4th Open Science Meeting of the Global Land Programme

April 24-26, 2019 | Bern, Switzerland

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Conference Agenda

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Session Overview

Session

304RA: Transformative adaptation for land systems: ecosystem services in pathways of adaptation to global change - Part A

Time: **Wednesday, 24/Apr/2019: 2:00pm - 3:30pm**
Session Chair: **Sandra Lavorel**
Session Chair: **Bruno Locatelli**
Session Chair: **Matthew John Colloff**
Session Topics: How do we support transformation?

Location: **MB-106**
Main Building, 1st floor, east wing, 78 seats

Session Abstract

Uncertain, novel changes to social-ecological systems caused by climate change and other drivers mean that we can no longer assume the ecosystems and ecosystem services we currently depend on for livelihoods and wellbeing will be supplied in the future. As ecosystems transform, so does society, driven by changes in ecosystem services and livelihoods.

Large-scale land ecosystem governance systems are emerging to address transformative adaptation, but it will increasingly fall to those whose livelihoods are most impacted to develop options for adaptation. To reflect on adaptation options for social-ecological systems, we need to envision possible adaptation pathways, assess how ecosystem services contribute to adaptation in those scenarios, and analyse how decision contexts should be reframed to allow new options for adaptation. Both bottom-up and top-down approaches are required to operationalize adaptation and to conceptualize how ecosystem services can be used for adaptation.

In this session, the objective is to focus on local-regional case studies on the design and implementation of transformative adaptation, with an emphasis on land social-ecological systems. In particular, we will focus on case studies that encompass progression from the conceptual phase to the operational phase to implementation and adoption, with an emphasis on identifying sets of fruitful approaches for methodological development and transfer.

These case studies include issues of re-framing of governance structures for ecosystem-based adaptation, knowledge co-production and learning, overcoming operational barriers to ecosystem-based adaptation, and mainstreaming transformative adaptation into policy and management. The objective of the session is congruent with the conference theme of building and enhancing scientific capacity to enable transformations in land systems for a sustainable future.

Session Organizers: Sandra Lavorel, Matt Colloff, and Bruno Locatelli

Presentations

Full talk
ID: 659 / **304RA: 1**
304R Transformative adaptation for land systems: ecosystem services in pathways of adaptation to global change
Keywords: social-ecological system, ecosystem services, adaptation, pathways

Analyzing social-ecological systems for exploring adaptation pathways in land systems

Bruno Locatelli[1,2]
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The interaction of climate change with other global drivers of change requires new frameworks and approaches that can help people implement adaptation responses. The TARA framework (Transformative Adaptation Research Alliance) is based on three core components: adaptation services (the benefits to people from increased capacity to respond to change provided by the capacity of ecosystems to moderate and adapt to climate change), the values, rules and knowledge perspective (VRK, a system for diagnosing the aspects of societal decision-making contexts which enable or constrain adaptation), and adaptation pathways (an adaptive decision process for informing and sequencing adaptation decisions and actions under circumstances where goals are ambiguous, decision-making is contested, social-ecological systems are complex and highly dynamic and trajectories are unpredictable). In this presentation, we propose to operationalize this framework using case studies in the Peruvian mountains. We applied system analysis tools and developed causal loop diagrams of social-ecological systems, using different methods and sources of information, including participatory work with local and regional stakeholders. The system representations were used to identify drivers of changes, key adaptive capacity and vulnerability, and major ecosystem and adaptation services. The system representations were also used to simulate possible future pathways. Different representations of the social-ecological systems illustrated different worldviews and led to the identification of different drivers and pathways. Our findings revealed that diverse views on a social-ecological system, reflecting the diversity of people's values, enabled visioning multiple adaptation pathways. The multiplicity of adaptation pathways is a way to foster discussions among stakeholders about adaptation decisions and actions.

Full talk
ID: 513 / **304RA: 2**
304R Transformative adaptation for land systems: ecosystem services in pathways of adaptation to global change
Keywords: Adaptive pathways, Migration

Migration as transformation? Interacting adaptation and migration pathways and their impacts on ecosystems and people

Houria DJOUDI[1], Bruno LOCATELLI[2]
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Mobility in its different forms has been always an important feature of societies in different contexts. In recent decades, however, new patterns of human mobility by larger populations over wider geographical extent have been interpreted in opposite ways. Migration has been described either as an adaptive strategy or as a failure of adaptation to environmental, political or socioeconomic changes. It has also been considered either as “development from below” or as a failure of state and development, and either as an emancipatory pathway or as a passive reaction to change. Hence migration, a well-established livelihood strategy is mostly associated with tensions, the politics of fear, and the separation between the privileged and the poor. In addition and beside the fact that mobility and migration induce significant demographic changes in rural and urban areas, yet links between migration or mobility and landscape or ecosystems have been overlooked in the literature on migration and vice versa migration and mobility has been overlooked in the environmental literature.

To fill those gaps and to capture the diversity of linkages between migration, adaptation and ecosystems, we analyzed adaptation and migration pathways in several cases studies in drylands. We explored the impacts and feedback loops of different migratory patterns on ecosystems and adaptive pathways of people, including the long term different impacts of remittances on wellbeing. We also analyzed how knowledge, values and rules evolved along the pathways and affected ecosystems. The findings show that policies and the intervention of state agencies, development planners and local organizations should better account for mobility and migration. Learning from case studies can help develop strategies, incentives and policies that can transform landscapes and improve human wellbeing.

Full talk
ID: 818 / 304RA: 3
304R Transformative adaptation for land systems: ecosystem services in pathways of adaptation to global change
Keywords: food system, wicked problems, transformation, knowledge systems

Analyzing wicked food system solutions – recommendations for more transformative food system research

Verena Seufert[1,2], Graham MacDonald[3], Pietro Barbieri[4], Rachael Garrett[5], Hermann Lotze-Campen[6], Roni Neff[7], Thomas Nesme[8], Sam Rabin[1], Mark Rounsevell[1], Hannah Wittman[9]
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Providing sufficient, safe, nutritious, and culturally-appropriate food while maintaining or improving environmental quality is a key global sustainability challenge. Solutions proposed to address this challenge need to consider multiple complex social and environmental dimensions, a plurality of stakeholder perspectives, and uncertainty in interactions across food system components at different scales. Therefore, most food system challenges are recognized as ‘wicked problems’, where clear solutions are difficult to define and truly optimal solutions may not exist. Yet, little theoretical or empirical research has explicitly addressed the ‘wickedness’ of food systems. Instead, food system challenges are typically treated like ‘tame problems’, both in research and practice, and this results in proposed food system solutions that may themselves result in unintended new problems, including conflict among stakeholders, social inequities, or displaced environmental burdens. We provide practical recommendations and present a framework to facilitate incorporating wickedness in the knowledge creation process. We identify a set of wicked characteristics that should be considered when analyzing food system solutions, present a tool to evaluate these wicked characteristics, which in turn helps to prioritize certain processes or methods in the research process, and apply this framework by using three prominent food system solutions (increased organic management in agriculture, reduced meat consumption, and reduced food waste). We then identify seven best practices that can help to account for inherent wickedness of food system solutions and to address emergent complexity and uncertainty in the knowledge creation process.

Solutions are urgently needed to address the global food system challenge, but failing to acknowledge potential wickedness could exacerbate existing problems or create new problems. Embracing wickedness in the design of food system research could be a major step toward more equitable and just interventions that reduce the likelihood of trade-offs for the environment or different stakeholders.

Full talk
ID: 280 / 304RA: 4
304R Transformative adaptation for land systems: ecosystem services in pathways of adaptation to global change
Keywords: Adaptation pathways, governance, agroecology, Southeast Asia

Exploring adaptation pathways to global change: lessons from failed attempts to bring agroecology to scale in Southeast Asia

Guillaume Lestrelin[1], Jean-Christophe Castella[1,2], Rada Kong[3], Jean-Philippe Venot[2], Malyne Neang[4], Pascal Lienhard[1], Florent Tivet[1]
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Agroecology is a promising way to synergize climate change mitigation and adaptation. It builds on the practices and knowledge of smallholder farmers to address food insecurity while reducing dependence on fossil fuels and avoiding land degradation. However, bringing agroecology to scale remains an important challenge when it comes to addressing the broader policy, social and economic contexts. Agroecology research and resulting evidence on what makes the application of agroecology principles successful are typically generated at small spatial scales. Policies instruments and intervention mechanisms that would create enabling conditions for local agroecological innovations on a large scale are still largely missing.

We investigated the approaches, methods and resources employed by research-development stakeholders to promote agroecological practices in Southeast Asia. We considered two dimensions related to the modalities of intervention, namely (i) push-pull interventions and (ii) transition-conversion approaches. The first dimension refers to the distinction between push interventions – where financial, technical, material and/or organizational support is provided to targeted actors allowing them to modify their practices (e.g. subsidies and farm extension work) – and pull interventions that target the broader social and economic conditions in which actors make decisions in order to favour desired practices (e.g. sensitization and price premiums, regulations on agricultural practices e.g. restricted pesticide use). The second dimension refers to a practical opposition between approaches that promote a strict conversion from one set of practices to another seen as more desirable and approaches that allow (or even plan) for a transition between different practices.

We illustrate these multiple dimensions of transformative adaptation through concrete examples related to conservation agriculture and organic farming in Laos and Cambodia.

Full talk
ID: 458 / 304RA: 5
304R Transformative adaptation for land systems: ecosystem services in pathways of adaptation to global change
Keywords: agriculture; climate change; adaptation; groundwater; irrigation

Agricultural adaptation pathways - new water use conflicts?

Annelie Holzkämper[1], Ole Rössler[2], Fabien Cochand[3], Philip Brunner[3], Daniel Hunkeler[3]
[1]Agroscope, Switzerland; [2]University of Bern, Switzerland; [3]University of Neuchâtel, Switzerland

Climate change will profoundly alter production conditions for agriculture in Switzerland, making the need for adaptation unavoidable. Feedbacks of agricultural management adaptations on the hydrological system were not studied in Switzerland so far – leaving a potential risk of maladaptation unevaluated.

In this study, we apply a coupled modelling system (crop-hydrological-hydrogeorological) to an aquifer catchment in the Bernese Seeland (1) to evaluate impacts of climate change on future water demand for irrigation and on groundwater resources, (2) to evaluate combined effects of climate change and irrigation on groundwater resources, and (3) to explore which alternative adaptation strategies could reduce the risk of maladaptation in the long term (e.g. shifts in crop mixtures, allocation of cultivation zones).

For the most pessimistic emission pathway RCP8.5, the model results suggest that until 2099, crop productivity for most arable crops will be severely affected. Thereby, limitations through increasing temperatures are more severe than water limitations – making a shift in the varietal choice (towards varieties with higher temperature requirements) unavoidable. Considering that varieties will be adapted to increasing temperatures, net irrigation requirements will increase by up to 60% in annual mean until the end of the century. Expected impacts on agricultural production are accompanied by projected reductions in ground- and surface water resources. While annual streamflow into the aquifer catchment (Aare Hagneck) will remain on today’s level until 2070, a decrease by 13 % in comparison to (1985-2009) is projected for the end of the century (2075-2099). Thereby, a strong decrease in summer and autumn streamflow (-46% and 30%, respectively) could not be compensated by the increases during winter (+39%) and spring (+13%). Regarding changes in groundwater resources, a decrease by about 50 cm in groundwater heads in summer is projected for the most pessimistic scenario (RCP8.5). Participatory adaptations scenarios are developed together with local and regional stakeholders. Model evaluations reveal likely impacts of climate and managemenet changes on groundwater resources as well as

agricultural production.

Full talk
ID: 739 / 304RA: 6
304R Transformative adaptation for land systems: ecosystem services in pathways of adaptation to global change
Keywords: Ecosystem services, Geographic Infomation Systems, service supply, Europe

Identification of spatial bundles of forest ecosystem services at the European level for governance

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Forests provide humans and societies with a wide array of benefits – the forest ecosystem services (FES) – including supply of timber, regulation of water flows, sequestration of carbon, stabilization of slopes as well as provision of cultural and recreational opportunities. In order to safeguard such benefits, it is helpful to identify areas allowing the simultaneous provision of unique sets of services (also called bundles), which should become the target of conservation and sustainable use strategies. Identifying these areas requires the ability to map multiple ecosystem services at a relatively fine resolution and to detect common patterns in the provision of multiple services across space. Such mapping would ideally be overlaid with a mapping of the policies across space, to identify where the spatial ecosystem service bundles coincide with an existing governance regime to support ecosystem service provision.

We present a study aimed at identifying areas supporting a variety of FES bundles at the European level. The supply of various FES (i.e. biomass, carbon storage, soil stabilization, recreational opportunities) was mapped at a 1-km resolution starting from European Commission (EC) data and using Tier 1 methods (i.e. overlay and simple modeling). Unsupervised classification was used to group pixels showing similar patterns in the provision of FES, therefore representing providers of specific bundles.

Results show that similar sets of FES can be found at different locations across the continent, and provide some accurate information about the magnitude of FES supply at these locations. The proposed mapping approach may then be used to identify areas where comparable FES-based industries and initiatives may thrive or be promoted with policy. To illustrate the relevance for governance,we present an example of geographically differentiated strategic emphases, overlaid with the FES map.

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