., Bolortsetseg, S., Buuveibaatar, B., Dashpurev, T., Drees, L., et al. (2018). Mobility at risk: Sustaining the Mongolian Steppe Ecosystem - societal transformation processes. Stakeholder analysis and identification of drivers and potential solution pathways. ISOE-Materialien Soziale Ökologie. (52), from http://www.isoe-publikationen.de/fileadmin/redaktion/ISOE-Reihen/msoe/msoe-52-isoe-2018.pdf.

Secretariat of the Convention on Biological Diversity (2020). Global Biodiversity Outlook 5. Montreal."

Goals and objectives of the session:

The session will focus on a conceptual reflection of ecological tipping points (TPs) in terrestrial, but also aquatic-focused social-ecological systems. This shall be discussed (1) from an inter- and transdisciplinary perspective; (2) focusing on societal transformation processes (causes, but also avoidance strategies of TPs); and (3) in relation to ES supply-demand relationships and possible disservices.

Planned output / Deliverables:

Developing a joint product (e.g., opinion paper).

Session format:

5 Minutes Pitches and World Café

Voluntary contributions accepted:

Yes, I allow any abstract to be submitted to my session for review

Related to ESP Working Group/National Network:

Thematic Working Groups: TWG 3 - ES Indicators

II. SESSION PROGRAM

[Date of session: 12. October 2022
Time of session: 11:00 – 13:00 (2 hrs)

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
11:00 – 11:05	Dr. Marion	Mehring	Institute for Social-Ecological Research (ISOE), Frankfurt a. M., Germany	Introduction and session overview
11:05 – 11:10	Sophie	Peter	Institute for Social-Ecological Research (ISOE), Frankfurt a. M., Germany	Mongolian herder mobility as an indicator of societal transformation with ecological consequences
11:12 – 11:17	Dr. Antonio J.	Castro	Andalusian Centre for the Assessment and Monitoring of Global Change (CAESCG), Department of Biology and Geology, University of Almeria, 04120, Almeria, Spain	On the role of emotions in human-nature connectedness in Mediterranean landscapes
11:19 – 11:24	Jana	Spulerova	Institute of Landscape Ecology of the Slovak Academy of Sciences	Impact of land use changes on the provision of ecosystem services of grassland (case study from Slovakia)
11:26 – 11:31	Amar	Maruf	Universitas Halu Oleo, Department of Environmental Science, Indonesia	Are varied means better? Exploring the role of different types of social capital existed in patron-client relationship in social resilience of Bajau fishermen in Wangi-Wangi Island of Wakatobi Biosphere Reserve, Indonesia to climate change impacts and risks
11:33 – 11:38	Lukas	Drees	Institute for Social-Ecological Research (ISOE), Frankfurt a. M., Germany	A nomadic pastoralism for the 21st century in Mongolia. Shaping social-ecological transformations to avoid ecological tipping points
11:40 – 11:45	Lena	Bickel	Institute for Social-Ecological Research (ISOE), Frankfurt a. M., Germany	Rangeland desertification and land use changes on commercial land in Namibia's Waterberg region
11:47 – 11:52	Dr. Markus	Rauchecker	Institute for Social-Ecological Research (ISOE), Frankfurt a. M., Germany	Post-independence development projects to combat desertification in communal areas in Namibia's Waterberg region

Time	First name	Surname	Organization	Title of presentation
11:54 – 11:59	Ph.D Spyros	Theodoridis	Senckenberg Biodiversity and Climate Research Centre (SBiK-F), Frankfurt am Main, 60325 Germany	A framework for evaluating medicinal ecosystem services and their exposure to global change
12:00 – 12:05	Lukas	Drees	Institute for Social-Ecological Research (ISOE), Frankfurt a. M., Germany	Introduction to the World Café
12:05 – 12:35	Lukas	Drees	Institute for Social-Ecological Research (ISOE), Frankfurt a. M., Germany	World Café (digital & in-person)
12:35 – 13:00	Sophie	Peter	Institute for Social-Ecological Research (ISOE), Frankfurt a. M., Germany	Final résumé of the session and the World Café

III. ABSTRACTS

Abstracts are ordered based on the session program. The first author is the presenting author unless indicated otherwise.

1. Type of submission: Abstract

T. Thematic Working Group sessions: T3b – Ecological tipping points and societal transformation processes in social-ecological systems

On the role of emotions in human-nature connectedness in Mediterranean landscapes

Presenting author: Antonio J. Castro Martínez
Other author(s): Irene Otamendi-Urroz, Cristina Quintas-Soriano
Affiliation: University of Almeria, Spain
Contact: acastro@ual.es

Landscapes can lead to different emotions towards nature that in turn shape people's behavior and environmental decision processes. Former literature has explored the issues of landscape changes and people's emotional responses towards these changes and the tolerance, attitudes and emotions towards particular carnivore species. Yet, there is no deep research on how emotional experiences of and in nature can be important for fostering connectedness to nature. This study explores the role of emotions that Mediterranean landscapes produce on people as a way to unravel human-nature connectedness (HNC). We

conducted 176 face-to-face surveys to capture the diversity of emotions associated with a suite of landscapes and determined their influence in HNC. Results revealed that Marine and Coastal Protected Areas received the highest number of positive emotions, whereas Greenhouses and Non-Protected Littoral were linked to negative emotions. By using an emodiversity index, we propose a framework for classifying emotional landscapes according to four groups: emotionally positive, negative, polarized or neutral. Results showed that the study of emotions plays a key role in shaping HNC and may be used as a common ground for understanding roots underpinning human actions that lead to environmental sustainability or degradation

Keywords: Emotional Landscape, leverage points, Mediterranean landscapes, social preferences, Spain, sustainability science

2. Type of submission: Abstract

T. Thematic Working Group sessions: T3b - Ecological tipping points and societal transformation processes in social-ecological systems

Post-independence development projects to combat desertification in communal areas in Namibia's Waterberg region

Presenting author: Markus Rauchecker
Other author(s): Meed Mbidzo, Lena Bickel, Diego Menestrey Schwieger
Affiliation: Institute for Social-Ecological Research
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Namibia is one of the driest countries in the world, and a large part of its population living in communal areas depend on subsistence livestock farming. Therefore, rangeland degradation in these territories constitutes a significant socio-economic and environmental risk. After the country's independence, different development projects to combat desertification were implemented in the communal farming areas in the Waterberg region such as SARDEP, NAPCOD, Desert Margins, CPP and NAP3 from 1991 until today. These projects worked mainly under the umbrella of UNCCD. The aim of this contribution is to analyse the projects' perceptions of desertification and their causes guided by the following research questions: How did the projects define desertification? How did the projects measure desertification? What were the causes of desertification according to these projects? Did the understanding change over time? How did these projects address desertification causes in practice? Although in the projects the desertification tipping points concept was not explicitly used, what aspects for ecological and social tipping points can be found? We analyse project reports and interviews with key informants from the mentioned projects with Qualitative Content Analysis.

Keywords: desertification, tipping points, development projects

3. Type of submission: Abstract

T. Thematic Working Group sessions: T3b - Ecological tipping points and societal transformation processes in social-ecological systems

Are Varied Means Better? Exploring The Role of Different Types of Social Capital Existed in Patron-Client Relationships in Social Resilience of Bajau Fishermen in Wangi-Wangi Island of Wakatobi Biosphere Reserve, Indonesia to Climate Change Impacts and Ri

Presenting author: Amar Maruf

Other author(s): Asnarulkhadi Abu Samah, Nobaya Ahmad

Affiliation: Department of Environmental Science, Faculty of Forestry and Environmental Science, Universitas Halu Oleo Kendari, Indonesia, Indonesia

Contact: amarmaruf@uho.ac.id

The socioeconomic and cultural aspects of small-scale fishing communities and individuals have been affected by climate change, particularly in tropical developing nations. Fishers have developed various strategies to combat the effects, such as capitalizing on human and social resources. As the primary fish producer in Southeast Sulawesi, Bajau fishers in Wakatobi Biosphere Reserve have historically adapted to the impacts of climate change by relying on patron-client relationships. Understanding the types of social capital embedded in the relationships and their contribution to the social resilience of fishermen in the face of the impacts of climate change is critical for developing regenerative adaptation and transformation. This study aims to explore the social capital embedded in the patron-client relationship and its role in the social resilience of Bajau fishers to climate change impacts. This research was conducted between September 2021 and February 2022 using both purposive and snowball sampling methods. Data saturation was achieved at 23 informants consisting of 15 fishers and remaining patron actors. The findings demonstrated the existence of bonding, bridging, and linking types of social capital in patron-client relationships among Bajau fishers. In addition, the fishers have capitalized on various benefits from the three distinct types of capital, thereby increasing their social resilience to climate change impacts. While these relationships have reduced social capital's negative aspects, such as illegal fishing practices, they have excluded other fishers from effective fisheries management. Serious attention from relevant stakeholders is necessary as excluding the others will lead to other issues and problems. How social capital determines the distribution of benefits from patron-client relationships to community and household levels is ripe for investigation. Moreover, the role of small-scale fisherwomen in the relationships must be considered.

Keywords: Social Capital, Patron-Client Relationship, Social Resilience, Wakatobi Biosphere Reserve, Climate Change

4. Type of submission: Abstract

T. Thematic Working Group sessions: T3b - Ecological tipping points and societal transformation processes in social-ecological systems

A nomadic pastoralism for the 21st century in Mongolia. Shaping social-ecological transformations to avoid ecological tipping points

Presenting author: Lukas Drees

Other author(s): Stefan Liehr, Batjav Batbuyan

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For millennia, nomadic pastoralism has played an essential role in shaping the condition of the ecosystem of the eastern Mongolian steppe. Besides, it also shapes the country's cultural identity and, therefore, is of huge importance for societal and political debates about public or private land ownership, land laws, and associated use of natural resources. In short, nomadic pastoralists are key to the current and future management of ecosystem services. However, the economic importance of this sector decreased in the last decades and, combined with a relatively low degree of political organisation, pastoralists' voices are being heard less and less in decision-making processes.

At the same time, global change processes such as urbanisation, industrialisation and climate change exert pressure on the ecosystem. Especially due to the local concentration of large livestock herds, the exploitation of mineral resources, as well as an expansion of infrastructure projects, which result in a further fragmentation of the steppe. All these pressures could bring the steppe ecosystem close to or beyond an ecological tipping point. While this also strongly affects the nomadic way of life, the pastoralists' long experience in adapting to a volatile environment can be a key for a holistic response to these challenges.

To get closer to such a response, we conducted a transdisciplinary process for the joint development of future scenarios that involved a broad range of scientific disciplines and societal, political and economic actors. The process revealed the importance of finding a new way of nomadic pastoralism for the twenty-first century. Besides developing differing scenarios that describe a possibility range between favourable and undesirable futures, we could identify and classify key factors to shape a social-ecological transformation in Mongolia.

Keywords: Scenario development, Mongolia, steppe ecosystem, transformation, social-ecological system

5. *Type of submission: Abstract*

T. Thematic Working Group sessions: T3b – Ecological tipping points and societal transformation processes in social-ecological systems

Rangeland desertification and land use changes on commercial land in Nambia's Waterberg region

Presenting author: Lena Bickel
Other author(s): Katja Brinkmann, Stefan Liehr
Affiliation: Institute for Social-Ecological Research (ISOE), Germany
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Looming desertification and ongoing climate change put Namibia's semi-arid rangelands and thus fodder resources for livestock and farmers' livelihoods under increasing pressure. Rangelands are considerably vulnerable to interlinked socio-economic and biophysical changes and shocks, caused for example by droughts, which makes them a prime example for tightly coupled social-ecological systems (SES). Whilst ecological tipping points (TPs) within SES have been widely investigated, social TPs have received less attention. However, mutually reinforcing feedbacks can result in unfavorable system states referred to as social-ecological traps (SETs).

In Namibia's Waterberg region, the most important land use and land cover changes (LULCC) include bush encroachment, bush control, the subdivision of rangeland into smaller management units, and income diversification. Direct causes of land cover changes are driven and shaped by underlying socio-economic and biophysical factors, whereat climatic trigger events appear to play a key role. In the wake droughts and market shocks, cattle farmers are repeatedly forced to apply short-term risk coping and long-term risk mitigation strategies to manage ecological and social TPs (e.g., desertification, unprofitable business) and escape from SETs. As the strategies vary among farmers, different development paths are followed and three predominant farm types have emerged (i. e., pure cattle, hunting/ guest, or mixed farm).

To sustain rangelands in the face of rapid global change, a deeper understanding of this tightly coupled SES is necessary. Therefore, a mixed-method approach was chosen comprising literature research, semi-structured interviews with freehold farmers, and remote sensing techniques to explore the historical development of the research area and to identify patterns of social-ecological interactions and procedures.

Keywords: social-ecological systems, social-ecological traps, tipping points, land cover change, savannas

6. Type of submission: Abstract

T. Thematic Working Group sessions: T3b - Ecological tipping points and societal transformation processes in social-ecological systems

MORE STEP - Mongolian herder mobility as an indicator of societal transformation with ecological consequences

Presenting author: Sophie Peter

Other author(s): Sarah Nieß, M.Sc., Lukas Drees, PhD Candidate

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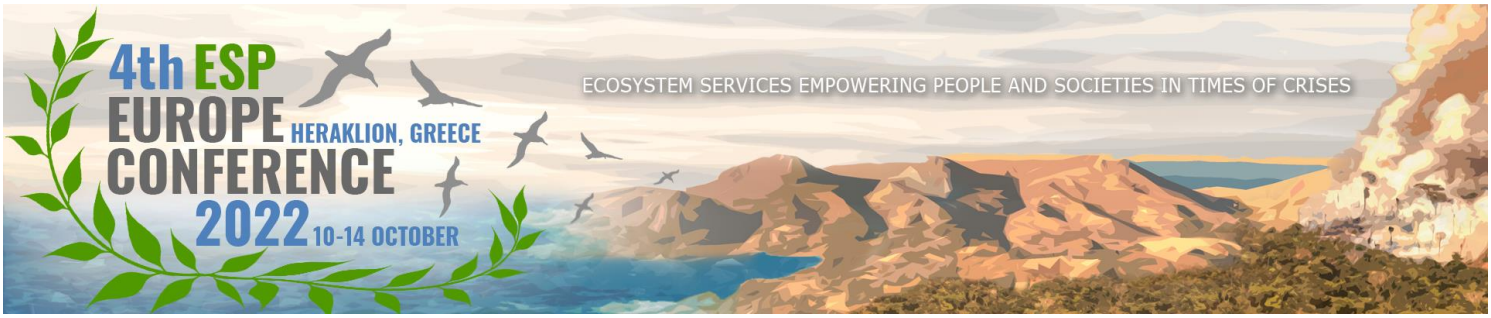
The Mongolian steppe ecosystem represents a unique social-ecological system. Therein, nomadic herders play a central role in maintaining the dynamic landscape. Traditionally, nomadic herder mobility was characterized by frequently changing the location while traditional ecological knowledge on e.g. herding practices and caring for livestock played a central role. However, this nomadic lifestyle in Mongolia is constantly transforming due to societal and environmental impacts (e.g., the oil industry is booming, while climatic extremes are getting more frequent because of climate change). Nowadays, less mobility and sedentary lifestyles are observed incl. using new methods and techniques to maintain one`s livestock. This societal transformation can have negative ecological consequences for the Eastern Steppe such as overgrazing and degradation.

Here we present the results of our empirical social study in Eastern Mongolia. We conducted a quantitative survey among 289 herder households in 2019 and 2020 on herder mobility behavior and its social drivers (e.g., the status of traditional ecological knowledge and education, distance to the capital Ulaanbaatar (UB)). With our analysis, we seek to get insights of trajectories towards societal transformation that could contribute to ecological tipping points. The outcome of our Structural Equation Model shows that herder families largely change their location in all four seasons (over 55% of all households), in line with a nomadic lifestyle. Interestingly, other than expected, households farther away from UB move less frequently, which indicates that frequent mobility is not a traditional characteristic for herders in the far eastern Steppe. In addition, households closer to UB have higher levels of education and a higher status in traditional ecological knowledge. Taken together, we can show that societal transformation is a complex process and changes in herder mobility can serve as an indicator.

Keywords: Ecological tipping points, empirical social study, herder mobility, social-ecological system, societal transformation



7. Type of submission: Abstract

T. Thematic Working Group sessions: T3b - Ecological tipping points and societal transformation processes in social-ecological systems

A framework for evaluating medicinal ecosystem services and their exposure to global change

Presenting author: Spyros Theodoridis
Other author(s): Evangelia G. Drakou, Thomas Hickler
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Medicinal plants and their bioactive molecules are integral components of nature and deliver vital ecosystem services by supporting the health of human societies through millennia. Yet, the prevailing view of medicinal biodiversity solely as an ecosystem-decoupled natural resource of commercial value prevents us not only from fully benefiting from nature's capacity to provide therapeutic goods, but also from assessing the vulnerability of these goods to global environmental crisis. Emerging scientific and technological advances pave the way for appreciating nature's medicinal properties from a planetary health perspective. Moreover, ongoing efforts of the World Health Organization and regional agencies, such as the European Medicines Agency, are enabling a centralized scientific evaluation of medicinal plants by listing key bioactive compounds and providing public guidance for their safe and effective medical use beyond traditional knowledge. Here, we integrate current knowledge spanning medicinal, biodiversity and global environmental change research in a transdisciplinary framework for evaluating medicinal ecosystem services and their vulnerability in the Anthropocene. Using Europe as an application case, we propose the use of key spatial indicators to map medicinal plant ecosystem services and the exposure of these services to climate and land-use change. The proposed framework aims at triggering and bridging transdisciplinary research on medicinal biodiversity and could guide decisions in jointly addressing critical Sustainable Development Goals.

Keywords: Medicinal biodiversity, Bioactive compounds, Anthropocene, Climate change, Land-use change