Leverage Points 2019
International conference on sustainability research and transformation
Lüneburg, Germany, 6-8 February

Conference handbook and programme
Conference hosted by

LEUPHANA
UNIVERSITAT LÜNEBURG

With financial support from

Niedersächsisches Ministerium für Wissenschaft und Kultur

VolkswagenStiftung
Welcome!

It is our pleasure to welcome you to Lüneburg for the Leverage Points 2019 international conference on sustainability research and transformation!

Inspired by Meadows’ work “Leverage Points Places to intervene in a system” - places in complex systems where a small shift may lead to fundamental changes in the system as a whole - we seek to explore (in theory, methods and practice) the deep leverage points that can lead to sustainability transformations. This conference will ask: how do we transform ourselves, our science, our institutions, our interventions and our societies for a better future?

The conference will provide innovate formats and spaces intended to help facilitate shared and inspiring conversations, understanding and co-learning among the diverse group of scholars and practitioners attending the conference. This includes a mixture of workshops; parallel sessions that focus on allowing time for interactions between presenters and the audience; interactive plenary sessions and opens spaces for exploration and dialogue. All the component parts of the conference will be accompanied by a dedicated graphic facilitation team that will harvest and visualize key ideas emerging form the six conference themes:

- **Restructuring institutions** for transformative change
- **Reconnecting people and nature** as a deep leverage point
- **Rethinking knowledge** in relation to sustainability transformations
- **Systems thinking** and complexity as tools for transformation
- **Transformative research practices** in sustainability science
- **Emerging ideas** dictated by inspiring research relate to sustainability transformation

We wish you a happy and stimulating conference!

Sincerely,
The Leverage Points 2019 organizing committee.
This conference owns a debt of gratitude to the inspirational work of Donella Meadows. In order to help think about the daunting questions of sustainability and transformations addressed at the conference, and to help facilitate shared understandings, we propose ‘leverage points’ as a shared lens (or boundary object) that can facilitate and stimulate conversations across the disparate traditions, disciplines and cultures of sustainability science and practice present at the conference. To do so we provide a brief description of the leverage points concept as we have been using it.

Leverage points are “places in complex systems where a small shift may lead to fundamental changes in the system” (Meadows, 1999). In turn levers are the actual policies or interventions that target those intervention point. In her seminal paper Meadows identified twelve such places to intervene, we aggregate these twelve ‘places’ to four (broad and interacting) system characteristics that sustainability interventions can target.

The four system characteristics are:

- **Parameters** – tangible system properties such as taxes, standards, information that are typically targeted by policy makers to effect system change.
- **Feedbacks** – the internal system dynamics that amplify or dampen the effects of specific levers.
- **Design** – The social structures, rules and institutions that manage feedbacks and parameters.
- **Intent** – The underpinning values, goals and world-views of actors and institutions that shape the emergent direction to which a system is oriented.

These four system characteristics represent a nested hierarchy of tightly interacting realms of leverage from ‘shallow’—places where interventions are relatively easy to implement yet with potentially limited transformational potential, to ‘deep’ leverage points that might be more difficult to alter but potentially result in more transformational change.

Figure 1: A heuristic model of the leverage points concept (adapted from Abson et al. 2017)
KEYNOTE SPEAKERS AND PANELISTS

**Ioan Fazey** is Director of the Center for Environmental Change and Human Resilience at the University of Dundee and Professor in Social Dimensions of Environmental Change. He is an interdisciplinary researcher with current research focusing on resilience, adaptation, what it means to achieve equitable and sustainable societal transformations and the practices that can help facilitate such changes. Ioan’s work has included international projects on diverse issues relating to ecosystem services, biodiversity, agricultural systems, social change, vulnerability and climate change.

**Elena Bennett** is Associate Professor in the Department of Natural Resource Sciences and the McGill School of Environment at McGill University in Montreal. As a postdoc, she coordinated the Scenarios Working Group of the Millennium Ecosystem Assessment. She is currently co-chair of the Future Earth project ecoSERVICES, which aims to set the research agenda for ecosystem services, and lead author on the IPBES Global Assessment. She teaches about leverage points in a systems ecology course, and is one of an international group of scientists collecting Seeds of Good Anthropocenes.

**Niki Frantzeskaki** holds a PhD on ‘Dynamics of Sustainability transitions’ from Delft University of Technology and is an Associate Professor on Sustainability Transitions’ Governance at DRIFT, Faculty of Social Sciences at Erasmus University Rotterdam where she researches contemporary sustainability transitions and their governance across Europe, USA, Brazil and in developing countries like Vanuatu, and Ghana. Niki is coordinating research on environmental governance, and urban sustainability transitions. She contributed as a lead expert in international dialogues and projects, under the theme of innovating cities with nature-based solutions.

**Ray Ison** was appointed Professor of Systems at the Open University in 1994, his research and scholarship spans the biophysical and social and is primarily interdisciplinary and collaborative. Ray has had periods as head of the former Systems Department, Director of the Environmental Decision Making Program, and is currently involved in managing and presenting the post-graduate program in Systems Thinking in Practice (STiP). Ray also contributes to the activities of the Applied Systems Thinking in Practice (ASTiP) Group, including leading an initiative to create a LEVEL 7 (Masters) Apprenticeship for the Systems Thinking Practitioner.
Karen O’Brien is a professor in the Department of sociology and human geography at the University of Oslo, Norway. She works on issues related to global environmental change, globalization, vulnerability, climate change adaptation, and human security. She is particularly interested in how societies both create and respond to change. Her research explores the ways that processes such as climate change, biodiversity loss and other large-scale environmental transformations interact with other global processes to exacerbate inequity, increase vulnerability and undermine sustainability.

Gogo Dineo Ndlanzi is celebrated as a sangoma, spiritual teacher, life coach and and professional African storyteller, poet, writer, dancer and facilitator. Gogo is a facilitator of change. She is passionate about enlightening people to view life from a different perspective through bringing about changes in outlook to allow for holistic healing. Gogo Dineo brings creativity to facilitate safe learning spaces and processes of social change. She has consulted with companies such as Nedbank, Standard Bank, FNB, the Gordon Institute of Business Science, Gautrain and Activate Architecture, amongst others.

Petra Kuenkel is an Executive Committee Member of the International Club of Rome and the founder of the Collective Leadership Institute. As a seasoned systems scientist, visionary author and expert in complex multi-stakeholder settings she promotes systems transformations through a collective stewardship approach for corporations, public sector and civil society. She authored the 2019 Report to the Club of Rome on sustainability transformations and is a pioneering thinker on re-inventing leadership as a collective competence. Her latest book, "Stewarding Sustainability Transformations" focuses on navigating collaborative change.

John Holmberg is a professor of physical resource theory and he also holds Sweden's first UNESCO chair in education for sustainable development. His current research focuses on guiding sustainability transitions and he is the founder of Challenge Lab. He is active as an advisor and expert at United Nations: to the UN HQ in New York related to the Agenda 2030; to UNESCO in Paris for higher education for sustainable development; and to UN-environment in Nairobi.
**Per Olsson** leads the Stockholm Resilience Centre’s research stream on Resilience Science for Transformation. His current research focuses on agency and system entrepreneurship, social-ecological innovations, transformations to sustainability, and how to reverse current trends of crossing critical thresholds and tipping points in the Earth system. Per also works with change makers around the world to strengthen their capacities to achieve transformative change that helps humans and nature thrive together. This previously involved co-leading the Rockefeller Foundation Global Fellowship Program on Social Innovation and Resilience and currently involves serving as the director for the BALTICLEAD and the Transforming Change programs.

**Lorrae van Kerkhoff** is an Associate Professor at the Fenner School of Environment and Society at Australia National University where she convenes the Bachelor of Environment and Sustainability degree program. Lorrae’s research and teaching interests include qualitative and integrative research methods, particularly as they contribute to decision-making and action in the arenas of sustainability and global health. She is particularly interested in the role of science in governance, decision-and policy-making as it relates to sustainability; north-south research collaborations; and institutional influences on the governance of knowledge. Her most recent research focuses on whether, how and to what extent science can contribute to transformations toward ‘future-oriented’ conservation management.
At the 2019 Leverage Points Conference a team of facilitators and visual practitioners will implement a Harvesting Strategy. Our work is all about gathering insights, ideas and information from the many sessions and conversations at the conference and combining them through a synthesis process to create a bigger picture.

The Purpose of our Visual Harvesting work is to:

- Support collective sense making
- Provide an overview of the created knowledge and atmosphere of the conference
- Engage people in the harvesting and cross-pollination of knowledge
- Break down complex themes, knowledge and conversations in tangible and structured experiences

This is also called Visual (or Graphic) Facilitation, a multifaceted craft that has 8 core functions, summarized in the diagram below:

The created visuals make connections and shared insights visible. In itself this approach has a leverage effect: as single actors see how they are connected in a bigger system, they are enabled to adapt their actions more accurately to what is needed. This encourages a diversity of perspectives and purposeful collaboration.

Our harvesting and graphic facilitation team

Laura Martin
Jakob Kohlbrenner
Lara Schmelzeisen
Liz Clarke

https://www.orange-essence.com/
Thematic harvest walls
In the Forum you’ll find six thematic harvest walls, one for each conference theme. On these walls the summaries of every sessions can be read and everyone can post individual insights and questions too. Just drop-off your post-it note next to the wall in the ‘Harvest Drop Off Corner’.

Plenary sessions
During the plenary sessions, the harvesting team there will be live graphic recording the presentations and talks of the panellists. These will be combined with the harvests from the parallel session in forum space of the conference.

Interconnections harvest wall
By connecting and synthesizing from across the conference themes and plenary sessions we will create a meta level visual representation, called the interconnections harvest wall that will bring all sessions of a day together on one wall.

How can you participate in the harvest?
Through discussions in the parallel sessions, where key insights will be captured by session rapporteurs; and via post-it notes where you can record your “aha” moments and insights. When you have filled them in, please place them next to the harvest walls in the “Harvest Drop off Corner”

http://leveragepoints2019.leuphana.de/knowledge-harvesting/
AFTERNOON PLENARY SESSIONS

As part of the ethos of the conference we place an emphasis on discussions and active engagement of conference participants. Therefore we have chosen novel formats for the afternoon plenary sessions. Each session will be focused on a daily conference theme:

Day 1) EXPLORE: What are the ‘deep’ or neglected ‘leverage points’ for sustainability transformations?

Day 2) NAVIGATE: How do we navigate complexity when thinking about sustainability interventions?

Day 3) ACT: How does a leverage points perspective help us to act?

Plenaries days 1 (Wednesday) and 2 (Thursday)

These plenaries will have three parts:

1) A first round of small group ‘table’ discussions, will be centred around the question of the day. These individual table discussions will be instantly shared/livestreamed with the whole plenary using the online software slido (www.slido.com eventcode #LP2019). Please bring your smart phones to the plenary sessions!

2) A panel of discussants will respond to the results of the table discussions.

3) Finally there will an opportunity for individual voices from the floor to be heard.

Plenaries day 3 (Friday)

We will close the conference with a fishbowl conversation, intended to lessen distinctions between the speakers and the audience. All conference participants are cordially invited to speak during this session.

All of the afternoon plenary sessions will be accompanied with live graphic recordings of the conversations and will feed into the knowledge harvesting and sense making process occurring throughout the conference.
The Transformations Timeline

A knowledge co-production exercise during the three days of the Conference to engage all participants in the co-creation of a timeline with the theme of LEVERAGE POINTS of TRANSFORMATION. The goal is to capture the emergence and development of transformation and key leverage points that have advanced the field regarding research, policy and practice. Constructing a timeline together as a group clarifies for a larger group what has been, what is, and helps to set the stage for what could be. Detailed instructions for participating in the timeline construction will be provided during the conference.

Mobile Solution Workshop

The Mobile Solution Workshop contextualises global models for local solutions. Within the Mobile Solution Workshop a solution or problem can be broken down in comprehensible steps on five 65” screens.

The equipment is put into action on location, where scenarios are chosen by stakeholders on tablets and subsequently results are displayed on the big screens and discussed with scientist. As a result, takeholders are empowered in the decision-making process and models are subjected to and improved by practical testing.


**FORUM SPACES**

**Conversation Corners**

It is often the case that conferences inspire specific questions, but little opportunity or space to discuss such questions with fellow attendees. Using the open space method we will provide specific spaces dedicated to informal discussions on specific predefined questions during the conference. Conference attendees can suggest topics for the conversations (at the reception desk) and the selected topics will change twice a day.

**Play and Exploration Spaces**

Come and play with leverage points in fun, exploratory ways. In the games room, you can re-arrange and interpret Donella Meadows original 12 leverage points, try to hit a difficult leverage point, or stretch towards some of Meadows’ “systems wisdoms”. On the way to the workshop rooms, you will pass play stations that tempt you to play leverage points hopscotch or dig deep for your own underlying paradigms or get lost in the riddles of a leverage treasure hunt.

**Knowledge Harvesting Walls**

Our graphic facilitation team will be working in the Forum space and the outputs from the daily harvests will be co-produced and displayed in the same space.

**Art Ecology Space**

The artists collective Art Ecology [www.artecology.eu](http://www.artecology.eu) will bring several instalations to the Leverage points conference these will include a presentation fo the CIVIL WILDERNESS project; the Küchenmobil (mobile kitchen) presenting regional self-made products form acorns; The Oaks and Neophyt Portaits and the (Bio)Diversitätskorridor.

**Forum Theatre (Audiomax auditorium)**

Forum Theatre is a type of [theatre](https://www.theatre.org) created by the innovative and influential [practitioner Augusto Boal](https://www.augusto-boal.org), one of the techniques under the umbrella term of [Theatre of the Oppressed](https://www.toiology.org) (TO). This relates to the engagement of spectators influencing and engaging with the performance as both spectators and actors, termed ‘spect-actors’, with the power to stop and change the performance. As part of TO, the issues dealt with in Forum Theatre are often related to areas of social justice with aims to explore solutions to oppression featured in the performance. The work of Augusto Boal is also inspired and based on the teachings of Paulo Freire.
EATING, TWEETING AND MEETING

Eating at the Conference

All the food at the Leverage Points 2019 Conference is 100% organic and 100% vegan. If you have other dietary requirements please just let the catering staff know and they will be happy to help you. Tea, coffee and snacks will be provided in the coffee breaks.

In addition to the food provided in during the coffee breaks and lunch breaks there will be a buffet provided in the evening of day 1 (Wednesday 6. Feb.) to accompany the poster presentations.

Wifi

We use our twitter channel to report live from the conference and use it as a tool for the knowledge harvesting and shared sense making (see “Facilitation and knowledge harvesting”). Free wifi is available for all conference attendees using:

Username: LevPoints
Password: IsMy1caC

Twitter

Please join our twitter feed. Follow the conference @LevPoints4Sust, and tweet using the conference hashtag #leverage2019, and the daily hashtags

Day 1 #day1Explore
Day 2 #day2Navigate
Day 3 #day3Act

Find and follow @LevPoints4Sust online to follow the harvest and also to see the daily guiding questions we are posing for the conference, share your answers and join the ongoing discussions.

Ice Breaking event (Tuesday evening)

You are cordially invited to the ice breaking event on Tuesday 5. Feb. from 19:00-21:00 in the Forum space of the new central building at Leuphana University, where we will provide food, drinks (non-alcoholic) and entertainment in the form of the band Brass Riot. This is an opportunity, to relax, meet old friends and make new ones.

Buffet and poster presentations (Wednesday evening)

On Wednesday evening, immediately after the plenary session we will provide a buffet and there will be a special sessions of speed talks and poster presentations in the Forum and audiomax. The posters will be displayed in the Audiomax auditorium throughout the conference.

The conference Dinner (Thursday evening)

For those who have purchased tickets for the conference dinner, the event will be hold at Die Ritterakademie Am Graalwall 12, 21335 Lüneburg. The venue is approximately 40 minutes walk from the university and 15 minutes form Lüneburg town centre. Alcoholic drinks are not included but can be purchased at the venue. (see getting around for transport to the venue).
A FAMILY FRIENDLY CONFERENCE

Child care at the conference

We will provide free professional kindergarten carers can take care of your children during day (from 8:00-18:00). The day before the conference starts, your children can get acquainted with the carers while you are there. You can discuss your children's special needs and preferences. We have a quiet nursing room for breastfeeding and pumping. We have a napping room: completely dark and quiet. If your child needs a nap during day time one of our caretakers will watch over your child while it sleeps. We have a kitchen with the possibility to store food, milk etc. in the fridge and a microwave and kettle to heat baby-food. All of the childcare facilities we provide are in the same building as the conference. They are easy to access with strollers. All facilities are next to one another. We will supply baby food and food and drinks for older children during the day. We can arrange individual babysitters for your children in the evening (and night) if required (costs not covered by the conference).

Meet the mothers at the conference

Are you a mother and an academic (or aspiring to be)? There will be a networking event, hosted by Mama is an Academic. Mama is an Academic is an online peer support community for mothers pursuing an academic careers (or academics pursuing motherhood). We want to share our experiences of academic motherhood - the good, the bad, the ugly, and the juggling. Join us during lunch on Wednesday 7th February at LOCATION. You can bring the children if you want, or you can come alone. The plan is to meet each other as part of a friendly, supportive community to share our successes and frustrations as we negotiate an academic career as a mother. Please see the website here: https://mamaisanacademic.wordpress.com/
**CONFERENCE THEMES**

**ReStructuring institutions for transformative change**

Institutional arrangements are deeply rooted structures that shape the rules of a system and, thus, have the power to advance systems change. Social structures, embedded in formal institutions (rules, regulations, and policies) enable, constrain, and guide human action, and thus shape sustainability transformations.

In this theme, we will explore the potentials of systemic, institutional change as a leverage point for sustainability transformation. Existing research often lacks a systems-oriented view, and pays only scare attention to processes of institutional failure and decline, and even less to potentially productive functions of such phenomena.

**ReConnecting people and nature as a deep leverage point**

Calls for humanity to ‘reconnect to nature’ have grown increasingly louder from both scholars and civil society. Yet there is relatively little coherence about what reconnecting to nature means, and how it can be levered for sustainability transformation.

In this theme, we will explore material, experiential, cognitive, emotional and philosophical connections to nature. Drawing on the insights from disciplines such as conservation science, environmental psychology, geography, social-ecological systems research, anthropology, social ecology, human ecology, and environmental education, we seek to identify how these types of connection interact, and how they may provide leverage points for sustainability.

**ReThinking how we know and act: transforming towards sustainability**

This theme focuses on whether and how Donella Meadows’ concept of leverage points can help us to explore different viable ways of understanding the world and of organising and generating knowledge. How we are developing a new understanding of our relationship to the earth; a willingness to change; a collective learning approach among all participating interests; and openness to new kinds of solutions. In particular, where we are aiming for wider societal transformations to deal with the complex network of wicked problems we are facing in the Anthropocene.

The dominant social paradigms in our society are under increasing scrutiny, with reflection on our assumptions, beliefs and values at the heart of this. What helps us, and what hinders us, in our striving towards a just and sustainable future? And how can science and society come together more effectively to create this change?
Systems thinking and complexity as tools for transformation

The transformation of social-ecological systems towards sustainability involves intervening in ecological, political, economic, social and personal realms. Such systemic changes have to take into account strong, and often unforeseen, interactions between the different realms, across multiple scales. The scientific challenge of conceptualizing, assessing and modelling such system wide transformative changes represents a major challenge for sustainability focused research.

In this theme we explore challenges such as how to define and measure systemic transformative change; how to integrate perspectives from multiple realms with different based on different scales, units of analysis, methodological approaches and systems of interest; and the role of systems thinking is transformative research agendas.

Transformative research practices

Inter- and transdisciplinarity (along with related field such as action research) are increasingly recognized as a crucial part of sustainability research, linking scientific and non-scientific knowledge, social norms and empowerment in the context of transformative change. Innovative modes of research have the potential to address concrete local problem constellations by creating novel science-society learning and action, but are fraught with theoretical, methodological and practical challenges.

In this theme we will explore the methodologies and practice of sustainability and transformative research from theoretical, methodological and practical perspectives. With a focus on the science-society interface and transdisciplinary approaches as leverage points for transformative change.

Emerging ideas about sustainability transformations and leverage points

We know that there are many perspectives (from educating change agents, to emotional engagement and transformations; and from political principles, to pragmatism action), beyond those five themes that will have a great deal to say on the question of transformative change and sustainability.

This theme is intended for conference contributions that do not fit the other five conference themes. It provides an open space of dialog, stimulation and cross pollination of ideas and perspectives, seeking the broadest possible scope on societal transformations. Contributions should have an explicit focus on research (empirical, theoretical or methodological) or praxis related to sustainability transformations. We particularly welcome contributions that utilize a ‘leverage points’ perspective on conceptualizing, research or enacting transformative change.
### SCIENTIFIC PROGRAMME OVERVIEW

#### Day 0 (Ice breaker): Tuesday 5th February

<table>
<thead>
<tr>
<th>Time</th>
<th>Sessions</th>
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<tbody>
<tr>
<td>19:00-21:00</td>
<td>Official welcome and ice breaking event</td>
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#### Day 1 (Explore): Wednesday 6th February

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<tr>
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<th>Sessions</th>
<th>Forum</th>
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<tbody>
<tr>
<td>8:30-9:45</td>
<td>Opening, welcome and keynote presentations</td>
<td>Space, for debate, reflection, exploration</td>
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<tr>
<td>9:45-10:30</td>
<td>Coffee break</td>
<td>participation and play</td>
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<tr>
<td>10:30-12:30</td>
<td>Parallel sessions</td>
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<tr>
<td>12:30-14:00</td>
<td>Lunch</td>
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<tr>
<td>14:00-16:00</td>
<td>Parallel sessions</td>
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<tr>
<td>16:00-16:45</td>
<td>Coffee break</td>
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<tr>
<td>16:45-18:00</td>
<td>Conference plenary</td>
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<td>18:00-20:00</td>
<td>Poster speed talks</td>
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<td>20:30-20:00</td>
<td>Buffet</td>
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#### Day 2 (Navigate): Thursday 7th February

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<td>8:30-9:45</td>
<td>Welcome and keynote presentations</td>
<td>Space, for debate, reflection, exploration</td>
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<tr>
<td>9:45-10:30</td>
<td>Coffee break</td>
<td>participation and play</td>
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<td>16:00-16:45</td>
<td>Coffee break</td>
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<tr>
<td>16:45-18:00</td>
<td>Conference plenary</td>
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<td>18:00-19:00</td>
<td>Forum theatre</td>
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<td>19:30-20:00</td>
<td>Conference dinner and social event</td>
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#### Day 3 (Act): Friday 8th February

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<td>Welcome and keynote presentations</td>
<td>Space, for debate, reflection, exploration</td>
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<tr>
<td>9:45-10:30</td>
<td>Coffee break</td>
<td>participation and play</td>
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<td>10:30-12:30</td>
<td>Parallel sessions</td>
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<td>12:30-13:45</td>
<td>Lunch</td>
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<td>13:45-15:15</td>
<td>Parallel sessions</td>
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<td>15:15-16:45</td>
<td>Break</td>
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<tr>
<td>15:30-16:45</td>
<td>Conference plenary and close</td>
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DAY 0 TUESDAY FEB. 5: BREAKING THE ICE

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<td>16:00-19:00</td>
<td>Registration</td>
<td>Forum spaces for reflection, exploration and play</td>
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<tr>
<td>19:00-21:00</td>
<td>Ice breaking event</td>
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We cordially invite you to join us On Tuesday the 5th Feb. at 7pm in the new central Building for the official opening of the Leverage Points 2019 conference.

Live music by Brass Riot

Food by Alochérerie
# DAY 1 WEDNESDAY FEB. 6: EXPLORE

Guiding question: What are the ‘deep’ or neglected ‘leverage points’ for sustainability transformations?

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<th>Time</th>
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<tr>
<td>8:00-8:30</td>
<td>Registration</td>
<td>Forum space for debate, reflection, exploration and play including: the participatory; transformation timeline; conversation corners (opens spaces); the solutions theatre; graphic facilitation outputs etc..</td>
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<tr>
<td>8:30-8:45</td>
<td>Conference introduction</td>
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<td>8:45-9:45</td>
<td>Keynote speakers Ioan Fazey and Elena Bennett</td>
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<td>9:45-10:30</td>
<td>Coffee break</td>
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<tr>
<td>10:30-12:30</td>
<td>Knowledge co-production for sustainability (1.1)</td>
<td>Learning; knowledge and wisdom (1.6)</td>
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<td>Destabilizing institutions for transformative change (1.2)</td>
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<td>Perceptions of nature (1.3)</td>
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<td>Communities of collaborative research (1.4)</td>
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<td>Socio-ecological transformations (1.5)</td>
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<td>Impact, evaluation and accompanying research (1.7)</td>
<td>Transformation timeline (1.12)</td>
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<td>Dancing with the system (1.8)</td>
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<td>Institutions, innovation and change (1.9)</td>
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<td>Developing a theory of transformational change (1.10)</td>
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<td>Researcher-practitioner Network for Inner Transitions (1.11)</td>
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<td>12:30-14:00</td>
<td>Lunch</td>
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<td>14:00-16:00</td>
<td>Narratives for sustainability transformations (2.1)</td>
<td>Inner transformations (2.6)</td>
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<td>Intergrative environmental governance and policy coherence (2.2)</td>
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<td>Landscape change and connections to nature (2.3)</td>
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<td>Exploring the Power of Collaborative Research (2.4)</td>
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<td>Governance of energy transitions (2.7)</td>
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<td>Bottom up transitions and governance (2.8)</td>
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<td>Knowledge learning, science and sustainability (2.9)</td>
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<td>Experiments in transformative co-production (2.10)</td>
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<td>The power of memes to transcend paradigms (2.11)</td>
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<td>16:00-16:45</td>
<td>Coffee break</td>
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<td>16:45-18:00</td>
<td>Conference plenary</td>
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<td>18:00-</td>
<td>Buffet</td>
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<tr>
<td>18:30 -</td>
<td>(7.1) Transdisciplinarity, research practice and learning (Forum stage 1)</td>
<td>(7.3) Sustainabilty case studies (Forum stage 2)</td>
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<td>(7.2) Leverage points and sustainability science (Audiomax)</td>
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# DAY 2 THURSDAY FEB 7: NAVIGATE

Guiding question: How do we navigate complexity when thinking about sustainability interventions?

<table>
<thead>
<tr>
<th>Time</th>
<th>Sessions</th>
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<tr>
<td>8:00-8:30</td>
<td>Registration</td>
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<tr>
<td>8:30-8:45</td>
<td>Conference introduction</td>
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<tr>
<td>8:45-9:45</td>
<td>Keynote speakers Niki Frantzeskaki and Ray Ison</td>
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<td>9:45-10:30</td>
<td>Coffee break</td>
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<tr>
<td>10:30-12:30</td>
<td>Agency, change agents and stewardship (3.1)</td>
<td>Room: 40.108; Room: 40.154; Room: 40.152; Room: 40.146; Room: 40.153; Room: 40.255</td>
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<td>Institutional change (3.2)</td>
<td>Room: 40.154; Room: 40.152; Room: 40.146; Room: 40.153; Room: 40.255</td>
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<td>Urban nature and sustainability (3.3)</td>
<td>Room: 40.152; Room: 40.146; Room: 40.255; Room: 40.176; Room: 40.704</td>
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<td>Methodologies and frameworks for collaboration (3.4)</td>
<td>Room: 40.146; Room: 40.153; Room: 40.255; Room: 40.704; Room: 40.176</td>
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<td>Transforming food systems (3.5)</td>
<td>Room: 40.153; Room: 40.255; Room: 40.704; Room: 40.176; Room: 40.154</td>
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<td>Sustainability solutions and innovations (3.6)</td>
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<td>10:30-12:30</td>
<td>The role of local initiatives in leveraging change (3.7)</td>
<td>Room: 40.254; Room: 40.165; Room: 40.175; Room: 40.256; Room: 40.704</td>
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<td>Researcher-practitioner Network for Inner Transitions (3.8)</td>
<td>Room: 40.154; Room: 40.152; Room: 40.146; Room: 40.255; Room: 40.176</td>
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<td>Transdisciplinary perspectives on land use issues (3.9)</td>
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<td>Local and embodied knowledge for sustainability (3.10)</td>
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<td>Belmont Forum funding call open scoping session part 1 (3.11)</td>
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<td>Forum Theater workshop (3.12)</td>
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<td>12:30-14:00</td>
<td>Lunch</td>
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<td>14:00-16:00</td>
<td>Education and learning for sustainability transformations (4.1)</td>
<td>Room: 40.146; Room: 40.153; Room: 40.175; Room: 40.254; Room: 40.255</td>
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<td>Governance of Sustainability Transitions (4.2)</td>
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<td>Sustainable consumption (4.3)</td>
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<td>Interculturality and power (4.4)</td>
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<td>Systems, models and transformation (4.5)</td>
<td>Room: 40.152; Room: 40.255; Room: 40.704; Room: 40.176; Room: 40.154</td>
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<td>Transformative design practices (4.6)</td>
<td>Room: 40.255; Room: 40.704; Room: 40.176; Room: 40.154; Room: 40.154</td>
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<td>16:00-16:45</td>
<td>Coffee break</td>
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<tr>
<td>16:45-18:00</td>
<td>Conference plenary</td>
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<tr>
<td>18:00-19:00</td>
<td>Forum theatre (Audiomax auditorium)</td>
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<tr>
<td>19:30-</td>
<td>Conference Dinner and social event</td>
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**DAY 3 FRIDAY FEB. 8: ACT**

Guiding question: How does a leverage points perspective help us to act?

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<thead>
<tr>
<th>Time</th>
<th>Sessions</th>
<th>Forum</th>
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<tbody>
<tr>
<td>8:00-8:30</td>
<td>Registration</td>
<td>Forum spaces, for debate, reflection, exploration and play including:</td>
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<td>the participatory; transformation timeline; conversation corners (opens</td>
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<td>spaces); the solutions theatre; graphic facilitation outputs etc..</td>
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<td>8:30-8:45</td>
<td>Conference introduction</td>
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<td>8:45-9:45</td>
<td>Keynote speakers Karen O’Brien and Gogo Dineo Ndlanzi</td>
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<td>9:45-10:30</td>
<td>Coffee break</td>
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<td>10:30-12:30</td>
<td>Indigenous and local knowledge (5.1)</td>
<td>Transformations, change agents and agency (5.6)</td>
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<td>Room: 40.153</td>
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<td>State and global sustainability governance (5.2)</td>
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<td>Experiencing nature (5.3)</td>
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<td>Room: 40.152</td>
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<td>10:30-12:30</td>
<td>Transformative co-production experiments for societal learning (5.7)</td>
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<td>Transformative educational structures (5.4)</td>
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<td>12:30-13:45</td>
<td>Measuring impact of science and social learning (6.1)</td>
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<td>13:45-15:15</td>
<td>Institutional design for transformative change in water governance (6.2)</td>
<td>Emerging financing transformations systems part 2 (6.6)</td>
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<td>A Critical debate on digitalization as leverage point (5.9)</td>
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<td>Room: 40.254</td>
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<td>13:45-15:15</td>
<td>Global perspectives on reconnecting to nature (6.3)</td>
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<td>Room: 40.152</td>
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<td>Subjectivity, positionality and power (6.4)</td>
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<td>15:15-15:30</td>
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<td>15:30-16:45</td>
<td>Conference plenary</td>
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PARALLEL SESSIONS FORMATS

We have selected formats for the sessions that are intended to maximize the time for interactions and discussions between the presenters and the audience. There will be a maximum of five presentations in each parallel session (maximum four presentations in the slightly shorter Friday afternoon session). All parallel sessions will be held in rooms on the first and second floor of Leuphna University’s new central building.

Talks and world café discussions
Each presenter will give an 12 minute talk. After all the presentations there will be two rounds (approximately 20 minutes each) of simultaneous, focused ‘circle’ conversations centered around each presenter. Audience members may either move to a different circle or remain with one conversation after the first round of discussions. The session will end with a discussion, moderated by the session chair, among all the session attendees (approximately 15 minutes) and the opportunity for session attendees to share any insights/inspirations/thoughts that they had during the session (5 minutes).

Talks and panel discussion
Each presenter will give an 12 minute talk, followed by 5 minutes of direct questions from the audience. After all the sessions presentations there will be a panel lead group discussion of approximately 40 minutes. The panel will consist of the presenters from the session and will be moderated by the session chair. The session will end with an opportunity for session attendees to share any insights/inspirations/thoughts that they had during the session (5 minutes).

Workshop /special sessions
Workshop sessions will follow a variety of different formats, but with an emphasis on interactions and participation. Details of the format of each workshop will be provided by the workshop/session facilitators at the beginning of the session.

POSTER SPEED TALKS

Poster presentation speed talks (Wednesday evening with buffet)
Each presenter will give a 5 minute speed talk based on a single poster slide. This will be followed by the opportunity for presenters to discuss their research in more detail with the audience. All posters will be displayed in the main auditorium throughout the three days of conference. There will be three parallel speed talk sessions focusing on: 1) Transdisciplinarity, Research Practice and Learning; 2) Leverage Points and Sustainability Science and 3) Sustainability case studies. The poster presentations will be held in the forum and main plenary auditorium.

If you have not uploaded your presentation, please bring your presentation on a USB stick at least 15 minutes before the start of your session.
Exploring change through learning journey metaphors

Jennifer Rao-Williams

A key question facing transformation scholars is how different kinds of change (e.g., incremental vs transformative) emerge through different kinds of learning processes. This issue was explored using the metaphor “learning as a journey’ with participants engaged in a system change oriented project in the context of climate disadvantage. The project was a collaboration across multiple sectors including national government, local authority, voluntary and private sector and with individuals across three climate disadvantaged communities. A key aim of this project was to develop an interpretation methodology of how leveraging change happens within a multi-actor dynamic project.

The methodology is based on a novel evaluation method using visually augmented elicited metaphors, which tracked individual learning journeys in different ways. We illustrate how participants’ learning changed as a consequence of the project. The learning journey is defined as “the nature of learning that emerges from the subjective experience of a process seeking to enhance resilience, in respect of the participants’ position, interests, role, extent of engagement, prior knowledge and nature of the social interactions encountered” (Rao-Williams, 2018).

This presentation will outline a total of six distinct metaphors which emerged from the project giving reference to key design characteristics, which suggest that the project as a largely emergent process, facilitated change in relation to social structure, information flows and self-organisation. The metaphors also explore insights into the dynamics of multi-actor learning such as the role of intention and culture, ultimately illustrating resilience building as a complex social process which can be constrained by such systemic relations.

The implications of diverse forms of co-production to address socio-ecological challenges

Josie Chambers, Melanie Ryan and Carina Wyborn

Diverse groups are increasingly using processes of co-production, co-design, adaptive management, collaborative governance, social learning (etc!) to join competing agendas, perspectives and knowledge to better address socio-ecological issues. We present the findings of an analysis of 25 case studies of co-production from around the world that span six continents and operate at multiple scales. The analysis itself was co-produced by engaging with co-production researchers and practitioners through a series of workshops in Mexico, the United States and the United Kingdom. Our findings help clarify the implications of how co-production efforts frame socio-ecological challenges and seek to bring together actors in diverse ways and for diverse purposes. We can also demonstrate how particular underpinning logics and capacities may heavily shape the outcomes of these processes. Our findings demonstrate some important potential benefits and pitfalls of co-production theory and practice and ultimately support a wide range of researchers and practitioners to use processes of co-production more effectively in their efforts to transform socio-ecological systems.

Co-producing transformative change? Rethinking conservation under climate change in Colombia

Lorre van Kerkhoff, Claudia Munera, Michael Dunlop and Carina Wyborn

Co-production processes promise to deliver ‘actionable knowledge’ and solutions to complex problems in contested and often uncertain contexts. While there is much to be said in the promise of co-production, critical and in depth inquiry into the practices that underpin these encounters is limited. This paper presents a project, Future-proofing conservation, where a collaborative team of researchers, civil society partners and protected areas managers worked together to co-produce a systematic process for transforming the way they think about climate adaption for protected areas. While the outcomes of the process have been presented elsewhere, in this presentation we focus on the co-production process itself. We identify a range of challenges and strengths in the ways in which the project was structured and developed over time; the monitoring evaluation and learning processes used throughout; and the importance of trusting relationships in enabling substantial change.

Lessons learned include the importance of designing interventions to capitalise on existing momentum of policy opportunities and shared institutional objectives, and the need to maintain flexibility within project objectives and individual agendas to be able to capitalise on windows of opportunity that present themselves along the way. This led to tensions during the project, for example between working in the frame of existing structures and rules, while simultaneously seeking to open them to challenge and transformation; between respecting our collaborators’ existing relationships which limited the actors we could engage with directly; and continually reconsidering who was learning what from whom and towards what end. These tensions resulted in less progress through “our” originally conceived plan, but led to additional activities that provided more meaningful co-creation opportunities around the sticking issues, in the end making a more effective and enduring suit of activities. Staying focused on principles and process was key to the ultimate achievements of the project.

Transforming Research and Innovation Systems through Responsible Research and Innovation: Real-world Experiments of the NewHoRRizion Project

Michael Bernstein

In this session, I present the preliminary work of the European Union Horizon 2020 project, entitled: “Excellence in science and innovation for Europe by adopting the concept of Responsible Research and Innovation” (RRI). With the short title NewHoRRizion, this project seeks to advance the practice of responsible research and innovation (RRI) across research funding programmes in Europe. NewHoRRizion seeks to foster multi-stakeholder communities of RRI practice through a method termed “Social Labs,” where interventions are co-created for pilot implementation, evaluation and cross-sector learning. A total of 19 Social Labs have designed and are piloting some 45 content-advance different dimensions of RRI within research funding programmes, projects and industry.

My presentation will start by connecting ideas of RRI with aspirations for sustainability. Next, I will...
present results from the efforts of the project to diagnose the current state of research and innovation with respect to responsibility. I specifically review institutional opportunities and challenges related to two different types of European Commission H2020 programmes: one "investigator driven" (Future and Emerging Technologies (aka FET)), the other "societal challenge driven" (Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy (aka FOOD)). Through the talk, I will invite broader reflection about how transformation of research and innovation systems is of vital concern for sustainability transitions. Horizon Europe, the ninth European Framework Programme, is in development (with a proposed budget of 100 billion Euro). The implication for sustainability transformations is provide improved means of finding and acting on leverage points in research and innovation governance for sustainability.

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**Destabilising institutions for transformative change (1.2)**

There is growing recognition that in order to achieve sustainability it is important to get rid of unsustainable regimes. The contributions to this session focus on the productive role of declining or failing institutional regimes, and how institutions can be destabilized. It also critically reflects on collapse discourses.

**Session Chair:** Jens Newig, Nicolas Jager  
**Format:** Talks and world café  
**Room:** 40.108

**Exploring 'Energy Sobrieties' as leverage for rapid urban decarbonisation.**  
**Jesse Schrage**

Developments in the international climate landscape are revealing new and alternative forms of governance that have started to appear around and on the edges of the United Nations Framework Convention on Climate Change, and, amongst others, point to the emergence of the role taken-up by city-regions in tackling a global mitigation and adaptation agenda. In parallel to this, the theorisations of socio-technical transitions and energy regimes have often emphasised technology and/or economic growth as the main drivers of change. Setting against a failure to explicitly consider energy demand as an endogenous factor of energy policy and transitions, the slow pace of supply transitions has coincided with ever-increasing energy use. It is to counter and complement a supply-dominated agenda that this paper proposes to carve out a space for exploring alternative practices, norms and knowledge for energy sobriety, intending real-term decreases in urban energy demand. Understood as a deliberate reduction in energy consumption, energy sobriety in an urban context allows a re-framing of energy transitions governance, on behalf of city governments, towards a focus on emissions related to the routines practiced by city dwellers. Identifying threads in the literature and based on examples, this paper intends to outline (1) how this new range of policies have the capacity to considerably change the daily practices, lives and norms of those undertaking those changes and, (2) whether or not these new arrangements have the capacity to deliver the stringent mitigation rates as communicated by the climate science. In reframing the role of cities for rapid urban decarbonisation, the implications for sustainability transformations of this research are as follow:

- Charting multi-level pathways for urban decarbonisation,
- Perspectives on the changing role of governance institutions for sustainability transformation
- Insights in the deliberate dismantling of unsustainable practices and institutions- Implications for post-growth discourses.

**Sustainability transformations through failure? How institutional failure and decline contribute to fundamental change**  
**Pim Derwerff**

While current literature on the governance of sustainability transformations is preoccupied with innovation, novelty, success and 'best practice', there is an emergent tendency to consider decline and failure as opportunities to work towards and to achieve sustainability. Using a systems perspective, this contribution therefore looks at the way in which various forms of institutional failure and decline can serve as a lever for sustainability transformations, directly linking it to Donella Meadows’ concept of leverage points.

This contribution will first describe five archetypical mechanisms through which various forms of failure and the active management of decline may facilitate sustainability transformation. These conceptual archetypes relate to (1) crises triggering institutional adaptations towards sustainability; (2) systematic learning from failure and breakdown; (3) the purposeful destabilization of unsustainable institutions; (4) making a virtue of inevitable decline; and (5) active and reflexive decision-making in the face of decline instead of leaving it to chance. It will continue by linking these pathways to four broad types of system characteristics identified in the Leverage Points project: ‘parameter’, ‘feedback’, ‘design’ and ‘intent’, examining how the archetypical mechanism impact and influence the different levels of system characteristics, in which each archetype may relate to different systems’ levels. In doing so, this contribution pays particular attention to the interplay between these levels and examine whether a hierarchy can be detected.

Implications for sustainability transformations include the better integration of the leverage points framework and the five conceptual archetypes. Offering suggestions for future empirical applications of Donella Meadows’ framework, it harnesses the potential of hitherto overlooked institutional dynamics and moves forward the debate on sustainability transformation.

**Breaking out! Six propositions on the deliberate unmaking of unsustainable socioecological systems**  
**Giuseppe Fedó**

Societal sustainability transformations imply a disruption of modern, capitalist socioecological relations that inform destructive modes of interaction with the natural environment. Radical civil society initiatives may hold the potential for such transformations, but it remains unclear if they can generate societal transformation. Innovation and transition theories have usually assumed that the disruption of the dominant order is an automatic impact of innovation, and have therefore largely undertheorized this aspect of transformational change. On the other hand, those scholars who have investigated forms of disruption, have made strong ontological assumptions on how change comes about (e.g. class struggle in Marxist studies), and have failed to uncover the diversity of social change processes demonstrated by existing radical civil society initiatives. This paper discusses the notion of ‘unmaking’: processes to deliberately ‘make space’ (temporally, spatially, materially, and/or symbolically) for radical alternatives that are incompatible with dominant socioecological relations. The paper mobilizes and originally integrates literature from across resistance and social change studies, and political ecology. It also innovatively connects the individual and the socioecological levels of analysis, which has been urged in societal transformation studies. This paper’s findings are distilled in six propositions, namely unmaking: (i) occurs through construction of emergent, situated processes; (ii) involves both symbolic and material deconstruction; (iii) involves the deconstruction of subjectivities; (iv) is a contradictory personal experience; (v) is often hidden, but can be used strategically for a new activism; (vi) is generative. Implications for sustainability transformations are that notions and practices of radical sustainability need to be deliberately ‘made space’ by unsettling established socioecological relations, rather than be expected to grow within existing systems, exploit supposed windows of opportunity, or await the decay of existing configurations. Deliberate unmaking underscores more proactive, disruptive, political and potentially conflictual transformation pathways than usually postulated in the sustainability transformation literature.

**Institutional decline in sustainability transitions towards water sensitive cities: the case of Melbourne, Australia**  
**Stephen McGrail and Bronwyn Rogers**

From many sociological perspectives, institutional change entails the de-regulatisation of existing practices and/or the regularisation of new practices along with the key ideas and shared meanings which underpin them. Related to this, institutional decline entails a significant level of questioning of ingrained ways of doing things and associated taken-for-granted meanings. Such a perspective on institutional change is especially relevant to sustainability transformations, which we argue must be as much about the abandoning of entrenched practices as it is about the uptake of new practices and creation of new socio-
technical systems. From this perspective, institutional decline can be a "leverage point" for sustainability, suggesting a potentially strong role. To flesh out these arguments and explore their practical implications we present a case study of sustainability transitions in the urban water sector in Melbourne, Australia. The case study examines well progresses in the urban stormwater management towards more water-sensitive forms of urban design and planning, focussed on the causal mechanisms which appear to promote and mediate the abandoning of entrenched socio-technical practices in urban contexts. Two emerging sociologically-informed perspectives on institutions and institutional change are used in the analysis – constructivist institutionalism and practice-driven institutionalism – which share a strong focus on institutional change and place greater attention on the dynamic aspects of institutions (rather than primarily viewing them as rigid and/or autonomous external 'structures').

Implications for sustainability transformations: Our research and paper has implications for both practitioners and academic work. The study identifies a number of mediating dynamics which promote and/or hamper the abandoning of entrenched practices, which practitioners need to be aware of during change interventions and, in some cases, can seek to influence. We also argue that the study can inform more robust theorising of sustainability transition processes.

Leaving the "sustainability or collapse" narrative behind
Sebastian Strunz, Matthias Schröter and Melissa Marselle

The paper investigates the "sustainability or collapse" narrative. Following this narrative, ancient civilizations, such as the Maya in Mesoamerica, have collapsed because they failed to adapt to changing ecological restrictions. As the current global civilization goes into ecological overshoot, it risks civilizational collapse as well. In consequence, the narrative warns humanity to shift course in order to prevent global social-ecological collapse.

In order to assess the cogency of this narrative, we combine three different strands of literature: First, the anthropological/archaeological literature has thoroughly analyzed – and in most cases refuted – the hypothesis that ancient societies have collapsed. Second, the ecological-economic literature has identified specific challenges, such as biodiversity loss and climate change, which constitute much more pressing sustainability challenges than, say, resource input restrictions. Third, the psychological literature has shown that the most common behavioral response to collapse-warnings is apathy, not action.

From this literature synthesis we conclude that the "sustainability or collapse" narrative is problematic on three accounts: i) collapse-diagnoses of ancient societies are often based on narrow if not outright distorting interpretations of the available empirical evidence on past socio-ecological transformations; ii) the collapse narrative often inappropriately prioritizes the 'input/resource'-side over the 'output/pollution'-side as sustainability challenge; iii) collapse-warnings are psychologically ineffective because individuals experiencing fear or guilt succumb to apathy rather than taking action.

Implications for sustainability transformations: We suggest that the "sustainability or collapse" narrative should be dropped. Instead, we call for a different framing that highlights the prospects for a "good anthropocene". We illustrate our argument with the examples of clean energy transitions and water scarcity in South Africa.

Perceptions of nature (1.3)

Human perceptions, attitudes and values fundamentally shape connectedness to nature. This session investigates topics ranging from spiritual dimensions of human-nature connectedness to attitudes about specific elements in nature, such as carnivores.

Session Chair: Christopher Ives, Maraja Rechters
Format: Talks and panel discussion
Room: 40.152
Exploring Connectedness with Nature: The need for an integrated methodological approach
Maximilian Muhr, Lisa Schlesinger and Berta Martin-Lopez

Many scientists agree that the increasing disconnect of Western societies with nature is one of the greatest sustainability challenges of our time. Reconnecting humans with their natural environment may constitute an important leverage point for sustainability transformation. To be able to foster such sustainable change, it is thus promising to further disentangle the construct of connectedness with nature (CWN). CWN has so far been investigated primarily in psychological disciplines, following quantitative approaches. However, since the concept encompasses cognitive, affective, and experiential dimensions, an integrated methodological approach is needed. Based on a comprehensive literature review, we analyze and compare different quantitative, qualitative, and arts-based approaches to CWN. Strengths and weaknesses of different methods are discussed in the context of CWN and existing studies. We finally suggest following an integrated methodological approach to CWN based on three principles: method pluralism, coherence, and reflexivity. With this paper, we aim to provide a valuable impulse for all researchers, artists, and practitioners investigating human-nature relations. Implications for sustainability transformations: further entangling CWN helps its potential to act as a leverage point, incorporating arts-based research into sustainability science may foster new and creative solutions for sustainability challenges.

Pele Cannon

This presentation will deliver preliminary findings from a PhD project that has been designed within the framework of the Deep Leverage Points theory-of-change, particularly 'reconnecting people and nature'. This project has also emerged in the context of a movement in the conservation literature to examine ideas of 'coexistence' with wildlife, particularly carnivores. It is exploring peoples' differing affective relationships to and ontologies of 'nature' as well as the normative and ethical motivations for individuals to modify their behaviour to allow the continued existence of a potentially antagonistic or unwelcome component of the biosphere such as a predator. It seeks to understand whether and how different educational interventions influence peoples' understanding of carnivores, and particularly, what concepts and practices are important to people who engage with these interventions. The research has been designed around a case-study approach, and preliminary findings from the first qualitative case-study of an educational wolf sanctuary and nature center in Colorado, USA, will be discussed here. The implications of this project for sustainability transformations revolve around a philosophical and human-ecological inquiry into the meaning of 'nature' in the context of 'reconnecting people and nature'; including considering the intersection of carnivore/human ecologies and questioning the implications of 'recognising' nature as a key to 'reconnecting' to nature.

Navigating Spiritual Depths: The Development of an Interfaith Ocean Ethic
David Krantz

Scientists famously have an aversion to faith, but there may be no greater leverage point in the world than religion for scientists to utilize. An estimated 84 percent of the world's population belongs to a spiritual faith, and many are fervent followers. Surely the success of environmental sustainability solutions for the planet will be dependent upon its adoption by people of faith. Yet the connections between religion and nature remain vastly underexplored. This paper presents an event ethnography of when faith-based environmental leaders met for a week to bridge the divides between religion and science as well as between their own faiths, while delving into their own connections to nature, in order to create an interfaith ethic of the ocean. What was the result of their work? What challenges were faced in the process? And what lessons can be learned for others wishing to follow their path of interfaith cooperation on environmental issues? Research methods include document analysis, event observation and event participation.

People perception of nature in an Andean ecosystem. Guayllabamba surroundings, Ecuador
Andrea Muñoz Barriga

We analyze the relation of nature and society in the region of Guayllabamba valley, near Quito, the capital of Ecuador. In the framework of the concept of socio-ecological systems, with an emphasis on ecosystem services, we evaluate the perceptions of the residents/users in relation with different elements (water provision, climate regulation, production services, recreation and cultural services). Within the methodology, we combined two methods in order to get the information. As a
WEDNESDAY 6th 10:30-12:30

quantitative method, surveys were applied to the residents of the area and users of ecological and archeological parks in the region. The survey has divided in three main parts: socio-demographic profile, the ecosystem services perception and the risk and vulnerability perception. In the case of tourists/users surveys, there is a specific part related with the recreation/leisure service perception.

The preliminary results show that even though the residents do not know the terms "ecosystem services", they have their own traditional knowledge related with this terms. The old residents have a deeper relation with nature than the younger ones. Moreover, there are some external factors affecting the region, such as the presence of foreign agribusiness enterprises, which for instance have important impacts on the sustainability of the region. This multidimensional analysis is important in order to evaluate the connections between people and nature.

Human-nature connectedness as leverage points for sustainability transformation

Maraja Riechers, Agnes Balazsi and Joern Fischer

Most efforts to combat detrimental environmental changes have focused on changing specific system parameters (e.g. taxes, incentives) or feedback loops (e.g. better knowledge). Such interventions rarely fundamentally change system trajectories. The project of Leverage Points for Sustainability Transformation aims to look more deeply. Drawing on the seminal work of Donella Meadows, we use the notion of leverage points as a metaphor and analytical tool applied across a number of “realms of leverage” – places where interventions may result in transformative change. One of those realms of leverage is human-nature connectedness, including material, experiential, cognitive, emotional and philosophical dimensions. This talk aims to assess and prioritize these five dimensions of human-nature connectedness across different scales. In doing so, we seek to broaden the frame within which inner worlds and emotions and outside system structures can be analyzed. We will highlight differences between different landscapes and their changes, focusing on Lower Saxony, Germany and Transylvania, Romania. Our qualitative and transdisciplinary data shows the influence of landscape change on nature connectedness and highlights potential levers for sustainability transformations, such as (1) fostering dialogue and collective knowledge generation, (2) using a sense of discomfort as a motivational source for transformation, and (3) stopping a spiral of disengagement through meaningful participatory processes. We argue that the specific focal areas of (i) agriculture, (ii) regional identity, (iii) sense of landscape beauty, (iv) solidarity within rural communities, and (v) sense of agency are potential connectors that have a major impact on all dimensions of nature connectedness. These focal areas, in combination with other potential levers for sustainability transformation, could play important roles in fostering change.

Communities of collaborative research (1.4)

This session presents different types of collaborative research such as Action Research, Citizen Science, or real-world labs. They all share the goal of transformation and finding solutions to sustainability problems, while navigating challenges. Reflexivity and co-creational approaches are proposed as ways to overcome these challenges.

Session Chair: Andra Horcea-Milcu
Format: Talks and world café
Room: 40.254

Collaborative explorations of social-ecological system dynamics and positive landscape futures in Helge å catchment, Sweden

Katia Malmborg, Elin Enfors-Kautsky and Albert Norström

Ecosystem services are co-produced in social-ecological systems. Due to its social-ecological nature, the ecosystem services concept holds the potential to be a boundary object around which different stakeholders with vested interests in different aspects of ecosystem service production can meet. If facilitated right, this can be used to co-produce a shared system understanding and start a conversation about sustainability transformations among the stakeholders.

In this study, focusing on Helge å catchment, Sweden, we investigate the social-ecological system dynamics underlying current ecosystem services generation in the area. Together with a group of local to regional stakeholders we performed an iterative, participatory ecosystem service bundles analysis to create a common understanding of the landscape. The bundles were used as the starting point for identifying the most important variables in the system, how they are linked and the feedbacks underlying the configuration of ecosystem service bundles across the catchment, as well as the main external drivers. Building on this understanding, we collaboratively formulated future visions for the landscape and discussed current conditions that support or undermine pathways to these visions. We also identified existing initiatives (so-called seeds) that, if up-scaled, could support the visions. Finally, we used our joint understanding for the system dynamics, visions, pathways and seeds, to identify leverage points for systemic change that would allow the stakeholders to navigate their system towards a more sustainable future.

Implications for sustainability transformations: By using this method of exploring system dynamics and positive futures in a participatory setting, we believe that we can keep the rich social-ecological nature of the ecosystem services concept intact while at the same time develop concrete, actionable results around specific leverage points in the system. In this context the ecosystem services concept has a real value as a boundary object to support local decision-making for sustainability transformations.

Making long-term changes in the face of transient: Lessons and leverage through action research

Rebecca Laycock Pedersen

Action Research (AR) is considered to be a crucial methodology for leveraging transformative change in sustainability science. However, employing AR in practice poses challenges that impact its aim of making both academic and practical contributions. One challenge that Action Researchers face is transient partners/partner organisations with high turnover, which can prevent the delivery of lasting changes. In this paper, we present challenges of conducting AR with transient participants and propose strategies to manage these difficulties.

The findings come from a 2.5-year AR project with three student-led food growing initiatives in English universities, where the aim was to help students maximise the sustainability benefits of their initiatives in the face of a transient volunteer base. Data was gathered through interviews and workshops, and this was complemented by reflective journaling.

The challenges faced were (1) superficial understandings of issues by student partners because of short term engagement resulting in difficulties identifying/ theorising issues to be addressed by the research; (2) difficulties implementing actions given those involved in the planning phase often left before the action phase; (3) participants lacking capacity to engage in search given participation was a priority; and (4) the introduction of the researcher acted as an ‘intervention’. The involvement of a long-term stakeholder (Laycock Pedersen) changed the group dynamics, prompted critical reflections by student partners that had not previously taken place, and improved continuity. This challenged the notion of what constitutes an ‘intervention’/‘action’ in AR, and required a higher level of reflexivity that was enabled by reflective journaling.

Implications for sustainability transformations: Researchers engaging in transdisciplinary or action-oriented sustainability research could benefit from adopting a first-person approach to inquire into the researcher’s own experience. This can enable more insightful understandings of the issues at play/enable the researcher to leverage change at a deeper level.

Developing leverage: A systematic review on societal laboratories for realizing Agenda 2030 through processes of transformation and integration

Gavin McCorry

The necessity of fundamental societal change towards sustainability was outlined in a universal, transnational agreement “Agenda 2030 – transforming our world”. The Agenda acknowledges that transformative change depends on the integration of different perspectives and actors. Despite this, it is unclear how different stakeholders at various levels can engage with the Agenda, and how transformative change can be supported. This signals a need to experiment at the interface of science and society. Societal laboratories (labs) in real-world contexts are proliferating as potential safe spaces that can host transformative experimentation in multi-stakeholder settings. At first glance, labs seem well-suited to work with leverage points,
effectively contributing to Agenda 2030, e.g. by developing innovative structures and providing space to learn and re-think societal systems. Until this point however, they have seldom been attached explicitly to the Agenda 2030 in practice, and a systematic assessment of the suitability of labs to support the Agenda is lacking. The main aim of this paper is to situate existing lab approaches in relation to the ambitions of Agenda 2030. We intend to employ a step-based systematic review approach. Firstly, we highlight and unpack two keywords from UN discourse to guide the realization of Agenda 2030: transformation (to sustainability) and integration by proposing an analytical framework. Secondly, we investigate a breadth of lab approaches to identify their capacities to contribute to transformation in practice. In the context of Agenda 2030, implications for sustainability transformations are suggested on two levels of leverage: (1) labs as transdisciplinary approaches which engage with systems in society, established around ‘leverage points’, either pre-defined beforehand or collaboratively identified during the lab process, and (2) labs themselves, as an array of low-risk interventions to be considered leverage points that promote learning-by-doing and carry transformative potential.

**What challenges are posed by working across sectors, with communities and civil society to: mitigate; prepare for; respond to; and recover from; hazardous events or trends?**

Helen Baxter

Globally communities are increasingly being exposed to the effects of climate change (European Environment Agency, 2017). The 2008 financial crisis and the resultant policy of austerity adopted in the UK has led to an impact on key public services, including emergency responders (Christie, 2011). The empowerment of communities, and the involvement of civil society is actively being pursued in Scotland as a strategy to improve communities’ resilience to current and future shocks (Scottish Government, 2017a; Scottish Government, 2017b, Scottish Government, 2017c).

When communities are exposed to a hazardous event or trend their ability to cope with the resultant consequence will depend upon interactions between organisations and individuals. Therefore, an understanding of how to enable government authorities, public sector organisations and civil society to engage and work with communities, to create the conditions for communities to improve their own resilience is needed.

As part of a piece of work investigating collaborative resilience strategies across sectors and their evolving roles. Workshops were held with: resilience practitioners from across Scotland and a local resilience planning group. The participants included, policymakers, local authorities, third sector organisations, emergency responders the National Health Service all of whom have direct experience of working with local communities to improve their resilience. The purpose of these workshops was explore the changing landscape of community resilience and what they saw as the challenges and opportunities of working in partnership, and engaging with communities, to build resilience.

Common themes which were disused included, organisational culture, attitudes, terminology, assumptions and timescales. The dominant challenge that emerged during these workshops was trust between individuals within communities and between organisation. These challenges need to be addressed so that new ways of working across sectors, with communities and civil society to: mitigate; prepare for; respond to; and recover from hazardous events or trends; are effective.

**The semantics of transformation: conceptual work based on Freirean methodology**

Sadhhí Juarez Bourke and Ulli Vilsmaier

This paper explores the potential of concept work for collaborative inter- and transdisciplinary teams by adapting Freire’s transdisciplinary methodology.

Research processes that enhance reflexivity, social learning and knowledge integration are more likely to be transformative. In this context, Paulo Freire’s Critical Pedagogy (1970) offers valuable insights for the design of transformative research processes. Based on the concept of praxis (action-reflection), the approach offers new ways of performing research in collaborative teams, which include normative and affective dimensions as well as addressing unequal power dynamics.

Freire’s work uncovers the relationship between words and human agency. For Freire, words represent the basic element connecting action and reflection. Generative words are those that carry a high conceptual but also emotional significance for a given community of practice. Thus, the investigation of the semantic universe of a word allows us to deconstruct its constitutive elements. In doing so we unveil positionality, values and plurality of meanings attached to a concept, integrating both academic knowledge and personal experience, which supports mutual understanding in collaborative teams. This paper presents the results of the process of generating a Glossary by following a Freirean methodology within the research group ‘Processes of Sustainability Transformation’, involving 12 PhD students. In order to develop the glossary applying Freirean principles, several consecutive workshops over a period of three months are conducted, in which the semantic universe of the words is explored. This empirical work also explores the role of Formative Accompanying Research (FAR) within transdisciplinary teams, by designing a process about, with and for the research group. About, in studying how the method helps to articulate normativity, with by engaging in a joint reflexive process and for, in providing a specific space and structure for this to happen.

**Examining the potential for societal transformation through citizen science.**

Jade Lauren Cawthray

Citizen Science is defined as the participation of the public in scientific research and is a relative new comer in the landscape of participatory research. It is a fast growing approach to natural sciences research, that is becoming widely adopted and in turn diversifying rapidly, with different models of practice (eg. co-created) currently under scrutiny. With its principle aim to increase the capacity of science to collect datasets whilst engaging the public with scientific research, this maturing field is now starting to recognise its potential value for deeper and broader societal impact and transformation, and is beginning to investigate and experiment with these possibilities.

To realise a sustainable future all institutions and sections of society will need to transform, and in our current paradigm we see the balancing of power, the embracement of collaboration and the incorporation of diverse perspectives as three critical social activities that make up that transformation. Within the natural sciences, Citizen Science looks to be having that impact by challenging the assertion that only qualified scientists can produce scientifically valid research and opening up all aspects of the scientific process to collaboration with non-scientific stakeholders.

This presentation will review the breadth of practices and outcomes as currently identified in the discipline of Citizen Science. It will then make a critical appraisal of the field highlighting the opportunities and weaknesses in current practice, before presenting a case for the transformation required within scientific institutions in order to utilise Citizen Science in a way that can help realise a sustainable world.

Implications for sustainable transformations: Citizen Science can deliver datasets at scales far exceeding those of traditional science, and applicable to questions of both global and localised concern. Simultaneously it presents an opportunity to develop a culture of knowledge co-production and of collaboration across different types of expertise.
WEDNESDAY 6th 10:30-12:30

Reinette Biggs, Rika Preiser, Per Olsson, Elena

ecological systems: The Seeds of Good

transformations in complex social-

building capacity to deal with unexpected change

properties and mechanisms that are important for

SES phenomena can help identify structural

Better understanding of the complex causes of

ecological relations at the centre of the analysis.

the framework by applying it to several case

emergent SES phenomena such as

develop hypotheses about key social-ecological

ecological action situations to address this gap.

SES outcomes as being shaped and shaping

requires approaches that facilitate an analysis of

the emergence of interactions among agents

evolve into macroscopic patterns feeding back on

the agents, uncovering mechanisms that explain

emergent SES phenomena remains challenging. It

reason of action or facilitation-making based on a mode of thinking that derives its validation from

the characteristics of complex adaptive systems.

The emergence of social-ecological regime

shifts and transformations

Maja Schlüter, L. Jamila Haider, Steven Lade, Emile Lindkvist, Ronina Martin, Kirill Orach, Nanda Wiermans and Carl Folke

Social-ecological systems (SES) are complex adaptive systems where change or persistence, such as regime shifts, transformations or traps, emerge from relations and interactions between diverse people, collectives and societies with ecosystems within and across scales. While empirical research on adaptive governance, resilience and transformation has illustrated how the emergence of interactions among agents

Humanity faces unprecedented challenges in the Anthropocene, such as an increasing disconnect between people and nature, widening inequalities, and potential planetary tipping points. At the same time, technological progress and human agency are opening up exciting opportunities for addressing these challenges. The "Seeds of Good Anthropocenes" project, a Future Earth initiative, aims to solicit, explore, and develop a suite of provocative alternative visions for "Good Anthropocenes" – positive futures that are socially and ecologically desirable, just, and sustainable. Psychological and sociological research suggests that inspirational visions can be key components of transformations to sustainability, as they can help shape the future by changing how people understand the world and what they expect from it. The Good Anthropocenes project has developed an innovative new method for building provocative positive future visions through a bottom-up approach based on "seeds" - self-based techniques that demonstrate one or more elements of a positive future that might contribute to creating a good Anthropocene. Through this collaborative initiative we aim to counterbalance prevailing dystopic visions that may be inhibiting our collective ability to transform onto a positive trajectory for the Earth and humanity. This presentation introduces the emerging theory of change that is being developed in the project, which draws on and integrates the socio-technical transitions framework (Geels 2002), and the stages of social-ecological transformations framework (Olsson et al. 2006; Moore et al. 2014). It then discusses how existing and new research approaches and tools are being used and developed in the project to operationalize key aspects of this theory of change. Key implications for sustainability transformations include better understanding the nature of transformations and how they occur, and thereby better guide specific actions that have the potential to leverage deep systemic change.

How to break vicious circles of land use competition and rangeland fragmentation? Using agent-based modeling to support land use planning

Gunnar Dressler, Lance W. Robinson and Birgit Müller

Land is the fundamental resource to secure the livelihoods of millions of smallholders worldwide. However, in many regions competition about land is becoming more prominent, as land use patterns change and available land is becoming more scarce. One example is the Borena Zone in Southern Ethiopia, where the expansion of crop cultivation into former communal pasture land is undermining the resource base and livelihoods. This trend has the potential to result in a vicious circle that may contribute to an erosion of resilience.

Land use planning has the potential to address this issue, e.g., by securing land rights for pastoralists, managing increasing land pressure and guiding development. However, it remains unclear how this might affect the livelihoods of the poorest, who have become dependent on the minimal income that they gain from cultivation. We address this problem with a multi-agent simulation model that takes a social-ecological systems perspective by considering the dynamic interactions between pastoralist livestock production, cropland expansion and household livelihood in a dryland system. The model is designed as a virtual lab to support land use planning by visualizing potential trajectories of land use planning scenarios, and facilitating discussions between stakeholders, policy makers and scientists. Using the example case of the Borena district in Southern Ethiopia, we analyze which land use planning interventions are most promising to promote change towards a new, sustainable state that allows farming and pastoralist production to coexist.

Implications for sustainability transformations: considering the social-ecological interdependencies between different land use practices and smallholder’s livelihoods and taking on a long-term perspective to assess possible unsustainable side effects of new policies will allow us to identify effective leverage points to avoid a vicious circle.


Margaret Haderer

The city as a leverage point for intervening in unsustainable human-environment relations has become increasingly important. In recent years, two urban approaches to global socio-ecological challenges have become particularly prominent: the smart city and the degrowth approach (such as repair cafés, non-commercial sharing platforms, urban agriculture, food co-ops, etc.). Beyond their significant differences, they share important, yet mostly overlooked, common denominators: Both trust in local intervention in everyday life and in experimental, rather than end-of-the-pipe, solutions. Localism and experimentalism tend to be regarded as a promising avenue towards a transformation towards greater sustainability by those involved in smart or degrowth urbanism, but also by scholars of environmental governance. The core thrust of this paper is to make sense of the current trend towards localism and experimentalism against the backdrop of three larger, societal developments: the normalization of post-facticity (a challenge for defining a clear and comprehensive goal of transformative action); the fragmentation of governance (a challenge for steering transformative action); and increasingly liquid subjective commitments and identities (a challenge for sustaining transformative action). Possibly, the paper suggests, localism and experimentalism may be better understood as symptoms of a highly constrained scope for transformative action on the socio-ecological crisis in late modern democracies than – as is commonly assumed – signs of hope for transformative change. The paper’s implication for sustainability transformations is a shift in perspective from solutions to conditions of and barriers to (radical) change. Whereas much of the current environmental governance literature focuses on solutions, this paper takes a step back and examines the macro-political conditions for (a) the emergence of certain solutions and (b) realizing fundamental change. This paper argues that precisely if further impasses in coming to terms with the socio-ecological crisis are to be avoided, understanding the micro-political alongside the macro-political is key.
Learning the Complexities of Commoning. Playful Agent-Based Modeling as Thinking-Toys for Urban Commoners.
Shintaro Miyazaki, Viktor Redd, Selena Savic and Yann Patrick Martins
The sustainable use and organisation of common resources is highly complex. This paper will present first learnings from a Swiss research project with a focus on alternative urban neighbourhoud and communing initiatives. From the field of experimental design research at an art and design university the project inquires into media-based thinking tools which will help to better illustrate, demonstrate and negotiate the complexity of these communing and sharing processes. The 4-year research project (2018-2021) is funded by the Swiss National Science Foundation.

The aspiration formulated throughout numerous utopia-inspired projects that seeks to design infrastructural aspects of urban life in an autonomic, sustainable, and self-managed way, raises several questions. Since, based on the high level of complexity that (occasionally) comes with the shared use of resources, for the individual community member it is often difficult to estimate his or her own action and consequences to the last detail. Especially when it comes to unpredictable, adaptive processes, he or she can no longer grasp them intuitively nor follow them without the help of media-based thinking tools or toys — such as agent-based models — which make those processes not only visible but also comprehensible.

For this reason, we are working in close collaboration with the members of three Swiss urban neighborhood projects (NeNa1 in Zurich, LeHa in Basel and Warmbächli in Bern) on playful simulations (based on ABM) and design new thought-spaces for communing. Our aim is to enable alternative ways for future social participation and transformation processes. The leading question of the project is: How could an experimental and community-based approach to design and development of a digital game system stimulate reflection on the intuitively incomprehensible complexity of communing, make it more understandable and negotiable through playing and gaming? The paper will present some intermediate results, learnings and reflections about the projects.

Navigating cognition biases in the search of sustainability
John-Oliver Engler, David J. Abson and Henrik von Wehrden
We provide a conceptual review of the available knowledge on the role of human cognition biases for sustainability and sustainable behavior. Human cognition biases are defined as any deviation in decision making from the standard framework of rational choice. We distinguish between biases in individual decision making and biases in group decision making, and highlight the relevance of each for sustainable behavior. We find that while both categories contribute to unsustainable behavior, human cognition biases in group settings are central to understanding many of the current sustainability issues. Moreover, we argue that the effects of group-related biases may outweigh those at the individual level in driving unsustainable decision-making and behavior, and that biases that have been discussed under various labels in the literature can be interpreted as manifestations of human cognition biases in group settings.

Practical wisdom for sustainability transformations. Mobilizing old concepts for new problems.
Guido Caniglia, Christopher Luederitz and Daniel Lang
Sustainability challenges, from loss of biodiversity to desertification and pandemics, are wicked and do not allow for simple solutions. Understanding how to take action to address such challenges is not an easy task. And yet, if we want to support sustainability transformations through research, it is important that we come up with ways of understanding how we should act in a wicked world so as to facilitate transformations towards sustainability. Current understandings of how we act and make decisions collectively are often informed by linear thinking and motivated by anticipatory approaches to solving issues within which we live. At times, the wickedness of sustainability problems results in a crises of agency, where we are just incapacitated to take action. Other times, when we do take action following linear thinking and aspirations of control, our actions can result in solutions that are potentially damaging.

In our talk, we suggest that the old idea of practical wisdom can help us think about how to act and support sustainability transformations in ways that go beyond linear thinking and control. This notion, originally coined by Aristotle, has provided over the centuries a way to frame issues of action above all in situations that are complex, contentious, and where sure and certain knowing is lacking, but our conscience or our circumstances demand that we act. Recently, this notion has also been used, for instance, in fields as diverse as social psychology, philosophy of science, nursing and medical education, and urban planning. In our talk, we rely on traditional and new uses of practical wisdom and suggest that, using this concept, we can better frame and talk about actions and solutions in sustainability science.

Learning our way through complex global challenges? Facilitated learning in transdisciplinary research collaborations
Blaine Harvey
Climate change represents one of the grand challenges of our time in terms of the scale of the impact it will likely have, its complexity, and the need for global cooperation to develop lasting solutions. The facilitation of collective, transdisciplinary learning processes within collaborations to create and sustain the world in which we live. At times, the wickedness of sustainability problems results in a crises of agency, where we are just incapacitated to take action. Other times, when we do take action following linear thinking and aspirations of control, our actions can result in solutions that are potentially damaging.

In our talk, we suggest that the old idea of practical wisdom can help us think about how to act and support sustainability transformations in ways that go beyond linear thinking and control. This notion, originally coined by Aristotle, has provided over the centuries a way to frame issues of action above all in situations that are complex, contentious, and where sure and certain knowing is lacking, but our conscience or our circumstances demand that we act. Recently, this notion has also been used, for instance, in fields as diverse as social psychology, philosophy of science, nursing and medical education, and urban planning. In our talk, we rely on traditional and new uses of practical wisdom and suggest that, using this concept, we can better frame and talk about actions and solutions in sustainability science.

Learning; knowledge and wisdom (1.6)
This session focuses on learning in relation to transformative change. Talks range from sessions on Aristotelian notions of practical wisdom, through facilitated and collective learning; playful learning and unintentional learning. The session challenges the dominant paradigms of how and what we learn.
Session Chair: Matthias Barth
Format: talks and panel discussion Room: 40:176
From intentional to unintentional unlearning

Thomas Grisold, Markus Peschl

Acknowledging that sustainable solutions will be relevant in a not so distant future, we have to ask how can we know today what will be relevant for shaping a thriving future? Certainly, we can make predictions being based on what has worked in the past (Quist & Vertragt, 2006); however—from a complex systems perspective—building on our past experiences does not only hinder us to deal with unpredictable dynamics, but will also prevent us from creating new niches in an unfolding future.

In our presentation, we argue that instead of projecting our expectations into an unknown future, we have to overcome our “Organizational Predictive Mind” (Grisold and Peschl 2017, 2017a) and need to unlearn what we know so that we can grasp emerging dynamics, which point to future potentials and can provide the grounds for developing sustainable futures. We build on the claim that unlearning requires some form of intentionality (Nygren et al. 2017). However, we suggest to take it one step further and argue that, in the context of developing sustainable innovation, intentionality can take on three forms:

1. Dominance over environment: In this type of unlearning, we seek to think through things in advance in a new way, but we have relatively expectations or plans as to what should happen and which goal we are pursuing with this unlearning process. It is a hydromorphic perspective (e.g., Ingold 2013) in which a desired final state of change is more or less predetermined. Our knowledge dominates over the environment.

2. Co-Becoming: Here, both the cognitive system (or the organization) and the environment form a unity of mutually being shaped and shaping each other. They are co-becoming and unfolding over time. While unlearning, we attune to environmental dynamics, which inform our knowledge, and in turn, our ideas are imposed on environmental dynamics.

3. Submission to environmental dynamics: This is the most radical approach to unlearning as we prevent our cognitive apparatus from developing expectations and norms but we fully submit to environmental dynamics (cf. Ingold 2014). While extremely challenging to realize, we suggest that this is the most promising approach to sustainability, as we are trying to get in resonance with environmental dynamics and follow its potentials.

In our paper we will discuss in detail the foundations and implications for this third form which we refer to as “intentional unintentional unlearning”; the main points being: the future (partly) drives the present, change from within, identifying and cultivating future potentials, personal transformation as prerequisite, and shifting from efficient cause to final cause/purpose.

Implications for sustainability transformations: We will show that the degree of sustainability depends on the question of how far we are able to set aside our expectations and predictions for what may happen in the future and develop individual and organizational capacities (epistemic skills and mindsets) to submit to reality.

Impact, evaluation and FAR (1.7)

We address practices and approaches of evaluation and assessment of transformative research. Besides the question of finding adequate indicators and frameworks, contributions more fundamentally question practices of evaluation and ask how process-oriented, collaborative and accompanying forms of reflection can be applied.

Session Chair: Stefan Hilser
Format: Talks and world café
Room: 40.175

Co-creating an evaluation framework for a water sensitive valley: The case of Molenbeek valley in Brussels, Belgium.
Catalina Codruța Dobre

In the context of growing environmental challenges faced by urban areas, small-scale actions aiming to adopt nature-based solutions contribute to a move towards sustainable stormwater management practices. While in transition studies the potential of small-scale actions to effect a change at a larger scale is thoroughly investigated (Sengers, Wieczorek, and Raven 2016), questions remain on how to evaluate their impact. Evaluation tools in the water sector primarily focus on the impacts of on-ground works (Burns and Mitchell 2007) and rarely cover all the institutional, social, spatial and technical implications a sustainable practice brings to the water system. More than that, soft actions, for example participatory mapping sessions, are often disregarded because it does not have a direct impact in transforming the physical space.

The paper is based on an action-research project I carried out in Brussels in collaboration with a non-profit organisation and representatives of four municipalities located within the same urban watershed, Molenbeek Valley. The action research aimed to create a framework of evaluation criteria in order to assist municipalities in the planning and evaluation of a common vision of a water sensitive valley. A hybrid process was carried out, composed of expert-based (existing criteria found in the literature) and a participatory process (co-creation workshops to select the most appropriate criteria for the valley). The three-year process brought several implications for sustainability transformations on how the definition of a water system depends on contextual realities, how water issues are transversal to the current division of municipal departments and how evaluating the interrelation of small-scale actions (soft and on-ground works) is a first step in guiding change in the whole water system. From an operational perspective, the research proposes a context-based framework to link small-scale actions to a larger scale of the water system.
Dancing with the system (1.8)

This session explores different ways to conceptualize and engage with the leverage points concept, which fundamentally challenge approaches to achieving sustainability. Key concepts include liveliness, emotion, paradigm, world view, the role of crisis, knowledge processes, metaphor and narrative for change.

Session Chair: TBA
Format: Talks and world café
Room: 40.255

What if we took into account more systematically that we are a part of Nature?

Danielle Davelaar

How does one wake Homo sapiens from rusty notions to more reality? 500 years ago the Copernican revolution freed humankind from the false belief of being inhabitants at the center of the universe. Likewise, today we are trapped in a misleading dream of egocentrism and dominance on our home planet. The wave of consciousness that will delete this false idea from our collective mind is coming. The new paradigmatic truth is simple; its implications far reaching. Humans are neither an economic nor an ecological exception to the system of Living Systems on Earth but a true, responsible part of the Biosphere.

There is so much to be gained by considering today’s complex sustainability challenges and their best practice, scientific resolution pathways from a truly inclusive human-nature systems perspective. In this contribution I shall illustrate my point by focusing on the inspiring “Leverage Points” sustainability research project at Leuphana University.

A human-nature inclusive, consistent systems thinking approach to transformative change and sustainability addresses the deep leverage points in Meadows’ model: self-organization, goal and paradigm. Direct implications are more awareness and a better anticipation of what lies ahead in the key leverage area’s defined.

1) “Restructure”: self-organization experiments emphasize the value of function and functionality, moving us towards a higher degree of freedom that will create conditions conducive to regeneration and human evolution.
2) “Rethink”: we are moving from an outdated worldview informed by ontological, disconnected thinking to a modern learning society anchored in relational and functional thinking.
3) “Reconnect”: a radical shift from stewardship over the Earth to functional partnership in the natural world is around the corner, involving the emergence of a new nature paradigm and a new understanding of the concept of sustainability.

Systems Aliveness as a Key Component of Sustainability Transformations

Petra Kuenkel

Although many experts and scholars have called for a paradigm shift in thinking and acting (Finifter 2015; Fullerton 2015; Jaworski 1996; Scharmer and Kaufer 2013; Senge et al. 2015) the essential question – what will advance the widespread paradigm shift that is needed to
accelerate the necessary changes in collective behavior? - has not yet been answered (Fullerton 2015; Godfray et al. 2010; Meadows, 1999; Meadows et al. 2004). Korten (2015) suggests that there is a need for an entirely new story that puts the wellbeing of people and the planet center stage. Fullerton (2015) advances the notion of responsible and regenerative capitalism, while Donaldson and Walsh (2015) proposes that it is time to redefine the true meaning of business as creating collective value. The paper introduces an approach to sustainability transformations that is anchored in systems thinking with a focus on life-enhancing processes. It does so in a trans- and multidisciplinary way and shows the role of patterns as a relational and constituting element in the co-creative process of transformative change. In light of this research, it relates such constituting elements to vitality and resilience in human interaction systems. It introduces the concept of systems aliveness as a key element for understanding novel approaches to sustainability transformations. Based on essential features of life-enhancement in systems it suggests and emerging Patterns of Aliveness Theory, which shows how six essential organizing principles allow life to emerge, thrive, and re-create itself in natural as well as social systems. Moreover, it argues and translating the insights of this approach to understanding how socio-ecological systems function (or fail to function) is key to conceptualizing stewarding transformative change in a new way.

Building on good life – adopting a powerful and appealing narrative for change
Antonietta Di Giulio and Defila Rico
In looking for leverage points potentially leading to sustainability transformations it is crucial to identify topics and forces that link to and are appealing for people and have the potential of providing powerful and broadly shared narratives for sustainability.

Narratives provide the epistemic fabric for how the material dimension of society is perceived, assessed and shaped and thus go hand in hand with structural material forces. They provide explanations and are thus part of individual and collective knowledge, and knowledge in turn informs individual and collective problem framing, the setting of priorities, the questions that are asked, and the options and pathways that are considered. Identifying narratives corresponding to both, peoples’ mindsets and sustainability, could reveal leverage points for change towards sustainability.

The notion of good life (human well-being) has the potential of offering a powerful narrative for change. Different findings of different research projects we have conducted in the past years confirm that a narrative linking the ideas of a good life and justice actually exists, and that this narrative could, if supported and reinforced by relevant material structures and coherent action, serve as a societal source of power for sustainability.

Based on the results of a project funded by the Swiss National Science Foundation (SNF) we will show that people are using this narrative in their dual role of consumer and citizen in considering, disagreeing and enacting sustainability policies. Based on a secondary data analysis we will show that good life seems to be one of four values that are part of what could turn out to be a “culture of sustainability”. Based on the results of a research project funded by the Foundation Mercator Switzerland we will show that this narrative can be made tangible in form of so-called “protected needs” and could be translated into policies.

From pushing levers to dancing with the system: Rethinking transformation for sustainability through metaphor
Elizabeth Clarke, Guido Caniglia, Dave Abson and Daniel Lang
In her Leverage Points essay, Donella Meadows points to the power to change our mindsets and to transcend paradigms as the deepest leverage points for change, and at the same time presents us with a strong metaphorical framework to both transcend and to shift our mindsets, assumptions and beliefs. She says in her concluding sentence, “In the end, it seems that mastery has less to do with pushing leverage points than it does with strategically, profoundly, madly, letting go and dancing with the system”. Since the Enlightenment, paradigms in science have been described by mechanistic metaphors, such as the clock (a well-functioning mechanical device controlled by a watchmaker) and that of a complex machine that we as humans can control and modify. These metaphors are not restricted to science, but dominate many of our broader social paradigms.

In the Anthropocentric era, these paradigms and metaphors are being challenged, as we struggle to tackle the wicked problems associated with transforming towards a sustainable and just future. But what kind of paradigm shift do we need, and how can we achieve this?

We propose that the Leverage Points framework provides a basis and a metaphor to navigate the shift from paradigms of control in a mechanistic universe, to a paradigm of self-organisation, emergence and adaptation to change in complex systems. While using a familiar mechanistic metaphor for system processes and change, Meadows at the same time, opens up a pathway to transform our thinking - to rethink the pathways to sustainability.

We demonstrate this through case studies of complex projects and initiatives that use the Leverage Points metaphor and framework as a part of changing mindsets and transcending paradigms.

Exit and voice in the governance of genome-edited food
Chad Baum and Bartosz Barkowski
Genome editing technologies have been hailed both as revolutionary and as offering a potential solution to agriculture-related sustainability problems. Owing to the challenges and controversies associated with the widespread rejection of genetically engineered, especially once used for agriculture and food production, such technologies have also given rise to their fair share of questions and concerns. Tradeoffs between potential benefits of genome editing and the widespread opposition towards genetic engineering, as well as the inadequacy of current regulatory regimes, thus serve as the background and starting point for this paper. Against this background, we apply and extend Hirschman’s influential exit–voice framework to provide insights into suitable governance approaches for genome-edited food. In this context, we give specific attention to the use of labelling as a governance solution that facilitates ‘exit’ of consumers from markets, and to public deliberation as an expression of ‘voice’. First, this offers a notable contrast to the general thrust of the literature and its focus on, e.g., how to address information “deficits” on the part of the public (Stirling 2008; Torgersen 2009) or “fine tune” applications to ensure broad acceptance (Frewer et al. 2016). Rather than analysing how acceptance of GM food may be increased (Araki and Ishi 2015; Kolodinsky and Lusk 2018), we thus explore what we see as a more pressing matter, given the numerous configurations and overall complexity of the relationship between these technologies and society, i.e. which governance approaches would facilitate an active role for the general public whereby their views on the foregoing tradeoffs can be ensured and integrated. Implications for sustainability transformations include commentary on existing institutional frameworks of the EU and US vis-a-vis the “baseline” of current regulatory frameworks, especially regarding the limited options for registering choices not just between products but between alternative trajectories of technological development.
indicate that breaches of the legal framework are controlling factors, with the exception of both former and current government officials. Many farmers have institutionalized this corruption in order to access water; increasing social conflicts and hindering any type of planning or water management. Implications for sustainability transformations: understanding governance systems, their structure and the interactions that weaken and bypass formal institutions to the detriment of water resources, is requisite for identifying entry points that could be used to restructure the governance regime, such that it better supports adaptive water governance.

Reusing Wastewater in Agriculture. A Challenge of socio-technical Innovations

Byrni Ebert, Engelbert Schramm and Martina Winkler

Globally food security and providing clean water and sanitation remain an area of conflicting aims. As irrigation in agriculture makes up more than 70 percent of demanded water, debates about the Water-Energy-Food Nexus are highly salient in the light of the Sustainable Development Goals. Especially industrialized agricultural production causes multiple undesired consequences like nitrate in groundwater resources, the use of pesticides and degradation of soils. Wastewater treatment infrastructure does not get adapted to natural and societal needs like the removal of trace elements, pharmaceuticals or hygienic matters. Reasons include institutional characteristics of long planning horizons, path-dependencies of large grid-connected infrastructures and municipal organizational arrangements.

In coupling and synchronizing innovations in wastewater treatment, soilless growing systems and digitalized steering mechanisms, technical progress provides opportunities to address challenges of the nexus between agriculture and water. The diffusion of a system growing crops, knowing that nutrients and water have their origin in treated wastewater, is in need of societal acknowledgement and appropriation in socio-technical interactions. Without all new actors have to get involved or established actors have to diverge from their current roles in existing networks. Secondly, lacking established arenas of cooperation in existing management practices, the actors are confronted with diverging problem descriptions, knowledge-demands and interests concerning temporal, spatial and social scales. These social challenges constitute a joint decision trap, the European Commission seeks to bridge with a legislative process aiming harmonized standards. In doing so, the Commission narrows the discourse to technical efficiencies and bypasses potential veto players acting at the national or regional scale. Using the empirical evidence of semi-structured expert interviews and theoretical implications of new institutionalism, the contribution highlights transformations of informal and formal norms and institutions necessary to foster socio-technical innovations at the intersection between wastewater treatment and crop production.

How might Scottish environmental policy instruments allow transformative change in a Post-Brexit Britain?

Alba Juarez-Bourke, Kerry Waylen, Kirsty Blackstock, Jessica Maxwell, Sophie Tindale

The environmental policy landscape is often critiqued for being atomistic and participatory approach. Institutional arrangements, including policies and their subsidiary instruments, tend to reflect traditional sectoral approaches. These have had profound influences on practices for environmental management. Therefore, it is important to understand if and how these instruments could deliver in a systems approach that deliver multiple benefits.

We explore the implementation of policy instruments in Scotland. We analysed ten environmental instruments through analysis of official documents and interviews with stakeholders charged with policy design and delivery. This analysis focuses on the rules of the system as a leverage point as well as the goals of the system, from which we can start to infer the overall paradigm of the system. We also explore how the rules of the system are contested or defended. For example, the hybrid and voluntary instruments have evolved to be participatory and holistic, yet this was not always part of the policy design. There is also considerable effort, often invisible externally, to avoid duplication or conflict with other instruments. However, there are opportunities to do more.

Within the UK, Brexit gives the opportunity to reconsider our policy mix. Whilst some are keen for change, others seem paralysed or are actively defending existing arrangements. Our paper will therefore reflect on whether the Brexit crisis offers opportunities and how these may be realised. Both within and beyond the UK the challenge remains: how best to achieve systems approaches in a crowded institutional landscape – should we invest in voluntary collective approaches, or are new statutory policy instruments essential?

Implications for sustainability transformations: focus on the neglected topic of policy implementation at the scale of policy instruments, comparing across types of instruments, to illuminate the interplay between different leverage points.

Restructuring institutions for transformative change: exploring the case of Formula Electric, in the motorsport industry.

Cristiana Pace

The emergence of transformative changes has highlighted the importance of the socio-economic and political context in which innovations are conceived and introduced, including regulations, governance structures and business models of the participants in the industry. Most recently, researchers focusing on technological change have argued for a multi-level perspective (MLP) approach to analyse long-term technological transitions and interventions related to the governance and management of technological change.

This paper applied a longitudinal MLP framework to the transformative change of Formula Electric (Formula E), in the motorsport industry, in order to understand how institutions restructured themselves throughout this transformative change.

Formula E is a new flagship championship which uses exclusively electric powertrain. In 2012 the Federation International del Automobil (the FIA), the governing body of motorsport, announced that the first race of this Full Electric championship would have been in September 2014. Since then the changes have been both globalised and drawn to the interest of many automotive manufacturers.

This paper presents an analysis of institutions and actors which contributed and connected to this innovation, including the governance connections between regulators and the business, technological and sport actors of motorsport. This concept of governance is dynamics, changing with the unfolding of innovation. The paper concludes with a discussion on the importance of restructuring institutions to enable successful transformations.

Implication for suitability transformations: This paper offers an empirical example of reconfiguration of institutions in transformative changes. Additionally governance emerges as a wider and dynamic concept to include actors and institutions and to account for the complexity of the multi-factor phenomenon of changes.

Scale, normative prescription and complexity: can Australia’s regional natural resource management organisations meet the challenges of sustainability transformation?

Kathryn Andrews

Scale, normative prescription and complexity are inherent challenges for transformation studies (Turnheim et al 2015).

Over a decade ago Australia embarked upon a remarkable experiment by establishing Integrated Natural Resource Management (INRM) organisations across the entire continent. Despite their diversity, these organisations share fundamental principles and processes such as regional-scale planning, practice change and community participation. INRM organisations have been working in sustainability for many years, across production and environment, stakeholders and landscapes.

This paper will explore, drawing upon theory and practice, whether these principles and processes can contribute to the challenges identified above, and to sustainability transformation.

Regional planning and community engagement may be a means to addressing issues of scale, normative prescription and complexity. Scale is often discussed in the sustainability transformation literature in a socio-technical, institutional or political context, rather than biogeographical or landscape. Geels’s seminal work on the multi-level perspective epitomises this. Yet how important is the geographical scale – regional or landscape – in achieving transformation? NRM organisations may potentially marry the socio-technical and social-ecological theories for sustainability transformation – on the ground and in practice. The literature has more recently acknowledged concerns regarding the normative nature of sustainability transformation; community engagement in planning may also be one means of addressing this.

Implications for sustainability transformations include understanding the potential role of integrated natural resource management in sustainability transformation, to identify leverage points for change and possibly transferrable principles and processes.
Developing a Theory of Transformational Change (1.10)

Steve Waddell, John Colvin and Ioan Fazey

The term transformational change as used by the SDG Transformations Forum is one of three types of change, involving distinct qualities and issues. As such, it requires a distinct theory. However, today people refer simply to “theories of change” without distinguishing the type of change they mean. This results in muddling of actions. To address this, the Forum is evolving a theory of transformational change (ToTC). This session will advance it, building on elements following.

The Forum distinguishes between incremental, reform and transformational change by associating each with different loops of learning as pioneered theoretically by Argyris and Schon (single, double) and extended to triple loop by various theoreticians. Transformational change is distinguished by its depth of challenge to prevailing systems including ways of thinking, assumptions and power structures; it involves re-defining of purpose and system boundaries. A ToTC should include a description of the relationship between change types. (see: www.transformationsforum.net/transformation)

Each type of change is characterized by a different type of activity: transformation with visioning and experimenting to things that have not been done before; reform with adjusting and adapting; and incremental change with copying and duplicating. Tye.

In its ToC, the Forum distinguishes three types of “causes” for change challenges. Illustrated with respect to climate change, these are: direct (emissions), proximate (such things as policies, technology, and political will); and deep (societal systems such as capacity, meta-narratives, financing structures, and governance forms). Addressing these deep causes is critical to transformational change.

The fora for addressing these deep causes are also critical. These can be placed-based, geographies, which can be at the level of a community, city, bio-region, or country. They can also be issue-based as represented by the SDGs. Of course these two fora interact.

This session will be organized as follows with small table discussion.

Researcher-practitioner Network for Inner Transitions (1.11)

This dialogue session continues an initiative to form a network of researchers/practitioners on inner transitions to sustainability, launched in 2016. For this session, the main objective is to collect ideas to develop a research agenda.

Session Chair: Christoph Woiwode, Stella Veciana
Format: Workshop/special session
Room: 40.165

Building and Strengthening a Researcher-Practitioner Network for Inner Transitions to Sustainability (Dialogue Session/Panel)

Christoph Woiwode, Stella Veciana, Petra Schweizer-Ries, Christine Wamsler and Iris Kunze

Cultural aspects underpinning socio-technical sustainability transitions, especially those relating to ‘inner’ dimensions of human life, are underrepresented in research and praxis. Such unfathomable dimensions like worldviews, ethics, values, religion, consciousness, spirituality and self are increasingly seen by researchers and practitioners as inevitably important for profound and durable sustainability transitions at both the individual as well the societal plane. Therefore, this emerging field may be considered a crucial leverage point towards transformational sustainability interventions within the socio-cultural realm (Abson 2016).

This dialogue session continues an initiative to form a network of researchers/practitioners on inner transitions to sustainability launched in 2016. We have held two dialogue sessions at the International Sustainability Transitions Conferences 2015 about “Inner Transitions: The Role of Religion, Spirituality, Consciousness and the Self in Urban Sustainable Pathways” and 2017 on “Exploring the Role of ‘Inner Change’ in Sustainability Transition”.

For this session, the main objective is to collect ideas to develop a research agenda. The focus will be on exploring questions like 1. What kind of research in this area is already ongoing? 2. What are potential research questions/areas? 3. What are the barriers to conduct research in this area? 4. How can research and practice be (better) linked and collaboratively co-created? 5. What are the implications of this research/practice area for sustainability policies?

Session 1

1. Collective check-in (S. Veciana)
2. Purpose of this session and brief introduction to theme (C. Woiwode)
3. Brief report about results from the two previous dialogue sessions. (C. Woiwode)
4. Interaction: Collecting participants’ interest in the topic and their (research) background (S. Veciana)

Transformations timeline (1.12)

Glenn Page and David Abson

Since large scale systems change (transformation) is a major theme of the leverage points conference, we propose to create a knowledge co-production exercise during the three days of the Conference where all participants and co-create an actual timeline with the theme of LEVERAGE POINTS of TRANSFORMATION. The goal is to capture the emergence and development of transformation and key leverage points that have advanced the field regarding research, policy and practice. A well-crafted timeline can be a useful tool that illustrates historical and current dynamics that can be quite useful in considering the potential future trajectory of a given place, sector or thematic area – in this case it would be dedicated to the concept of transformation.

There will be designated area in the forum space of the conference building where conference participants can contribute to a collaborative process to document the historical evolution of the concept of transformation, the legacy of past events and their potential to constrain or enhance intervention efforts in the present and future (living labs, T-Labs, brightspots etc.). Developing a timeline of leverage points of transformation, and comparing events across different topics and scales, can bring people together toward a shared understanding of the challenges and opportunities of transformative work. Constructing a timeline together as a group clarifies for a larger group what has been, what is, and helps to set the stage for what could be.

We intend to develop a basic framework for constructing a timeline with both systems thinking and complexity concepts embedded in the final design engaging artists and creative scribing to generate visually compelling systems map over time that could be a model for place-based or thematic based initiatives around the world. Timelines are best considered a work in progress, never fully complete and always subject to refinement and adjustment, however, the process and product could be documented as an action-oriented research endeavor that is published after the conference.

Guiding Philosophy:

Given that leverage points are “places in complex systems where a small shift may lead to fundamental changes in the system” (Meadows, 1999). The Timeline for Transformation T4T project is examining historical examples of levers such as actual policies or interventions that target intervention points in a system and something has happened as a result. Since Meadows identified twelve such places to intervene, we...
have aggregated these twelve ‘places’ to four (broad and interacting) system characteristics that will be used as common language to describe specific events that may have served as interventions towards large scale system change (aka transformation). The four system characteristics are:

Parameters – tangible system properties such as taxes, standards, information that are typically targeted by policy makers to effect system change.

Feedbacks – the internal system dynamics that amplify or dampen the effects of specific levers.

Design – The social structures, rules and institutions that manage feedbacks and parameters.

Intent – The underpinning values, goals and worldviews of actors and institutions that shape the emergent direction to which a system is oriented.

These four system characteristics represent a nested hierarchy of tightly interacting realms of leverage from ‘shallow’—places where interventions have been relatively easy to implement yet with potentially limited transformational change, to ‘deep’ leverage points that might be more difficult to alter but have resulted in more transformational change.

The T4T will be open throughout the day – but there will be people stationed at the site in the morning and in the evening and at breaks. When there is no one there, there will be clear instructions for what to do. People who want to contribute to the T4T will be asked to contribute events that have led to the concept, science and practice of transformation – and events that can be considered deep leverage points for large scale systems change. There will be two dedicated sessions to discuss the development of the timeline during the conference (see the preliminary scientific programme).
Narratives for sustainability transformations (2.1)

This session explores the relation between narratives and leverage points for sustainability transformation, including the role of narrative in climate adaptation and resilience, and changes in meat consumption. We address the building blocks of narrative, e.g. hero, journey, adversary and values.

Session Chair: TBA
Format: Talks and world café
Room: 40.146

Beyond 'best practices' and 'global exemplars': working with narrative to understand successful environmental governance in cities, through the case of climate change adaptation in Fukuoka.

Leslie Mabon

I use climate adaptation in Fukuoka City, Japan, to explore the relationship between narratives and leverage points. Despite comparatively slow national progress on adaptation in Japan, Fukuoka City produced its first climate plan in 1994, and has continually refined and updated climate governance since through engagement with locally-based academics. Through historical documents relating to the urban environment produced by local institutions from the 1960s to present, plus interviews with government, academia and civil society, I map out a narrative of local institutions developing an independent evidence base to inform environmental governance primarily for the benefit of the citizens of Fukuoka. This narrative first emerges as a reaction to the Minamata Disease and Kitakyushu air pollution incidents which happened close to Fukuoka in the 1960s. In response, the concept of kiteki kankyou – a 'liveable environment' - is developed by the local science-policy community and comes to represent a consistent goal for their actions. I argue that this goal of kiteki kankyou has repeatedly acted as a leverage point in Fukuoka for achieving tangible policy outcomes. Despite comparatively slow national governance in cities, through the case of climate change adaptation in Fukuoka.

Beyond 'best practices' and 'global exemplars': working with narrative to understand successful environmental governance in cities, through the case of climate change adaptation in Fukuoka.

Aditya Ghosh

Mumbai, a coastal city in South Asia and its financial hub, is highly vulnerable to impacts of a changing climate. However, the city's sustainability and climate governance has remained inadequate at best and suspended at worst. Rapid growth in its real-estate sector and demographic distributions have not matched with its sustainability governance, resilience-building and climate-proof infrastructure development. This inaction seems to be a product of discursive conflicts that fail to produce the critical policy push through concerted public opinion. While various agendas, encased in their respective narratives, run parallel which neither intersect nor reconcile each other to produce a concerted sustainability and climate governance, the inaction in particular can be traced to one critical set of narratives which is conspicuous by its absence in the public domain. Middle and upper-middle class residents have the largest population group in the city – could have been instrumental in leveraging sustainability and climate action in the city and bridge the seeming discursive divides between agendas and their actors because of their influence on the electorate. The existing sets of narratives represent four sets of actors – the elite environmentalists, the poor and marginal population, the administrators and managers of the city and the policy actors but excludes the middle and upper-middle classes, described here as the ‘missing link’. Drivers behind the apparent disengagement and non-participation of the Middle and Upper-Middle class residents in sustainability and climate governance discourse is uncovered in the study and found to be deeply emmeshed in the existing socioeconomic, political and cultural tapestry of neoliberal urban development in the Global South. We discuss how this section of the society could be inspired and motivated to participate and engage in the sustainability and climate change discourse that can leverage policy processes towards effective sustainability governance in Mumbai.

Cultural narratives and their potential for leverage

Grit Martinez

Transitions to sustainability and its governance are receiving high attention from the academic world and as policy concern across the globe. Transitions are complex processes that require broad societal responses and multi-agency. Model-based approaches of sustainability transitions are prone to exclude cultural elements as discursive or decorative factors often seen as an addition to technological and behavioral scientific approaches. Cultural narratives which are embedded in the world-views of those who govern and those who are governed inside the discourses and their underlying interests holding the capacity to shape transitions.

Cultural narratives which are embedded in the world-views of those who govern and those who are governed inside the discourses and their underlying interests holding the capacity to shape transitions.

The contribution deals with discourses of climate change and their specific contexts and will reflect on their potential to create leverage

Protection and adversarism: Two challenges for the persuasiveness of sustainability narratives

Manuel Rivero

Based on theoretical investigation and two empirical studies, I will put forward two complexes of hypotheses regarding stumbling blocks that sustainable development (SD) narratives have to overemotional resonance of narratives within the lifeworld. It is the particular character of the villain, however, that poses particular problems for consensus-oriented SD narratives. In my talk, I explore how a sound (i.e., not demonizing) articulation of the adversary – indispensable for political narrativization – is conceivable for SD narratives. Implications for sustainability transformations: If we articulate SD narratives with clear adversaries and a coherent value structure, we might be able to re-enter central parts of political arenas.

The role of narratives in transforming societies

Sander van der Leeuw

If we assume for the moment that narratives constrain ‘imagined futures’, I need to investigate how these imagined futures anchor societal institutions (in the anthropological sense, not confined to formal institutions but including informal ones that one could characterize as ‘customs’ or accepted ‘ways of doing things’).

One way into that is by looking at conflict situations in which different narratives are juxtaposed, such as recently the long-standing battle to give a recognized name to the Former Yugoslav Republic Of Macedonia (FYROM), in which the Greek narrative and the Macedonian one reflect two different perspectives on history. Both are very tightly coupled to the identities of the two populations. But to move from identifying the role of narratives to finding the leverage points at which changes in the narratives can unblock a conflict situation and enable a change takes another important step. Why was the potential solution to the FYROM issue (renaming FYROM as “Northern Macedonia”) feasible at this particular time? What facilitated this particular solution? In the paper I will look at some of the contextual issues as well as the nature of the
compromise narrative. I will then apply the same approach to two different narratives concerning socio-environmental interaction that, when considered together, have a surprising consequence.

**Integrative environmental governance and policy coherence (2.2)**

Complex sustainability problems, transgressing sectoral and scalar boundaries, pose specific challenges to the institutional structures set out to govern them. This session brings together conceptual and empirical contributions that address these challenges through perspectives of integrative environmental governance and policy coherence.

**Session Chair: TBA**

**Format: Talks and world café**

**Room: 40.154**

**Governance challenges at the interface of food security and biodiversity: a multi-level case study from Ethiopia**

Tolera Senbeto Jiren, Nicolas Jager, Ine Dorrestein, Julia Leventon, Jannik Schultner, Arvid Bergsten, Feyera Senbenta and Jorn Fischer

Integration of food security and biodiversity conservation is a contemporary sustainability challenge that requires coordinated solutions across multiple levels of governance. For complex systems, a governance approach that ensures a good fit between governance and biophysical systems is essential. To ensure this fit, identification of governance challenges and associated possible interventions is essential. This study aimed to identify gaps in the multi-level, integrated governance of food security and biodiversity conservation. For this, we conducted a case study in southwest Ethiopia where we interviewed 201 stakeholder organizations working at local to national levels. Our findings revealed three key governance challenges that merit critical attention. First, we found institutional misfits including institutional overlap and an institutional gap that resulted in redundancy and lacunae in the governance of food security and biodiversity. Second, problems of institutional interplay and a lack of coordination and collaboration were found both in horizontal and vertical institutional interactions. Third, policy incoherence such as contradiction between policy instruments, contents, and goals were also found in the study area. These governance gaps, which affected the individual sectors of food security and biodiversity conservation, also posed challenges for the integrated governance of food security and biodiversity, often in a more pronounced way. Based on our findings, we argue that governance interventions for enhanced sustainability require a holistic and collaborative approach that ensures institutional fit, pays attention to institutional interplay, and ensures consistency across policy goals.

**The “policy package” perspective: what’s in it for transformation research?**

Chiara Jurato

The transformation of the energy system is a central “grand challenge” for the success of a climate-friendly future. This future will not materialize without a radical restructuring of the socio-technical energy system. The Copernicus project “Elavi” examines this challenge, among other approaches, from a “policy package” perspective. The idea behind this approach is that promising transformation paths towards a climate-friendly future will only happen through adequate interventions and measures. Accordingly, a policy package is a bundle of socio-political measures that addresses and implements transformation paths in line with the objective of a sustainable energy system. Concerning the current mix of national energy policy instruments, there is a steadily growing and cumulative body of interventions intended to contribute to the achievement of the energy transition. However, the design processes and characteristics of these instruments are not necessarily consistent. Rather, empirical research shows that greater results can be achieved through and not “policy packaging” of various interventions at different levels of governance. Indeed, the bundled consideration of distinct interventions and their interactions aims to improve the effectiveness of single measures, to minimize possible unintended effects and/or strengthening the legitimacy of the intervention to facilitate their implementation. Moreover, the successful implementation of policy instruments is unlikely to occur in practice without the inclusion of suggestions and ideas from different stakeholders, for instance from politics, business, science and civil society. By using the example of urban passenger transport in Germany, this presentation illustrates the policy packaging approach from a conceptual perspective and focuses on the transdisciplinary research embedded in the Copernicus project Elavi.

**Implications for sustainability transformations: the “policy packaging” approach offers a systemic perspective on the interplay and integration between different policies that aim to transform a socio-technical system.**

**Adaptation of the agriculture sector in Aotearoa New Zealand to climate change: Role of institutional structures and policy coherence**

Tanira Kingi and Bianca Cavicchi

This article examines the influence of institutions on the transformation of natural resource-dependent industries to bioeconomies that instil environmentally sustainable production systems and the adoption of green technologies. New Zealand's economy is highly dependent on the agricultural agrifood sector. This paper returns. This reliance has resulted in a unique greenhouse gas profile where almost 50 percent of the country's carbon emissions are from agricultural sources. In recent decades the New Zealand government has implemented several policy interventions to reduce the impacts of agricultural intensification on fresh water and to reduce agricultural greenhouse gas emissions.

Drawing on Innovation Systems, Grounded Innovation and Institutional Change approaches, we develop a conceptual framework to examine two case studies in New Zealand. The first is a catchment-based study that assesses the imposition of nutrient reduction regulations on rural landowners. The second is a case study on a collective of Maori landowning groups that have had land returned under the Treaty of Waitangi settlement process. The institutional and policy environment has spawned a range of industry initiatives aimed at encouraging the adoption of low emission technologies and low impact farming systems. However, change is often hampered because of the dependency on historical value chains that are underpinned by high volume, low value products.

The assessment of these two cases includes not only the role of formal institutions (government legislation, regulations, rules, land tenure systems, industry structures etc.) but also informal institutions (including cultural values and norms). Implications for sustainability transformations include clarifying the role of formal and informal institutions in enabling the social-ecological systems. Assessing resilience of a system is important because it is a substantial component of sustainability and relates to ecosystem integrity measures. Nonetheless, public policies pursuing resilience often focus on conservation rather than transformative development which is affected by development and non-development policies. For this reason, this paper asks: How can transformative development be pursued through resilience strategies in watersheds?

This paper proposes a conceptual and methodological framework that operationalizes policy coherence for development as a policy methodology for the promotion of resilience. PCD is a policy tool that examines how non-development policy arenas undermine or support development objectives and analyzes how mechanisms within development policies similarly reinforce or weaken development strategy objectives. Nonetheless, PCD has not yet been implemented as a policy methodology, especially in sub-national contexts. The paper addresses resilience through the lens of PCD because it pursues transformative development through the reinforcement of beneficial policy interactions and the elimination of damaging relationships.

One innovation of this paper is the operationalization of PCD through Social Networks Analysis (SNA) to analyze connections between policies and policy communities in different policy arenas in order to elucidate PCD defined as coherent relations for resilience. SNA will allow us to identify the relational structure between the different components of resilience strategies. Implications for sustainability transformations: By assessing resilience through
PCD analysis, this research can analyze resilience-focused policies with the aim of understanding how policy interactions promote or undermine transformative development.

**Landscape change and connections to nature (2.3)**

Landscape change is one of the most visible outcomes of global environmental change. How do people navigate such change, and how does landscape change influence people's attachment to particular places? This session explores a wide range of landscapes around the world.

**Session Chair:** Joern Fischer  
**Format:** Talks and panel discussion  
**Room:** 40.175

**From Space to Place: Place Attachment as a function of social and physical changes**

Gerhard Reese, Lea Heidbreder and Marlis Wullenkord

Place attachment refers to the emotional bond between a person and its surroundings, or its place. In this research, funded by the European Space Agency (ESA), we aim to identify whether the use of earth observation (EO) data can inform social science research on perceptions and experience of place. Specifically, we test the idea that people's sense of place would be affected by information about physical changes of the Environment (e.g., changes in the atmosphere) as well as social changes (e.g., changes in social bonds). Similarly, we seek to understand whether higher place attachment on various Levels (i.e., local, national, global) motivates people to seek Information about changes in the atmosphere. Various studies were designed, and the first set of studies indicate significant relations.

In Study 1 (Questionnaire, N = 118), we asked participants to indicate their place attachment as well as their interest in information about changes of their local environment. The stronger participants' place attachment, the stronger was their interest and intended information search. In Study 2 (N = 158), we experimentally tested whether inhabitants of a small town in Germany would indicate lower place attachment after imagining the loss of one specific feature of their town (physical, social or both). Results revealed that imagining a loss of either physical or social features resulted in lower place attachment, with the combination of both resulting in lowest place attachment.

These studies provide preliminary evidence that place attachment may be affected by changes in socio-physical environments, and may affect information search regarding such changes. Three additional experimental and correlational studies are conducted until end of 2018, testing the relation between place attachment and information search on various Levels, as well as causal effects of earth observation data presentation on place attachment.

**Re-connecting people and nature by farming activities**

Marina García-Llorente, Irene Perez-Ramírez, Clara Saban de la Portilla and Alejandro Benito

During the last decades, the economic model (together with others drivers of change) in Spain has promoted drastically land use changes in three main ways: urbanised areas with a strong demand of services, agricultural intensification in order to give answer to the demand from large cities, and abandonment in rural areas link to unsustainable ecosystems transformation. It has ecological consequences, but also an impact on our quality of life and on the more disconnected from natural environments. In order to reverse this tendency European policies call for a rural renaissance based on fostering innovation and business opportunities in those marginalised areas for the period 2014-2020. At the same time, from the bottom-up level there is an increasing interest in society in development at local scales, food sovereignty, food short chains, organic farming, community home gardens, and social farming between others.

We present Agrolab project, a living lab to reconnect rural and urban people with agrarian activities by creating opportunities to develop and enhance employment at the farming sector, and provide spaces for reconnecting people with nature. Around 25 people start the program each year since 2015 at two municipalities of Madrid. In order to measure human-nature connectedness validated scales are self-administered each year (at three different moments): inclusion of nature in the self, nature relatedness scale, satisfaction with life scale and social support scale.

Results obtained are also discussed at participatory workshops. Implications for sustainability transformations: we hope that those living labs could contribute to the design of an alternative model (applicable to other initiatives) in which collective learning, community management and social inclusion criteria feed agricultural practices to unravel its environmental, social, relational, cultural and economic value, which lastly will contribute to the dynamism and renaissance of these areas.

**Navigating social-ecological transformation and their impacts on human-nature connectedness in Transylvania, Romania**

Balazsi Anees, Riechers Maraja, Hartel Tibor and Fischer Joern

Romania has been subject to multiple social-institutional shifts within the last decade that has had implications for cultural landscapes. Despite a trend towards intensification of agriculture, traditional farming has partially survived in Transylvania. Our study included two Transylvanian social-ecological systems, Erdővidék (Covasna County, rural influences) and Aranyosszék (Cluj County, urban influences), that were similar until the end of socialism, but today show different development trajectories. We examined changes that influenced landscape management and human-nature connectedness (HNC). The HNC was interpreted in five dimensions: material, experiential, emotional, cognitive and philosophical (Ives et al., 2018). We conducted semi-structured interviews (n = 39) in 2018. The data analysis included inductive and deductive approaches. There were three major transitions in the governance system of Romania that had different implications for landscape management in the two areas. 1) The period of transition from informal and formal institutional governance after the World Wars and before socialism, 2) the top-down government during and right after the socialism and 3) the transition to a multi-level governance system. Changes of HNC not linearly followed the dynamics of the governance system. Material
connection became vulnerable on changes that influenced the food production. Experimental and emotional connections were influenced by socio-economic changes. Cognitive connection was influenced by the quality or degradation of formal and informal knowledge systems on nature and landscape management. Philosophical connection was influenced by shifts of ideologies in the governance system, globalization and quality of other HNC dimensions. Transylvania has all the ingredients for a sustainable transformation, but interventions in the system and their synchronicity are crucial. Our results have implications for sustainability transformations: offering understanding on the dynamics of social ecological systems, revealing ways of reconnection of people to nature and cultural landscapes and understanding of the aspirations of leaders, change agents, community.

Landscape values, place attachment, awareness, and personal responsibility as leverage points for landscape sustainability

Maria Garcia-Martin and Claudia Bieling

Personal connection with landscapes seems important for engaging in landscape sustainability actions, but this connection is still poorly understood and spatially explicit insights are lacking. To frame this connection, the perception of landscape values can be a good indicator of how people experience and relate to the places they live in. Taking over personal responsibility, the awareness of the consequences of own actions on the landscape, and the attachment to the place, are considered likewise important aspects for sustainability-related actions. However how these aspects interact has not yet been given enough attention in the literature.

We address the question of how perception of landscape values is connected to strong place attachment, awareness, and responsibility and how this is affected by socio-economic backgrounds and bio-physical landscape characteristics in different places within Europe. In a cross-site comparison study, residents from six municipalities (in Spain, Greece, Switzerland, United Kingdom, Sweden, and Estonia) were surveyed combining Public Participation GIS methods to in-depth perception of landscape values, with a set of statements in a Likert scale to elicit their levels of attachment, awareness, and personal responsibility. Responses from 726 participants were analysed with descriptive statistics, measures of association, and spatial statistics. Results reveal how perception of landscape values depends on the types of relationships a person has with landscapes and on the experience generated thereby, as well as on certain bio-physical and socio-cultural characteristics of places (age, landownership, and accessibility are very influential aspects). Personal responsibility, awareness, and attachment are stronger when a varied interaction with landscapes exists. Structural constraints and lack of personal capabilities hinder awareness and sense of personal responsibility.

Implications for sustainability transformations: Fostering and enabling different ways of engaging with landscapes (e.g. by reducing socio-cultural constraints and improving accessibility) might strengthen personal action for a transition towards landscape sustainability.

People and nature connections: the case of a social-ecological system in southwestern Ethiopia

Girma Shumi, Ine Dorrestein, Jannik Schultner, Kristoffer Hylander, Feyera Senbeta, Jan Hanspach, Tola Gemechu Ango and Joern Fischer

Especially in the Global South, local people depend on nature for their livelihoods and are important stewards of ecosystems, including woody plants. However, people can also be the agent of both direct and indirect drivers of change to nature, for example through deforestation. Taking a social-ecological systems perspective, we assessed people’s use and management of woody plants and their perceived property rights in southwestern Ethiopia to conceptualize the bi-directional links between people and nature. Ninety-five species were used for eleven major purposes. The majority of plants (52) were used for house construction followed by farm implements (42), fuelwood (38) and honey production (37). Surprisingly, we found abundant regeneration of trees throughout the landscape, including in farmland. However, timber species were found to be over-harvested, especially in forest with coffee management. Forests were also where people felt the lowest level of tenure security and had the least use rights.

Implications for sustainability transformations: our findings suggest that to maintain and enhance existing sustainable human-environment links, the local community needs to be given clearly defined property rights to their land, including the right to manage and use trees in forests.

Collaborative research methods (2.4)

This session investigates novel and under-explored collaborative research methods such as game-based approaches, theatre as organisational research method, or collaborative conceptual systems mapping. The presented methods aim to create a space for problem-oriented dialogue, and tend to engage with the normative, affective or power related dimensions of doing collaborative research.

Session Chair: Daniela Peukert
Format: Talks and panel discussion
Room: 40.153

Moving Sustainability Forward: A Game-based Approach For Building Confidence In Municipal Administration

Leo Reutter

Cities with a car-oriented mobility system are significant consumers of energy and require drastic transformations in their structure and function to minimize their harmful impacts on environment and people and to achieve sustainability goals. To promote such sustainable transformations, municipal administrators need to act as change-agents. Because municipal governments are often not agile organizations, they tend toward incremental actions in pursuit of transformational goals. Therefore, there is a need in municipal governments to build individual transformative capacity so that municipal administrators can design, test, and implement plans, projects, and policies that are capable of transforming cities toward sustainability. This research presents a game-based workshop, “Stadt-liche Ziele” (AuCity), that uses a backcasting approach to make municipal administrators build a sustainability strategy. I conducted a pilot study to test the effects of the game on municipal administrators’ confidence in their own ability and power to implement sustainability actions, a key determinant of transformative capacity. Five municipal administrators from Lüneburg, Germany, working on mobility issues, participated in a three-hour-workshop playing the game. Interviews and questionnaires were used before and after the workshop to assess how contributions during the event were recorded to explore collective changes in confidence. Results indicate that the game increased participant confidence by rewarding collective success, breaking down an ambitious goal into achievable tasks, and acknowledging how administrators’ current actions already contribute to the goal. Implications for sustainability transformations: successfully increased transformative capacity in municipal administrators can lead to municipal sustainable transformations.

Collective Theatre for Transformative Self-Organisation

Claire Deschner


Autonomous politics in Germany exemplify the agency of self-organisation (Beal, 2006). As Meadow (1999) indicated, self-organisation as a political tactic has significantly contributed to the resilience of these networks active since at least the 1960s. There have however been indications, that radical self-organising here and elsewhere can stall. Flexible, resilient structures can become rigid (Bergman & Montgomery, 2017). Self-reflection and imagination can become limited and self-organised projects can become unsustainable burn-out stoves (Chen & Gorski, 2015; Lagalisse, 2010).

There are few angles on the problem left to discuss. In my PhD I use theatre workshops to change the mode of discussion. Autonomous networks are based on practical contributions and intellectual discussion. Theatre methods from Boal’s Rainbow of Desire (2006) invite a non-verbal communication about feelings and dreams. Image theatre and improvisation offer opportunities to connect the intellectual discussion with embodied practise. The playful distance allows critique and wishes for transformation of and through the networks to be expressed. Epistemologically, the workshops gather situated and emotional knowledge on the
transformational potential of self-organising. The ability to let this knowledge emerge is grounded in a cooperative inquiry of activist researchers in and outside the academy (Heron, 1996; Luchies, 2015). Implications for sustainability transformation can be drawn methodologically first from the creation of collective research spaces through situatedness in a network and second from the potential of theatre as organisational research method to include embodied feelings to identify leveraging points.

Collaborative conceptual mapping and its potential for transformative dialogue

Ariane Koenig, Isabel Sebastian, Kristina Hondrila, Karl Piskar, Bo Raber and Sebastian Manhart

The University of Luxembourg is currently adapting and further developing the collaborative conceptual systems mapping (CCM) method developed by Proust and Newell (2006) in two transdisciplinary research projects. The purpose is to develop the CCM method for its ability to create problem-oriented dialogue and shared priorities for action among a diverse set of stakeholders in spite of differences in interests, expertise, values and worldviews. The two projects where the CCM method is being further developed are embedded in two different fields of practice – one project is concerned with future-oriented systems thinking in Luxembourg schools, the second project that is conducted in collaboration with two river partnerships is concerned with sustainable engagement with water and land. The paper will first briefly outline the development of the CCM method and its theoretical underpinnings within the systems literature. Subsequently, some of the key lessons learned from applying the CCM method in different workshops in Luxembourg schools over the past 12 months will be shared. The main focus will include a critical reflection on the CCM method and its potential for creating problem-oriented dialogue across differences in order to identify leverage points for transformative learning. Of specific interest is whether the CCM method has the potential to direct dialogue and influence between the personal, social, technological and biological spheres in social-ecological-technological systems.

Implications for sustainability transformations include suggestions for adapting the CCM method to better enable stakeholders to dialogue, to create collaborative and place-based knowledge and to fuel transformative change in Luxembourg’s schools as well as water and land use.

Making Visions for Sustainability Research and Transformation: overview of methods and cases

Jacq Ovst

Visions are important in sustainability research and transformation. Their role, functions and use needs further study, both conceptual and empirical, including relevance for governance and transdisciplinary and transformative practices. A distinction can be made between (i) visions in long-term developments and transitions, also used to explain socio-technological change, (ii) generating visions through interactive learning and interaction among groups (of actors) and transdisciplinary contexts, and (iii) assessing visions through vision assessments to explore possible values and other value-driven and interest-driven differences among actors and stakeholders in emerging transitions. This paper will focus on methods for making visions for Sustainability Research and Transformation. Two major approaches for making visions are backcasting and transition management, though other participatory visioning approaches can be found too. The paper will first review recent developments of vision-based approaches through an overview of the literature and building on research work and projects of the author. This will followed by an inventory on methods and cases using these methods how visions can be made, supported by examples in transdisciplinary and transformative sustainability research. The inventory of visioning methods includes: (i) creativity methods, such as brainstorming, in combination with clustering, (ii) problem structuring approaches, as often used in transitions management, (iii) elaboration of visions starts via setting targets, (iii) Morphological analysis, in the sense of creating diversity for different dimensions of the system under study, (iv) Q-methodology, a method from social sciences that is applied to study diversity in viewpoints; it can also be used to generate future perspectives that may yield up to five or six future perspectives, and (v) Making narratives and imaginary.

The paper consists of an introduction, a literature overview of visioning approaches, a section describing main visioning methods, a discussion section developing a framework for methodological characteristics and criteria for application before drawing conclusions.

How transformative is participatory research for sustainability? Reflections on the engagement of communities with photo-voice and co-creation workshops.

Angela Moriggi and Kathrina Soini

A growing number of researchers have committed to produce bold research with a transformational impact. This implies methods and approaches which are value-laden and moved by normative orientations and ethical underpinnings inspired by a desire to facilitate change for people, practices, and places. Regardless of virtuous and well-intentioned attempts, it is often challenging to ascertain the actual effectiveness of research in supporting sustainability transformations. As a consequence, one might question to which extent we are able to contribute to co-production of knowledge, through processes of social learning and empowerment of participants. This presentation aims at discussing such conundrums, drawing from insights and lessons learnt during a PhD work conducted with a participatory approach over the span of three years. Research was carried out in partnership with social entrepreneurs experimenting with Green Care practices in Finland, activities in nature that provide with therapeutic, social inclusion and educational purposes. The presentation will focus on some of the methodologies employed, highlighting their experimental and ethically-informed nature. Specifically, I will introduce the technique of photo-voice used to engage a group of mentally disabled individuals, and the co-creation workshops that involved different Green Care stakeholders. The latter were mainly aimed at two objectives: a) sharing research findings in a way that could be useful and empowering for participants; b) facilitating a process of envisioning the future, to build on the knowledge gained and identify areas of further development in line with sustainability needs and desires of the communities involved.

Implications for sustainability transformations include: insights on the challenges and opportunities of using unconventional methods aimed at transforming the “how to” – the ways researchers interact with communities, reflections on the effectiveness of the used methods and possible areas for improvement.

Levers and leverage (2.5)

This session draws in a range of perspectives for identifying where to intervene in complex systems. Talks focus on enabling change agents, transition design, transformation and leverage potential across a number of different systems (food, energy, scientific etc.).

Session Chair: TBA

Format: Talks and world café

Room: 40.176

Interventions in food and energy systems and their leverage potential for sustainability transformation

Christian Dominer, Henrik von Wehrden, David Abson, Pip Denworth, Kathleen Klapanick, Christopher Ives, Cristina Apetrei, Daniel Lang, Nathalie Spittler, Maria Lanoosenlehner, Massa Becchi, Julia Leventon and David Lam

The purpose of the study is to provide a systematic review on deliberate human interventions in food and energy systems and their leverage potential for sustainability transformation. We coded 301 empirical academic articles for the leverage potential of their presented interventions using the leverage points scale of Donella Meadows. Leverage points, as described by Donella Meadows, are possible intervention points in a system with supposedly different potential for change, ranging from shallow to deep. From a systems thinking and sustainability transformation perspective, it is highly relevant to know more about the characteristics of interventions in food and energy systems targeting sustainable change. With this contribution we are aiming at finding and analyzing empirical cases for mostly conceptually discussed intervention points. On the basis of the generated results, we were able to track the relation of these questions – ranging from tangible techno-fixes to feedback, design, and any leverage across the system – and the potential for transformative change.

Moreover, in our analysis we assess the respective problem framing, spatial scale, and disciplinary approach of the coded study to analyze it in relation to the proposed and observed interventions and its outcomes. This allows us to explore the interactions between research components and foci with the studied and proposed interventions and whether certain research modes exhibit trends in any direction, i.e. more shallow or deep leverage points.

Implications for sustainability transformations: Our study aims at generating robust knowledge
Diagnosing enabling conditions to identify leverage points and build collective capacity for driving sustainability transformations

Briony Rogers, Katie Hammer and Chris Chesterfield

In situations where urgent transformations are required to address sustainability challenges, how can change agents develop a basis for collective action and prioritise strategic interventions that will most effectively leverage system transformations? Critical diagnostic insight into the current system is needed, with particular regard to its transformation dynamics and enabling factors that need to be established.

This paper presents findings from a research program on urban water management in six Australian cities, in which industry stakeholders are committed to a transition agenda that will address the challenges of climate change and urbanisation. As part of this research, a diagnostic tool was developed to capture scholarly insights on critical enablers for transformation pathways in complex systems and applied in participatory envisioning and backcasting processes with local change agents in each city. Following their engagement with this diagnostic tool and process, change agents stated they felt much better equipped to pursue their transformation agenda because they: (a) were now acting coherently and strategically across diverse stakeholders, guided by a common understanding of transformation dynamics and the enabling factors that need to be established through strategic action, and (b) now had confidence that the priority strategies and actions being pursued in the short- to medium-term are supported by theoretical explanations of transformation dynamics.

Implications for sustainability transformations: Harnessing existing knowledge of transformation dynamics in accessible tools that can be used to diagnose a system’s current conditions and facilitate dialogue amongst change agents can be a powerful way to identify effective leverage points and build collective capacity for driving sustainability transformations.

Leverage Points in ICT: An explorative analysis of 25 student works

Birgit Penzenstadler, Colin Venters, Leticia Duboc, Gabiame Betz, Christopher Becker, Evangelia Christhian, Mark Masterbrook, Norbert Seyff and Krysztof Wnuk

Modern societies are highly dependent on ubiquitous, complex software systems which permeate the fabric of daily living. Sustainability is a complex problem and a primary concern for society as humanity is faced with a number of intractable, multifarious and interdependent challenges that present a serious threat to societies from climate change to food and water security. Software systems have the potential to be utilised as agents of change to promote the transition towards more sustainable societies; Software Engineering for Sustainability (SE4S). One approach to identifying successful sustainability interventions is to consider leverage points within a system where a change in one aspect can result in significant system-wide change. As part of an ongoing investigation into SE4S, we applied the concept of leverage points to analyse a UK public transport system, which exemplified the impact on other software projects and suggested action points for software engineers. We introduced leverage points in a course on Information and Communication Technology for Sustainability (ICT4S) for undergraduate students in the Spring of 2018 at the California State University Long Beach, USA. Our results indicate that computer science students can strengthen their analysis skills significantly using the new perspective of systems thinking in general, and specifically exploring the concept of leverage points. We aim to provide an overview and synthesis of the twenty-five individual explorative results and discuss the insights and challenges that students had in this assignment. We compare the student explorations with related work on leverage points in disciplines other than software engineering and outline directions for future research. Based on these results we aim to create a stimulating discussion around how leverage points can be integrated into a software engineering education programme in general and thus infuse it into software engineering in practice.

Time in sustainability transformations – identifying the “when” to intervene

Lotte M Lutz and Annika Weiser

The language of the global sustainability transformation discourse in science and society is laden with time rhetoric between urgency and long-term thinking. Despite this strong presence of time-related language, time is often not explicitly integrated in sustainability research and decision-making.

Sustainability transformations encompass processes on different scales and embrace a variety of societal sectors. As complex as these social-ecological systems might be, they all share the dimension of time. Analyzing processes of change through a times lens allows to identify moments or phases in the transformation process when an intervention is likely to lead to the desired impact. A deep understanding of time can thus contribute to the concept of Leverage Points and help to identify not only the “where” to intervene, but also the “when”.

We present a three-step approach to operationalise temporal system dynamics for decision making on interventions. This offers ample room for discussion on how knowledge of temporal system characteristics (i) can enable actors to push processes to the desired outcome by aligning processes from different scales and sectors, (ii) can strengthen actor’s awareness of how to perceive and foresee processes and thus reduce the risk of delay, and (iii) allows actors to identify temporal misfits and windows of opportunity in transformative processes.

Systems thinking at the interface of transition studies and sustainability science – A literature review and outlines of a future research agenda

Christian Bing, Alicia Harley and Bill Clark

Transformations toward sustainable development gain increasing interest in academia and policy-making. It becomes increasingly clear that current production-consumption systems need to be deeply transformed if humanity wants to stop overdraining our planetary life-support systems. Transition studies and sustainability science with their long histories in analyzing transformative change in complex adaptive
Inner transformations (2.6)

This session draws in a range of perspectives for identifying where to intervene in complex systems. Talks focus on enabling change agents, translation design, transformation and leverage potential across a number of different systems (food, energy, scientific etc.).

Session Chair: TBA

Format: Talks and world café

Room: 40.254

Inner Transformation in the Anthropocene

Jessica Böhme, Zachary Walsh and Thomas Bruhn

Meadows’ analysis of leverage points for affecting system change suggests that the most effective leverage point creates a shift in mental models out of which the system arises (Meadows, 1999, 17-19). In the context of sustainability, a growing body of scholars from various disciplines emphasizes that a broader cultural transformation requires an intra-subjective (“inner”) transformation involving shifts in mindsets (e.g. Wamsler and Brink, 2018), paradigms (e.g. Ulano, 2009), consciousness (e.g. Rowan, 2017), mental models (e.g. Wahl, 2017), and worldviews (e.g. Hedlund-de Witt, 2013). Empirical methods must account for subjectivity and its role in shaping scientific practice to reflect the complexities of intra-subjective processes as dimensions of sustainable transformation (Manuel-Navarette, 2015). On a more practical level, however, there is no consensus on how such diverse discourses and contexts should be integrated in a coherent understanding of inner transformation for sustainability.

In this paper, we therefore want to provide greater conceptual, empirical, and practical clarity about what inner transformation encompasses and how it can be translated into specific activities towards sustainability transformations. We will offer a framework for the conceptualization of inner transformation in the context of sustainability by investigating how the various terms are used across a broad range of relevant disciplines and contexts. Based on this conceptual mapping, we will identify the linkages and potential synergies between these different aspects of subjectivity and cultural transformation toward sustainability. Our paper will contribute to sustainability transformations by enabling researchers to better identify and harness the contributions of inner transformation in the context of social change. We will also highlight very specific examples of how an engagement with inner transformation can practically contribute to systemic change towards sustainability.

Religion as a sphere of leverage for urban sustainability

Christopher Ives

Religion has received relatively little attention in sustainability science, despite 84% of the global population identifying with a religious faith of some kind. Its influence is broad, shaping social structures and practices and influencing personal perspectives on human-environment relationships. While religion has been framed as a root cause of anthropocentric attitudes which lead to environmental exploitation, other scholars have suggested that religious beliefs have the potential to catalyse positive change for sustainability. However, there is little empirical research on how religion might practically enable sustainability transformations. How does religion fit into conceptualised according to Meadows’ leverage points framework? It is argued that religion may facilitate interventions that span shallow to deep leverage points. Second, empirical insights are presented from interviews with religious leaders in Singapore during a 2017 UN Faith-Based Urban Thinkers Campus. Qualitative insights revealed nuanced perspectives on values & worldviews about urban nature – a potential deep leverage point. For example, a continuum was evident between the conceptualisation of nature a scientific term and nature as ‘creation’. Finally, outputs are described from a workshop where religious leaders identified faith-based actions for urban sustainability, and classified them according to the ‘three spheres of transformation’ (after Sharma, 2007; O’Brien, 2018): personal, political, and practical spheres. The majority of interventions were practical (shallow) but many also were identified as personal or political. Interestingly, workshop participants expressed discomfort in restricting actions to one category. Importantly, religious and non-religious sustainability transformations: religion ought to be considered a potentially powerful agent for sustainability transformations because of its relevance across all leverage points. However, more research is needed to explore (i) nuances regarding how religious belief informs deeply held paradigms, (ii) links between individual, organisational and societal scales, (iii) how religion interacts with other realms of society, and (iv) how religion can be more effectively mobilised for sustainability.

Connecting inner and outer sustainability: systemic change by self-organisation

Stella Veciana, Taïdi Tam and Oliver Parodi

Inner and outer sustainability practices need to be connected in order to achieve deep systemic change towards sustainable development. Based on this hypothesis this article studies the connections between outer sustainability focusing on socio-technical regimes (Geels 2002) and solutions, and inner/personal sustainability referring to evolving behaviour and cultural patterns. How do these dimensions, needs and wishes, emotional and habitual patterns, perceptions and bodily experiences relate to our daily life in shaping genuinely sustainable lifestyles? It is more and more understood by researchers and practitioners (Veciana 2018) that the crucial relevance of tackling global challenges simultaneously from the outer and inner perspectives to realise profound and durable sustainability transitions. However, there has been little research on how inner and outer sustainability dimensions interrelate and interfere with each other. As our first tentative approach to address this emerging research field this presentation analyses the connection of inner and outer sustainability in relation to the twelve leverage points of Meadows (1999), in this case to “transcend paradigms” connecting personal and outer collective sustainability. Sustainable development is not only a question of an inner and outer perspective (to the world) but of an inner and outer mode of being connected to the world. Ultimately that means different modes of being (human). The phrase “outer way of being” is characterized by a cut between us and the world around us. Being detached from our environment like this allows us to acquire knowledge (“truth”) about and control over the world around us. It is the basis of science and technology. The other mode of being and living a deep connection to humans, animals and inanimate things around us and of being part of a world transcending us characterizes an inner connection to the world – generally called “love”, This is essential for sustainability too. Shifting the paradigm means a sustainable development based on truth and love.

Connecting inner and outer sustainability: recognizing the mindsets and finding the power to transcend paradigms

Taïdi Tam, Oliver Parodi and Stella Veciana

Inner and outer practices need to be aligned in order to achieve deep systemic change towards sustainable development. Based on this hypothesis this presentation studies the connections between outer sustainability focusing on socio-technical regimes and solutions (Geels (2002)), and personal sustainability (Parodi, Tam...
2018) exploring the impact of inner processes and cultural patterns on behaviors that support or hinder the development of genuinely sustainable lifestyles. The crucial relevance of tackling global challenges simultaneously from the outer and inner perspectives to realise profound and durable sustainability transitions has been increasingly understood by researchers and practitioners (Veciana 2018). However, there has been little research on how inner and outer sustainability dimensions interrelate and influence each other. To contribute to this emerging research field this presentation analyses the potential of connecting inner and outer sustainability in relation to the first two leverage points of Meadows (1999), focusing on the mindsets that the systems arise from and the power to transcend paradigms. Using the example of selected civil society and governance approaches in Europe (Tam 2018), the shared assumptions underlying the mindsets are briefly outlined and the inner and outer strategies for achieving paradigm change are discussed. Next, the relevance of transcending paradigms is discussed and some possibilities for making that happen are considered.

**Governance of energy transitions (2.7)**

Fundamental transitions in the energy sector are a keystone for a carbon-free future, yet strategies and pathways to reach that goal disputed. Contributions to this session provide conceptual insights and empirical examples for the governance of energy transitions. Contributions discuss new venues and strategies to advance energy transitions, and explore the role of new actors.

**Session Chair: Paul Upham**

**Format:** Talks and world café

**Room:** 40.108

The Transformative Capacity of the Water Energy Food Nexus Narrative

Larissa Koch and Claudia Pahl-Wostl

A Water Energy Food nexus is increasingly promoted to approach complex trade-offs between water, energy and agriculture to achieve sustainable development. Furthermore, collaborative environmental governance is emphasized for realizing sustainable collective action. Networks can under certain circumstances address difficult social-ecological problems more effectively. However, substantial knowledge gaps remain regarding how transformative change is facilitated by collaborative governance. How is transformative change reflected in social network dynamics? What conditions facilitate social tie formation for transformative change? To conceptualize the Water Energy Food Nexus (WEF Nexus) as a narrative to answer these questions. The WEF nexus shapes how actors frame particular events or problems, favor or disregard certain options and how particular social groups are empowered or sidelined. At a more general level, narratives function as observable phenomena of collective reality construction, identity formation and interpersonal communication. They are the leitmotif that link a diversity of knowledges providing structure, meaning and vision through a beginning, middle and end. In the dynamic narrativisation of the WEF nexus, new structures are incorporated into existing narrative frameworks, thus opening up spaces for innovations and collective learning processes. Discourse Network Analysis is used as a tool to measure and visualize the discourse on the WEF nexus. Narrative and co-occurrence analysis help to identify sector-coordinating coalitions where shared forms of narratives increase vertical coordination and horizontal cooperation. I assume the more elements of actors’ different narratives overlap, the stronger the tie between them. Dynamic versions of network types help evaluate to what extent learning took place between certain time frames. The strengthening of prevalent social ties hints at single-loop learning, while in triple-loop learning new social ties to socially-distant actors develop. Implications for sustainability transformations require legitimate and assertive narratives that have the capacity to build bridges to sub-networks governing and using natural resources.

**Energy system change and the dynamic relationship between perceptions of publics and envisioned futures for gas in the Netherlands**

Toyah Rodhouse, Eefje Cuppen, Aad Correlje and Udo Peesch

The Netherlands is at the start of an energy transition: a process of transformation from one energy system configuration to an increasingly more sustainable one. While the end goal is clear – namely, carbon neutrality by 2050 – the path towards this goal is far from unequivocal; above all, controversy has emerged with regard to the role of natural gas within the (future) transition. Main drivers of controversy have been public concerns around, and protests against negative impacts of exploitation activities in Groningen, and ensuing public claims for institutional (procedural) change and redistribution of risks, costs and benefits involved in gas production.

Contrary to the past, when the public arguably had little direct influence in decision-making on gas, nowadays decision-makers involved with the energy transition are aware of many of their decisions by reference to publics, their interests and the legitimacy of their demands and views. In other words, the energy system is increasingly redesigned or transformed by decision-makers who claim to respond to the public and its viewpoints regarding (the future and value of) gas.

In this paper, we develop a conceptual framework for understanding how energy system transformation occurs as a consequence of (or perhaps better, can be envisioned as) the dynamic relationship between energy actors’ perceived publics and their visions for the future of gas in the Netherlands as enacted in decision making. This includes considering what implications this relationship might have for sustainability transformations: what democratic dilemmas emerge as a consequence of responsiveness to (particular) perceived publics? And, what potential consequences might responsiveness to such perceived publics have for the technical and economic efficiency and social equality of the energy transition?

Regional carbon budgets and leveraging rapid transitions to fossil free futures

Jessie Schrage, Kevin Anderson and Isak Stoddard

The Paris Agreement on climate change delivered an unprecedented covenant amongst world leaders to take action to hold “the increase in ... temperature to well below 2°C ... and to pursue efforts to limit the temperature increase to 1.5°C.” It also acknowledged the need to undertake rapid reductions [in greenhouse gas emissions] in accordance with the best available science [...] and on the basis of equity”.

In the spring of 2017, the Centre for Environment and Development Studies (CEMUS), were asked to calculate the carbon budget of a Swedish municipality and the associated emission reductions required for them to embark on a pathway to a post-carbon future in line with the climate commitments in the Paris Agreement. Since then, this commissioned research has led to a series of reports designed to inform the energy- and climate plans of a number of municipalities, counties and regions in Sweden and abroad.

This paper gathers reflections on the implications of engaging with a carbon budget framing at a local and regional level. It first outlines and discusses the methodology used to calculate the regional carbon budget range. This is followed by an analysis of the way in which regional carbon budgets informed and influenced the political process in the municipality, as an illustrative example of the challenges and opportunities underlying the interaction and learning that takes place between climate change research and governance.

In addressing the changing role of institutions and providing perspectives on the interplay and integration between academic institutions and local authorities, this paper is envisaged to connect directly to the conference theme: Re-structuring institutions for transformative change.

Implications for sustainability transformations:

- Outline of equity and science-based regional/local energy and climate strategies
- Insights into democratic implications of transformation processes
- Examples on the role of regional levels of governance in climate transformations.

Transdisciplinary transition management arenas for energy policy futures design in illiberal democracies: a conceptual framework

Eduardo Nohoa and Paul Upham

While the theory and practice of transition management has been articulated and tested in Europe, little work in this vein has been undertaken in illiberal democracies, where state institutions may be captured by commercial interests, clientelism may operate and democratic rights may be constrained. We argue that a combination of insights from transition management and transdisciplinary research offers a basis for developing local strategies by which informal institutions could nurture alternative energy policy visions and prescriptions, in order
to exploit policy windows that may periodically arise. We articulate a conceptual framework to underpin strategies for sustainability transformations, which emphasises the role of academics or other knowledge brokers as policy entrepreneurs, helping to build knowledge and capabilities, create networks of social capital and establish alternative discourse coalitions. While our particular applied interest here is in arenas for the development of low carbon energy scenarios in Latin America, the framework is also intended to have wider applicability.

An innovation in sustainable regional governance? The case of the “Energieavantgarde Anhalt”
Sebastian Heilmann

The scientific and political debate on sustainable regional governance started decades ago. In Germany the attention towards the theme did broaden again with the upcoming of the “energy transition”. Alongside the emergence of community networks, so called “energy regions” appeared and soon dominated the informal political debate in German municipalities. The role of these “new” informal institutions has not been researched a lot thus far – a gap that this contribution is going to narrow.

The “Energieavantgarde Anhalt e.V.” (EAA) is a promising new founded institution that wishes to re-structure regional governance – nevertheless not without disputed elements. The EAA sees the region Anhalt-Bitterfeld-Wittenberg as a model for new approaches towards energy and counts itself to be a region that is committed to sustainability-oriented transformation research in the innovative form of a region-wide real-world laboratory.

I argue for a more intensively look at the interplay between inter- and intraregional levels of governance in order to get a better understanding of how to make “energy regions” more successful. I will be doing this from a sustainability science informed perspective on regional planning. By looking at different dimensions of spatial development and using the concept “sociocapital relations to nature (SRN)” I first ask what form of governance we do find in the region in its current constitution and second what future development the currently discussed scenarios within the EAA might bring about.

Implications for sustainability transformations: The main assumption of the EAA concerning regional development and planning is a need of more flexible options in practiced forms of regional governance. (The EAA as) a new institutional player can provide the necessary institutional innovation to accelerate building capacities for intraregional governance, while crossing sectoral spheres.

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**Bottom up transitions and governance (2.8)**

This session focusses on bottom-up innovations for transformation. It includes complex systems perspectives of tourism, industrial farming, smart cities, social innovation and transitions movements, urban resilience and social justice.

Session Chair: Julia Leventon

Format: Talks and world café

**Room: 40.165**

**Intensive farming and the control of knowledge and resource flows in agriculture: an example from Navarre (Spain)**

Amaia Alzuza, Elena Bennett and Unai Pascual

Intensive farming has important implications for sustainability. What is less known is the impact of agricultural intensification on the flows of knowledge, information and resources among different types of farmers. This can have long-term implications for the configuration of agrarian landscapes. Here we develop a social network analysis to understand the extent to which different types of farmers (intensive and traditional farmers) control such knowledge and key resource exchanges and shed light on the land use decisions this implies. We use a case study from a farming community in Navarre (Spain) where large-scale modern irrigation technology has been introduced leading to an agrarian intensification process. We found that intensive farmers occupy a position in the network that supports their land use practices, and help control and influence the knowledge and resource flows in the community. We further found that these well connected intensive farmers believe that their land use practices increase the agrarian ecosystem capacity to fix nitrogen and reduce soil pollution. It is relevant understanding how most central, active and connected groups think and act since they may influence other farmers to do and think the same. This, we further argue, has implications for the maintenance of farming strategies and the sustainability of the rural system, as a whole.

**Tourism, urban transformations, and overall life quality in Mediterranean cities. A systems perspective.**

Silvio Cristiano, Francesco Gonella, Amalia Zucaro and Sergio Ugliati

While international organisations and scholars debate on the goodness of sustainable paradigms for tourism and development, the acceleration of material and immaterial urban transformations to increase the accommodation capacity of many cities is causing difficulties in many destinations. In fact, beyond the narrative of the creation of jobs, the alleged benefits to the local economy often conflict with the wellbeing of local populations, up to the very survival of the social fabric as well as of the urban texture and functions as we know them. After tourism was discovered as a controversial trend, controversial formulas started to be used as international agendas such as ‘sustainable tourism’. A very delicate situation is present in cities and countries recently facing financial crises and/or debts, where the attraction of foreign capitals is seen as an opportunity for an economic recovery. Yet it is not always clear what the real goals of touristic transformations are. To try to respond to such question, a systems perspective is here offered to tourism in cities, focusing on the Mediterranean context, and specifically on two typical and different examples such as Venice and Naples, Italy. The several aspects of sustainability and the various levels of interconnection and dependency involved are taken into consideration, with these discourses framed in the larger issue of wellbeing, toward which alternative scenarios are presented, and seen as a basis for quantitative analyses to be performed in terms of urban metabolism.

Implications for sustainability transformations: the comprehension of the dynamics that drive a complex system such as a city and of the leverage points toward the definition of urban sustainable patterns able to face changes in the external inputs for the system to decrease the dependency on these and to last over time while pursuing wellbeing and a just society.

**Pyramidal Deliberative Democracy**

James Danielsen

An optimum solution to the interrelated and “wicked” crises of the 21st century – environmental sustainability, in particular – requires iterative and collaborative processes of problem-framing and solution-testing among all global stakeholders. An optimum solution, then, requires the formation of local, national, and transnational collaborative networks that engage and empower citizens, communities, and experts in the formulation and iterative testing of solutions to the crisis of ecological sustainability. Such networks, ideally, should be premised on a Deweyan pragmatic conception of democracy as cooperative experimentation and social reconstruction; i.e. a knowledge-based and community-driven process of democratic experimentation that engenders new kinds of institutions and new socio-economic-political systems.

The problems of scale and the economy of time, however, have always bedevilled the implementation of any form of participatory democracy; we cannot expect citizens to have the time, incentive, or resources to engage, face-to-face, in processes of democratic experimentation. I argue that these problems might be solved by means of an ICT-facilitated form of deliberative democracy called “pyramidal democracy”. By means of a bespoke application – and by means of a special organisational form called the pyramidal network – it might become feasible for thousands or millions of citizens to self-organise, deliberate over policy, and project power in order to implement or modify policy. In short, I argue that pyramidal democracy might solve the problem of scale and engender the local, national, and transnational collaborative networks necessary for resolving the interrelated crises.

From a systems-thinking perspective, pyramidal democracy has the potential to revolutionise information flows – a mid-level leverage point – and, in doing so, engender feedback loops that activate changes in higher leverage points; self-organisation, system goals, and paradigm. Implications for sustainability transformation: pyramidal democracy has the potential drive a
transition towards sustainability by empowering citizens to collect, analyze and critically intervene at all levels of socio-economic-political systems.

An Exploration into Learning Processes in Networked and Community-led Sustainability Experiments

Elif Erdogan Oztekin and A. Idil Gaziusluk

Experimentation has a crucial role in sustainability transitions; experiments provide means of addressing complex sustainability problems through iterative prototyping and testing of promising interventions, evaluating and learning from outcomes, thus paving the way for identifying new socio-technical practices that can be effective in achieving transitions. What counts as an experiment in the context of sustainability transitions is up for debate. While some argue that only systematically and on-purpose set-up (mostly researcher-led) empirical cases can be regarded as experiments, others regard established or emerging, community-led initiatives as experiments. The former type has been subject of research in the past decade more frequently than the latter type. While we consider on-purpose experimental set-ups as valuable, we propose that community-led initiatives provide opportunities for researchers to explore the dynamics of sustainability experimentation in its entire social, technological, economic and political complexity. With this being our position, in this article we explore the dynamics within and between a selected set of eco-settlements and informal networks they are part of. We analyse these dynamics using theoretical and analytical models from system innovations and transitions theories and social practice theory to understand the enablers of social and technological learning in eco-settlements and diffusion of such learning across the networks they are part of. The research is undertaken following an ethnographic methodological framework and situational analysis.

Implications of this research: The main theoretical implication is generation of insights that may strengthen the bridge between two highly-relevant yet somewhat isolated theoretical bodies of work, namely sustainability transition theories and social practice theory. The practical implications include a more in-depth understanding of how social change happens in complex real-life socio-technical niches through peer-to-peer and multi-level interactions, therefore development of policies and interventions that take into account such complexity.

Knowledge learning, science and sustainability (2.9)

This session focusses on learning, sustainability science and transformative knowledge. The role of emotions, context, motivations, and experiential learning are explored, largely within the context of tertiary education. Here educational institutions and contexts are seen as levers for transformative change.

Session Chair: Daniel Long
Format: Talks and world café
Room: 40.164

Early career scientists in IPCC. A moderate or radical pathway towards a sustainable future?

Karin M Gustafson and Monika Berg

Global knowledge assessments such as the IPCC play a key role for our understanding of climate change, as well as the direction of policy to combat it. Thus, IPCC’s assessments have a framing effect that influences the potential and direction of sustainability transformations. The IPCC has been criticized for its natural scientific dominance which has favored a narrow set of solutions that do not address the root causes of CO2 emissions, such as growth. As a consequence of this criticism there have been enduring calls for increased inclusion and influence of the IPCC that derive from current theoretical debates. We use these two perspectives to explore IPCC introduction of early career scientists, the role they play in the organization, and how this role is to be understood in terms of creating an opportunity for institutional change and sustainability transformations. The introduction of early career scientists partly diver from IPCC’s previous strategy to reach sustainability by enrolling world leading scientists to ‘speak truth to power’. The change can be seen in the light of a growing work load, but it also involves the inclusion of a new group and the opportunity to, at least partly meet the criticism regarding lack of inclusion. Empirically, the study analyzes interviews, documents, and scientific journal articles. Theoretically, the study elaborate on how the socialization process can enhance deliberative capability for sustainability transformations. Global knowledge assessments do not per se result in sustainability transformations. Knowledge assessments may be organized in ways that either prevent or enable transformative changes. Due to its framing effect, a reflective and deliberate organization, execution, and use of knowledge assessments is crucial to enable future sustainability.

Pushing the boundaries: Experience based learning in graduate sustainability curricula

Jodie Birdman

At the root of all sustainability solutions are the people who conceptualize and implement them. Universities play a vital role in the education of these actors. To this end it is necessary higher learning curricula adopt pedagogical practices that foster key competency development and empower future change agents. This requires shifting from practices which frame students as receivers of knowledge to processes that foster reflection and student-centered knowledge creation. Empirically driven support for effective practices and the learner benefits is unfortunately lacking. This comparative case study examines the implementation of one opportunity for educators, Experience Based Learning (EBL), in the first semester curricula and practices of three sustainability graduates programs, each with an explicit EBL unit, one with EBL practices integrated throughout the semester, and one with traditional teaching and learning practices. Student and instructor interviews and student focus groups were conducted and analyzed using grounded theory. The results were combined with contextual knowledge from program and course descriptions, in-vivo observation, and document analysis of assignments and student output to provide evidence-driven insights situated in thick data on the challenges and benefits associated with introducing EBL into curriculum. Findings include the role of time, tension between institutional structures and revolutionary teaching practice, and how discomfort can shape both teaching and learning. This presentation will, through the intersection of innovative pedagogy, new curricular concepts, and context-embedded research, explore these findings and the implications for those looking to adopt EBL practices in their own curriculum design and teaching.

Implications for sustainability transformations: In order to foster the key competency development necessary for students to become successful change agents, university curriculum must be transformed to align with these goals.

"The Autonomous Assembly of the People of Mexico’s City Basin". The emergence of a new environmental governance regime and a new trajectory towards sustainability

Arcelia Amanarta Moreno Unda, Maria Perevochtchikova and Véronique Sophie Ávila Pousset

Mountainous peri-urban forests provide a number of ecosystem services to Mexico’s city inhabitants, including air quality improvement, carbon sequestration, recreation and several hydrological services. Among them is acting as the main catchment area to recharge the city's aquifer, which in turn is the main source of fresh water. Yet rapid land use change and now climate change, threaten to compromise this vital provision. Since the year 2000 these areas have been declared as conservation territories and even some payments for environmental services programs have been implemented, but they seem to have no effect on the conservation of the forest.

As a result from a political crisis, a disagreement with the City’s new constitution in 2015, in the last year a new grassroots movement has emerged, they call themselves the Autonomous Assembly of the Peoples of Mexico’s City Basin (AAPCM), comprise by representatives of the rural towns located in the periurban territories, they seek to obtain a fair retribution from the ecosystem services they provide. Historical documents, scientific data, information exchange, community monitoring and community police have been AAPCM’s tools to regain control of their territories.

I use the adaptive cycle and panarchy models to reveal historical dynamics of the governance and management systems, while considering multiple interactions and feedbacks (transcalar, translevel) to define the periurban social ecological system (SES) trajectory. I also assess if the conditions for a transition towards a new environmental governance regime gestating and if this process could stir the SES trajectory into a path towards sustainability. I explore what are the conditions currently missing to ensure ecological integrity and social justice and I reflect on my own role to play in this transformation as a member of the academy.
German science policy: On route to sustainable development?

Anna Schwalla

Science policy is inherently normative. In this contribution, based on empirically grounded, qualitative research in the frame of my PhD thesis, I expose in which way the concept of sustainable development is constructed in the BMBF's policies and on which underlying institutions and practices the interpretation is based. I examine science policy through the lens of the Sociology of Knowledge Approach to Discourse. In doing so, I put forward that the policy ideas (expressed in strategies, programmes and research funding initiatives) are inherently interlinked with the structural and institutional context in which they are shaped.

I demonstrate that the general discourse of German science policy influences the prevalent concept of sustainability in science policy substantially. On the surface, the introduction of sustainability as a new policy idea may count as an example of successful transformation. However, in the change process, the concept of sustainability was appropriated, narrowed, depoliticized and thereby turned into a legitimizing narrative for securing German prosperity through promoting technological, economically-viable solutions.

At the same time, my research generates general insights in view of the implications for sustainability transformations: Institutional structures (such as organisational shape and bureaucratic rules), practices in policy making (such as redundancies in processes) as well unequal power distributions (in view of decision-making) contribute to a high degree of stability of the policy discourse, which in turn stabilizes the institutional structures. In pointing at potential spaces of agency as well as institutional entry points of change I wish to go beyond a mere analysis of the status quo, but also contribute to the growing field of literature on processes of sustainability transformations.

Co-production of knowledge – highly valued, rarely realised

Rico Defila and Antonietta Di Giulio

In both discourses, the discourse about transdisciplinary research and the discourse about transformative research, it is a basic and unquestioned assumption, that the goal of such research is to link scientific and non-scientific knowledge in co-producing new knowledge. The participative approach in research is meant to enhance salience, credibility and socio-political legitimacy of the knowledge that is produced, and it is meant to ease diffusion and implementation of knowledge and products. The co-production of knowledge complements the co-design of research and is inextricably linked to the very notion of an actor-oriented understanding of transdisciplinary and of transformative research.

Integrating the knowledge of researchers (certified experts) and of practitioners (uncertified experts) in the process of knowledge production means to link different perspectives and different types of knowledge not only in defining research goals/questions, interventions, products etc., most often does not happen, and that collaboration often is either instrumental (uncertified experts collect data for certified experts) or extractive (certified experts collect data they later analyse without including uncertified experts). This is the case not only in projects in which collaboration failed, but also in projects in which collaboration succeeded.

Based on the results of an interview study (we led in-depth interviews with both, certified and uncertified experts from four transdisciplinary research groups) and based on the recent experience of accompanying real-world-laboratories (Baden-Württemberg, Germany) we will show some of the reasons why co-production of knowledge so often does not take place. Based on a lay-out of the most prominent challenges that have to be met, we will discuss what could possibly be done in order for co-production of knowledge to really happen.

What is action-oriented knowledge for sustainability? Rethinking actions and their knowledge in sustainability science.

Guido Caniglia, Christopher Luederitz, Daniel Lang and Henrik von Wehrden

One of the aspirations of sustainability science is to generate knowledge in the service of action. Action-oriented knowledge for sustainability should help us navigate societal transformations towards more desirable and just futures. To date, numerous action-oriented approaches in sustainability research (e.g. transition management, transformational sustainability science) have developed theoretical frameworks and methods which intend to generate knowledge that informs actions for sustainability. However, we still lack clear theoretical concepts to define what we mean by actions for sustainability as well as what is the knowledge that can support such actions. This lack of clarity and shared concepts risks undermining researchers’ ability to jointly support sustainability transformations through research across approaches and contexts. Hence, in our talk, we address two interrelated theoretical questions: What are actions for sustainability? And what is the kind of knowledge that can support them? Our answers to these questions build upon abstract, philosophical considerations on the nature of action and on the relationship between knowledge and action. First, we suggest to look at actions for sustainability as courses of events that encompass three dimensions as they are (a) intentionally planned; (b) enacted by collective agency, and (c) implemented in specific contexts. Second, we argue that action-oriented knowledge for sustainability can serve actions in these three dimensions both tacitly or explicitly. We organize and synthesize sparse attributes and insights from the sustainability literature so as to identify key features that this knowledge should possess. We suggest that, our theoretical arguments have implications for sustainability transformations as they can help structure debates, conversations, and collaborations among researchers working with different approaches in action-oriented sustainability research.

Experiments in transformative co-production (2.10)

In this session 5 cases studies will be presented on experiments on transformation followed by a world café to explore experiences of transformative experiments.

Session Chair: Bruce Goldstein, Glenn Page

Format: Workshop/special session

Room: 40.256

Experients in transformative co-production: A world café

Bruce Goldstein, Glenn Page, Joan Fazey, Per Olsson Michelle-Lee Moore

The cases are:

• Learning Networks (Goldstein et al. 2018), which combine multistakeholder collaboration in place-based communities with community-spanning interaction and exchange across sites and scales (Goldstein)

• Proto-type learning journey in the Gulf of Maine as a pre-feasibility study process to build momentum and focus for the creation of a hub for such activity (Page).

• Scottish Borders Climate Resilient Communities Project (Fazey)

• Insights from the Transformative Spaces Special Issue, Ecology and Society (Olsson)

• Insights from the Program “Guidance for Resilience in the Anthropocene: Investments for Development” (GRAID) (Moore)

Afterwards, each case presenter will host a table where they will facilitate a collegial and conversational World Café – style dialogue with these table questions:

• What’s your personal experience of being involved with a transformative co-production experiment like the ones just shared? How did your experiences leverage system change, especially at the level of paradigm shift and transcendence?

• What were key elements, in your experience, that made the experiment develop transformative capacity—or not?

• Which of your beliefs were challenged as you engaged in the experiment, and how did that impact your work going forward?

• Did you feel supported in this work?

• What do you need to better support this kind of work?

We will conclude with brief report-outs from each table, and if there is time, reflections on session insights by the presenters.
The power of memes to transcend paradigms (2.11)

In this workshop, we will discuss the need for current action with respect to, and questions associated with, developing new narratives about how we humans view our place in the world—putting storytellers, mythmakers, and sensemakers of all sorts in the role of today's shaman attempting to heal the world. In particular, we will focus on "memes" as core units of narrative.

Session Chair: Sandra Waddock
Format: Workshop/special session
Room: 40.152

The Power of Memes to Transcend Paradigms

Sandra Waddock, Karen O'Brien and Steve Waddell

In a revision of her paper on leverage points for change, however, Donella Meadows added as the most powerful lever the ability to transcend paradigms. The question that looms in thinking about engaging this capacity for transcending paradigms or shifting mindsets is how does it happen? In this workshop speed talks, we will discuss the need for, current action with respect to, and questions associated with developing new narratives about the how we humans view our place in the world—putting storytellers, mythmakers, and sensemakers of all sorts in the role of today's shaman attempting to heal the world. In particular, we will focus on "memes" as core units of narrative. Memes include words, phrases, ideas, image, symbols, and artistic expressions. When memes are successful, they resonate and replicate from mind to mind, becoming powerful underpinnings of the stories, narratives, and paradigms that shape how people view the world, yet the importance of their role in doing so is frequently overlooked. Successful stories and narratives are constituted of resonant memes, often taking the form of what mythologist Joseph Campbell called the "monomyth," a core narrative found different configurations in many cultures, movies, and plots because the memes that constitute it are common and very resonant.

Today's dominant narrative comprises a very resonant set of memes around (individual) liberty and freedom, free markets and free trade, continual growth, military-based security, all guided by heroic markets and self-interested decision-makers in businesses interested in endless financial and material growth. Foundational memes that represent a new vision require new, compelling, and visionary narratives and stories. In this workshop, we will gather people interested in working on shifting the narrative, asking questions around the new narrative content and how to speed its adoption. Implications for sustainability transformations: how to advance the transformational narrative.

A systems approach to identifying leverage points in protected areas (2.12)

This session examines how systems thinking can be applied to key conservation challenges in and around protected areas to identify leverage points. We focus on southern Africa, where conservation and the wildlife economy are an integral part of the rapidly changing social-ecological context.

Session Chair: Onnies Bieg
Format: Talks and panel discussion
Room: 40.255

Lock-ins and path-dependence in private land conservation in South Africa

Hayley Clements and Graeme Cumming

Private land conservation areas (PLCAs) have proliferated around the world and the growing body of research demonstrates their potential to complement conservation efforts on state-owned protected areas. In terms of broader-scale governance and financial support, however, there are concerns that PLCAs may lack resilience to socioeconomic and/or environmental change. For example, many PLCAs in southern Africa are dependent on ecotourism and hunting for revenues and thus vulnerable to volatile tourism markets. Over a third of PLCAs surveyed in South Africa were unprofitable, which raises questions about their ability to effectively adapt their business models to tourism market changes. Options for adaptation can be constrained by initial conditions, a concept known as path dependence. We tested three hypothesized drivers of path dependence in PLCA business models: (1) size of land areas (wildlife abundance is constrained by available land area); (2) extent of infrastructural assets (the introduction of large, charismatic wildlife such as elephant requires substantial infrastructural investments); and (3) productivity (rainfall limits vegetation and thereby wildlife abundance). We developed and ground-truthed a mechanistic PLCA model using simple rules for the abundance of wildlife that can be sustained on a given land area and rainfall regime, infrastructure that can be developed with available capital, and resultant ecotourism/hunting revenue. Despite attempts by modelled owners to adapt, it identifies a more financially viable business model, adopted business models after 13 years were differentiated by initial land area and infrastructural assets, supporting hypotheses (1) and (2). Notably, we found that path dependence was sensitive to national tax and interest rates, highlighting key leverage points through which policy and financial schemes can promote PLCA adaptive capacity.

Implications for sustainability transformations: The resilience of conservation efforts on private land can be enhanced through understanding constraints on adaptation and identifying key leverage points to overcome these constraints.

The power of memes to transcend paradigms as an approach to identifying leverage points in dryland conservation systems

Kristine Macielowski and Onnies Bieg

Drylands support over two billion people as major providers of critical ecosystem goods and services. However, these ecosystems also represent places where human population is growing most rapidly, biological productivity is least and poverty is highest. Drylands are therefore particularly fragile and vulnerable to shifting into an alternative state and desertification. This change in the structure and function of a dryland ecosystem can be seen as a regime shift that impacts not only on ecological processes or biodiversity but also the provision of vital ecosystem services as well as human wellbeing. In this study, we analyze dryland degradation in sub-Saharan Africa as a social-ecological regime shift. The analysis is based on information captured in the Regime Shifts Database (www.regimeshifts.org), an online, open-access database that synthesizes a diverse set of social-ecological regime shifts. Focusing on the major drivers responsible for this regime shift and how this impacts on ecosystem services and human wellbeing, we identified leverage points, places to intervene to increase the resilience of dryland ecosystems. Agriculture, erosion, ranching and rainfall variability are the most common causes of regime shifts which may threaten biodiversity, wild animal and plant products, and impact on livestock, and food crop production. This not only affects human wellbeing in terms of food nutrition but also economic activities but may also compromise achieving key Sustainable Development Goals (SDGs), particularly Zero hunger; Responsible consumption and production; and Life on land. Using a complexity lens will help us to understand these underlying patterns and provide us the tools to help inform the development of managerial strategies to reduce the risk of these regime shifts and prevent further dryland degradation.

Reframing a crisis to find leverage points for transformation: Insights from Africa's illegal Wildlife trade

Duan Biggs

The illegal wildlife trade crisis (IWT) that threatens many including iconic taxa like elephant and rhino is one of the most high profile environmental challenges facing us today. Over US$1 billion has been spent in an attempt to deal with the crisis since 2011. Fierce debates rage over the most appropriate policy response. One group of stakeholders is advocating for a more tightly focussed approach, that the best solution is tighter bans on trade and stronger enforcement from poachers to consumers along the supply chain. Another group argues that the solution is to establish highly regulated markets for wildlife, which can fund enforcement against illegal trade, incentivize the protection of wildlife, and enable socio-economic development where wildlife occurs. However, policy debates have failed to account for the social-ecological complexities of finding a sustainable solution to this crisis. The IWT crisis is an artifact of a highly connected and globalized world with increasing inequities between societies that a) want wildlife to be conserved, b) consume wildlife products, and c) the communities and societies that live with, and depend on, wildlife, and the bear the bulk of the costs of conservation. Critically, different stakeholders value different types of ecosystem services from wildlife: some derive and exist and non-consumptive use values, whereas consumers of products like ivory and rhino horn perceive use values. Stakeholders also hold different perceptions of whether use of wildlife is ethically acceptable or not. A resolution to current policy conflicts will only be possible by acknowledging the central role of values and...
ethics in defining policy responses and finding common ground between stakeholders that derive different, but not necessarily incompatible, values from the ecosystem services that wildlife produces. Participatory Action Research closely linked to the policy process and involving key decision-makers offer a leverage point for transformation out of the current crisis.

Using systems thinking to re-frame land claims on protected areas as a conservation and development opportunity

Alta De Vos

If protected areas (PAs) are to be resilient to biodiversity loss, it is important that they are recognized and managed as complex social-ecological systems that are established by society for society. An important challenge for PAs worldwide is to reconcile achieving social justice for communities that have been displaced by conservation with PAs mandate to protect biodiversity. In South Africa, where land restitution is a national priority, more than one third of PAs have land claims lodged against them by communities excluded during the Apartheid era. Under the current system, conservation authorities pursue co-management agreements as the desired outcome when land rights are awarded to communities. Whilst these agreements are considered to represent a win-win outcome, in reality neither communities, nor conservation agencies are benefitting. Despite evidence that the current strategy is failing, there have been few attempts to understand the challenge at a national scale.

Here, we take a systemic approach to reporting on the extent of land claims on PAs in South Africa. We consider ecological integrity and conservation importance, existing governance regimes and contestations, as well as external threats and opportunities to PAs currently under land claim. We relate typologies of PAs-under-land-claim to existing literature on challenges in co-management and explain the opportunities that a systemic approach may yield for building PA resilience in changing times. By changing the rules of the current conservation system to account for polycentric governance, diversity, and cross-scale feedbacks, land restitution processes may prove an opportunity for the PA network to become more socially just, with longer-term ecological benefits. Our work provides useful insights for shifting the global discourse around conservation displacements.

Implications for sustainability: A systemic approach to appropriate mechanisms for managing PAs under land claim will yield institutions that are more resilient and socially just, with long-term benefits for biodiversity.

Nature Values, Rules and Knowledge in the Cape Floristic Region, South Africa

Emmeline N. Topp, Berta Martin-Lopez, Jacqueline Loos

Human-nature relations hinge upon three human dimensions: individual core values, individual attitudes, and individual behaviour. While core values have been considered unlikely to change during the course of a lifetime, attitudes might be leverage points upon which to change behaviour, which can lead to more positive and sustainable human-nature relations. A case study of this is renosterveld conservation in South Africa’s Cape Floristic Region, where agricultural intensification has left a highly fragmented landscape with low perceived utility of remaining natural renosterveld fragments by landowners. We interviewed 29 farmers and land managers across the Swartland municipality to understand existing values, knowledge sources and informal and formal rules regarding renosterveld conservation that underpin attitudes towards renosterveld. To conduct the content analysis of interviews, we applied the TARA (Transformative Adaptation Research Alliance) and IPBES (Intergovernmental Panel on Biodiversity and Ecosystems Services) frameworks. We find that knowledge of wildlife and regulating services such as pest control do not necessarily translate to favourable attitudes of renosterveld due to the dominance of instrumental values; whilst relational values can lead to conservation attitudes. Remaining renosterveld patches have the potential to be viewed as multifunctional resource pools in the landscape, providing multiple values and cultural ecosystem services. Recognition of these services as well as deeper understanding of values and rules could lead to improved human-nature relations in this unique, highly diverse and critically endangered ecosystem.
THURSDAY 7th 10:30-12:30

**Agency, change agents and stewardship (3.1)**

This session explores human-social interactions and networks in the pursuit of sustainability transformation, including enabling and characterising change agents and local initiatives, notions of stewardship and social capital. Alternatives modes of organising are explored including cooperatives, citizen movements and worker ownership.

Session Chair: Julia Leventon

Format: Talks and world café

Room: 40.108

"Think twice before you start a cooperative" - Identifying Leverage Points for navigating the diverse economy

Philip Hector and Eva Houtebeckers

The fixation on continuous and exponential economic growth is understood as one of the core problems of contemporary societies and policy-making (Latouche 2009; Raworth 2017). It has direct and indirect links to sustainability challenges. While many might agree with this in theory, there is little consensus what to do instead.

Alternative organising has been suggested as one means to frame contemporary initiatives that challenge the dominant paradigm of economic growth. These initiatives often include cooperatives, worker-owned enterprises, social enterprises, and organisations run by citizen movements. Yet, to better address sustainability transformations, there is more to learn about their everyday organisation.

We draw from empirical material consisting of ongoing fieldwork in Finland with 5 citizen initiatives. The initiatives include the establishment of a self-sufficiency school, a foundation for managing farmland for sustainable cultivation, a citizen campaign to protect forests, an outdoor test site for practical sustainability experiments on campus, and a cultural lab running on an internal currency.

We analyse them with the notion of diverse economy (Gibson-Graham et al., 2013; Roelvink et al. 2015), which provides tools for analysing labour, enterprise, transactions, property, and finance. Instead of thinking of alternative initiatives as weak and scarce, this approach understands that everything takes place in a diverse economy. Thus, it deals not only with the rethinking of rational economic actors, but sometimes diverging value orientations as a process for maintaining the status quo focus on social capital as different types of relationship that constitute social networks. However, when resilience is conceptualized as a transformative process subjective, socio-cultural dimensions (e.g norms and values) of social capital are included, although this approach is uncommon. Secondly, empirical findings tend to highlight interconnections between tangible (e.g the structure of social networks and formal institutions) and socio-cultural dimensions in shaping how change processes unfold, however the role of these socio-cultural dimensions is often left unexplored. Donella Meadows identified nine leverage points for systems change which include tangible factors, (e.g the distribution of materials and information and formal rules of a system) and subjective factors (e.g the distribution of power, system goals and culture), the later areas of leverage being more challenging but also more effective. Our findings reflect these different types of leverage point and emphasise the importance of understanding and working with socio-cultural factors for more systemic, transformational change. Implications for sustainable transformations are a need for more explicit focus on the nature and role of socio-cultural dimensions to better leverage social capital for transformational change.

**Socio-cultural dimensions of social capital as a leverage point for transformative change**

Esther Carmen

Contemporary ideas of resilience building are increasingly viewing this as a process leading to significant system change. Key to this process is the role of human social interactions often considered to be social capital. This is thought to enhance adaptability and flexibility in the context of ongoing change. There is however limited understanding of the relationship between social capital and resilience, especially with regards to more transformative systemic forms of change. This presentation therefore reports on a meta-synthesis of 153 studies about resilience and social capital. This involved examining both conceptual representations of and empirical findings about the relationship between these two concepts. There were two main findings. Firstly, conceptualisations of resilience as a process for maintaining the status quo focus on social capital as different types of relationship that constitute social networks. However, when resilience is conceptualized as a transformative process subjective, socio-cultural dimensions (e.g norms and values) of social capital are included, although this approach is uncommon. Secondly, empirical findings tend to highlight interconnections between tangible (e.g the structure of social networks and formal institutions) and socio-cultural dimensions in shaping how change processes unfold, however the role of these socio-cultural dimensions is often left unexplored. Donella Meadows identified nine leverage points for systems change which include tangible factors, (e.g the distribution of materials and information and formal rules of a system) and subjective factors (e.g the distribution of power, system goals and culture), the later areas of leverage being more challenging but also more effective. Our findings reflect these different types of leverage point and emphasise the importance of understanding and working with socio-cultural factors for more systemic, transformational change. Implications for sustainable transformations are a need for more explicit focus on the nature and role of socio-cultural dimensions to better leverage social capital for transformational change.

**Exploring the normative dimensions of sustainability transformations: The relevance of prudence, justice, and the good life in landscape stewardship practices**

Claudia Bieling, Tobias Plieninger and Uta Eser

Why do people engage for more sustainable futures of land-use and food systems? What are the underlying normative paradigms that drive action, and how do these among people and in diverse contexts? We explore these questions for cases of landscape stewardship practices. Stewardship is an inclusive notion for all individual and collaborative efforts toward achieving sustainability. In general terms, stewardship approaches assess and reduce vulnerability to known stresses, develop proactive strategies to shape nature, and advance transformational changes to potentially more favourable trajectories. Stewardship actions build on the appreciation for the multiple values that people attach to their environments and perceive as crucial for their own well-being. With this, stewardship practices include a deeply normative dimension, which, however, is rarely explicitly addressed.

In our presentation, we aim to explore the relationship between stewardship approaches and normative key paradigms. For this, we firstly deal with a conceptual level where we analyse the linkages between stewardship conceptualizations and the principles of prudence, justice and the good life, which can be traced back to major philosophical schools of thought. In a second step, we present cases of practical implementation of stewardship in different fields of sustainable landscape management such as agriculture, urban landscaping or coastal and marine stewardship. For these cases, we explore the practical relevance of arguments and motivations referring to a better life, achieving more justice or acting in a more prudent way. We show that people draw on different ethical claims when striving for sustainable futures, at times resulting in diverging ideas on goals and pathways, which may challenge joint and successful action.

Implications for sustainability transformations: More explicit consideration of people's implicit and sometimes diverging value orientations as a leverage point for the advancement of sustainability transformations.

**Knowledge and Agency - An environmental governance perspective on the role of knowledge in sustainability transformations**

Sandra van der Hel, Jennifer Bansard and Manjana Milkoreit

What role does knowledge play in exerting agency over transformations to sustainability? Questions of agency are central to environmental governance research, which investigate the role, influence and responsibility of different actors in addressing challenges of global change and enabling transformations towards sustainability. Knowledge is often proposed as an important factor in sustainability transformations. Yet, we lack a systematic review of the relationship between knowledge and agency in environmental governance. Which and whose knowledge shapes environmental governance, and how do different kinds of knowledge in their pursuit of transformations towards sustainability? These and other questions related to knowledge and agency are addressed through a systematic review of the literature on agency in environmental governance. Based on an extensive coding process, we selected and reviewed 95 scientific articles relevant to the question of knowledge and agency. Common themes in the literature on knowledge and agency are the role of epistemic communities, the science-policy interface, local and indigenous knowledge, boundary organisations, scientific assessments and social learning. Based on our review, we map the manifold interactions between knowledge and agency, and identify important avenues for further research to better understand this complex relationship. Implications for sustainability transformations: With knowledge being a central driver of sustainability, it is essential to better understand how knowledge relates to the ability of actors to shape and steer sustainability transformations.
THURSDAY 7th 10:30-12:30

Human agency as deep leverage for sustainability transformations: The transformation lab in the Xochimilco social-ecological system

Lakshmi Chari-Joseph, Hallie Eakin, J. Mario Sigueiro-Garcia, David Manuel-Navarrete and Rebecca Shelton

Agency is considered in the literature as crucial to foster transformation towards sustainability. However, the focus has been placed more on the capacities needed for the agents of change, rather than the mechanisms and processes to build agency as a deep leverage point. We present here an intentional intervention—a “transformation laboratory” (T-Lab)—devised to discover and mobilize agency in relation to a stagnant sustainability challenge: the ongoing urbanization of a culturally, ecologically and historical wetland in Mexico City. The T-Lab is designed to stimulate endogenous transformation at multiple levels (individual, collective, social-ecological), through identifying and building individual and collective agency among a small group of diverse actors involved in the use and management of the Xochimilco urban wetland. We posit that by enabling participants to reformulate their connections to the system, to others, and to themselves, the system could be transformed from the inside out. Transformation, in this sense, is essentially about how changes in perception about one’s own role in social-ecological dynamics mobilizes individual and collective agency. We describe methods that help agents see the potential of their position within the social-ecological system, identify the practices they share with others within specific social networks, and create new spaces of action. Particularly, we present a new methodology developed for this project called “Agency Network Analysis”, and demonstrate how it was implemented. We propose that the combination of the practical methodological approach and the emphasis on re-framing as a deep leverage point to building agency for sustainability transformations. We conclude with a reflection on the opportunities and the challenges involved in exploring the mechanisms that could “open up” new pathways for change.

Building a truly sustainable society will require substantial shifts in the way humans interact with the environment: changes in the rules, norms, and practices that govern socio-environmental systems. Implementing such changes is daunting, given the key role of many institutions. Hazards have been posited as a potential trigger for changing long-standing institutions because they upend underlying stable system states. For instance, Australia’s Millennium Drought led to sweeping changes in the country’s approach to water law and infrastructure. However, research on the ability of hazards to shift norms and practices is still nascent.

This paper uses a recent drought to assess the potential for hazards to lead to institutional change. From 2012-2016, the US state of California was in its worst recorded drought. While the drought did instigate a substantial shift in water policy -- the state's first-ever regulation of groundwater withdrawals -- we assess whether it yielded a shift in institutional norms: namely agency application of an existing regulation, the National Environmental Policy Act, toward enhanced resilience in the face of climate change. We collect Environmental Impact Statements for federal agency plans, programs, and infrastructure projects issued in the years prior, during, and after the drought. We use computational text mining to assess the content of EISs in terms of whether, over the years of the drought, agencies began to exert pressure on project developers to shift infrastructure siting and design to improve climate resilience. We explore changes in how documents discuss water security, the effects of drought, or other climate impacts on the viability of the project.

Implications for sustainability transformations: this paper will explore whether environmental hazards may enable conditions leading to institutional transformation toward sustainability.

The challenges of phasing-out fossil fuels in a fossil fuel intensive economy: the case of the Netherlands

Sem Oxenaar and Rick Bosman

It is becoming increasingly clear that to avert dangerous climate change a transition towards a low-carbon energy system is needed (UNFCCC, 2015). For this transition to succeed, specific attention should not only be directed towards building-up the desired low-carbon alternatives, but also to breaking-down and phasing-out unsustainable fossil fuel production and consumption.

The Netherlands, a fossil fuel intensive economy with a historically strong fossil fuel based energy regime, provides an interesting case to study such fossil fuel phase-out. Despite a long history of policy making aimed at increasing the share of renewable energy, the Netherlands ranked 2nd last in the European Union with a share of 6% in 2017. In the transitions literature, this has been attributed to the strong interdependencies between the Dutch government and the fossil fuel industry.

Our study maps the financial interdependencies between the Dutch government and the fossil fuel industry. It was found that fossil fuel related activities form an important source of revenue for the Dutch government and that it is tightly interwoven with the fossil fuel industry, with financial relations and even state owned enterprises found in all segments of the fossil fuel value chain, from production and exploration to use and R&D, at the local, regional, as well as national levels of government.

Still, under pressure of environmental NGOs and civil outrage over earthquakes caused by gas production in the north of the Netherlands, the government has commenced a coal exit and announced a phase out of natural gas production by 2030. Implications for sustainability transformations are that the highly entrenched nature of fossil fuels at all levels of Dutch society, raises intriguing questions regarding the role of governments in enacting fossil fuel phase-out and under what conditions such phase-out can still occur.

Towards a Transformative Food Policy: Understanding Processes and Change in Romania

Ijana Alexandra Duse, Julia Leventon, Nicolas Jager and David J. Abson

The need for analytical and explanatory theories is more than ever essential to study the complexity of the policy process. This complexity emerges from socio-political drivers of stability and change, interactions among a large number of actors who seek power and influence, a mix of external events and other contextual factors characterized by various conditions from geographical to socio-economic. In this paper, we explore the different policy change processes and what is the implication of these changes in the food production policy subsystem in Romania.

Drawing on the Punctuated Equilibrium Theory (Baumgartner and Jones, 1991, 1993) and on the ideas of Donella Meadows (Meadows, 1999,2008) our core argument is that there is a need to focus on proposing intentional interventions rather than just describe the different punctuations and system characteristics that trigger changes in any system. Specifically, we propose a more detailed analytical framework to understand these punctuated patterns as opportunities for leverage change through systemic thinking perspective. The policy change processes in Romania created different opportunities to intervene in the system, involving every time new actors, new power relations, different resource allocations and an entirely new policy discourse.

The findings of this study are relevant for sustainability transformation through the fact that it urges policy scientist and decision-makers to abandon existing practices and make a fundamental switch to a new mode of operation. If we want to create sustainable policies we have to think about prescriptive interventions and we need to expand our analytical toolkit and think not just in diagnostic terms to explain processes of change, but we need to tackle the problems of prescriptive interventions in specific situations. Moreover, we also need to take advantage of processes that can alert us to the unintended consequences of policy decisions that are appealing in superficial terms.

Institutional change (3.2)

This session questions how to describe, and how to trigger fundamental institutional change towards sustainability. The contributions to this session present case studies, analysing institutional barriers, path-dependencies and challenges, processes of institutional change, and factors contributing to successful institutional change.

Session Chair: Pim Dewort

Format: Talks and world café

Room: 40.154

Environmental hazards, path dependency, and transformative change: Does drought affect the conservation of wetland climate impacts in Environmental Impact Statements?

Nicola Ulubari, Tyler A Scott and Omar Perez-Figueroa

The need for analytical and explanatory theories is more than ever essential to study the complexity of the policy process. This complexity emerges from socio-political drivers of stability and change, interactions among a large number of actors who seek power and influence, a mix of external events and other contextual factors characterized by various conditions from geographical to socio-economic. In this paper, we explore the different policy change processes and what is the implication of these changes in the food production policy subsystem in Romania.

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Institutional Barriers for a Cooperative, Low Temperature trajectory in the Amsterdam heat transition
Ilonka Marselis and Matthijs Hisschemoller

The historical focus in the Amsterdam heat transition has been on replacing individual gas powered boilers with district heating fed by high temperature residual heat from two central sources. In order to explore the alternative of cooperatively owned, low temperature heat systems, this study has mapped the institutional barriers that are currently in place for this trajectory. In-depth interviews were performed with actors in the heat transition of Amsterdam and the Netherlands, and together with a document review this has led to the identification of the main institutional barriers. These barriers are categorized in three topics: 1) uncertainty and disagreement about the alternative heat systems, 2) the capacity of heat cooperatives and 3) the procedures and culture of the municipal departments. All these barriers accumulate to a perverse incentive for the large-scale implementation of solutions other than high temperature district heating. Based on the research results, the current state of the Amsterdam heat transition is defined as an intractable conflict and a social dilemma. Recommendations are made to alter this situation, starting with the creation of social consensus about the underlying objective and collective goodwill that should be realized in this transition. On top of this, all relevant actors and available knowledge have to be included in the debate. The paper is concluded with recommendations for further actions to overcome the current institutional barriers.

The leverage behind the points – representative democracy’s central institutions as imperative for successful sustainability transformations
Lars Erik Berker

All leverage points Meadows accentuates in order to facilitate transformation processes are based on decisions and complex negotiations among a variety of actors, above all in policy-making processes.

Which institutions are then pivotal in those policy-making processes? Which are the main actors forming these institutions?

In sustainability science, scholars often investigate the role of governance without paying attention to the nation state as central decision-making entity. In my contribution, I argue, that the nation state might not be the only, but it is the most important actor to address Meadow’s points. In-depth interviews were performed with actors in the heat transition of Amsterdam and the Netherlands, and together with a document review this has led to the identification of the main institutional barriers. These barriers are categorized in three topics: 1) uncertainty and disagreement about the alternative heat systems, 2) the capacity of heat cooperatives and 3) the procedures and culture of the municipal departments. All these barriers accumulate to a perverse incentive for the large-scale implementation of solutions other than high temperature district heating. Based on the research results, the current state of the Amsterdam heat transition is defined as an intractable conflict and a social dilemma. Recommendations are made to alter this situation, starting with the creation of social consensus about the underlying objective and collective goodwill that should be realized in this transition. On top of this, all relevant actors and available knowledge have to be included in the debate. The paper is concluded with recommendations for further actions to overcome the current institutional barriers.

Urban nature and sustainability (3.3)
With increasing levels of urbanization worldwide, how urban residents interact and engage with green areas requires urgent attention. This session explores topics such as urban gardening, green space conservation, urban stewardship and sustainable urban lifestyles.

Session Chair: Henriek von Wherden, Marja Rechers
Format: Talks and panel discussion
Room: 40.152

Fostering Urban Childrens Connection to Nature as Deep Leverage Point: The Salamander Case.
Stephan Barthel, Sophie Belton, Chris Raymond and Matteo Guisti

The aim of this talk is to explore how children learn to form relationships with nature. It draws on a longitudinal case study of children participating in a stewardship project involving the conservation of salamanders during the school day in Stockholm, Sweden. The qualitative method includes two waves of data collection: when a group of 10-year-old children participated in the project (2015) and 2 years after they participated (2017). We conducted 49 interviews with children as well as using participant observations and questionnaires. We found indications that children developed sympathy for salamanders and increased concern and care for nature, and that such relationships persisted 2 years after participation. Our rich qualitative data suggest that whole situations of sufficient unpredictability triggering free exploration of the area, direct sensory contact and significant experiences of interacting with a species were important for children’s development of affective relationships with the salamander species and with nature in an open-ended sense. Saving the lives of trapped animals enabled direct sensory interaction, feedback, increased understanding, and development of new skills for dynamically exploring further ways of saving species in an interactive process experienced as deeply meaningful, enjoyable and connecting. The behavioral setting instilled a sense of pride and commitment, and the high degree of responsibility given to the children while exploring

the habitat during authentic situations enriched children’s enjoyment. In terms of practical policy advice, authentic stewardship actions as an activity at urban schools and kindergartens may be a promising combination for societies to counteract broad-based processes toward weaker connection to nature. The study also has implications for the design of education programs that aim to connect children with nature and for a child-sensitive urban policy that supports authentic nature situations in close spatial proximity to preschools and schools.

Untangling different stakeholders’ motivations for urban greenspace conservation in sub-Saharan Africa
Solène Guenat, Andy Dougill, Bill Kunin and Martin Dallimer

Developing understanding of how urban greenspaces are conceived is crucial as the ecosystem services provided by such greenspaces can help the transition towards sustainability while increasing the well-being of residents. Despite our knowledge of the benefits of urban greenspace, implementing greenspace conservation or retention measures in densely populated landscapes is often driven by public opinion (rather than scientific evidence): something we know little about in fast-growing cities in Africa.

In two rapidly expanding cities in Ghana, we used Q-methodology to identify viewpoints on ecosystem services and disservices from three groups of stakeholders: (a) experts, who have both interest and influence on urban greening and/or planning and include planners, NGOs and representatives of the traditional authorities (as main landowners); (b) authorities, who have influence on the population and include for instance religious authorities and the media; and (c) users, including urban farmers, owners of gardens and users of public greenspaces.

The importance of greenspaces was recognised across both groups, and overall viewpoints were not highly differentiated between stakeholder groups, highlighting the potential for common arguments to be used to communicate effectively. The perception of users was more diverse than that of experts and authorities, and there were strong disagreements regarding the relative importance of regulating and provisioning services. In contrast, cultural services provided a common ground across stakeholders. Our study shows that, in fast-growing cities in Sub-Saharan Africa, cultural ecosystem services such as city beautification, tradition or recreation could play a pivotal role in the discourse for greenspace conservation.

Engaging urban citizens in communities of nature stewardship: transformative action in practice
Laura Mumaw, Nadine Gaskell, Helen Coreny, Irene Kelly and Ray Ison

Urban nature conservation is challenged by beliefs that nature worth conserving is nature without humans, that the species needing saving are absent from cities, and that urbanites lack the sense of place, community, or connections with nature that underpin land stewardship. The
paradigm that fostering biodiversity is done by others in wild places. The proposal is based on the recognition of the connection between urban communities and the nature they live in and modify. We share insights about connecting people and nature from three related inquiries. One is a case study of a program, run by a local government-community group partnership in Melbourne Australia, which engages residents to foster biodiversity in their gardens (wildlife gardening). We explore what engages participants, how a land stewardship ethic and practice develops, and the effects on participants’ wellbeing and connections with nature, place, and community. Second is a systemic inquiry of biodiversity governance in Victoria Australia that led to an initiative to shift the governance system from a top-down, tick-box, species-focused practice, to one that builds and embeds biodiversity stewardship through co-design processes. Third is action research on the initiative, Gardens for Wildlife Victoria. This network of community and agency champions from different municipalities helps each other to develop community partnerships that engage residents in biodiversity stewardship through wildlife gardening. Programs are designed for local strengths and aspirations, and target social alongside environmental goals. The network builds relationships across communities and aims to influence policy through a steering group made up of community, research, local government, and state agency members. Implications for sustainability transformations include the importance of community champions, citizen-agency partnerships, networks, empowerment, social learning, co-creating socio-ecological knowledge and practice, systems thinking, and understanding and responding to institutional dynamics.

Propagating success? Benefits and challenges arising from a community-based sustainable food model

Alan Farrier, Mark Dooris, Adrian Morley

Incredible Edible Todmorden (IET) is an urban sustainable food community ‘movement’ developed over the past decade, located in a small town in the north of the UK. Best known for its focus on food growing through ‘propaganda gardening’, it has developed and implemented a ‘three spinning plates’ model concerning local community, business and learning assets. The movement emerged as a response to both the global challenge of climate change and the local economic and social challenges associated with post-industrial decline – including a growing disconnection between people and nature.

This presentation details findings from evaluative research exploring the social, economic and environmental impacts of the IET model, which took a mixed-methods approach –, including a Thematic Coding (TOC) stakeholder workshop, interviews and focus groups, and a Social Return on Investment (SROI) analysis. It concludes that despite numerous challenges, IET has resonated with Todmorden’s residents, catalysing reconnection with the natural world, galvanising deep and sustained community action and achieving a range of social, economic and environmental impacts on the town and its population.

IET’s simple and engaging model involves multiple stakeholders, empowers local residents, organisations and businesses, and ensures joined-up action that has demonstrable value and

ensures the effective translation of ideas into practical action. IET has shown a commitment to bottom-up and inclusive ‘people power’, making things happen by harnessing supporters and volunteers and building a proactive ‘can-do’ culture. Drawing on findings, the presentation argues that IET used food not only as the focus for growing, education and business development, but also as a common language to engage people and provide a powerful leverage point enabling them to reimagine place and public realm, and use local action to address global sustainability challenges.

A framework to assess where and how children connect to nature

Matteo Giusti, Ulrika Svane, Christopher Raymond and Thomas Beer

This speech discusses a toolbox that guides the assessment and monitoring of places and experiences in which children form their human-nature connection (HNC). A sequential mix of qualitative and quantitative methods constitutes the development of this toolbox.

First, I interview professionals in the field of connecting children to nature (N=26) about what human-nature connection and connected children are, and then I validate these results with an online survey with another set of professionals (N=275).

The results highlight three overarching principles for HNC: (a) significant nature experiences are various and with differing consequences for children’s HNC; (b) children’s HNC is a complex embodied ability, and (c) children’s HNC progresses over time through diverse nature routines.

Specifically, professionals identify 10 abilities of children’s HNC that are progressively learnt in three phases. The first HNC phase is being able to be IN nature and the distinguishing abilities are: reading natural spaces, acting in natural spaces, feeling attached to natural spaces, knowing about nature, and relating to nature. The third HNC phase is being able to FOR nature; i.e. taking care of nature, caring about nature, and being one with nature.

Additionally, 16 qualities are identified as markers of nature experiences that significantly promote these abilities. The 16 qualities are; entertainment, thought-provocation, intimacy, awe, mindfulness, surprise, creative expression, physical activity, engagement of senses, involvement of mentors, involvement of animals, social/cultural endorsement, structure/instructions, child-driven, challenge, and self-restoration.

Altogether these results are used to produce the Assessment framework for Children’s Human Nature Situations (ACHUNAS). ACHUNAS shows what to quantify or qualify when assessing where and how children connect to nature.

Methodologies and frameworks for collaboration (3.4)

This session offers multiple potential answers on how to design methods and frameworks for collaborative transformation oriented research to leverage their transformative potential. Propositions include design principles to be followed when applying an idealypical transdisciplinary process.

Session Chair: TBA

Format: Talks and world café
Room: 40.146

Approaching problem-oriented transdisciplinary sustainability research based on design practice

Esther Meyer and Daniela Peukert

In this article we link two terms to develop a figure of thought for transdisciplinary sustainability research. The concepts are, on the one hand, the problematic, which has been constituted in twentieth-century French philosophical theories. This concept goes beyond an understanding of problem, which is limited to problem-solving as a normative target. On the other hand, we propose design as a creative and planning practice. Our approach departs from a previous discourse-analysis that highlights solution orientation of problems as a central component in the discourse of sustainability sciences contextualized in the German and English speaking Europe. It also shows that, despite an ubiquitous appeal to multi-perspective identification of problems, the transdisciplinary approaches found in the discourse are unable to break down an objectivist, passive and narrow view of problems. A concrete starting point for (re)conceptualizing problems in transdisciplinary sustainability research is found in the French philosophical tradition of the problematic.

We consider life as a permanent state of being in the making, keeping contact with a particular environment, in which the design is both a proposal and a solution. Design has both a reflexive, open character as well as an enclosed nature, which is based on its object characteristic. Design embodies process as well as product. Ideally, an idea of the possible manifests itself in the design, leaving at the same time enough room for interpretation and further development.

Against the background of problem orientation of transdisciplinary sustainability sciences and its externalizing, enclosed solution thinking, we would like to stimulate design as a practice in discussing the ethical application of the epistemological figure of the problematic for a transformative transdisciplinary sustainability research.
Moving beyond complex system understanding to transformation knowledge: design principles from a case-study in Transylvania, Romania

Andra- Ioana Horcea-Pițică, David Lam and Daniel Lanz

Both within science and society transdisciplinary approaches are increasingly expected to meet the research requirements engendered by today's sustainability challenges. Often transdisciplinary research is structured in three core phases: a) problem framing or formation of a common research object; b) co-creation of research projects generated by field studies to transformation knowledge. Based on a concrete case-study in Transylvania, developed in eight years of place-based social-scientific research addressing the sustainability transformation challenge in Transylvania, we bring together our learned experience with translating the model of an ideal-typical transdisciplinary process into practice. Our case-study builds upon a solid system understanding generated during the first five years of this research engagement in the area. First, we illustrate how we carried out each phase, providing descriptive examples of how it played out on the ground. Second, we propose new complementary, empirically informed design principles that add nuance and depth to existing ones, or break them into more detailed subphases. For example, we introduce the notion of Phase 0, or initiating phase. Despite the guidance for the core transdisciplinary process, its initiation often remains an uncharted area due to its heavy context dependency. Implications for sustainability transformations: By revisiting the conceptual model of Lang et al. (2012) we: i) further enhance the practice of transdisciplinary sustainability research; ii) turn the initial set of design principles into evidence-based ones; iii) lever the transformative potential of transdisciplinary research while considering its limitations.

The experimental turn in sustainability research – how scientists deal with new and conflicting roles

Martina Schäfer, Emilia Nagy and Gabriele Wendorf

Experimental modes of research are gaining importance in transdisciplinary sustainability research as a possibility to deal with uncertainty regarding transformative change. Several authors stress that a new orientation of transformation oriented research is needed, which combines being open for new insights based on experiments by – at the same time – considering unintended effects and possible risks. In contrast to scientific laboratory experiments, design, results and effects of 'real-world-experiments' cannot be completely controlled. This has crucial implications regarding (social) risk assessment. As the findings of 'real-world-experiments' are unique, context-sensitive and depending on various factors, it is challenging to generate results which can be transferred beyond the context they were produced in. The paper compares different projects of sustainability research at the Center for Technology and Society regarding the potentials and challenges of experimental elements in transdisciplinary research. It analyses the role scientists have in initiating and designing experiments, the measures taken to assess and prevent risks and how scientists deal with conflicting demands from scientific and life world partners. We found that scientists are expected to act as supportive advisers as much as scientists in the role of analysing, systematising and producing new knowledge. They are usually regarded as knowledge holders for any sort of question that might arise and even face the demand of all stakeholders that their process go on after the end of the project. Scientists are under pressure to develop complementary competences to be able to cope with the challenges in the experimental formats. New concepts for sharing tasks and responsibility with practitioners could enable them to focus on their core task - the production for transformation. Implications for sustainability transformations: Science can only play a constructive role in transformation processes if it reflects its responsibilities and roles and brings in its specific strengths.

From place to emplacement: The scalar politics of sustainability

Elisabeth Barron, Laura Hartman and Frederik Hagemann

Sustainability has emerged as a central concept for discussing the current state of the human-environment system and planning for its future. To delve into the depth of sustainability means to talk about ecology, economy, and equity as fundamentally interconnected. However, each continues to be colonized by normative epistemologies of disciplinary sciences, neoclassical economics, and development, suggesting that with enough science, and with markets in ecosystem services, a more equitable sustainability is achievable. In analysis, place emerges as an alternative epistemology through which to analyze sustainability. Place exists at multiple spatial and temporal scales, understood through direct observation of boundaries, processes and patterns, phenomenologically through individual experience, and as a complex hybrid: always emerging through interactions among individuals and institutions. Despite the ubiquity of place in the socio-ecological literature, a unified conceptual framework to systematically understand sustainability by examining changes 'in place' is lacking, and in much as sustainability happens or does not happen in real places rather than in policies and models, a place based sustainability framework is necessary to move forward. To address this gap, we developed the emplaceme framework, consisting of four domains: displacement, misplacement, replacement, and emplacement. Each domain is dynamic, constructing place as praxis, and reframing sustainability as a site of collective inquiry and choices. Our goal is to root transdisciplinary, place-based research and engagement in political economic, social, natural, historical and ethical elements of sustainability by repositioning scholars in community and building informed networks of sustainability at livable scales.

Implications for sustainability transformations:

The emplacement framework grounds the quest for transformational solutions in real places and diverse stakeholder communities. It answers the call set forth by Abson et al. (2017) to "assess the ways in which knowledge is compiled and integrated; and whose knowledge is legitimized and counts to what extent." (36).

Case-specific design of deliberate transformation processes towards sustainable food systems

Johannes Halbe and Claudia Pahl-Wostl

Sustainability transformations require broad societal change ranging from individual behavioral change, to community projects, businesses that offer sustainable products as well as policy-makers that set suitable incentive structures. Concepts, methods and tools are currently lacking that help to explore such diverse interactions of actors, as well as help to find strategies to actively facilitate sustainability transformations. This contribution presents a methodology for the analysis and design of case-specific transformation processes. Sustainability transformations are understood as the deliberate implementation of sustainability innovations (e.g., practices and technologies with sustainability benefits), which require learning at multiple societal levels (i.e., individual, group, organizational and policy levels). Supportive factors of learning are practical leverage points for the implementation of sustainability innovations. These learning factors can take the form of knowledge (e.g., skills), institutions (e.g., a piece of legislation) or operational aspects (e.g., infrastructure). The methodology combines an expert and participatory approach to identify learning factors and to examine those relevant in specific cases: 1) a systematic literature review of supportive and impeding factors of learning; 2) a participatory modeling approach to identify case-specific sustainability innovations as well as related implementation barriers, drivers, and actor roles; and 3) a governance system analysis to operationalize these findings by designing case-specific transformation processes as a sequence of action situations. A case study on sustainable food systems in Southwestern Ontario is provided that demonstrates the potential of the methodology to design case-specific transformation processes and to identify potential transformational changes within the food system. The methodology allows for the identification and analysis of case-specific intervention points for sustainability transformations at multiple societal levels. The methodology furthermore permits the analysis of interplay between individual, group, organizational and policy actions, which is a first step towards their coordination.
Holistic Management as a leverage point for complex adaptive rangeland systems

Wesley Tourangeau and Kate Sherren

The grazing of livestock on rangelands for meat and wool now borders the terrestrial globe, representing the most extensive form of land use on the planet. Poor management of rangelands stimulates global environmental changes such as desertification and losses in biodiversity and carbon sequestration. A long-standing debate in rangeland science and management is on the utility of rotational grazing (moving livestock between two or more sections of rangeland) for improving grass cover and preventing land degradation. This debate represents a rift between scientific (experimental) and farmer (experiential) knowledge. Some are calling for ‘complex adaptive systems’ approaches that integrate these disparate knowledge sources—arguably a paradigm shift for rangeland management, though challenges with pairing conflicting knowledge sources persists. Meadows sees the shifting of underlying paradigms that guide systems as among the most important leverage points for actions and lasting change. We argue that Holistic Management (HM) is an overlooked tool for creating paradigmatic transitions at the farm level. HM is a method of livestock production that typically uses intensive rotational grazing techniques to carefully balance grazing and recovery times. Such practices are HM’s most prominent and contentious aspects. Beyond a prescription for coordinating grazing, HM is also a means for specifying farm-level goals: it combines improved ecosystem management (e.g. onboarding climate risks) with considerations for economic well-being, relationships, and overall quality of life. Farmers who adopt HM are not just managing differently but are thinking in systems, and thus matching their production to their landscape and context. Synthesis from ongoing research in North America, Australia, and the Falkland Islands is used to demonstrate the value of farmer knowledge in systems-based approaches to rangeland management.

Implications for sustainability transformations: We argue that the wicked problems themselves cannot be bounded, which makes them hard to analyse. We propose to focus on the analysis of ‘wicked food system solutions’, i.e. interventions that have been proposed to address food system challenges (e.g. dietary change, reductions in food waste or organic agriculture), but that showcase numerous typical wicked characteristics themselves. Focusing on wicked solutions thus allows to clearly delineate the system for analytical purposes. We then propose a tool to assess a range of wicked dimensions of the ‘solution’, which in turn helps to prioritize certain steps in the knowledge creation process to best address the wicked characteristics identified. Finally, we outline seven principles of best practice for including wickedness in food system research, which can help researchers of any type to improve knowledge systems so they can better contribute to societal transformation.

Overcoming undesirable resilience in the global food system

Tom Oliver, Emily Boyd, Kelvin Balcombe, Tim Benton, James Bullock, Deanna Donovan, Giuseppe Feola, Matthew Heard, Georgina Mace, Simon Mortimer, Richard Nunes, Richard Powl and Dominik Zaum

The current configuration of our global food system is undermining many of the UN Sustainable Development Goals (UN SDGs), leading to calls for major food system reform and transformation. However, our knowledge regarding food system transformations is fragmented and this is hindering the development of ‘un-ordinated solutions’. Concurrently, other science-policy and business initiatives call for a food system more resilient to economic and environmental shocks, for example by improving the economic resilience of current supply chains. Prioritisation of short-term security to a subset of vested interests, however, can undermine the resilience of longer-term beneficial outcomes for society. In this presentation, we advocate a more inclusive and farsighted approach focusing on the resilience of positive outcomes for the whole of society, i.e., capturing the aim to promote resilient delivery of multiple UN SDGs. A significant challenge is to prioritise suites of interventions that can effectively transform the global food system to deliver these goals.

Implications for sustainability transformations: We show how a transdisciplinary lens can be used to identify ‘lock-in’ mechanisms that span four key areas—knowledge-based, economic/regulatory, sociocultural and biophysical constraints—which will help avoid ineffective siloed solutions to food system reform. Furthermore, emergent system dynamics need to be considered using a more holistic approach. We highlight the importance of well-coordinated actions on multiple leverage points during windows of opportunity for food system transformation.
Unpacking resilience in local and global food systems research: The power of narratives in shaping pathways and solutions to achieve global goals

Cibele Queiroz, Line Cordon, Rebecka Chaplin-Kramer, Elena Bennett, Barbara Frei, Deborah Bossio, Erik Andersson, Matti Kummu, Charlotte Weí, Elín Róös, Dave Abson and Roseline Remans

Transformative change of food systems is needed to meet global sustainable goals, including curbing escalating malnutrition, and reducing climate impact. While this need for transformation of food systems worldwide is now evident, a wide diversity of narratives highlights very different (and sometimes conflicting) perspectives on what the main problems are, and what types of interventions would be required for achieving a sustainable and resilient global food system that can navigate through future uncertainty. In this paper, we conducted an extensive literature review of 103 papers on features of resilience in food systems, and analyzed how the different properties of resilience are highlighted by the different papers and how this is shaped by five variables: the type of narrative of the paper, scale (local, regional or global), focus on social or ecological properties of the system, part of the food system assessed (production, distribution and consumption), and empirical vs non-empirical focus of the research. We performed a Multidimensional Scaling statistical analysis and a PerM_ANOVA to explore the distribution of the different papers based on the resilience features they highlighted and the particular effect of each variable. Our preliminary results identified a total of 45 features of resilience across all papers. Most features were highlighted by papers at all scales but a higher average number of features was reported by papers with a local focus. Still, we found no statistical significance for the effect of scale on the type of features reported by the different papers. Instead, we found a significant effect of empirical vs non-empirical focus of the research and the type of narrative. Understanding this complexity is essential to overcome the so far fragmented views on the challenges and solutions for fostering long-term resilience of sustainable food systems.

Sustainability solutions and innovations (3.6)

This session focuses on generating solutions to wicked sustainability problems, with a focus on innovation processes, technology, the identification of social tipping points, stewardship, and nature-based approaches. The talks address solutions in the context of ecosystem services, climate change and universities as hubs for innovation.

Session Chair: Zuzanna Harmackova
Format: Talks and world café
Room: 40.255

Toward ranking interventions for Technological Innovation Systems via the Leverage Points concept

Alco Kieft, Robert Harmesen and Marko Hekkert

The Technological Innovation Systems (TIS) approach is a widely used conceptual framework to find ways for stimulating technological innovation. This framework was initially developed to analyze specific technologies, or groups of technologies, it is developing into a framework that analyzes the role of technological innovation in broader sustainability transitions. The TIS-framework prescribes that interventions should be focused on alleviating systemic problems that cause unsatisfactory system performance. There are clear guidelines available to identify these systemic problems and formulate options for intervention that may alleviate them. However, the TIS-framework is less developed in relation to choosing between the often numerous possible intervention options and deciding on how to combine them into a coherent set. In other words, although it is a well-developed problem identification framework, it is not yet an intervention formulation framework. This paper finds inspiration in a ranking that relates to the lever point concept from System Dynamics. It explores similarities and differences between System Dynamics and the TIS-framework and subsequently proposes a ranking that fits the TIS framework. The criterion is helpful to inform the choice between different types of intervention options for a TIS, and for creating coherent intervention sets. The proposed TIS-ranking is illustrated by two intervention sets aimed at improving the energy-efficiency of existing houses in the Netherlands. Implications for sustainability transformations: explore where two prominent theoretical frameworks relevant for sustainability transformations complement each other (and differ), a contribution that brings the TIS-framework a step closer to being not only a problem identification framework but also an intervention formulation framework.

A payment by any other name: Reimagining Payments for Ecosystem Services as Stewardship Support in Costa Rica

Mollie Chapman, Terre Satterfield, Hannah Wittman and Kai M. A. Chan

Debates about Payments for Ecosystem Services (PES) center around the promise (according to some) and peril (according to others) of conservation as a transaction. Many of the extensive and well-reasoned theoretical debates about the impacts implicitly assume that PES programs are understood as such by participants—as transactions of payment for service—but research has not investigated the perceptions of PES by those involved. We studied Costa Rica’s famous PES program in the traditional cattle ranching region of Guanacaste via 43 in-depth interviews with program managers, local experts and PES participants. We found substantial differences in the ways that different groups understood the payments and their purpose. Whereas the head office saw the program as simple financial transactions (and emphasized the economic value of nature), most participants saw their payments as a type of help or assistance (and emphasized the relational value of nature). This finding—that market logics did not fully transfer from program leadership to local managers to act as facilitators for transformative change—is explained and discussed e. g. the “diffusion of responsibility” and the "not invented here-syndrome".

Finally, suggestions on how to overcome these barriers are outlined, focusing on specific methodological examples for promoting a transformational culture within universities. Particular tools are introduced e.g. the “Synonym Barometer for sustainability” or the “ATIS-model” as a scheme of analysis for actions of sustainability in vocational contexts are introduced. Overall, this presentation introduces tools and methods for changing the intent and design of higher education institutions in order to generate and strengthen transformational processes towards sustainability.

A database of sustainability solutions: implementation, application, findings

Helke Zimmermann, John-Oliver Endler, Esther Kohlhase, Fiona Köhnke, Teresa Russell, Henrik von Wehrden and Daniel Lang

Currently there is a plethora of literature on existing sustainability solutions, but they are not systematically codified and made available in an easily accessible format. To address this gap, a database of sustainability solutions has been developed. This database includes solutions from various domains such as energy, transportation, building, agriculture, and industry. The solutions are classified according to their impact on social, economic, and environmental sustainability. The database also includes information on the implementation and application of these solutions. This will help to identify gaps in the availability of solutions and inform the development of new solutions.

Sustainability at German Universities: The University of Hamburg Study for Sustainability-Oriented Organizational Development

Claudia Schmitt and Sophie Palm

The Center for a Sustainable University (Kompetenzzentrum Nachhaltige Universität – KNU) at University of Hamburg (UHH) is an interdisciplinary institution wherein various university stakeholders work together towards transforming the UHH into an “University for a Sustainable Future”. Thus, it is an example for addressing transformation processes of sustainable development and for a place where interventions can lead to transformative change. Moreover, the UHH Center for a Sustainable University is a field of application for sustainability-oriented organizational development.

In this presentation, the UHH Center for a Sustainable University is introduced and serves as a case study: First, linkages and parallels between sustainability and innovation processes as well as the benefits of organizational development for sustainability as working domain are illustrated. Second, opportunities and challenges arising from the concerns of sustainability-oriented higher education institutions development and re-structuring institutions for transformative change are defined. Especially, different sustainability-oriented transformational change are explained and discussed e. g. the “diffusion of responsibility” and the “not invented here-syndrome”.

Finally, suggestions on how to overcome these barriers are outlined, focusing on specific methodological examples for promoting a transformational culture within universities. Particular tools are introduced e.g. the “Synonym Barometer for sustainability” or the “ATIS-model” as a scheme of analysis for actions of sustainability in vocational contexts are introduced. Overall, this presentation introduces tools and methods for changing the intent and design of higher education institutions in order to generate and strengthen transformational processes towards sustainability.
The role of local initiatives in leveraging change (3.7)

Local sustainability initiatives may play an important role as arenas for transformative action and incubators of social innovation towards more far-reaching sustainability transformations. This session unites different perspectives and examples of local initiatives and highlights their potentials as leverage points for transformative change.

Session Chair: Pedro Macedo
Format: Talks and world café
Room: 40.254

Establishing processes and spaces for the emergence of sustainable practices – the social innovation labs approach
Eva Wascher

Social Innovation, understood as innovation in social practices, plays an important role for the transition towards sustainable development. (New) social practices can show themselves in various forms such as car-sharing, alternative currencies or ecovillages. Social innovation starts with a new practice exercised by a small group of people and eventually becomes institutionalised as a broadly shared social practice. One way of systemically developing new social practices is to use the social innovation labs (SI lab) approach. The term SI lab is used to characterise a variety of different organisational forms and methods with the intention to create practice inventions (e.g. social entrepreneurship hubs, public policy labs, change labs). Hence, social innovation labs can be characterised as a new infrastructure for stakeholder collaboration. They are applied especially for problems where direct responsible agents are hard to identify and cross-sector collaboration is a prerequisite for finding possible solutions, because a variety of actors have a stake in the problem. This is one possible starting point for the development and introduction of sustainable practices in a certain context.

From ideal concepts of SI labs to the empirical findings in our 14 international case studies certain challenges are getting visible. For example, SI labs as a new organisational mode with distinct new working practices around co-creation, human-centred design etc. have to find legitimisation for the way that they think solutions are best created. Depending on the institutional setting in which the lab is situated, including differing institutional logics, acknowledgment for the “appropriateness” of SI labs is achieved to a greater or lesser extent. Implications for sustainability transformations: SI-Labs are a meaningful instrument of collaborative (urban) governance as an enabler of cross-sector cooperation which creates innovation that is directed towards sustainable transformative change.
networks. Since the Earth Summit in Rio in 1992, where the need for inclusive approaches to sustainable development was emphasized, governments have also started to establish long-term advisory councils dealing with issues of sustainable development. While these councils focus on mainstreaming sustainability concerns in a more general sense, other advisory councils focusing on specific topics related to sustainability (e.g., food) emerged as well. Over the last decades, the number of food policy councils (FPCs) has increased. Originating in the US and Canada, FPCs have recently been founded in Europe as well. In Germany, for example, the first councils were formed in 2016 while many civil society initiatives throughout the country are planning to found FPCs in the near future. The analysis will be based on a case study about the emergence of one of the first food policy councils in Germany in the city of Oldenburg, Lower Saxony. By disentangling aspects such as design, composition and legal status, we will develop a better understanding of how advisory councils might be crucial to the transformation of our (food) systems towards sustainability.

Leverage points for institutional change in urban fringe areas: Experiences with problem- and stakeholder-driven approaches in Bangladesh and India
Leon Hermans and Sharlene Gomes

Institutional research typically focuses on relatively stable patterns of social interactions and looks at structures of connected, nested, and partially overlapping rules. We argue that the identification of meaningful points of intervention, leading to transformative change, requires a problem-oriented view on institutions. In such a problem-oriented view, one moves outward from a given collective action point to identify the relevant institutions that impact on its outcomes.

The need for such a problem-oriented perspective is especially present in urban fringe areas. These are the areas at the transition between urban city centres and their rural hinterland. In rapidly developing countries in South Asia the changes in these urban fringe communities are so vast, fast, and uncontrolled that many of the existing institutions may be considered redundant and outdated at the same time. Also, many of the conditions required for functioning institutions are violated – actor constellations are heterogeneous and constantly changing, and there is no expectation of a collective memory for monitoring and enforcing rules.

Yet, often, it is in such environments that we will need to look for leverage points for transformations. In our contribution, we will share insights and ideas for how to do this with local stakeholders. Local stakeholders are the ones who can best identify, try, and re-try feasible institutional changes – building towards the leverage points for larger scale transformative processes. In the past four years, we have explored the participatory applications of institutional analysis, game theory and gaming elements to address water management problems in urban fringe areas in Bangladesh and India. In the coming years, we will be incorporating notions of adaptation pathways as methods to help local stakeholder navigate institutional complexities

Implications for sustainability transformations:

Insights and methods for the participatory identification of institutional leverage points in highly dynamic peri-urban areas.

Re-structuring relations between community-based initiatives and public bodies - How public funding influences community-based initiatives in Germany
Anna Betsch and Markus Egermann

Community-based initiatives (CBI) engaged with social innovations are increasing and are sites of new ways of doing, knowing, organizing and framing (Haxeltine et al. 2017). Hence CBIs are considered to be one of the entities that generate the social and technological change required for sustainability transitions (Seyfang & Smith 2007; Seyfang & Haxeltine, 2012; Rücker-John 2013). Recently scientific interest has turned to politics of community-based sustainability transition, primarily policy and juridical frameworks influencing the organisation and management of CBIs (Taylor Aiken 2014, Creamer 2015; Dinnie & Holstead 2017, Fischer et al. 2017).

Only a few studies have systematically explored how CBIs engage with public bodies and what kind of effects public funding schemes have on the CBIs. Scholl & Gossen (2017) show, that current environmental policy and respective funding schemes in Germany are judged as not favorable for CBIs and for fostering social innovation. In the frame of a research project (funded BMU/UBA Germany) attention is turned to the understanding on how environmental policy and respective funding schemes can promote, foster and encourage CBIs. Based on 26 semi-structured interviews with CBIs and intermediate actors involved in funding schemes and workshops with CBIs and funding bodies the research offers empirical insights into the usefulness and shortcomings of federal environmental policies and its funding schemes.

Results show that funding schemes need to respect much better the needs of CBIs, e.g. in regard to innovative organizational forms, voluntary commitment or the understanding of common welfare. Beside others, intermediate structures and actors as well as forms of co-production between CBIs and public bodies are crucial to couple public funding schemes and social innovation actions of CBIs.

The implication for sustainability transformations is that a meaningful design of public policy and funding schemes can unlock the innovation potential of CBIs to accelerate sustainability transitions.
Transdisciplinary perspectives on land use issues (3.9)

This session presents the results of a collaborative experiment (learning-by-doing) that seeks to develop stronger bridges of understanding between natural and social sciences in the-often top down, natural science focused-field of Land Use Science.

Session Chair: Cristina de la Vega-Leinert
Format: Workshop/special session
Room: 40.175

"Addressing socio-cultural change" – relevant insights on migration dynamics, emergence of new hybrid communities, social conflict and/or impacts on livelihoods and land use

Cristina de la Vega-Leinert, Jörg Priess, Jahi Chappell and Kirsten Thönische

Land Use Science is a powerful approach to detect, analyze and compare land use and cover (LULC) transformations, and investigate underlying driving forces and potential impacts over nested scales. It has rapidly gained weight at the science-policy interface. However, it often produces policy recommendations that are primarily based on top-down, natural science-based quantitative approaches, which tend to be socially blind by ignoring history, governance, ethnicity, gender and power, to name but a few critical dimensions that affect LULC. Land Use Science needs to incorporate a number of social science perspectives, which have a long tradition of addressing complex social-ecological processes that drive and result from land-use transformations fruitfully. Conversely, social sciences such as political ecology, cultural geography, critical agrarian or gender studies, anthropology, history, political sciences, may tend to forget the importance of materiality and end up having little relevance for spatial studies. We argue that Land Use Sciences has the potential to develop stronger bridges of understanding between natural and social sciences, quantitative and qualitative approaches, theoretical, empirical and participative methodologies to encourage innovative, hybrid research.

To address this gap, we launched a collaborative project to reflect, discuss and perform cross-fertilisation between disciplines in a learning-by-doing approach. This is centred on two on-going special issues of the Journal of Land Use Science, which analyse current socio-ecological, economic, political/administrative and cultural transformations at extractive and agrarian frontiers in Latin America. This writing process was supported by a workshop, in which a core group of interdisciplinary authors co-developed a research agenda and identified clusters to synthesise emergent insights. This session presents preliminary results of this collaborative experiment. Implications for sustainability transformations: true transdisciplinary implies accepting to trust that each source of knowledge has a significant role to play in the collective understanding of socio-ecological change and the construction of sustainable paths.

The session will include the following presentations:

Cristina de la Vega-Leinert: "Incorporating new digital technologies in ULUC" relevant insights on how to combine smartphone-based tools to identify, support and develop transformative pathways in agricultural frontiers and elsewhere.

Jörg Priess: "Making transdisciplinary research on extractive frontiers" – relevant insights on how to guide policies towards food security, sustainability, and biodiversity conservation.

Jahi Chappell: "LULC modelling of Latin American extractive frontiers" – relevant insights that can improve state-of-the-art narratives, scenarios, drivers, processes, indicators and scientific application

Kirsten Thönische: "Addressing socio-cultural change" – relevant insights on migration dynamics, emergence of new hybrid communities, social conflict and/or impacts on livelihoods and land use.

Local and embodied knowledge for sustainability (3.10)

This session engages with community values and embodied knowledge, learning and practice as key levers for transformative change and resilience. Talks address issues related to collective agency, community knowledge, multiple evidence bases, sense of place and regional identity.

Session Chair: David Lam
Format: Talks and panel discussion
Room: 40.256

The community monitoring brigade as a green employment alternative towards environmental governance

Iskra Rojo and Maria Perevochtchikova

The Conservation Land (CL) of Mexico City, Mexico is the area designated for the conservation and use of nine original communities (pre-Hispanic origin) as owners of the territory and a great biological, historical and cultural wealth. The Community of San Miguel and Santo Tomas Ajusco have a number of problematic socio-environmental characteristics of the entire CL and, one of their main demands inadequate and conflicting environmental policies. In addition several studies identify the limitations of such policies as: unemployment, high income in illegal activities, low public accessibility and type of views of government institutions and other actors, absence of inclusion, participation and consultation of communities and their needs. The objective is to show how the establishment of the community brigade in Ajusco for environmental monitoring like a green employment proposal, which could focuses and improves conservation policies; because the design and implementation is carried out by the community together with other actors and in articulation with the existing scientific knowledge. The analysis framework was Socio-Ecosystems (SES), especially in environmental governance and local sustainability. The methodology formed the emergence, establishment and operation of the community brigade and environmental monitoring with a mixed methodology through interviews, surveys, participation processes, discourse analysis and documentary in the period of 2012-2018. The results show that the need for jobs can be with green jobs (good quality job, recognized and trained) through the community brigade and with tasks such as monitoring in conjunction with governmental, social and academic actors. The scope and conflicts of green brigade and employment as well as the interrelationships of SES implicit in this process of environmental governance under construction are also observed. Even with the most pessimistic scenarios within the Ajusco community, green occupations associated with the brigade are a possible start to environmental governance and local sustainability.

Valuing Community Embodied Knowledge to Re-connect People and Nature

Laura Donkers

Community embodied knowledge is a valuable leverage point in fostering transformative change and sustainability in remote communities. It exists where people know each other through familial and experiential ties; are attached to their place/environment/land; and, utilise intergenerational knowledge to understand their own existence.

This research aims to identify the value of existing community embodied knowledge as a deep leverage point to reconnect people and nature.

A food-growing initiative was designed to provide co-learning opportunities for the community to set up and run growing hubs exploring the potential of practical wisdom to improve climate literacy and reduce carbon emissions.

The Grow Your Own Community Project based in the Outer Hebrides, Scotland is funded by the Scottish Government's Climate Challenge Fund and run by a local organisation. During 2017-18, CO2e was reduced by 38.94tonnes, through increased growing of fruit and vegetables, and by 19.73tonnes, through reusing fish farm waste. The project provides young families with communal growing facilities; promotes adaption measures and low carbon behaviours by working with local organisations and businesses to create demand and capacity for locally produced food; supports crofters to increase production of ‘Machair Potatoes’ through providing storage facilities and delivery services; develops community resilience and self-sufficiency by delivering practical workshops using local knowledge to improve carbon literacy and reduce waste by teaching the use and reuse of local resources i.e. repurposing redundant fish farm structures.

Embodied knowledge enables interactions between explicit and implicit knowledge, linking to ethical domains (e.g. Aristotle’s term phronesis), which are key to shifting mindsets at the harder, but more impactful ends of Meadow’s leverage spectrum. Bringing us to the deeper kinds of change she highlights as being difficult to achieve, profoundly shaping/shifting systems.

Implications for sustainability transformations:
Communities who value practical wisdom are invested in developing a sustainable future for their own community.

Northern Australia has resisted attempts at agricultural transformation for two centuries: can landscape literacy help create pathways to sustainable transformation?

Kathryn Andrews

With increasing international food security concerns and push for development in Australia there is revival in discussion of the great 'untapped' agricultural potential of northern Australia. The tropical savannas of Northern Australia cover an area larger than 1.5 million km², the majority of which is Indigenous land.

Failed attempts at cropping have accumulated over 200 years, with ambitious American entrepreneurs losing millions, families walking off farms, and Indigenous and Indigenous Australians being further marginalised. Despite governments investing millions of dollars supporting agriculture the huge region has countered the international trend of agriculture intensification; expected transformation and broad-scale cropping has not occurred.

A frontier mentality including a blindness to history, culture and environment contributed to regular failed attempts. Parallel have been alternative approaches seeking sustainable development across the north. A sustainable transformation that relies upon acknowledgement and learning of the area as a cultural landscape, and a coming to terms with place.

Examples of a lack of comprehension of the northern landscape are legion; whether by an imposition of European then southern Australian assumptions, a blaneking of the north with a fictional homogeneity, or naive ignorance of place. Understanding the northern Australian landscape requires recognition that it is a cultural landscape, a result of tens of thousands of years of culture and law, with intricate, intimate land and sea management. Cultural landscape literacy brings three things: acknowledgement of Indigenous knowledge of country and respect for this knowledge domain, better understanding of country, and the capacity to create sustainable opportunities for the future. Implications for sustainability transformation: We see in northern Australia the stark distinction between 'perception of place' and 'relationship with place', a shift required to create inclusive equitable pathways for sustainability transformation. Landscape literacy can create connection and a leverage point for change.

Partnerships for transformations? Multiple evidence base dialogue as leverage points

Maria Tengö, Pernilla Malmer, Beau Austin and Vanessa Masterson

In many cases, transformations for sustainability require partnership among actors that have a history of power inequalities, mistrust and even abuse. For example, conservation co-management agreements that addresses biodiversity as well as human well-being that builds on partnership between government, conservation organizations, and Indigenous peoples and local communities. Here we present lessons learned from a set of case studies where knowledge sharing and dialogue based on a Multiple Evidence Base (MEB) approach was a critical leverage point for building further partnership. MEB emphasizes complementarity, equity, and dialogues across diverse knowledge systems. Two of the cases concern developing place-based collaborative solutions to conservation challenges, in Australia and Kenya, and two cases are global dialogues linking local challenges to global conversations on co-production of knowledge among indigenous, local and scientific knowledge systems, and on synergies between human rights and conservation. We also draw on a review of 20 case studies implementing a MEB approach.

We find that sharing and joint processing of knowledge is a constructive entry point to partnerships that provided conditions for a widened understanding of the problems at hand, development of trust and strengthening of active participation, and improved partnerships through the recognition and revitalization of local knowledge systems and governance. The cases indicate that a MEB approach can be particularly effective in dialogues where there are power imbalances among actors and historical bias concerning the validity or usability of knowledge systems other than western science. Further, our cases suggest that mobilization of knowledge and empowerment of knowledge holders may be critical steps for successful knowledge collaborations that also contribute to strengthening local collaborative governance capacity.

Implications for sustainability transformation: acknowledging and engaging with actors as experts, in addition to their roles as stakeholders, can provide fertile ground for mutual respect and constructive partnerships for transformative change.

Recognizing the potential for and of transformative learning through existing resource and environmental governance systems

John Sinclair, Joanne Moyer and Glen Hostetler

In recent years, action on sustainability has been highly influential around the globe and many now recognize the importance of individual and social learning to achieving sustainability outcomes. An important subset of this literature has considered transformational learning, largely through application and use of Mezirow’s Transformative Learning Theory. Over the last two decades a small group at the Natural Resources Institute in Canada has contributed to this literature in a number of ways through empirical investigations that have considered openings/opportunities/spaces/platforms for learning within governance contexts such as: formal and community-based environmental assessment, water management and agricultural extension, local resource management committees, conservation and development, and participatory irrigation management. In all of this work we have applied, tested and contributed to key constructs of the theory such as the ideal conditions of learning and the domains of learning in order to better understand the linkages among participatory governance, individual learning and social action advancing sustainability. The purpose here is to share some of the learning outcomes, particularly the learning/action nexus. Various of these studies have established and identified opportunities to leverage governance towards sustainability that are associated with the potential for learning within the complex of participatory activities common in resource and environmental management systems.

Belmont Forum funding call open scoping session part 1

3.11

During this scoping workshop we seek to bring together funders and researchers to understand the potential priorities for research regarding SDG development pathways.

Session Chair: John Tewksbury

Format: Workshop/special session

Room: 40.704

scoping session part 1

Josh Tewksbury, Judit Ungvari-Martin and Maria Uhele

The Belmont Forum is an international partnership that mobilizes funding of environmental change research and accelerates its delivery to remove critical barriers to sustainability. We want to bring together transdisciplinary research teams comprised of natural and social scientists, and stakeholders from around the world to set targets and create pathways to achieve the Sustainable Development Goals (SDGs) that were unanimously adopted by all member states of the United Nations in 2015. These goals encompass a broad range of economic, social, and environmental dimensions of sustainable development and set specific targets for implementation.

The Belmont Forum and its partners recognize that we currently lack a truly integrated, comprehensive qualitative and quantitative understanding of sustainable development pathways that account for the inter-linkages between the economy, technology, environment, climate, and human development, and that anchor within the constraints of a sustainable Earth system. The viability of achieving these multiple social-economic-environmental planetary goals simultaneously needs to be assessed. To help provide a science base for achieving the SDGs, the Belmont Forum and partners are exploring integrated qualitative and quantitative approaches to develop transformation pathways for sustainable development. This challenge needs direct input from the international research community and stakeholders to discuss critical questions or issues around the topic.

During this scoping workshop we seek to bring together funders and researchers to understand the potential priorities for research regarding SDG development pathways. The desired outcome of the workshop would be walking away with knowing where we think the community is regarding research progress and current activities, and with an idea of the research that needs to be supported to meet those goals. This engagement can help directly gauge the research community’s readiness to address these research challenges; identify the need for further networking and community building.
# Forum Theater (3.12)

The Forum Theatre Workshop offers the opportunity for further reflection and deeper emotional insight into a conference’s issues and topics. By initiating a creative process between audience and actors, a theatrical performance is realised in which the participants can review their experiences.

**Session chair:** Susanne Mitterhuber  
**Format:** Workshop/special session  
**Room 40.176**

Forum Theatre is a type of theatre created by the innovative and influential practitioner Augusto Boal, one of the techniques under the umbrella term of Theatre of the Oppressed (TO). This relates to the engagement of spectators influencing and engaging with the performance as both spectators and actors, termed ‘spect-actors’, with the power to stop and change the performance. As part of TO, the issues dealt with in Forum Theatre are often related to areas of social justice with aims to explore solutions to oppression featured in the performance. The work of Augusto Boal is also inspired and based on the teachings of Paulo Freire.

Mag.a Susanne Mitterhuber, theatre teacher, trainer, clown and member of the playback theatre group SOG Theater, Wiener Neustadt, Austria. Conception, design and realisation of theatre projects with focus on reminiscence and biographical work, community theatre and violence prevention. Various playwritings and performances in art exhibitions as well as history museums. She uses the methods of the theatre of the oppressed as creative form of practice-oriented learning in work teams or training groups. Forum theatre is especially suitable to change perspectives on challenging situations and enable a playful try out of alternative options for action.

This session will be a preparatory workshop for the forum theatre performance on Thursday evening.
Education and learning for sustainability transformations (4.1)

This session focuses on the important role of innovation in education and learning in transformational change for sustainability. It explores approaches to systems thinking, navigating complexity, ontological fluidity and skills for inter and transdisciplinary thinking and reflexivity.

Session Chair: Matthias Barth

Format: Talks and panel discussion

Room: 40.146

Education as a Leverage Point for Sustainability Transformation

Petra Hansson and Susanna Barrineau

Agenda 2030 explicitly states that education plays a key role in achieving the sustainable development goals (SDGs) (UNESCO, 2016). The issues encompassed by the SDGs challenge universities to rethink approaches to research and education (Barth, 2014; Cortese, 2003; Lozano, 2006; Sterling, 2001). Subsequently, Education for Sustainable Development (ESD) demands a re-structuring higher education institutions (HEIs) implying changes in educational culture, teaching methods, and curricula (Wals & Corcoran, 2006; Wals, 2012).

This paper explores education as a leverage point for sustainability transformation and outlines a transactional perspective (Dewey & Bentley, 1949/2008, Rogoff, 1995) on institutional transformative change implying a view on individuals and educational environments as mutually constitutive. It aims to increase knowledge of how different circumstances, such as institutional preconditions for educational innovation, teachers’ experiences of transdisciplinary work, and teachers’ views of knowledge and learning, participate in learning processes and consequently participate in shaping institutional transformative change.

Within the context of HE, the ‘Change Project’ approach (Mandikonza and Lotz-Sisitka, 2016) attempts to respond to the crucial role of education for achieving sustainable development. The change project approach involves educators in a context-specific collective learning process based on ESD-principles. It is characterized by an iterative process with the aim of contributing to capacity building and reflection on the relation between education and sustainable development and societal change by, for example, engaging participants in developing sustainability key competencies and reflecting on their pedagogical implications (Wiek, Withycombe, & Redman, 2011).

The paper explores one failed and one ongoing change project as has been piloted in a Swedish HEI and, in the light of the results, the paper reflects on education as a leverage point that will have implications for sustainability transformations.

Education for Sustainable Development as a Leverage Point for Transformation—the WISE Experience

Mike Jones, Jan Cincera and Katarzyna Jwinski

Complexity and uncertainty require a paradigm shift in science, policy and practice that embraces inclusive and holistic approaches to problem solving as an alternative to the expert driven linear approaches favored by centralized governance systems. Education for Sustainable Development (ESD) that exposes students to systems thinking and the core competencies necessary for problem solving in an uncertain world, is a high level leverage point for engaging society in the process of transformational change required to deal with Anthropocene tipping points.

The Widening Interdisciplinary Sustainability Education (WISE) project, funded under the Erasmus+ Strategic Partnership project, aimed to build an international network of teachers and researchers to promote interdisciplinary thinking and create innovative tools for higher education that address the complexity of environmentally sustainable development. This presentation provides:

- an overview of some of the key systems thinking features of the lesson plans contained in the WISE handbook for ESD that is designed to expose students to the core competencies required to successfully navigate and influence change in complex systems and a participatory research evaluation of the experiences of the divergent group of university teachers and researchers assembled to collaborate in the development of the educational materials for the WISE handbook.

The proposed topic has strong implications for sustainability transformations, as the evaluation study of the interdisciplinary experience of the WISE team revealed issues related to the heterogeneity of the group including clashes of different perspectives, group dynamics issues, trust, and facilitation challenges. These findings illustrate the value of normative and interpersonal competences for navigating social complexity to create transformational change and the difficulties of applying high-level leverage points.

How do I get to know what I think to know? Introducing reflexive knowledge generation within Higher Education

Pascal Frank

Sustainability science (SS) was strongly influenced by Gibbons’ (1994) distinction between knowledge generation (KG) in mode I and mode II society. KG in mode I society mainly is an academic practice, led by experts with monodisciplinary backgrounds producing knowledge with a predictive potential for future developments. In contrast to that, in mode II society, knowledge is generated in a participative process including social actors from inter- and transdisciplinary contexts. Its aim is rather exploratory, looking for socially robust solutions to real world challenges instead of striving for epistemic certainty. Current SS is construed as an Inter- and transdisciplinary KG practice (Kates et al., 2001), a “mutual learning process” (Scholz 2000) in which different knowledge systems are reconciled and merged into a more complete understanding and solution of complex sustainability-related problems.

In my presentation, I argue that despite valuable contributions to the larger project of Sustainable Development (SD), both modes of KG are not sufficiently to provide the transformative knowledge needed for this endeavor. This is because they both omit to take the individual-cognitive part of KG processes systematically into account. They heavily rely on rational, discursive knowledge processing, although non-rational factors, such as emotions, motivations and unconscious assumptions, strongly influence the way we deal with explicit forms of knowledge (Frank, forthcoming).

I suggest to complement current KG practices with reflexive KG, describing research and educational practices in which the KG actors observe their way to deal with new information, arguments, facts etc. I will present experiences and research from related seminars offered at Leuphana University since winter semester 16/17. In order to promote a sustainability transformation through the production and communication of knowledge, so the implication of my presentation, a reflexive turn within KG is promising is indispensable, as it lays the grounds for more constructive mutual learning processes.

Re-thinking diversity and complexity in teaching: the use of models and games

Geeske Scholz

Transformative change needs agents with the ability to change perspective, take complexity into account, and function together as team with other agents with diverse backgrounds. This is important, as complexity and diverse knowledge and perspectives render discussions and decision making more challenging, making it necessary to question own assumptions and values.

While our most pressing problems are complex or ‘wicked’ in their nature (e.g., climate change), implying the need to take diverse perspectives and different types of knowledge into account, students are rarely prepared with skills helpful to do so. Most study programs do not consider complexity nor diversity or gender studies. But, to invest in transformation, education matters, and we should worry about how to diffuse sustainability transformations knowledge and skills in our educational systems.

Even when interdisciplinary work and perspective change are taught in theory, this does not mean that students will be able to apply it later. Serious games and role plays are ways to tackle this challenge. Through project based learning students can make the experience to cooperate in a team, using the diversity of students as a resource (instead of seeing it as an obstacle to overcome). Gamification, on the other hand, can be used to create motivating settings in which diverse teams of students interact. I want to present experiences with two different courses taught at German Universities, that used the diversity of students and gamification to establish motivating and inspiring learning environments allowing students to develop some of the skills needed to act as transformative change agents. Education is essential to building transformative capacity. This talk is aimed at starting a discussion around challenges, experiences, and lessons learned when using the diversity of students as a resource to enable the experience.
of complexity and change of perspectives in a game setting.

Creativity Methods and Serious Play as Tools for Leveraging – Transformation of higher education institutions

Claudia Schmitt and Cordula Rüth

A vision for a sustainable future needs new perspectives – in technology as much as in science and methodology. Methods that foster creativity and promote “out of the box” thinking, like serious play, for example, allow to find different angles to problems, and therefore new perspectives for solutions.

The HOCH-N-project aims to facilitate a sustainable transformation of the German Higher Education landscape, by forming a network to exchange experiences and by researching transformative potentials in the fields of reporting, governance, education, research, operations, and transfer, as well as on the intersections of these fields. By using serious play and other creativity methods the HOCH-N-community incorporates transformative and innovative thinking into its research processes, while also gathering insight on how these tools can be used best. In this presentation we will explain the concepts and ideas of different methods like serious play, narrative techniques and others, and report on our own experiences and evaluation in our work. We consider creativity, serious play and other tools as valuable leverage points to initiate positive change.

Governance of Sustainability Transitions (4.2)

How to bring about and govern sustainability transformations? This is one of the pressing questions of sustainability sciences. The contributions of this session approach this question through diverse perspectives and bring together insights into the role of governance as a leverage point for sustainability transformations.

Session Chair: TBA

Format: Talks and world café
Room: 40.153

Can planning support urban transformations? Insights from a global inquiry

Marc Wolfram

Urban planning today appears to be at a crossroads: As a firmly institutionalized form of state intervention for steering urban and societal development, it is an integral component of the unsustainable urban system configurations created in the past. To leverage the deep sustainability transformations needed, virtually all characteristics of planning including its aims, processes, methods and instruments demand reorientation and reinvention.

Against this backdrop this paper explores global patterns and trends of change in urban planning institutions, asking for their potential contribution to sustainability transformations. It does so by first reviewing requirements for planning to become transformative, drawing on insights from various strands of sustainability science and urban studies. Second, it reports on the findings of a survey currently conducted in 15 countries (75+ cities) regarding the emergence and characteristics of urban strategies devised to address key sustainability challenges. As a result it appears that while major regional differences exist, transformation is increasingly becoming a core concern of urban planning. Novel state strategies trigger institutional responses to global environmental change with a view to secure the role of cities as key economic assets, yet hardly attending socio-economic transformation challenges. In turn, cities also drive their own voluntary transformation agendas with rather diverse priorities. Both implies shifts towards a more systemic scope of strategies, wider knowledge exchange and vision co-creation, but lacks consideration of the urban regional scale.

Implications for sustainability transformations: The paper recognizes that globally, planning institutions are changing to enhance the speed and depth of urban change - but not necessarily towards sustainability. Nevertheless, this provides opportunities to revise and transform key planning features currently system change, especially transdisciplinarity, multi-scalarity, community empowerment, participatory foresight and social learning. However, the driving forces and actors for exploring such opportunities require better identification and dedicated support.

Between governance and transformations: insights from a meta-analysis of 180 case studies

Elizabeth Dirth, Giuseppe Feola, Dries Hegger, Sandra van der Hel, Rakhlyun E. Kim, Heleen Mees, Joost Vervoort and Arjen Wardtekker

The actual and necessary emergence of societal transformations to deal with sustainability challenges is discussed in different bodies of literature, in the context of social-ecological systems, and policy innovation. An increasingly prominent topic in this literature is the link between governance and transformations. While recent papers have made laudable efforts to draw some syntheses about governance of or for societal transformations, a significant conceptual and empirical knowledge gap persists. Empirical studies are fragmented and limited in scope, particularly in terms of the modes of governance that are presupposed or advocated to steer societal transformations. Hence, we lack a systematic overview of the modes of governance that are applied in practice and what they produce in terms of societal transformations. In view of this knowledge gap, this research presents a systematic literature review that aims to document empirical case studies of the governance of societal transformations. We developed an analytical framework for conceptualizing both governance modes (including centralized, decentralized, public-private, interactive and self-governance) and other key elements of societal transformations (including system model, form and temporal range, seat of causality and outcome of the transformation). This analytical framework was used to systematically compare over 180 empirical case studies of transformation to sustainability of a range of systems and in different geographical contexts. This research is unique in the way that it reveals the interdependencies between modes of governance and pathways of transformation to develop a robust and holistic understanding of how societal transformations are governed and how governance might change in the process.

Implications for sustainability transformations: Based on a meta-analysis of 180 case studies, this study elucidates understanding of the way sustainability transformations may be initiated, supported, enabled or hindered by different governance modes.

Amazonian Governance to Enable Transformations to Sustainability

Eduardo Brondizio, Fabio de Castro, Celia Futemma, Carl Salk, Knister Anderson and Maria Telón

The Amazon basin is a “global keystone” region: locally, continentally and globally it hosts a wide array of environmental services, socio-cultural diversity, and economic activities. Governing these multiple dimensions amid pressing social, environmental, and climate change is one of the most pressing challenges for sustainability. While government-driven solutions are commonly
viewed as the role to sustainability, most sustainable forest management in the Amazon comes from individual and collective initiatives. This talk presents a recently funded Belmont Forum and NORFACE Transformations to Sustainability (TSG) project. The project titled “Amazonian Governance to Enable Transformations to Sustainability” (AGENTs) sets out to address the challenge above and contribute approaches and analytical tools to catalyze recognition of and actual contributions of existing, but often scattered “pieces of solutions” to protect and govern biodiversity and landscapes.

To understand and catalyze integrated and improved environmental governance in the Amazon, the project includes stakeholder engagement, multi-temporal analysis of land change at multiple units of analysis, predictive modeling of local conservation action, prognostic modeling of potential landscape connectivity scenarios, and participatory scenario development representing the views of local stakeholders. The project will develop innovative crosscutting methodologies to assess, map, and quantify the role of non-state actors, individual and collective actions to conservation, and use these outcomes to engage with and inform local and regional decision-makers, to leverage change and contribute to transformative change.

Lessons from the Amazonian basin will be relevant to many regions of the global south as they share similar local, national and global contexts. The talk will present the approach and open up the discussion of tools and approaches for linking local to regional sustainability transformations.

Institutions and governance as leverage points for transformations to sustainability

Jens Neiwig, Karen Seto, Peter Dreissen, Jose Puppim de Oliveira, Nicolas Jager and Bluemling Belfing

Fundamental societal transformations which break up established regimes of unsustainability are widely characterized as “complex” (Westley et al., 2011). As a fast-growing, but still fragmented field of research, there is a prevalence of normative and various conceptual contributions. However, our knowledge of the governance of sustainability transformation is still in its infancy (Patterson et al. 2016). This paper proposes an analytical framework to be used for comparative case analysis. Focusing on the institutional and governance aspects of transformation, we develop a theory-informed typology of transformation, distinguishing path-dependent regime ‘lock-in’ and required fundamental societal change; the extent of achieving outcomes toward sustainability, and deliberate political steering versus emergent transformation. Theoretical perspectives from literatures on socio-technical systems, institutional change and modes of governance will be scrutinized for governance aspects in three realms of leverage as intervention points in a complex system: overall institutional design; major policy decisions and (participatory) governance.

Our framework is intended to be used for comparative case analysis of sustainability transformations. It is thus meant to foster the building of an evidence-base of what has worked (and has not worked) in past an ongoing attempts of sustainability transformation around the globe.

Sustainable consumption (4.3)

Individual consumption choices fundamentally shape sustainability outcomes. This session looks at how communities consume a wide range of goods and services -- from food to fashion. How and why do people consider sustainability in their consumption choices?

Session Chair: Christian Derniger

Format: Talks and panel discussion

Room: 40.175

Edible cities – a leverage to re-connect people with nature and sustainability transformation?

Martina Artmann and Katharina Sartson

Society is facing two major challenges: rapid urbanization and an unsustainable food system. Today’s industrialized agriculture is a major reason for exceeding the planetary boundaries harming humans and nature. Absent food production within the city can be considered as a major challenge for increasing knowledge and consciousness on sustainable food consumption.

In general, urbanization is argued to be a key driver that people lose contact with nature. In this paper we argue that the concept of edible cities holds potential to re-connect people with food and nature. Edible cities provide (free) food by different forms of urban agriculture and focus on open green spaces such as urban parks. Based on expert interviews and field surveys from three German case studies (Andernach (frontrunner in implementing the edible city in Germany), Haar (follower I: implemented the concept after learning from Andernach) and Munich (follower II: the concept of edible city was not implemented yet but a range of bottom-up activities exist to promote the topic)) several potentials for re-connecting people with food are reflected.

Results show that edible cities can support material connection through providing organic and regional food, promote direct nature interaction and knowledge, and offer urban gardening and strengthen emotional connection with food and thus the value for food and its efforts for production. Experts state that edible cities can be considered as a treatment for several sustainability challenges such as social segregation, biodiversity loss or climate change. Furthermore, edible cities can reveal that food is connected with people and the Earth rather than with agribusiness. This spiritual dimension of urban food supply as crucial leverage point for sustainability is discussed in the end of the presentation. All in all, edible cities can provide deep implications for sustainability transformations due to its systemic contribution to various societal challenges acting as nature-based solution.

Learning to downsize

Magnus Boström

The paper is a systematic literature review (previous research) of groups and people that, for sustainability reasons, change lifestyles, with a focus on reduced consumption. It reviews how socio-material structures and cultural forces of massconsumption facilitate or prevent such lifestyle change. In the common understanding of the “green” or “climate friendly” consumer, the consumer is rarely a person who makes profound lifestyle changes, rather minor adjustments in everyday life. One point of criticism in previous research is that this focus on “greening” narrows the scope of social and societal change: minor changes in habits and consumption is insufficient to deal with climate change and other urgent sustainability problems. Another point of criticism concerns that the focus disregards the fact that individuals are embedded in social relations and structural/cultural contexts. In our everyday lives we are dependent on others, on infrastructure and technology; and others are dependent on us (e.g. our children). Thus, to understand the conditions for social transition we need to consider the role of more basic socio-material structures, resources, cultural norms and forces, as well as intimate social relations.

Particularly problematic are the structural/cultural forces of mass consumption and social acceleration. Therefore, efforts to downsize, necessarily involve a long-term (much likely cumbersome and ambivalent) learning process. However, such a process can also be a life-enriching experience. By becoming less dependent on mass consumption, what are the possibilities for achieving personal development, self-fulfillment, a less stressful life and a sense of (re-)connecting with nature? This paper offers a systematic review of existing literature on the attempts, experiences and achievements by groups and individuals with such aspirations.

Implications for sustainability transformations: deeper knowledge on conditions, possibilities and obstacles for ‘learning to downsize’, which is an essential kind of lifestyle change in the larger process of sustainability transformations

Applying the Energy Cultures Framework to understand energy transitions: a case study from Transylvania, Romania

Kathleen Kaniecki, Ioana Alexandra Duse, Julia Leventon and David J. Abson

Addressing the threat of global climate change will require large-scale transformation of our energy systems. To date, energy transition interventions have primarily targeted the parameters of the energy system (e.g. subsidies, taxes, technology adoption). However, scholars are increasingly calling for a more systemic approach that incorporates micro dimensions such as behaviors, attitudes, perceptions and preferences (Step et al 2015). Drawing on a quantitative representative study (n=374 surveys) conducted in the Pogány-havas microregion of eastern Transylvania, Romania, we employ the Energy Cultures framework (Stephenson et al. 2010) to describe and discuss the social and material energy system of the region. We highlight the interactions between norms, energy practices and material culture, as well as external influences that are shaping the energy system. Based on our findings, we define the ‘energy
How to "flip the tortilla": Traditional Ecological Knowledge (TEK)- driven innovation as leverage points for a more sustainable food system in Spain

Laura Pereira, Leonie Guerrero Lara and Federica Ravera

Following the 'Seeds of Good Anthropocene' project, this paper analyses innovative initiatives that have the potential to make the food system more sustainable. More specifically, building on the increasing recognition of the importance of traditional ecological knowledge (TEK) in sustainable food systems, we explore initiatives that are using TEK to improve food systems in Spain. This study conceptualizes the food system as a complex social-ecological system and builds on transformations theory, the concepts of social-ecological innovation, leverage points and TEK. It uses a case-study approach and is set in three different regions in Mediterranean Spain, where 12 semi-structured interviews with food seed initiatives were conducted. We found that the initiatives' main drive was towards enhancing food values that are linked to traditional food production, which are not currently widely appreciated. The presence of TEK can inspire different innovations within the food system, whereas the absence of TEK can present barriers to innovation. Most importantly, the absence of gastronomic knowledge among consumers on how to process and prepare local varieties and species was found to hinder the implementation of shorter food chains, that are recognised as an efficient approach for sustainable food systems. By reintroducing gastronomic TEK, direct consumer-producer links were strengthened. Such innovative applications of TEK can help to safeguard biocultural diversity and act as a crucial leverage point for the transformation of food systems towards sustainability. We suggest that taking TEK into account can enhance the success of conventional systems of innovation that emphasize scientific and technological knowledge, in order to enable sustainability transformations.

Interculturality and power (4.4)

The session focuses on a broad understanding of interculturality, differentiating the social, cultural and political dimensions. It addresses marginalized perspectives and knowledges and their role in transformative research, considering power asymmetries in and through transformative research practices.

Session chair: Moritz Enobles

Format: Talks and world café

Room: 40.165

Exploring social-ecological justice through an intersectionality lens

Nadia Sitas and Odrilwe Selomane

The principle of leaving no one behind enshrined in the SDGs necessitates that implementation activities aligned with the SDGs are aimed at improving the lives of the poorest and most vulnerable, irrespective of their gender, race, sexuality, age, ability, religion or location of residence. In decision making contexts many of these variables are either tangled in isolation or are addressed in an additive manner, when in reality these variables interact in complex and often surprising ways. Improving the understanding of these interconnections and how they are mediated by power at both local and broader scales is fundamental to identifying important leverage points in systems where transformative actions that benefit both people and the biosphere that supports them can be implemented. This is especially important as marginalized perspectives are often seen as vulnerable, but often also have unique capacities for building resilience and adapting to change. An intersectionality approach can assist with understanding where and how to nudge systems towards more transformative and equitable pathways by surfacing ways in which power oppresses or privileges certain communities or knowledge types, and mediates access and rights to ecosystems and associated ecosystem services. This presentation/interactive session seeks to advance conversations on traversing critical challenges, especially those related to how power can exclude people, knowledge types, lived-experiences often in relation to social and geographic positionality, and how these intersections need to be included into decision-making processes in order to promote more equitable and just development.

Integrating indigenous knowledge, values and expectations in territorial planning of multi-ethnic communities in Bolivia

Adriana Moreno Cely, Cesar Escobar, Dario Guajardo, Nelson Tapia Ponce and Tom Vanwynck

The Plurinational State of Bolivia has a promising normative framework to promote resilience in their multi-ethnic territories, embracing the Andean ‘Living Well’ approach to development. Current normativity’s entitles municipalities and territories of indigenous peoples to adopt an inclusive development via Territorial Plans (PTDI) by its Spanish acronym. PTDI should be implemented and monitored in a participatory manner, considering historical, geographical, economic and cultural diversity perspectives. At the same time, the PTDI, as new planning system should improve the operational planning of the municipalities that benefits communities and enhance potentialities of living systems. However, integrating to a territorial planning different views, needs and expectations is a challenge. In this research, we present a real world multiple case study in Totora, Bolivia and Samiipata municipalities, located in the high lands and the valleys in Bolivia. A systemic and transdisciplinary approach is implemented to construct qualitative indicators for monitoring the PTDIs in the municipalities. The research gives special attention to re-valuing traditional and indigenous knowledge in managing their territories, applying participatory methods to incorporate different world views and using circles of dialogue to deal with power relation issues in a multi-stakeholder environment. In the activities different stakeholders like community leaders, governmental and non-governmental representatives and academics interact with a deep respect to the cultural diversity and where the interactions of multiple stories contribute to the process. Preliminary results indicate the usefulness of the methodology to deal with power relation issues and at the same time, to understand the different meanings of “territory” and “living well” and their relationship with the notion of development in Bolivia. Understanding values, interests and views in territorial planning have important implications for sustainable transformations considering that the implementation of inclusive territorial planning is key to enhance cultural and environmental diversity.

Post-truth or pre-political – the role of transdisciplinary, transformative knowledge in discourses about the German Energy Transition

Andrea Amri-Henkel and Esther Meyer

The exchange of knowledge between politics and science has been framed as co-production of knowledge as well as transdisciplinary or transformative modes of research and has been the subject in various discourses of transformation research for far more than ten years. We want to contribute to approaches of...
Feminist women collective as leverage point for sustainability transformations

Elisa Oteros-Rozas, Irene Iniesta-Arandia, Sara Mingorza, Marina García-Llorente, Federica Raurea, Ana Paula García-Nieto, Violeta Hevia, Cristina Quintas-Soriano and Fractal Collective

Cooperative strategies have demonstrated a potential to enhance sustainability and to prevent systems from collapsing or facilitate them to recover after a disturbance, i.e. to play a role as leverage points. Research in ethnoecology, agroecology and political ecology research, among other Sustainability Sciences fields, have proven that collaborative strategies are crossed by power relationships (i.e. gender, ethnicity, class, age, etc.), affecting their transformational outcomes. The survival and leverage potential of initiatives within sustainability transitions frequently fail due to the lack of feminist perspectives in practices. However, the conversation between Sustainability Sciences and feminist environmentalism is just beginning to emerge. In this work our objective is to reflect around different feminist women collective with similar objectives for sustainability transformation: Why do these initiatives emerge? What are they objectives and proposal? What do they have in common? What similar and different challenges do they face? How do their feminist discourses and proposals influence the wider contexts in which they are inserted? We address these questions by looking at diverse examples of such initiatives in Spain: a network of women Pastoralists; an ecofeminist workgroup within the mixed fedration of environmental groups; a collective of feminist researchers and academic activists; a cooperative of agroecological education. Implications for sustainability transformations: feminist women collective initiatives are addressing sustainability transitions from holistic perspectives with proposals to counteract the multiple systems of oppression.

Science as means for social transformations in the constitution of global environmental expertise

Rolf Lidskog and Göran Sundquist

Numerous international expert bodies and panels have evolved around environmental issues. Their aim is to review and assess scientific research and make it relevant for policy makers, but sometimes also to facilitate and shape societal transformations towards sustainability. Without doubt, these bodies are important players in the discourse on global environmental sustainability, and currently there is probably no environmental issue that is not populated by scientific expertise. But what is needed to attain epistemic as well as normative authority for global environmental issues? By drawing on findings from Science and Technology Studies (STS), environmental sociology and critical social theory, this paper stresses that in order to give robust and relevant expert advice in environmental matters, the expertise needs to include at least two aspects: an understanding of how society works (analysis of social dynamics) and an identification of the character of a particular environmental problem (diagnosis of pathologies). Since long time back, however, there has also been raised claims that expertise also needs to include a third aspect; proposals for how to solve the problem at stake (therapy, i.e. means for initiating and supporting social transformations). By reviewing current forms of global environmental expertise, the paper investigates to what extent and in what ways it includes the three aspects mentioned above. It is found that relatively often, natural scientists speak about how society should be designed in order to solve a particular environmental problem, whereas much social scientists are rather silent concerning solutions. The paper ends by discussing the need for transforming expertise, including benefits and risks of including all three aspects in the making of global environmental expertise.

Models as boundary objects in inter-organisational collaboration for sustainable transformation

Igor Nikolic Nikolic, Erfe Cuppen, Jesse Brinkman and Nouran Peters

As part of sustainable transformation of industrial systems, collaboration between firms to exchange resources (e.g. heat, waste products) is often considered a promising route (resonating concepts such as industrial ecology, circular economy, industrial symbiosis). Such collaborations are complex socio-technical processes in which different organisations, often from different sectors, have to come to an agreement on changes in social, technical and institutional structure of industrial systems. The short, and certainly long term, impacts of these changes are highly uncertain and involve internal and external factors, such as development of oil prices, energy market, policies related to climate change, adoption of business models, entrance or exit of new actors, societal acceptance, the capacity to build trust and to collaborate. Models and simulations are powerful tools for representing complex systems. However, exploring these uncertainties, and have been successfully used in this context. They can systematically explore possible consequences of decisions and events under different scenarios, and typically include technical, organizational, institutional and social dimensions of transformations and their interactions.

While models and simulations are traditionally considered as independent technical artifacts representing a simplified reality, and providing "truth as outcome", we explore the usefulness of conceptualizing models as boundary objects in multi-actor collaboration. We argue that, for that, it is not so much the outcomes of the modelling that are important, but the process of modelling that provides space for deliberation, alignment and social learning amongst involved actors. We do so based on a number of case studies where models were used to support decision-makers in industrial transformation.

Implications for sustainability transformations: collaboration is conditional to sustainable transformation of industrial systems but at the same time one of the key challenges. This paper contributes to development of methods to facilitate and create the capacity to collaborate towards sustainable change.

Transformational change of regional energy systems – A social-network and social-modeling approach

Andre Schaffrin and Tanja Nietzen

Conceptualizing and measuring systemic and transformational change is still challenging due to the complexity problem of different scales, units of analysis, and socio-technical levels. For example, we know that there is substantial influence of local renewable energy projects on a wider process of structural, institutional, and social transformational change throughout larger regions. The decentralized character of this transformation demands a strong integration of a socially and culturally diverse set of regional actors, networks, roles, institutions, politics, identities, values, and preferences. However, we still lack an understanding of the mechanisms and patterns of how and why social transformation evolve over time due to the challenge to collect...
relevant and sufficient empirical data on socio-technical levels and alongside varying phases of development across a selection of renewable energy projects.

To grasp this bottom-up transformation process, we propose a social network and social modelling approach. Most transformation studies are conceptual in character and serve a static analytical framework. Empirical applications are ex post evaluations of case studies. Our approach proposes an integrated conceptual framework that fills the gap as it serves to apply ex ante evaluations of critical success factors, role, performance, and development of social networks in the process of a regional energy transition.

To demonstrate the usefulness of our approach, we applied the method of participatory scenario planning towards a sustainable energy system in a German county. The conceptual framework we use systematically reduces complexity and guides the collection of relevant empirical data across socio-technical levels, phases of innovation, and social, economic, and political factors influencing the local and regional energy transition. The empirical results we present demonstrate the first steps on how to select relevant project cases, to choose interview partners, and to collect sufficient data for a systemic social network analysis and an agent-based model.

Participatory scenario planning for reconciling food security and biodiversity conservation in south-western Ethiopia

Jan Hanspach, Tolera Senbeto Jiren, Jannik Schultzner, Jeen Fischer and Iren Doresteijn

Sustainability science requires research processes that embrace and maneuver the complexities of social-ecological systems. This includes engagement with a broad range of stakeholders and recognition of the dynamic and uncertain nature of future developments. In this presentation we want to share our hands-on experiences from such a research process, which aimed at reconciling food security and biodiversity conservation in a case study area. In particular, we applied the method of participatory scenario planning to elicit possible future development trajectories in south-western Ethiopia. We conducted more than 40 workshops with stakeholders concerned with food security and biodiversity conservation, including local farmers and representatives of governmental institutions at different levels. A first round of workshops included the description of social-ecological dynamics and the identification of key uncertainties. Important factors influencing current and future dynamics were the modernization of farming methods, the access to forest ecosystem services, and the increasing influence of global markets, climate change and population growth. Based on this systems understanding, we derived a consensus causal loop diagram and developed narratives of four different exploratory scenarios describing plausible future conditions in 20 years from now. We evaluated these scenarios in a second round of workshops and identified the opportunities, risks and implications together with stakeholders. Finally, we visualized the scenarios and produced a wide range of outreach material including a booklet, posters, postcards and other information that we then distributed throughout the study area.

Vision Modeling to Generate Target Knowledge for Transformative Change

Johannes Halbe and Jan Adamowski

Goals of a system are profound leverage points for system change, as noted by Donella H. Meadows. In fact, ‘whole system goals’ are often implicit and thereby ‘people within systems don’t often recognize what whole-system goal they are serving’ (Meadows, 1997). Thus, a first step towards using this high leverage point for sustainability transformations is to elicit current whole system goals as well as visions for alternative goals and related system designs. By collaboratively envisioning the goal of a transformation process, target knowledge is developed that can provide motivation and orientation for stakeholder actions and constitute a reference point for process evaluation (e.g., Halbe, 2016). There are different approaches for the development of joint future visions, such as written vision statements or visualization techniques. The use of systems modeling for the rigorous and systemic investigation of sustainability visions is an innovative research field. Various modeling approaches can be potentially applied to assess the internal consistency (e.g., existence of trade-offs), plausibility (are realistic constraints considered?) and desirability (are sustainability benefits reached?) of visions. Potential methods for conceptual vision modeling are systems thinking, influence matrices and functional analysis. Dynamic vision models build upon conceptual models and allow for quantitative analysis of the dynamics of a future vision, for instance by using system dynamics modeling or fuzzy cognitive mapping. This contribution will provide an overview of potential modeling methods and examples of their application for analyzing visions for sustainable food and energy systems.


The complex phenomenon of nutritional behaviour: Identifying leverage points for modification

Eva Hummel, Ingrid Hoffmann

As nutritional behaviour is a complex phenomenon, leverage points for successful modification must be deduced from a systems perspective.

A cause-effect model was developed by identifying factors directly or indirectly influencing the core factor “food consumption” and causal relationships between all factors on basis of current literature and expert consultation. The relationships were specified by strength (weak, medium, strong) and type (promoting, restricting). To develop the model and for subsequent analyses, elements of three instruments were combined: (1) Nutritional-ecological modelling (NutriMod, Schneider and Hoffmann 2011), further developed to NutriMod+ST (Strength and Type, Hummel and Hoffmann 2016); (2) Sensitivity model, amongst others for analysing the roles of factors in the system which e.g. indicate whether a factor is suitable as control lever or indicator (Vester 2007); (3) Cross-Impact Balance Analysis, amongst others to analyse effects of external impulses on the system based on consistent scenarios (Weimer-Jehle 2013).

The model consists of nineteen factors, each aggregating several aspects of nutritional behaviour. Each factor’s degree of influence on the system and each factor’s own influenceability is demonstrated. The model presents the interplay of all factors and relationships and therefore reveals cause-effect chains, feedback loops, multicausality, side effects and consequently eigen-dynamics within the complex phenomenon. Four of the nineteen factors were identified as promising leverage points to modify food consumption: agent of socialization family, socio-economic status, social identity, and psychological resources. Additional results show that it is not sufficient to modify single factors. Instead, the relevant factors need to be considered in parallel (Hummel 2017).

To be more successful in modifying food consumption, the complexity of nutritional behaviour needs to be considered and dealt with. Based on the presented results, more targeted measures can be planned which prioritize and combine the identified leverage points.

Transformative design practices (4.6)

Design can be a transformative practice to address complex issues in social, environmental, and political contexts. This session considers design practices such as prototyping, transition design methods and design thinking tools; exploring how they bridge a knowledge-action gap; develop sustainable innovations, and challenge paradigms.

Session Chair: TBA

Format: Talks and panel discussion

Room: 40:255

Re-thinking Design as a transformative research practice in Sustainability Science

Daniela Peukert

Transformative research approaches in sustainability science address complex issues by including diverse perspectives, forms of cognition and knowledge production, as well as different bodies of knowledge. A challenge within heterogeneous project teams is to gain a common understanding of what is considered the problem and to facilitate mutual learning towards integration between partners with specific expertise. Different epistemic cultures, theoretical
concepts, and methodological approaches need to be bridged and integrated to produce socially robust transformations. This requires an extended range of methods in transformative research. One way of doing this is using design prototyping, which will be introduced.

The presentation will provide insights into the practice of design, its methodology, and transformative potential. It shows how design prototyping in particular can be made fruitful as a transformative research practice. It explains how working with designs can create moments of integration and links heterogeneous perspectives and bodies of knowledge to one another. The visuality, tangibility and spatial situatedness of designs provide an alternative to written text and spoken word and enable the negotiation of different perspectives. These very characteristics seem to be appropriate to stimulate knowledge integration amongst different participants in transformative processes.

The use of design prototyping is illustrated based on examples and empirical results from two case studies in Lower Saxony, Germany and Transylvania/Romania. A conceptual framework, consisting of different dimensions of integration transdisciplinary process phases and design functions serves as a base to investigate the transformative potential of design methods. The empirical data and conceptual framework guide the discussion of design practices as potential intervening leverage points for sustainability transformations. The use of design practices in sustainability science, opens up the methodological spectrum for an active contribution to robust, solution-oriented knowledge, as required per future-oriented transformations.

Leveraging Design to Understand and Intervene in Wicked Problems

Thomas Eley, Yidan Gong, Robert Managad and Christina Danner

Transition Design is an emerging design practice for systems-level change through intervening at key leverage points over time to address wicked problems. During the Spring semester of 2018, we, Master's students in Design at Carnegie Mellon University, created new tools in this field. Through our use of Transition Design in a multidisciplinary group, we created new tools to help understand the negative effects of social networking sites and identify leverage points that will amplify throughout the system.

A Design perspective is needed when talking about transforming institutions and societies for a preferable future because all systems are designed by people. Designers routinely work with ambiguous situations where they need to define the problem and then figure out a way of resolving it. Recently, the field of design has expanded its scope from being solely object focused to also including systems. Transition Design is the episteme of this movement in design because it focuses on the need for societal transitions to more sustainable futures. The Transition Design framework is based on living systems and looks at large time horizons.

Transition Design uses participatory design methods that consider the multitude of stakeholders involved in a problem, the visual way in which information is communicated within transdisciplinary groups and to the general public, and ideas from Futures Studies to create visions of possible futures. Through a case study from our group project that addressed the negative effects of social networking sites, we will present the participatory tools of the Transition Design approach and how they can be used to catalyze systems-level change. Implications for sustainability transformations: a designerly approach to systems-level change that uses clear communication to engage and invite stakeholders into conversations about the futures they desire and the ways in which they may collectively arrive upon a shared future.

Why it is necessary to go beyond social collaboration in future-driven innovation and design processes

Markus Peschl

Facing the world’s huge challenges innovation and design have received new attention over the last decade (e.g., Fagerberg and Verspagen 2009; OECD/Eurostat 2005; Bender et al. 2011); so not much in the sense of making things aesthetically more appealing, making devices smarter, or much in the sense of making things aesthetically more appealing, making devices smarter, or enhancing the usability of user-interfaces, etc., but rather as a means and as a tool for creating sustainable solutions/futures for these grand challenges. It has become clear that these challenges can only be tackled in a collaborative and interdisciplinarity manner. This is due to the fact that our economy, technologies, and society have become hyper-complex, digital, dematerialized, highly specialized, and follow an exponential curve. These are challenges that go far beyond bounded rationality (Felin, Kaufman, Koppl, & Longo 2014), ill-structured, or wicked problems (Dorst 2006), as they are dealing with uncertainties that is not only unknown, but also unknowable (Sarasvathy et al. 2003).

The claim of this conceptual paper is that these kinds of challenges cannot be solved only in the “classical” manner and understanding of “together”, namely in the sense of (social) collaboration or co-creation. This paper suggests to go beyond this understanding, to investigate alternative and more profound concepts of “together”, and to show, how they are related to design and innovation.

#1 | Together …with others… | Together as social, collaborative, and interdisciplinary (epistemic) practiceThe roles in innovation and design processes have changed over the last 10+ years (e.g., Sanders and Stappers, 2008): while in classical user-centered design/innovation the user was a more or less passive object of study, in a co-design setting the user becomes more of an active co-creator. By including various stakeholders in the design/innovation process it becomes a socio-epistemic technology and practice (e.g., Peschl and Fundneider 2008). The idea is to introduce diversity of perspectives and, by that, achieve interdisciplinarity, multi-perspectivity, and emergent effects which cannot be brought about by a single designer or innovator only. The underlying assumption is that this diversity opens up new (and more adequate) spaces and opportunities for solutions.

#2 | Together …with oneself and the “material”… | Together as co-becomingThe classical understanding of design and innovation is based on the assumption that an agent (e.g., the designer) has an idea, a form, or a concept in his/her head, and he/she shapes the environment or material according to this form (= production of an artifact). In other words, the material more or less passively “receives” its form by the activity of the agent. Taking a different perspective (e.g., Ingold 2013, 2014; Roth et al. 2016; Peschl and Fundneider 2016) suggests to rethink this relationship in the following manner: one can think of both the creative agent’s and the material’s dynamics as two streams of becoming or as a flux of activities that are joining in the process of designing. It is true inter-action, a process of joint growth in which both, agent and material are active and passive; it is about our engagement with materials and materials engaging in our lives causing a kind of coupling, correspondence (Ingold 2013), mutual modulation and co-becoming, and “dance” leading to an emerging unity. In such a process we do not only shape the environment, but it is designing back on us, we are shaped by it by
Realising transformation? Early-career researchers navigating challenges of practicing transdisciplinary research in a complex world

Jessica Cockburn, Megan Davies, Petra Holden, David P. M. Lam and My Sellberg

Transdisciplinary competencies such as knowledge, skills and attitudes/dispositions have been identified by scholars over the last two decades. Recently, these efforts have been consolidated and refined considering task completion and problem solving in relation to sustainability transformations.

In this session, we aim to create a space for early career researchers (ECRs) working on transdisciplinary research and “related engaged research approaches” to reflect collectively on their experiences related to practicing transdisciplinary research in complex settings.

We will focus on the following research question:

How can we as early-career transdisciplinary researchers navigate the ‘triple jump challenge’ of scientific rigour and excellence, societal relevance and engagement, and self-respect and care?

We will firstly explore key competencies needed by ECRs in the context of, what we call, the ‘triple jump challenge’. We will secondly reflect critically on the transformative claims of transdisciplinary research.

Three speed talks will be presented by ECRs that have engaged in transdisciplinary research individually. Smaller group discussions and group drawing activities will then be used to co-illustrate and synthesise the relationship between key competencies for individuals conducting transdisciplinary, and transformative research, as well as their enabling conditions. There will be a strong emphasis on blending in-person and virtual participants, by having “remote clusters” of people join via Zoom/Skype/Google hangouts. In the spirit of transdisciplinarity, we will invite all participants to join in writing a paper to take the discussions ‘beyond the conference’. This will be purely voluntary.

Implications for sustainability transformations: We believe that reflecting critically on what influences key competencies for transdisciplinary research as an individual and how this relates to achieving research transformations is important. This can provide a platform for social learning and developing leaders that can engage meaningfully with others outside academia, but also across disciplinary boundaries. These are leadership opportunities for transformative research.

My Sellberg

This speed talk is part of the session: “Realising transformation? Early-career researchers navigating challenges of practicing transdisciplinary research in a complex world”

My will discuss the specific challenges of doing an individual transdisciplinary PhD, compared to a PhD that is part of a larger transdisciplinary project. Drawing on her experiences of leading collaborations on resilience assessments with non-academic partners as a PhD student, as well as scientific literature on transdisciplinary research and different researcher roles, she will explore potential enabling conditions for conducting this type of research, and strategies to deal with the discussed challenges.

Achieving transdisciplinarity - an interdisciplinary perspective

Petra Holden

Please note that the text below is for a speed talk that will form a part of the session entitled: Realising transformation? Early-career researchers navigating challenges of practicing transdisciplinary research in a complex world.

Petra will explore the relationship between transdisciplinary competencies, resource availability and the different elements of being transdisciplinary, such as interdisciplinarity, co-design, knowledge integration and the importance of research impact. Drawing on her experiences during her PhD, she will reflect on the internal conflict experienced when trying to achieve all these elements of transdisciplinary research while crossing vast disciplinary boundaries within academia.

Towards xeno-design cultures - designing as a process of becoming

Michaela Büsse

The concept of the Anthropocene acknowledges not only the irreversible influence humankind had on the Earth’s environment but also the limits of our cognitive capabilities.

When dealing with objects that transcend any localisation in time and space, for the individual there is no immediate feedback mechanism and therefore no perceived causality. What becomes apparent is that the challenge of overcoming the anthropocentric world view requires a fundamental shift in perception to begin with and only subsequently modified actions. Attempts to close this perceptual gap are addressed by researchers, artist and designers alike. Yet, there is a tendency to reinforce the notion of a nature-culture divide by implying a parasitic relationship between humankind and environment.

For design to meet the challenges implied by the Anthropocene it has to take into account not just the human (human-centred) but the assemblage of humans and non-humans that constitute realities (more-than-human-centred). The aim of the practice-led research is to investigate methods and approaches for a more-than-human-centred design approach, preliminarily referred to as “xeno-design.” Whereas design is commonly defined as a complexity reducing and problem-solving thinking and making, within this new paradigm the role of design becomes a facilitating one, where complexity is embraced, making (if at all) a participatory process between human and non-human agents, and outcomes have the open-ended character of an inquiry.

Implications for sustainability transformations: The aim of this paper is to lay ground for a new design ontology and practices that moves beyond the current human-centredness and adjust our understanding of ourselves, our environment, and collective horizons.
Expanding competencies for scholars learning the 'transdisciplinary triple jump':

Jessica Cockburn

Exploring competencies for scholars learning the 'transdisciplinary triple jump': Jessica will share reflections on the kinds of competencies which PhD scholars might need to be able to manage the triple challenge of scientific rigour and excellence, societal relevance and engagement, and self-respect and care. Drawing on the experiences in her PhD journey, she will briefly examine the notions of intellectual, relational, and emotional competencies. She will then consider the cross-cutting role of reflexivity in supporting the development of these competencies. Finally, she will provide some food for thought on what these competencies reveal about the transformative claims of transdisciplinary PhD research.

Constraining and enabling transformative change (4.8)

This session focuses on systemic issues ranging from short-termism and constraining problem framings to the question of whose voice is heard and how we as researchers are engaged with values that shape science and policy making.

Session Chair: Eefje Cuppen

Format: talks and world café

Room: 40.154

Coordinated research programs and their management: how to counteract “short-termism” in sustainability research

Tom Beer, Janos Bogardi and Zenda Offir

Irrespective of the urgent need for long-term sustainability research governments are reluctant to set up research institutes. This policy is counterproductive to build up accessible data and knowledge base.

Medium term support of international research programs and networks offer a compromise between short-term institutional funding. Being a substitute for long term engagement, these programs need a common vision, coherence, strategic leadership and transparent coordination to avoid falling apart to a number of semi-independent projects.

Potential conflicts of interest, reporting lines, deliverables and quality assurance should be addressed up front. Mid-term reviews could be relied on rectifying trends which may undermine scientific quality and practical applicability of the results.

Recommendations on how to conceive and manage an international research program are formulated on the basis of the mid-term review of the Integrated Research of Disaster Risk (IRDR).

Commissioned by ICSU in 2016, the findings of the Integrated Research of Disaster Risk (IRDR) were formulated on the basis of the mid-term review of an international research program. Recommendations on how to conceive and manage an international research program are addressed up front. Mid-term reviews could be set up to align and collaborate as an action network. Engage in context-sensitive, innovative and comparative work, respectful of different conditions and cultures, thus strengthening science for policy and practice.

Move towards collective impact:

- Mobilize the different components of the network to align and collaborate as an action network.
- Engage in context-sensitive, innovative and comparative work, respectful of different conditions and cultures, thus strengthening science for policy and practice.

Approaching values in transformational sustainability science: four discourses for change

Andra-Ioana Horcea-Milcu, Dave Abson, Cristina Apetrei, Maraja Riechers, Ioana Duse, Christian Domine, Rebecca Freeth, David P. M. Lam and Daniel Lang

At its core, sustainability is a normative, value-based concept. It is widely acknowledged that sustainability science needs to transparently engage with values. In particular, we need to better understand the role of values in dynamic, transformational situations. However, values and their role are often discussed in vague terms, and when clear conceptualizations exist, these differ widely across fields of application. To provide guidance and conceptual clarity, we propose a classification including four different discourses on how values are being operationalized for transformation. We substantiate with examples from the project “Leverage points for sustainability transformation”. The first discourse revolves around value reflection, which calls for critical reflection on normative orientations in scientific models and research practices related to transformation. Particularly in the context of transdisciplinary research, questions are raised about the epistemological groundings of models and about the underlying assumptions sustainability scientists hold in their interactions with society. The second discourse is related to value negotiation. Values held by different individual actors need to be discussed and understood in group decision processes, in order to successfully negotiate sustainability interventions. Especially solution strategies to wicked problems in place-based contexts require a safe space for values to be expressed. The third discourse is dedicated to assigning values to nature and includes conceptualizations surrounding nature connectedness, or rationales for economic valuations (e.g. intrinsic, instrumental, or relational conceptions). Fourth, the value change discourse highlights the dynamic nature of values. Taking a systems perspective, we explore the transformative potential of values and how they can be used to generate systemic shifts in patterns of human behaviours.

Implications for sustainability transformations: (1) move beyond general discussions implying that values matter, but leaving vague how they matter; (2) help reflect on the operationalisations of values; and (3) strategically combine aspects of the different discourses according to the sustainability problem at hand.

Towards a Process Epistemology for the analysis of Social Ecological Systems

María-Mancilla García and Tilman Hertz

Social-ecological systems (SES) are a class of complex adaptive systems. In SES, the social and the ecological are deeply intertwined and continuous change is a prominent feature. In view to address the phenomena that these characteristics produce, recent research is encouraging a focus on processes and relations, on verbs and actions rather than objects. Yet, the available set of concepts presents limitations in bridging the bifurcation of nature and society that characterizes modernity, and in putting change at the core of how we understand the world. In this presentation, we first lay out key ontological considerations that highlight the usefulness of rethinking our conceptual tools from a perspective that focuses on processes and relations as the main constituents of reality. This leads us to propose an approach to analyze SES from a process perspective, focusing on the concept of experience as understood in radical empiricism. This constitutes the basis from which we provide tools to critically revise our available concepts – such as tracking difference and paradoxical thinking – and to come up with new ones – such as assemblage thinking. Implications for sustainability transformations: French philosopher Gilles Deleuze notes that available concepts embody the space of problems posed as well as the space of possible solutions to these problems and hence direct our thinking towards specific paths. We expect a process-based epistemological position to help us formulate novel problems and envision different solutions to these problems, thus transcending the “path dependency” inherent in our current to conceptualizations of sustainability transitions.

How free are Swedish forest owners really? - an alternative narrative of forest management in Sweden

Ida Walin

For decades, policy makers struggle to design policies that halt biodiversity loss and habitat degradation in forests around the world. In Sweden, national environmental objectives for biodiversity and habitat protection on forest land are not achieved. At the same time, landowners enjoy high degrees of freedom in managing forests under the paradigm of “freedom-under-responsibility”. Consequently, few tools are available for policy-makers to affect management practices. Better knowledge about leverage points and alternative pathways to sustainability in forest management are thus needed.
Most scientific literature analyzing non-industrial private forest management focuses on individual owners’ values, beliefs and interests. The few studies looking beyond the individual owner point to the importance of professional advisory services for forest management. I here challenge the dominating storyline and provide a more holistic narrative of forest management by analyzing social practices performed by forest owners as well as other local actors. I conducted in-depth interviews with forest owners, professional advisers and representatives of local organizations in a highly localized case study - a “landscape laboratory” - in southern Sweden. From the interviewees I learned about the high level of interconnectedness and interdependencies between human and material agents in forest management. Natural disasters in the form of two severe storms have had the most profound and direct impact by drastically changing biophysical conditions as well as emotional relationships to the forest. Furthermore, family situation, local tradition and trust are of great importance for how forests are managed on how biodiversity protection is promoted or disadvantaged.

Implications for sustainability transformations: Governance efforts will benefit from focusing on the role of advisory services and aim for diversification of information networks. Further critical research is needed in order to contest reductionistic storylines that hold performative power and threaten to conceal possible pathways to increased sustainability.

Solving Competing Interdependencies: How Negotiating Interpersonal and Intrapersonal Conflicts Impacts Sustainable Solutions

Johann M. Maier, Matthias Barth, Hong Zhang, Roman Trötschel

Sustainability-related conflicts are known to be very difficult to resolve in an effective way. However, the underlying causes for suboptimal and unsustainable solutions are still not well understood and, therefore, pose a major challenge for human cooperation. In the present research, we propose a novel framework of competing interdependencies that takes into account the interplay of interpersonal conflicts between one’s own and the counterpart’s interests and intrapersonal conflicts between one’s own present interests and own future interests. Specifically, we believe that sustainability-related conflicts are especially hard to resolve, because parties do not only have to protect their own interests against their counterparts’ interests, but also have to shield their future interests against their present interests. By combining the well-established literatures on individual decision making (e.g., intrapersonal conflict) and collaborative decision making (e.g., interpersonal conflict), we develop the comprehensive framework of competing interdependencies and extend current theories of decision making in general and social conflict specifically. Whereas current social conflict research has predominantly focused on improving only interconflict resolution, these theories may not be sufficient to fully address competing interdependencies in sustainability-related conflicts. In contrast, our proposed framework may contribute to uncover the key challenges in sustainability-related conflicts, may explain the psychological roots of unsustainable solutions, and may offer innovative leverage points to reach effective and sustainable solutions. The presented framework of competing interdependencies will be discussed with respect to its transformative potentials for sustainable conflict resolution.

Systems Thinking for a Real Understanding of Sustainability - „It is the emotions, stupid”

Kai Neumann and Ullrich Lorenz

Starting with a qualitative Integrated Assessment Model (IAM) through participative explorative qualitative cause and effect modeling for the federal environmental agency we discovered the lock-in effect that explains why there is so little change despite the widespread knowledge. The lock-in effect describes a reinforcing feedback loop in which the different players (politics, economy, media and consumers) of our society block each other from change towards sustainability. While politics can cause the biggest changes it is the consumers who hold performative power and threaten to conceal possible pathways to increased sustainability.

Methods for facilitating collaborative processes and learn (4.9)

This session focuses on interpersonal dynamics in collaborative and collective approaches, including social learning, local and citizen initiatives. Tools to enable such approaches are also explored.

Session Chair: TBA

Format: talks and world café

Room: 40.254

Can designing ‘spaces for learning’ inform collective learning and transformations?

Caroline Lumosi, Claudia Pahl-Wostl and Geeske Scholz

Social learning in collaborative processes is considered important for addressing complex natural resource dilemmas. It is receiving recognition for supporting diverse actors in processes such as joint decision-making, knowledge co-production and collective learning. Social learning approaches have been credited to stimulate the development of a shared understanding and collective action among multiple actors. These processes are needed to support transformations and sustainability systems and networks. Yet little is known about the relational dynamics of social learning processes. In this paper we analyse the nature and dynamics of social learning processes that support transformations in transboundary water management processes. We agree that transformations require active learning spaces. Within these learning spaces, multiple actors navigate through relational features such as trust and working through conflicts. To this end, we conceptualize learning spaces as arenas for deliberation, interaction, perspective taking and diverse actors. Understanding these processes contributes to understanding what we need to foster transformations. Practically it could also contribute to designing collaborative learning approaches among diverse actors that could support knowledge exchange and co-production, reframing and collective learning. Implications for sustainability transformations include understanding the spaces for learning.

Shining light on leverage points for sustainability transformations: lessons from three cases working with the sustainability lighthouse

John Holmberg and Johan Larsson

Sustainability transformations are journeys into the unknown, characterised by uncertainty, complexity and ambiguity. Meaningful navigation under such conditions depends on a thorough and reflexive understanding of both systems in the present, as well as of the desired direction of change (to sustainability). We have recently developed a conceptual framework ‘the sustainability lighthouse’ to support such undertakings. Embedded in a backcasting process, we suggest that this approach may be useful to inspire and broaden conversations on sustainable futures to identify deeper levers of change. Building upon our backcasting framework, the aim of this paper is to understand how the lighthouse can support identification of and engagement with leverage points for sustainability transformations. Following a realistic evaluation approach, we draw from three empirical cases in West Sweden where the lighthouse has been applied in a backcasting process on different contexts across levels and scales: (1) a multi-stakeholder process initiated by the Traffic Office in Gothenburg City to identify areas of intervention for a transition to a sustainable electromobility transport system (2) a student-centred educational arena “Challenge Lab”, where students exercise transitional leadership through processes of co-production together with societal stakeholders around leverage points to guide sustainability transitions, and (3) an ongoing participatory citizen-engagement process in Åre municipality that seeks to re-establish trust in the democratic system, starting from a collaborative identification of leverage points formulated as “hot questions” in relation to Agenda 2030. Implications for sustainability transformations include conditions and mechanisms under which the lighthouse may trigger deep conversations on sustainable futures. These conversations offer
Is fighting with data enough? A reflection on the ambivalence of citizen science in the Chinese anthropocene

Daniele Brombal

Technology and digitalization have played an important role in empowering citizens’ participation in China’s environmental governance. A wide array of tools to collect, share, and compare environmental monitoring data is now available to the Chinese public. Citizen science (gongmin kexue; also Gongzhong Kexue) has become an important factor in enhancing transparency and responsiveness of China’s environmental policy. However, this form of citizens’ engagement carries considerable ambivalence. On the one hand it promotes awareness and provide reliable instruments to pressure those in power. On the other it implicitly endorses the idea that science and technology are the key forces in shaping sustainability. This is of particular importance in China, whose path towards modernization has been designed by the political elite based on a techno-centric approach, whereby the scientific discourse is used instrumentally to remove contentious issues from the arena of public debate. Despite the importance attributed to the early development of the environmental crisis, China’s development institutions remain anchored to an extractive relationship with nature, based on its monetization and the faith in technological advancement to mitigate anthropogenic impacts.

Implications for sustainability transformations: Against such background, “fighting with data” might prove to be not enough to pursue transformations for sustainability. In fact, the latter shall be rooted in a deeper reflection over the relationship between human beings and nature. This reflection needs values, ideas, and emotions, as much as it needs data. A more holistic conceptualization of citizen science should be pursued to establish a novel science-nature-policy nexus.

Supporting transformative research by doing transformative research - Empirical evidence about support mechanisms for mutual learning and the potential of wikis as a transformative research method

Stefan Hilser

Background:

In order to contribute to transformations towards sustainability we also have to transform our own research praxis to be more transformative. Transdisciplinarity, as well as participatory action research, intervention research and transition research - each with their own Community of Practice (CoP) and set of contributions to learn from - aim to be transformative and focus on mutual learning across disciplines and together with people outside academia. Such collaborative forms of research are particularly challenging and need to actively be supported. Formative Accompanying Research (FAR) aims to actively support learning in such transformative research and is consequently transformative itself, resulting in the following aims.

Aims:

My study aims to (1) collect support mechanisms for mutual learning in such settings and (2) empirical evidence about their effectiveness in different contexts. It further aims to do this in a transformative way that (3) connects the different CoP inside and outside academia with young scientists active in transformative research by (4) using an innovative research approach with transformative potential.

Approach:

Inspired by delphi studies, the approach integrates interviews and wiki software. The first step consists of interviews with experts and participants of transformative research projects, identifying support mechanisms for mutual learning. In the second step, results will be shared with the different CoP and young scientists, using a wiki-platform, enabling exchange of ideas and feedback, serving the refinement of support mechanisms through open peer review. In a third step, support mechanisms will be empirically tested in collaboration with young scientists.

Implications for sustainability transformations:

The study provides practical and empirical evidence on how transformative research can be supported, and the role of FAR in fostering learning between projects. It shows a pathway for transforming how (non-)scientists co-produce knowledge for sustainability transformations, contributing to a growing Community of Transformative Research Practice.

The LOTA Methodology – enabling a rational sustainability discourse in the transdisciplinary research process

Lorenz Hilfy and Clemens Mader

Running transdisciplinary research processes, brings researchers and stakeholders together, representing a diversity of values and norms. This normative orientation not only has a strong impact on results of the research but also leads to misunderstandings among research participants.

LOTA – Landscape of Opinions in Technology Assessment – is a new software tool that is being used in research processes, as like technology assessment, that should represent a wide spectrum of values and are targeted to contribute to sustainable development which is a normative concept as well.

Following a set of questions, LOTA visualizes the landscape of opinions in regard to the research object, of all participating stakeholders. This visualization has two effects:

a. The (anonymous) picture is being shown to stakeholders and informs a rational sustainability discourse. Talks on values are always hard to run. Having a open map of represented values informs this talk and enables a rational discourse on the real matter of research.

b. The picture contributes to the robustness of the research process by making the diversity of represented norms transparent. It also allows to interfere during the research process and to invite further stakeholders which norms are under-represented.

Authors will present the outcomes from a first application of the LOTA software tool in the course of a transdisciplinary technology assessment project on artificial intelligence.

Tipping points and the role of leveraging narratives (4.10)

Which narratives create leverage, when, why and how? To explore these questions, we will examine the nature of collective and individual tipping points and narratives focused on determining leverage points. This session will illustrate these questions with case studies and theoretical reflections.

Session Chair: Sander van der Leeuw
Format: talks and world café
Room: 40.256

Narratives addressing imminent and momentous challenges can create leverages of societal transformation to achieve sustainability as byproducts

Tetsu Sato

Expectations about the futures embodied in various types of narratives reflect a huge diversity of challenges facing societies or individuals. These challenges addressed in narratives are naturally not always directly to sustainability, thus not expected to function as leverage points to promote transformation of social-ecological systems toward sustainable futures. However, two case studies from riparian communities of Lake Malawi in the Republic of Malawi, East Africa, revealed that narratives addressing imminent and momentous challenges for the communities occasionally leveraged the people and communities to take actions toward more sustainable directions as byproducts, which were not directly related to their original intentions. In the first example of community-driven fisheries resource management in Salima region, the narratives by community leaders regarding challenges to secure safety of fishermen from frequent thunderstorms during rainy season leveraged the establishment of a seasonal fishing ban system. This in turn contributed to sustainable fisheries resource management as a byproduct of safety measures to protect life of fishermen. In the second case in Cape Maclear region, the narratives by a local NPO focusing on needs of preschool education in rural villages mobilized sustainable agricultural practices by the NPO and small-scale farmers as a funding resource for educational activities. Tourist lodges in the region were also engaged in this network to support the practices through procurement behavior to actively purchase permaculture products. Based on these case studies, I will discuss the potential process that narratives addressing imminent and momentous challenges for actors in rural communities may create leverage points of sustainability practices as byproducts of their actions to tackle with these challenges. It may happen when expectations on well-being and prosperity of the communities and people are shared among the actors, even if the

THURSDAY 7th 14:00-16:00
sustainability outcomes from their practices are not obviously intended or recognized.

**Change agents as deep levers for social innovation in rural Transylvania**

Elizabeth Clarke, Agnes Balazsi and Agnes Kuhrt

Transformation towards sustainability emerges from social innovation systems that include a complex combination of actors, networks, connections and social ecological conditions that drive change (Clarke et al. 2018; The World Bank 2012).

We explore such social innovation systems in social ecological systems in Transylvania, focusing particularly on cultural landscapes and food production and the waves of change affecting these systems. We look at the actors, networks, connections and social ecological conditions that promote or hinder change. In addition, we explore the role of change agents or “transformers”: those individuals (and groups) who create deep leverage for change within these social innovation systems, or who are the catalysts for the emergence of these systems.

Through a series of semi-structured interviews, we identify a wide range of active and potential change agents and their networks, motivations and characteristics, and who engaged with social innovation in a variety of ways. Despite their differences, these change agents share a number of common traits. Firstly, all feel a strong emotional connection to their local area from the physical (ecological), cultural, ethical, relational and aesthetic perspectives, and an ability to reflexively explore their own inner motivations.

Secondly, all of them display an ability and willingness to learn and explore new ideas; to leverage broad knowledge networks; and to draw together multiple stakeholders, and integrate knowledge and understandings. These agents of change are catalysts and connectors within social innovation systems, and can in many cases be regarded as "deep levers" for processes of change.

On one hand, these challenges and activities are unique to the local context, but on the other hand, the paradigm changes and innovation network approach is universal. This project provides a means to connect innovators and change agents both locally, regionally and internationally for support, ideas and shared experiences.

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**A Case Study Approach to Understanding Tipping and Leverage Points in Adopted, External Narratives**

Jan Stanley

In 2013, a U.S. consulting firm delivered a commissioned report to an influential group of tourism stakeholders in Iceland. In this report, I identified ways in which a markedly different cultural orientation toward human relationships to each other and nature can establish a new base from which a host country’s development proceeds and through which global homogeneity extends. The associated changes in this case appear to reframe human relationships to the earth and each other and may work undermine the resilience of a nation that has survived many challenges by pulling together and treating nature as a partner. In essence, the report established a new narrative within which subsequent development proceeds by presenting an imagined future to which tourism stakeholders may aspire. Additionally, my findings identify sources of vulnerability to this type of cultural reframing and corroborates the work of at least two Icelandic researchers. Several leverage points for change are suggested by the work and include points of intervention, the ways in which those interventions are made, and directions in which information and inspirations for sustainability transformations: Close study of narratives and imagined futures that guide individual and collective human action can suggest dynamics and processes at work in systems and suggest tipping and leverage points in those systems.

**Water governance: Finding a place to stand?**

Kevin Collins, Natalie Foster, Ray Ison and Chris Blackmore

Water governance is becoming an increasingly important issue as climate change, population growth and rising demands for water are predicted to exacerbate potential and actual threats to food, water and energy security (OECD, 2015; Jenkins et al., 2009). As narratives of water governance have evolved (Woodhouse and Muller, 2017), the need for systemic, integrated and adaptive approaches to water governance is increasingly recognised (Voulvouli et al., 2017).

This paper explores the contested narratives of water governance in England and Wales, in particular those arising between catchment-based approaches (CaBA) and competing policy emphases on natural capital and the EU Water Framework Directive. Despite significant investment in implementing the Directive by many people over more than 15 years, there is still no clear progress in England towards meeting its environmental objectives.

Drawing on a systemic inquiry with key stakeholders from policy and practice, the paper highlights some of the experiences of CaBA and the possibilities for new narratives to emerge and transform the future of water governance. Many of the requirements bear significant to changing (transforming) the implementation of the Directive in England, particularly with regard to institutionalising community-based social learning processes and re-framing the narrative of the Directive’s enactment as part of an iterative social learning system. Based on our findings, the paper ends with a discussion how systems concepts can inform our understanding of tipping points and processes of transformation.
multiple social-economic-environmental planetary goals simultaneously needs to be assessed. To help provide a science base for achieving the SDG's, the Belmont Forum and partners are exploring integrated qualitative and quantitative approaches to develop transformation pathways for sustainable development. This challenge needs direct input from the international research community and stakeholders to discuss critical questions or issues around the topic.

During this scoping workshop we seek to bring together, funders and researchers to understand the potential priorities for research regarding SDG development pathways. The desired outcome of the workshop would be walking away with knowing where we think the community is regarding research progress and current activities, and with an idea of the research that needs to be supported to meet those goals. This engagement can help directly gauge the research community's readiness to address these research challenges; identify the need for further networking and community building.

The workshop is open to all Leverage Points 2019 conference attendees.

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**Forum Theatre (4.12)**

The Forum Theatre Workshop offers the opportunity for further reflection and deeper emotional insight into a conference’s issues and topics. By initiating a creative process between audience and actors, a theatrical performance is realised in which the participants can review their experiences.

Session chair: Susanne Mitterhuber

**Format:** Workshop/special session

**Room 40.176**

Forum Theatre is a type of theatre created by the innovative and influential practitioner Augusto Boal, one of the techniques under the umbrella term of Theatre of the Oppressed (TO). This relates to the engagement of spectators influencing and engaging with the performance as both spectators and actors, termed ‘spect-actors’, with the power to stop and change the performance. As part of TO, the issues dealt with in Forum Theatre are often related to areas of social justice with aims to explore solutions to oppression featured in the performance. The work of Augusto Boal is also inspired and based on the teachings of Paulo Freire.

Mag.a Susanne Mitterhuber, theatre teacher, trainer, clown and member of the playback theatre group SOG Theater, Wiener Neustadt, Austria. Conception, design and realisation of theatre projects with focus on reminiscence and biographical work, community theatre and violence prevention. Various playwritings and performances in art exhibitions as well as history museums. She uses the methods of the theatre of the oppressed as creative form of practice-oriented learning in work teams or training groups. Forum theatre is especially suitable to change perspectives on challenging situations and enable a playful try out of alternative options for action.

This session will be a preparatory workshop for the forum theatre performance on Thursday evening.
Indigenous and local knowledge (5.1)

This session explores the importance of indigenous and local knowledge in sustainability transformation. The discussion will include the challenge of bringing together local and global understandings, and knowledge sharing across multiple knowledge cultures.

Session Chair: Berta Martin Lopez
Format: Talks and panel discussion
Room: 40.153

The role of marginalised knowledge and emotions in building climate resilience

Silja Kleipp, Daniel Morchain and Libertad Chavez-Rodriguez

Resilience to climate change demands a state of continual evolution. Social and technical innovations, as well as management practices that promote it need to be founded on inclusive, participatory processes that recognise the central importance of people’s interpretations and emotional engagement with processes of – often transformative – change.

The essence of climate resilience hinges on intangible elements: the transparent and inclusive integration of different roots and kinds of knowledge – from lay to scientific, including different epistemologies and worldviews, e.g. feminist, postcolonial and Global South perspectives; representativeness of governance structures; trust on institutions to represent people’s views; and a sense of equitability and joint ownership of the climate and development challenge.

We explore barriers and boundaries for the inclusion, translation/interpretation and influence of knowledge of marginalised groups (broadly traditional/indigenous, local/community, feminist knowledge) and social sciences outcomes in the climate resilience agenda. We argue that without these, responses to climate change will likely fail to build resilience and risk widening the divide between science – which continues to largely understand the problem as biophysical – and society – who demand agency in addressing it. It also risks widening the gap within societies, as it mostly those who will profit from resilience work that is not transformative.

Implications for sustainability transformations: Scrutinize Western science and knowledge as hegemonic source of knowledge for transformation and adaptation.

Indigenous, traditional and local knowledge in transformation research - A literature review

Elvira Hinz, David P. M. Lam, Berta Martin-Lopez, Daniel J. Lang and Henrik Von Wehden

Sustainability science is facing huge challenges regarding the transformation of social-ecological systems. But is Western scientific knowledge on its own able to solve the problems of a sustainable future at all? To get a more holistic understanding of transformations this thesis observes the use of indigenous, traditional and local knowledge systems in sustainability transformation research. Through a systematic literature review the status quo of the research field is identified and analysed. The results show a strong spatial research bias to the North American continent with 54% of the first authors’ affiliations and 38% of conducted case studies in this continent. Additionally, the research focus of the literature lies in large part in the practical knowledge of indigenous and local communities resulting from their daily experiences and activities. The content analysis of the received literature shows that indigenous and local knowledge is rarely connected to transformations in a conceptual way. Instead these knowledge systems are used to observe and interpret change processes, rather than fostering future sustainability goals. However, this specific research field has the potential to contribute to solutions for comprehensive sustainability problems and support transformation processes due to the possibility of using place-based indigenous and local knowledge on a national or even global scale.

Counter-hegemonic concept formation - a cross cutting leverage point in sustainability transformations?

Hella Lotz-Sitkaka

In her book, Donella Meadows (2008) suggests that use of language and system concepts are significant to transformations to sustainability. She cites Kofman’s view on language being the medium through which we create new understandings and new realities. Through this, she positions system concepts as being core to all other leverage points. She talks of ‘tyrannease’ – referring to the massive impact of hegemonic concepts that have shaped human activity in significantly unsustainable directions to date.

In this paper I both appreciatively and critically review Meadows’ views on language and concepts, noting that this work is under-developed and under-theorised in transformations to sustainability. Through in-depth semantic and historical materialist analysis, I probe the way in which new counter-hegemonic concepts, necessary for transitions to sustainability are being formed through social processes that stretch from activity (concrete) > ideal / concept > activity (concrete); i.e. via a process of dialectically ascending from the concrete to the abstract and descending from abstract to concrete. Most modern educational institutions, theories of learning and concept formation (including those popular in SES research), emphasise the latter with little regard for the former. Lost are important material-social and social-material dialectical processes - unpacked in this paper via analysis of two concept formation processes focussing on the concept of 1) ‘resilience’ popular in climate science responses, and 2) ‘Transgressive Learning’ – a counter-hegemonic concept that we have been working up (i.e. forming) via a large scale, nine country ICSSC supported Transformations to Sustainability research programme.

The paper argues that giving adequate attention to counter-hegemonic concept formation is crucial for transdisciplinary science and practice, social learning and the transformation of human activity. Overall, the paper argues that counter-hegemonic concept formation is a powerful, and as yet under-theorised and under-developed cross cutting leverage point for transformations to sustainability.

Understanding sustainability transformations with indigenous and local knowledge systems: an academic perspective

David Lam, Julia Möller, Daniel Lang and Berta Martin-Lopez

Scholars and practitioners call for sustainability transformations to cope with global challenges, such as biodiversity loss and climate change. Current discussions on sustainability transformations are dominated by western ways of thinking, such as viewing human and nature as separate entities, time as a circular phenomenon, or future as the most important time when we act for sustainability. This study aims to explore indigenous and local understandings of transformations in order to contribute to a more heterogeneous understanding of transformations.

We conducted semi-structured interviews with 11 researchers who conduct research with indigenous and local people in Australia, Asia, Africa, Europe, North- and South America. Most of our interviewees are members of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and five are indigenous and local knowledge holders themselves. We decided to interview researchers who work with indigenous and local people in order to get an overview of existing research on indigenous and local understandings of transformations.

Our interviewees confirmed that not much research exists on indigenous and local understandings of transformations. Based on their rich experience of the indigenous and local people they work with, interviewees highlighted (1) the differences of how indigenous and local people are connected to nature, (2) which major changes the indigenous and local people perceived within the last three generations, and (3) which changes indigenous and local people strive after for their futures.

We hope that this study will enhance understandings of sustainability transformations by reflecting on current scientific theories of transformations and reviewing concepts that are essential in these theories that we take for granted, such as understandings of human-nature connectedness, change, time, and future. By looking at transformations from different perspectives, we hope to support current transformations research and ultimately contribute to fostering sustainability transformations.

Knowledge sharing for sustainability transformation – A transdisciplinary methodology

Marie Rappaport and Adriana Moreno Celý

Bolivia, as one of the countries bringing together governmental development planning with local knowledge, offers the possibility to open a dialogue of communities belonging to different ontologies and epistemologies for managing social and environmental problems. In this context, the ongoing project “Co-creating new
knowledge through joint learning on life systems for adapting territorial development plans – Wakhimana” proposes a transdisciplinary research approach to develop life systems indicators for the implementation of the regional development plan in three different municipalities in Bolivia. Part of the research is focus on the factors that determine the knowledge-sharing space and the consequence implications for the applied participatory methodologies. How do external factors like the historical, political, or academic context influences the research frame? How and where in this frame do the applied methodologies help to open a space for integrating different forms of knowledge? How do internal factors like personal objectives and ideals of the local actors shape this dialogue? These are some of the questions that this research is trying to answer, drawing on a combination of participatory and ethnographic data collection methods. Acknowledging that we all have partial perspectives, different forms of understanding and visualising the same territory, requires building spaces of respectful and more effective dialogue through listening and sharing. Initial results show that open dialogue helps bridging different epistemologies and ontologies for the co-construction of knowledge on social and environmental problems in a multi-ethnic country like Bolivia. More effective dialogue could be the leverage point to connect multiple perspectives and world views. The implications for sustainability transformations in building an ideal territorial planning, where all local actors have something to say, open the possibility for a more equitable future.

Transformative legal analysis as a new tool for sustainability transitions

Andrzej Strzałkowski

Global threats require large, effective and quick social transitions. However, as one of panel’s description noted, many research omit systems perspective and focus on singular phenomena. Simultaneously, there are great methodological challenges for social systems analysis and implementation of research results into actions.

I would like to propose the approach of transformative legal analysis (TLA) which partly address these gaps and problems. Legal system, in the sense of legal acts, have many specific and relevant for sustainability transitions features. Firstly, it is systematically arranged and easy for analysis. Secondly, it is often detailed, so researchers could find concrete ways for little but systematic and consequent changes in it. Thirdly, legal system covers huge number of social practices. Fourthly, it directly regulates behaviors of people in whole countries or even continents. Moreover, what is probably most important, legal system is not purely theoretical idea but real and main instrument of power exercising.

Despite this potential, rather there are not many research which systematically analyze legal system through the lens of prominent social perspectives like social practice theory or multi-level perspective. Therefore, TLA, understood as legal analysis informed by transitional studies, has many implications for sustainability transformations: 1) help overcome some methodological challenges and could deliver uninitiative questions like how legal acts from different areas of social life (e.g. labor law, company law, social security law, energy law, environmental law etc.) are connected, how they depict and influence social order and in the end, what consequences they have for sustainability issues. 2) Further introduction of legal studies to
transitions research offer “common” language between scientists and government workers. 3) Writing propositions of legal regulations by interdisciplinary groups of research and legal scientists may be good way for implementation of transitional research results into practice.

Finance and the Earth system – exploring the links between financial actors and non-linear changes in the climate system

Victor Galaz, Beatrice Crona, Alice Dauriach, Bert Scholten and Will Steffen

The financial sector as an institution needs to rethink about how it engages with its impacts on the biosphere. This paper proposes a first step to inform such a process. Financial actors and capital play a key role for extractive economic activities around the world, as well as in current efforts to avoid dangerous climate change. In contrast to standard approaches to finance, sustainability and climate change, here we elaborate in what ways financial actors affects key biomes around the world, and through this the stability of the climate system. We combine Earth system and sustainability sciences with corporate finance to develop a methodology that allows us to link financial actors, via equity, to economic activities modifying biomes of key importance for stabilizing Earth’s climate system. Our analysis of equity capital in companies operating in the Amazon rainforest (Brazil) and boreal forests (Russia and Canada) identifies a small set of international financial actors with considerable, but as of yet unrealized, influence to move away from unsustainable investments and become leverage points for large-scale change. We denoted these “sleeping financial giants”, and elaborate how incentives and disincentives currently influence their potential to bolster or undermine the stability of the Earth’s climate system.

Governance innovations for sustainability transformations: The case of multiple-stakeholder platforms on oil palm concessions in Myanmar

Christoph Oberlack, Lara Lundsgaard-Hansen and Joan Bastida

Change agents are experimenting with governance innovations for transforming wicked sustainability problems. Governance innovations trigger transformative dynamics, which typically unfold in non-linear ways involving networked processes of collective action with emergent properties. However, precise understanding of these networked, transformative change processes and across particular social-ecological contexts is subject of current debate. This paper presents insights from a case study in Myanmar that analyses how similar multiple-stakeholder platforms trigger contrasting dynamics in transforming sustainability problems related to livelihoods, land rights and environmental performance in Myanmar’s oil palm sector. The paper adopts an embedded case study design. It focuses on a regional multi-stakeholder platform on oil palm concessions in western Myanmar, which are part of the Tanintharyi Region, Myanmar. Variations of transformative dynamics are observed both among platforms as well as over time. Data were gathered through semi-structured interviews,
Facilitative Accountability as a Leverage Point in World System Change for Sustainability

Sylvia Karlsson-Vinkhuyzen

The international community of States has excelled both in adopting goals for a sustainable world within legal (treaties) and non-legal (declarations, action plans) institutions and later ignoring the failure to achieve them and instead setting even more aspirational goals. Central to this failing dynamics is the institution of national sovereignty and the accompanying reluctance by states to accept being held accountable for global commitments through strong accountability mechanisms. In response States devise increasing attention to follow-up and review of commitments but do so with an explicit ‘facilitative’ mandate for these implicit accountability mechanisms where the purpose is encouragement, learning and practical support for implementation. The Paris Agreement with its global stocktake and the Sustainable Development Goals with their voluntary peer review are recent examples.

Frequent criticism of such ‘facilitative accountability mechanisms’ that exclude sanctions is based on the assumption that accountability can only work with the threat of negative consequences. In this paper I instead ask whether facilitative accountability mechanisms can evolve into leverage points for change and under what conditions. I approach this question in two steps. Firstly, I provide an overview of a set of literatures that provide insights into: 1) the importance of envisioning counter-reactions in transformation. The most important leverage points to the power that lies in the well-being of peasants (e.g. Corrado 2010). If we want to recover the political potential that lies in the geo-social position of peasant agriculture, we need to rebuild our relationships to it, we need to build solidarity.

The proposed session will focus on scientists’ relationships to agriculture, the relationships of peasants to their environment, and the possibilities for change that lie in embodied connection, drawing from the theory of revolutionary relating (Adamczak 2017). I will present a quick overview on current dynamics around peasant agriculture in Europe and peasants’ perspectives on their relations to nature and society. Through collective interactive investigation, we will examine the potential of strengthening peasantry as a leverage point to rebuild human-environmental relationships. My research is based on concepts of care work (e.g. Federici 2004, 2012), composed of interviews with peasants and scientists (currently being conducted), and largely drawing from my personal experience as a peasant market gardener.

Implications for sustainability transformations: A sustainable society requires a social approach to foodalimentation, and peasant agriculture can deliver this better than any industrial food system. If we want to make peasant lives possible again, we need to investigate how to support them.

Relational values in river systems in the Western United States

Antonio J. Castro, Adam Eckersell, Cristina Quintas-Soriano and Colden V Baxter

Relational values link people and ecosystems via tangible and intangible relationships to nature as well as the principles, virtues and notions of a good life that may accompany these, and their investigation may reframe discussions about environmental protection. Although examples of relational values provided by river systems may be easily perceived by the general public, such as family bonding or relaxation by fishing and recreation, the social and cultural foundations that shape them in river social-ecological systems remain unclear. We used the Henrys Fork watershed located in Eastern Idaho, a world renowned fishing destination, as a model river-system to explore the linkages between fishing and relational values. We conducted 286 face-to-face social surveys to explore, a) the social importance of different river-ecosystem services and linkages with human well-being, b) perceived benefits provided by fishing as well as factors impacting fish species, and c) differences among stakeholders. Preliminary results indicate that unprompted survey respondents identified cultural ecosystem services 80.6% of the time; and 29% of those respondents directly identified fishing as a main watershed benefit. This demonstrates the importance of fishing as a cornerstone for shaping cultural identity of the western U.S.
FRIDAY 8th 10:30-12:30

Teaching restoration of biodiversity to restore human-nature connections
Vicky Temperton, Jacqueline Loos, Johanna Hoffmann, Katrin Treske-Temperton and Berta Martin-Lopez

Despite major pressures on the biosphere, awareness within groups of non-environmental students of these pressures remains limited. Teaching for sustainability has the potential to raise such awareness and to empower future change agents through combinations of transdisciplinarity and project-based learning. Using a place-based ecological restoration project as a learning space, we illustrate how long-term and action-oriented courses for non-environmentalists can establish skills needed for transformation towards sustainability. The restoration course consists of five modules that run over four semesters, accompanied by group coaching to support team-building.

At the core of the teaching philosophy is the use of a diversity of formats both in teaching, skills development and evaluation of student performance. The transdisciplinary approach happens in close collaboration with a local traditional orchard club, whereby students and lecturers interact regularly with members of the club on issues of both land management and research. The research agenda involves two components: 1) tracking how biodiversity of plants and insects changes over time after the restoration of the traditional apple orchard; 2) testing whether the establishment of a gradient of different forbs/legume grassland species in the apple understory can further enhance overall insect diversity.

Implications for sustainability transformations by now are: a) improvement of both plant and insect diversity; b) experiential learning outcomes for the students through self-organization of research agenda and dissemination of the research findings at a transdisciplinary conference; c) excellent student feedback on the teaching format; d) establishment of a long-term monitoring program at the nexus of biodiversity and food security; e) fostering of closer human-nature connections and changes in attitudes of non-environmental students towards environmental issues.

We conclude that this teaching format has the power to foster and restore both biodiversity and human-nature connections and as such has potential as a model teaching format in future projects.

Sustainable Health and Justice: Nature-based health promotion for supporting prisoners with complex needs.
Dr. Michelle Baybutt, Professor Mark Doornis, Dr. Alan Farrier

Health is a fundamental human right and especially for individuals held in custody of the state. The needs of people in prison are complex and challenging and can make addressing their health needs particularly difficult. Research indicates that contact with natural places can: support both physical and mental health; encourage ecological engagement and pro-environmental behaviour; aid social and psychological development by providing outlets for risk taking and physical energy; reduce stress and anti-social behaviour; facilitate social interactions including team-working and informal sociability; and provide visible and worthwhile achievements.

This presentation explores the benefits of engaging with nature and its impact on prisoners’ health, well-being and future outlook. It argues that nature-based health promotion in the prison setting is a valuable leverage tool for supporting and engendering hope in those with complex needs. An innovative horticultural project in the prison setting in North West England ‘Greener on the Outside [GOOP]’ illustrates that prisoners demonstrate significant improvements in mental wellbeing and reductions in self-harm through engaging with gardening activities. The project utilises a ‘whole system’ settings approach to ensure effective interconnections and synergy across the prison and into the community, thereby tackling prisoners’ needs, addressing health inequalities and reducing (re) offending rates.

A case study will draw on doctoral and evaluative research, both concerned to explore the impacts of nature on prisoners’ mental and social health and well-being; anti-social behaviour and social inclusion; and citizenship skills. By focusing on human experience, underpinned by an epistemology informed by critical realist and constructionist perspectives, the case study will explore meaning within the complex system of the prison setting and present a dynamic vision of the reality experienced by prisoners’ participating in GOOP and reconnected with nature through an innovative horticultural programme.

Implications for sustainability transformations: demonstrates the necessity of non-dualistic transdisciplinary transformations for achieving deep sustainability; illustrates practical engagement with deep leverage points; catalyzes: increased capacity for respectfule engagement across worldwide views and with Indigenous peoples; creative capacity for innovation, and exploration of non-dualistic understandings of human-nature relations.

Transformative educational structures (5.4)
How can educational structures foster transformative research? This session discusses collaborative ways of experimentation in academic setting, including the transformative role of secondary schools and the role of young researchers as change agents of academic structures.

Session Chair: Lydia Kater-Wettstädt
Format: Talks and panel discussion
Room: 40.146
Towards Ontological Fluidity: Personal Transformations for Achieving Deep Sustainability
Viktoria Hinz and M.J. Barrett

Ontological fluidity (OF), the capacity to shift across diverse ways of engaging reality, has been identified as essential to building a sustainable future in a world where the dominant cultural and scientific paradigm separates a knowing human subject from a knowable, passive, objectified nature. This divide-based paradigm is increasingly recognized as perpetuating the global sustainability crisis through reproduction of a human-nature disconnect, or dualism. As a prerequisite to engaging non-dualistic alternatives, such as relational paradigms formulated by Indigenous and non-Indigenous scholars, ontological fluidity is crucial for transcending paradigms, understanding their limitations and strengths, and acting from diverse ontological positions, rather than being locked into one.

OF is not a mere theoretical exercise; it is a perpetual existential practice of learning to comprehend and become fluent in multiple ways of being that give rise to disruptive ontological experiences and happen at diverse levels including the emotional, mental, somatic and spiritual. Engaging in all levels of ones being allows comprehension of diverse paradoxisms from the inside, minimizing the risk of mis-conceptualizing them based on dualistic assumptions and preconceptions.

As graduate student and professor, we have found research and teaching focused on the emotional, mental and somatic experience of intuitive two-way-communications with animals and the natural world to be an effective facilitator of ontological fluidity. We offer a definition, pedagogical approaches that enhance OF, and methods of personal engagement: 1) transformative practices; 2) phenomenology as a research methodology; 3) energy healing; and 4) guiding values as part of a holistic learning process, including patience, humility, respect, and kindness.

Implications for sustainability transformations: demonstrates the necessity of non-dualistic transdisciplinary transformations for achieving deep sustainability; illustrates practical engagement with deep leverage points; catalyzes: increased capacity for respectfule engagement across worldwide views and with Indigenous peoples; creative capacity for innovation, and exploration of non-dualistic understandings of human-nature relations.

The TransLAB*: A vehicle for the methodical application of transdisciplinarity
Dirk Marx

Societies and universities are under more pressure to change than ever before. This is mainly due to a wealth of information and data transparency created primarily through the Internet and is in the context of the characteristics of a cooperative principle that is generally valid today called globalization. The consequences of global networking based on these determining systematics, mainly justified and triggered by the promise of and compulsion for economic growth, are expressed by limitations and other global challenges. The pace of such changes, shaped by trade and consumption, is determined by innovative technologies, by the generation of human desires and needs between food, health and safety and the attempt to satisfy them. Multiple crises - i.e. crisis-like conditions that arise not only on the basis of multiple indicators but are also interdependent - as an expression of the overexploitation of resources are not absent. Against the background of environmental/social and environmental/natural interactions, it is now more necessary than ever to address the university as a place for such answers. The challenges for the university as the primary social place of knowledge production and knowledge transfer are enormous and may represent an overload for the usual university processes and procedures the mere expression of a willingness to face such challenges requires a “university worker” to be able to change.

*Implications (inclusion) for sustainability transformations*
The future of conservation science through the eyes of young scientists
Jenna Purhonen

The generation of young scientists has grown up along the global environmental crisis. In the 5th European Congress of Conservation Biology, arranged in June 2018, we gathered young scientists together to brainstorm on solutions to the current environmental challenges.

Beforehand, we sent a questionnaire to all 140 graduate students registered to the congress, in order to collect their views on the crucial actions towards planetary well-being. The 67 responses gave priorities to acknowledged steps to advance sustainability, listed in the second notice on world scientists’ warning to humanity (Ripple et al. 2017, BioScience 67). All of the 13 steps were perceived as important, but they differed in the overall ranking. The three most valued actions were: (1) establishing of protected areas, (2) enhancing the use of new green technologies and renewable energy sources, and (3) revising the prevailing economy. The respondents brought up also actions not listed by Ripple et al. (2017). These were arranged into broad, thematic groups ranging from multidisciplinary research and participatory governance to environmental pollution and waste. At the congress, these themes were further contemplated in small-group discussions among 35 workshop participants. The discussion outcomes were documented for qualitative data analysis. In this presentation, I will reflect on the results of the questionnaire and the workshop by asking how to work as a scientist to better support solving of environmental problems in a changing world. The results suggest a merging of professional, political, and private lives in young conservationists, as actions to be taken in all domains were proposed, and the capacity of scientists as mobilizers of citizens and as citizens themselves was highlighted. Implications for sustainability transformations include detection of possible signals of change within the scientific paradigms and developing current conservation research, intertwined to a strong message on more participatory role of scientists in societies.

The educational option(s) – leverage point(s) of a climate-resilient sustainable development
Dunja Peduzzi, Oliver Schrot and Lars Keller

Future generations will have to cope with many impacts of climate change, even if current attempts to terminate anthropogenic emissions of greenhouse gases are successful. Therefore mitigation measures need to be complemented by innovative climate change adaptation strategies to ensure climate-resilient sustainable development (IPCC 2014, 16-17). The Intergovernmental Panel on Climate Change lists options to achieve this objective, including approaches for reducing vulnerability and exposure, adaptation (s. str.) and transformation, but their feasibility and sufficiency differ across regions (IPCC 2014, 26-27). Although the Alps belong to the areas most affected by the impacts of climate change, their capacity to adapt is relatively high, due to their financial power, stable states and existing institutions for inter-regional and international cooperation (EEA 2009, 96). Under such conditions, where economic development, access to technology or governance structures are not limiting, social factors like climate change awareness, knowledge and skills as well as individual and collective assumptions, beliefs and values can determine the ability and willingness of communities to respond to climate change (EEA 2009, 107). Thus educational options (IPCC 2014, 27) represent a leverage point for the climate-resilient sustainable development of the Alps.

"Generation F – Fit for Future" is a trans- and interdisciplinary education-research-cooperation between the Department of Geography at the University of Innsbruck, the European Academy Bolzano/Brixen and two secondary schools in each of the two alpine provinces North Tyrol and South Tyrol. The project aims to strengthen the adaptive capacity of the participating students, using a research based, constructive learning setting, and to provide further transdisciplinary and transformative knowledge.

Implications for sustainability transformations are derived from project experiences and preliminary research results.

Leverage Points for Education for Sustainable Development in the German Educational System
Mandy Singer-Brodzowski, Nadine Etschkorn, Theresa Grapentin and Julius Grund

In recent years, Education for Sustainable Development (ESD) has become increasingly important internationally and in the German educational landscape. The Global Action Programme for ESD (GAP ESD) (2015-2019) in Germany is coordinated by the German Ministry of Education and Research (BMBF) and accompanied by a Scientific Advisory Process by the Freie Universität Berlin. Part of this advisory process is the national ESD monitoring. This research project is comprised of four phases: 1) Desk Research (1, 2) and an interview study, 3) a questionnaire study and 4) Desk Research II. In the second phase, 66 qualitative expert interviews have been conducted to reconstruct the diffusion of the social innovation ESD (Bormann 2013) in the different areas of the German educational system in the last years. Furthermore, the aim was to identify leverage points (Meadows 1999) in the respective educational areas. Against the background that the educational system represents a social system with different subsystems (i.e. early childhood education, school education, vocational education, higher education), we figured out the respective system goals and characteristics and analysed their effects on the diffusion of the social innovation ESD with the theoretical lens of leverage points. The analysis was carried out by a Qualitative Content Analysis. The results of the interview study showed that the diffusion of ESD appeared to be very heterogeneous in the respective educational areas. Moreover, the prevailing understanding of education in the educational area has affected the diffusion of ESD. Efforts to combine ESD with the respective understanding of education in the educational areas (leverage points on the level of system goals) were mentioned only partly by the experts. In conclusion, the implications for sustainability transformation in the value of a system perspective in transformation processes that invites researcher and practitioners to reflect about the leverage level of (their own) transformation strategies.

The Discomfort Zone: An Auto-ethnographic Account of Building a Transdisciplinary Academic Career
Idli Gaziuloupy

This article investigates the implications of academic context on the development and career progression of transdisciplinary researchers through an auto-ethnographic inquiry. I am a sustainability scientist and a design researcher; the only academic fields which explicitly embody transdisciplinarity as a requirement for and enabler of “good”, “socially relevant” and “solution-oriented” research. Nevertheless, this internal legitimisation of the fields is not widely reflected within the still dominant, disciplinary conventions of the academic institution. Being a transdisciplinary researcher means inhabiting a zone of discomfort – a zone that never allows the inhabitant to feel grounded, relaxed, or “belonging”. This discomfort is due to the widely acknowledged challenges inherent to transdisciplinary research, including the institutional traditions within academia which shape organisational policies as well as power relations. There are only few contributions in the literature from emerging researchers on navigating the difficulties encountered as a result of choosing the transdisciplinary research path. I situate my auto-ethnographic account into the broader literature on institutional challenges of transdisciplinary research and contribute into the literature from the perspective of researcher experience. My analysis covers 2005-2018, the period covering starting my PhD in a traditional research university and being advanced on my tenure-track to the second stage of assistant professorship in a university which has adopted transdisciplinary research and education as a strategic goal. Implications of this contribution for sustainability transformations includes a series of policy- and practice-relevant insights for university management, peers and transdisciplinary researchers themselves on ways of supporting early- and mid-career researchers working on not only sustainability transformation research but also on any research area that deals with socially-relevant and complex problems.
Leverage points for improving gender equality and human well-being

Aisa Manlosa, Jannik Schulter, Ine Doresteen and Joern Fischer

Gender inequality persists in many parts of the world. How transformative processes could be facilitated to improve gender equality and consequently, human well-being, is a key question for moving towards a sustainable future. Focusing on southwestern Ethiopia where there had been significant changes in formal institutions related to gender, we applied a systems perspective in an investigation of gender inequality and different domains for intervention and change. We also investigated drivers of changes, and how changes were perceived to affect household well-being. A systems perspective recognizes complexity, interactions among components across scales, feedbacks and emergence. In particular, we applied the concept of leverage points. Drawing on qualitative data from 10 focus group discussions and 25 interviews, we considered shallow leverage points (i.e. visible gaps) and deep leverage points (e.g. structures, attributes) to understand gendered social dynamics and to identify opportunities for facilitating gender transformative change. Changes in structure particularly at the institutional levels facilitated a number of improvements in visible gaps such as increased female participation in public activities. Increased female participation, in turn, played an enabling role for further changes to social norms and community rules, and (albeit to a lesser degree) also triggered re-consideration of perceptions about women’s capacities. The key drivers to observed changes across leverage points included government policy and interventions, access to information and improved relationships between men and women at the household and community levels. Changes in the direction of more equal gender relations were perceived to contribute to household well-being by improving household management of harvest and income, improving capacities to be food secure, and improving health. Implications for sustainability transformation: Our systems perspective suggests that acting on shallow leverage points can create enabling conditions for changes in the deeper leverage points, with subsequent interactions between these that can support a gender-equal trajectory.

"Jobs and Growth": An Inquiry into the transformation of organisational purpose

Mark Edwards and Guinola Nonet

Despite attempts to innovate and collaborate for a future that embraces prosperity for all (including human societies and natural ecosystems), we struggle to move away from unsustainable economic models and practices. However, many experiments are being undertaken to develop new forms of organising and working that place greater focus on community and economic well-being. In this paper we review some of these experiments in the context of the leverage points of the "mindsets" and "paradigms" that underpin work organisations (Meadows, 2002) and the forms of transformative organising that address problems associated with economic growth. We argue that, whatever transformative pathways we adopt, we will need to reframe organisational purpose and its relationship to economic growth. If sustaining forms of prosperity are to be developed, organisations will need to become places that enable human growth in its broadest and deepest sense. Rather than unconsciously pursuing economic growth as a surrogate for human development, organisations will become sites for more intentional and integrative modes of occupation. To illustrate our argument we consider growth in the context of the United Nations Sustainable Development Goals (SDGs) and the economic, social and environmental investments needed to create a "safe and just operating space for humanity" (Raworth, 2018). This research contributes to the growing literature on alternative approaches to growth; from growth as economic increase to growth as expansion in developmental competency and vocational maturity. From this perspective dematerialization is challenged in its basic understanding or growth in the intangibles of mindset, values and relationships with nature and other people. Growth is about entrepreneurship in the mind and practice (including human societies and natural ecosystems). How transformative processes could be facilitated for breaking down or dismantling old, unsustainable economic ideologies and practices. (including human societies and natural ecosystems) growth as human development, ii) work organisations as sites for holistic growth, iii) transformation in mindsets and paradigms as part of everyday work.

Is changing the way goals are assessed a key leverage point?

Eureta Rosenberg and Harry Biggs

When conceptualising development programmes as complex processes in complex systems, one encounters the limitations of standard monitoring and evaluation (M&E) activities which assume that change commences along predictable, linear pathways. New approaches to M&E aim to track and assess change in complex open systems. The authors examine key features of such approaches, drawing on M&E and adaptive management processes which they have designed and implemented with partners in Southern Africa. The case base includes the Kruger National Park Rivers project; the Association for Water and Rural Development’s RESILIM-O programme in the Olifants River catchment in South Africa and Mozambique, and our participation in a social-ecological research and development programme involving Rhodes University and the South African government in the Tsitsa River catchment. Key features to include monitoring biophysical and social indicators; case studies and experiments; shared clarification and review of change theories; and the integration of elements to detect and understand change and stimulate reflexive feedbacks. The resultant M&E framework can be a bricolage, but critical realism (sensu Sayer) provides a base for integrating different forms of research and knowledge with coherence and credibility. The human factor which animates an M&E system, is critical, and flexibility and will to engage in learning, appear vital. Learning how to assess and shape change can challenge programme participants’ deeply held assumptions. This is engaging at the deepest levels in a system, described by Donella Meadows as paradigmatic. A desire for paradigm change would require learning-together of what is not yet there (sensu Engstrom), a necessary counterpoint to the notion of intervening in a system which implies, using a blueprint to change someone else. Implications for sustainability transformations are that programme and evaluation design should attend to a dialectic relationship between elements at the ‘superficial’ levels of systems, in this case metrics, and deeper, reframing dimensions.
Facing limits, such as planetary boundaries, is an opportunity to reimagine society. Worldwide, many citizens are joining together to strengthen resilience and sustainability. There are over 1,200 community-led Transition groups in 48 countries, working for resistance efficiency (e.g. local food) and social change.

Some of the initiatives have unintended results, like raising conflicts with local public administrations. Extensive research demonstrates that the nature of these interactions can either obstruct community-led initiatives, or act as powerful enablers.

Transition Network and the Transition Hubs started the "Municipalities in Transition" project in 2017. The objective is to create a clear framework for how Transition groups and municipalities can create sustainable change together. A participatory-action research approach uses transformative social innovation as an analytical framework.

The work included mapping and assessing impactful collaborative experiences around the world, co-building an agreed framework, testing and refining in six pilots and promoting a community of practice.

The framework is comparable to a cooperative game: a grid is used, with columns corresponding to different local actors, and rows to categories of actions (e.g. using new technologies or fostering relations). The first step in this "board game" is to set out the main transformative prelude initiatives already happening in the community, providing a baseline. The game unfolds by using joint efforts to occupy new "squares", some of which are considered to be leverage points.

The methodology takes a systemic approach, aiming for institutional and cultural change.

Implications for sustainability transformations: a systemic and operational framework was developed and tested through participatory action research, to promote synergies in the interplay between local governments and civil society, challenging existing practices and founding a supportive environment for new "transition patterns" to emerge and develop, believing this can act as a leverage point for wider social transformation.

Transforming Consumption: The role of civil society organizations in upscaling niche sustainable consumption practices to mainstream

Ola Persson, Vishal Parekh and Mikael Klintman

The issues of contemporary consumption and production patterns of the affluent countries have been on the global agenda for almost three decades. This has entailed an increasing interest amongst scholars and practitioners concerning the topic. Still, there is a lack of comprehensive research efforts of transdisciplinary collaboration between all societal realms on this topic. A novel initiative of this type is the Swedish research program Mistra Sustainable Consumption – from niche to mainstream. The program posits that the mainstreaming processes require collaborations between market, political, civil society actors and academia. One central hypothesis in the program is that the position of civil society organizations (CSO), at the intersection of private and public spheres, provides them with a unique potential for disseminating niche practices. The CSO's framings of problems, causes, and solutions are, however, by no means homogeneous. The point of departure of this paper, written within the above-mentioned research program, is to examine: 1) how established civil society organizations, operating in Sweden, understand and frame the problems of and solutions to unsustainable consumption patterns; 2) what types of niche sustainable consumption practices within food and furnishing are selected for further dissemination and what are their methods of dissemination; and 3) how these organizations perceive their role to aid in the diffusion of the selected niche sustainable consumption practices. To answer these questions, interviews are conducted with core transition groups and municipalities as well as with key personnel within the different CSO's. Additionally, participant observations are carried out during the CSO's dissemination events and activities. In this paper, we seek to develop relational understandings of care within stewardship. We use three theoretical perspectives increasingly adopted in the stewardship literature – dwelling, sense of place and biocultural diversity – to elaborate the two aspects of a relational conceptualization of care: (i) care as emergent from social-ecological relations, (ii) care as embodied and practiced, and (iii) care as situated and political.

Implications for sustainability transformations: In generating richer theoretical understandings of care within stewardship, we strengthen the legitimacy of actions towards sustainability that provide alternatives to top-down, expert-led approaches, whether in the form of market-driven appeals to instrumental values, or legislatively-driven attempts to exclude humans from ecosystems on the basis of intrinsic values. While these options may be appropriate for certain contexts and issues, they arguably miss a defining aim of sustainability – fostering close, generative and ongoing relationships between people and their environment. Caring approaches provide an alternative by mobilizing a central, yet currently under-recognized, aspect of what it means to be human – giving and receiving care. Relational approaches to care are rooted in recognition of the reciprocal social-ecological relationships within which care manifests and nurtures well-being among humans and nonhumans alike. Dwelling, sense of place and biocultural approaches provide pointers for where sustainability interventions guided by these principles might start; for instance, being attentive to and supporting existing, social-ecological relationships rooted in place and practice. Relational approaches to stewardship research and practice can lead to more nuanced,
Levels of Individual Change Agency for Sustainability Transformation — The Case of the Textile Industry

Maiké Buhr

This paper investigates how individual change agency is constituted with regard to beliefs, actions and competencies in order to enhance a sustainability transformation of the textile industry. Whereas the importance of individual change agency needed to advance corporate sustainability is receiving increased attention, a gap remains regarding the following aspects: Beliefs, actions and competencies of change agents have not yet been comprehensively studied from a systemic per-spective, i.e. on different levels of change (individual, organizational, system). Furthermore, we argue that the ability for change agents to increase their individual agency depends on the social practices within the company. By taking the analytical lens of different levels of change, this paper embeds individuals’ agency within the social practices of a company from a systemic perspective. Thereby, it analyzes how change agents are embedded in social practices and how their beliefs, actions and competencies are shaped through this. Methodologically, the paper approaches a single case study of a clothing company, as there are rare examples of richly describing the transformative potential of individuals inside an organization. The textile industry was chosen, due to devastating working conditions, intensive resource use and fast fashion cycles, displaying that a sustainability transformation is urgently needed. The paper places an emphasis on an incumbent firm, because there is a need for incumbents to change towards sustainability and due to their transformative potential of the market. The findings display implications for sustainability transformations in several ways. Firstly, the paper contributes to distinguish the transformative potential of individual change agents embedded in corporate practice. Secondly, the paper suggests strategies for change agents in how their beliefs, actions and competencies can be a leverage point for sustainability transformation. Thirdly, the paper provides insights in the transformative processes needed to enable sustainability transformations of the textile industry on different levels.

Change agents or drops in the ocean? On the systemic role of transformative entrepreneurs in dedicated innovation systems

Michael P. Schlâle, Sophie Urmetzer, Marcus B. Ehrenberger, Kristina Bogner, Matthias Mueller, Andreas Pyka and Michael Schramm

We aim to elucidate the role and transformative potential of different types of entrepreneurs in sustainability transitions. In innovation systems (IS) that take the normative dimension of transformations towards sustainability seriously, the entrepreneurial activities can be assumed to differ from those in the traditional IS paradigm as they rely more on institutional, social, sustainable, and environmental entrepreneurship (Schålale et al., 2017). It has been argued that entrepreneurial organizations can not only compensate for failures in the current IS but also stimulate the institutional changes necessary for developing the system in a direction where it is enabled to address the relevant problems (Beckmann, 2011). Many entrepreneurs have been found to play an important role in changing systems’ configurations (as so-called “systems entrepreneurs”; cf. Vexler 2017). We develop a typology of transformative entrepreneurs and conceptualize at which leverage points (Abson et al. 2017) they may intervene to spur transformations of institutions, markets, and habits of consumption and production in IS dedicated to transformations towards sustainability. Implications for sustainability transformations: Entrepreneurial activity must be regarded as a heterogeneous system function. In terms of their (leverage) potential to transform systems towards sustainability, different types of entrepreneurs must be distinguished.

Transformative co-production experiments for societal learning (5.7)

This session engages members of a thematic research network on learning in sustainability transitions on the transformative potential of co-production experiments. We will explore learning concepts to understand co-production experiments and their outreach as well as micro (e.g., individual and group) to macro learning (e.g. societal level) concepts.

Session Chair: Bruce Goldstein

Format: Workshop/special session

Room: 40.255

Transformative Co-Production Experiments as a Nucleus for Societal Learning

Bruce Goldstein, Ilan Chabay, Flurina Schneider, Johannes Halbe, Richard Beecroft, Julianna Gwiszcz

This panel will engage members of a thematic research network on learning in sustainability transitions on the transformative potential of co-production experiments. The issues we will explore include:

- Developing learning concepts to understand co-production experiments and their outreach. We will explore how micro (e.g., individual and group) to macro learning (e.g., structural change at the societal level) concepts help to understand how co-production experiments foster critical links between personal, small-group, and societal learning.
- Facilitation of mutual learning among diverse stakeholders as a lever for advancing changing perceptions, attitudes, and behaviors (e.g., towards global ecological citizenship). We will consider how diverse knowledge practices (traditional, cultural, procedural, and scientific) enhance meaning making and knowledge co-production, while taking challenges like power dynamics into account.
- Designing cross-boundary learning processes that connect “inside” (within participating individuals and groups) with “outside” (e.g., institutional changes) processes of change. We are particularly interested in how co-production experiments can leverage paradigm transcendence through reflection on the Modernist framing of learning processes as inner/outer learning, and emergence of new ways of framing and articulating to seek a “personal-to-civilizational scale transformation.”

- Co-production experiments have complex and case-specific features that impede transfer of findings between interventions. What kinds of learning are possible when methods are not standardized and other conditions for reliability, scalability and transferability do not hold?

This panel builds on activities that began at the International Sustainability Transition Conferences 2016 (in Wuppertal, Germany) and 2017 (in Gothenburg, Sweden), which led to creation of a thematic research network on learning in sustainability transitions, drawing together members of the social-ecological systems research, organizational science, and educational science communities. Follow-up activities, such as webinars and the preparation of a special issue, have developed scholarly interest in transition research from (see: http://www.tias-web.info/tias-activities/learning-community/).

Format

The session is divided in two parts. In Part 1, six introductory talks will focus on specific aspects of the role of learning in transformative co-production experiments. Part 2 is an interactive panel discussion using a fishbowl format which supports a lively discussion in a self-organized way, as members of the audience replace panel members who initiate the discussion.

Introductory talks:

- Bruce Goldstein (Program in Environmental Design, University of Colorado Boulder): “Transformative Learning Networks”
- Ilan Chabay (Institute for Advanced Sustainability Studies and Arizona State University): “Facilitating mutual learning for sustainability through multi-player games”
- Flurina Schneider (Centre for Development and Environment, University of Bern): “Fostering multi-level learning for sustainability transformations in different cultural contexts”
- Johannes Halbe (Institute of Environmental System Research, University of Osnabrück): “A Multi-Level Learning Framework to Analyze and Design Transition Governance Processes”
- Richard Beecroft (Institute for Technology Assessment and Systems Analysis, Karlsruhe Institute of Technology): “Embedding Transdisciplinary Project Courses in a Real-world Lab”
- Julianna Gwiszcz (School of Human Evolution and Social Change, Arizona State University): “Catalyzing Global Ecological Citizenship through Transformative Learning: The Integral Role of Affective Engagement”

Fishbowl discussion

Initial panelists: Bruce Goldstein (moderator), Ilan Chabay, Flurina Schneider, Johannes Halbe, Richard Beecroft, Julianna Gwiszcz
Scaling and local initiatives (5.8)

This session includes a focus on scaling local sustainability initiatives and innovations. This includes a critical appraisal of past experience with scaling, examples of scaling projects and the importance of local actors and initiatives and social networks.

Session Chair: Annelie Sieveking
Format: talks and world café
Room: 40.175

Enacting Embodied Leverage Practices for Sustainable Development in and through Organisation and Leadership

Wendelin Kuipers and Paul Shrivastava

Based on critique of conventional approaches for designing with the challenges for transforming towards sustainability, leverage points are used to reopen new possibilities (Abson et al., 2017; Ives et al. 2018; Meadows, 1999). Interpreting leverage points as embodied practices, the same influence specific activities in organization and in relation to stakeholders.

Besides exploring constraints that impede capacities for sustainable actions, we specifically focus on enabling leveraging practices for prudent, responsible-responsible and sustainable forms of wise managing, organizing and living in praxis (Kuipers, 2011, 2015).

Concerning the need for a transformed relationship of human and more-than-human beings, leveraging practices can serve a way to retreat from anthropocentric towards more ecocentric orientations and practices that also questions and displaces neoliberal regimes.

Concrete implications in forms of energy consumption, recycling, transport, food practices in relation to natural and social ecology will be discussed as part of environmental workplace behaviors (Clocirian, 2017). In particular, we will illustrate possibilities with concrete examples from practical initiatives and projects of sustainable practices at a university. Finally, political and theoretical implications of embodied leveraging processes for sustainability transformations are outlined.

Rethinking the idea and practice of scaling innovations for development and progress

Seerp Wigboldus

Scaling innovations is generally considered to be a core mechanism for achieving societal goals. It is based on the reasoning that, by scaling innovations, the gap between the scale of problems (or societal ambitions) and the extent to which these are addressed is bridged. However, most of the grand challenges are caused by innovations which went to scale in the past. Carbon emissions and the resulting climate change is just one example. Also, processes of scaling innovations are at the heart of contested societal trends, including industrialization and globalisation. Scaling innovations in many cases means "doing more of the same", which has (in potential negative) implications for (bio)diversity, proportionality, and distribution of benefits.

Still, the idea and practice of scaling innovations as such are rarely approached critically. Positive impact at scale is too easily assumed to be the resulting outcome. It is therefore time to rethink this idea and the associated practice. One way of doing so is to consider core narratives that motivate the idea and practice of scaling of innovations for development. They may be characterised in terms of a scaling rhetoric, a scaling paradigm, and a scaling ideology. The current focus of decision-makers is on making the scaling of innovations happen, which is about single-loop learning and at best second-loop learning. It is time for triple-loop learning: is scaling innovations as the generally accepted mechanism for achieving societal goals a flawed idea? Implications for sustainability transformations are significant since the approach of scaling innovations is also considered to be a key mechanism for achieving this.

Scaling for transformations: Analysing local initiatives in Africa with high potential to contribute to more sustainable futures

Amanda Jimenez Aceituno, David P. M. Lam, Berta Martín-López, Daniel J. Lang, Garry D. Peterson, Albert V. Norström and Per Olsson

Achieving sustainability in the Anthropocene requires radical changes to how human societies interact with the environment. A key question is how to find plausible pathways of development that can contribute to more sustainable futures. The Seeds of Good Anthropocenes project has identified a set of diverse existing initiatives - called "seeds" - that under proper conditions have the potential to catalyse sustainability transformations.

One of the determinants for these seeds to contribute to transformations is their ability to amplify their impact, moving from their micro-scale (where they perform as innovative experiments to test and promote alternative practices) to a meso-scale (where they change the dominant culture or practice of the system). While this movement requires the opportunity context to be conducive to engaging at the micro-scale, there are different amplification processes that can push this movement to happen. Amplification processes are diverse, but can be grouped into three mechanisms: scaling within (to have longer or faster impact), scaling out (to impact more people and places), or scaling beyond (to affect rules and values).

As a first inquiry we analysed African based seeds, to examine the different amplification processes they are using to increase their impact. Our objectives are: (a) to align the theoretical-based amplification typology with the empirical evidence found in African seeds; (b) to get a deeper understanding of the different practices and activities contributing to the different amplification processes, especially the ones changing rules and values; and (c) to evaluate how applied amplification processes are linked to the seeds contributions to the Sustainable Development Goals.

Implications for sustainability transformations: This work aims at better understanding how local initiatives in Africa try to increase their impact via amplification processes to foster sustainability transformations. A better understanding of the links between amplification processes and characteristics of local initiatives can inform transformative governance frameworks.

Social networks as levers for transformations: Understanding amplification of impact in non-governmental organizations in Southern Transylvania, Romania

David P. M. Lam, Berta Martín-López, Andra I. Horcea-Milcu and Daniel J. Lang

Research on sustainability transformations increasingly recognizes that the agenda of navigating and fostering change needs to be in the hands of local actors. Local actors, such as non-governmental organizations (NGOs), can foster large-scale systems change by increasing their impact via amplification processes. Amplification processes are actions used by local actors to increase their transformative impact and can be grouped into three mechanisms: scaling within, out, and beyond. Our objective is to understand how efforts from local actors to increase their impact via amplification mechanisms is reflected in their social networks related to the leverage points categories parameters, feedbacks, design, and intent. In our transdisciplinary case study in Southern Transylvania, Romania, we investigated how the networks of NGOs that act for sustainable development by breaking down their relations to the four leverage points categories. The networks were created based on three survey questions for each leverage points category - parameters (i.e., sharing material resources and tools, developing projects and applying for funding, implementing projects together), feedbacks (i.e., exchanging information, acquiring new knowledge, and exchanging informal advise), design (i.e., participating in the same policy processes, working together to change policies, setting up new collaborations), intent (i.e., pursuing similar strategies in your work, reflecting on your mission and goals, engaging in activities that help you to reconcile differences in values and worldviews).

Leverage points for pro-poor livelihood transformations in coastal Bangladesh: An initial systems analysis

Marion Glaeser and Samiya Selim

Coastal Bangladesh is highly vulnerable to anthropogenic salinity intrusion. New production systems need to replace the disappearing agricultural livelihoods of up to 20 million coastal people. Integrated multi-trophic aquaculture (IMTA) is new to Bangladesh but connects to local knowledge. IMTA can mitigate the harmful ecological impacts of conventional aquaculture and possesses transformative potential for the poor who bear the costs of environmental change. Collaborative innovation development in brackish water aquaculture (BWA) through which poor men and women increase their opportunity space as "experts and experimenters" is needed.
FRIDAY 8th 10:30-12:30

So far, aquaculture development has achieved little along these lines.

Since 2016, a group of social and natural scientists from Bangladesh and Germany in dialogue with ministerial, business and NGO representatives are preparing an initiative to enable poor coastal men and women to co-develop innovative, ecosystem-based BWA (i.e. IMTA and related options). We envisage an Innovation Systems Approach in which multiple stakeholders collaborate in extending opportunity spaces with and for those least successful within conventional transfer of technology models. Social innovation beyond technology and the establishment of “countervailing powers” among poor and marginal coastal residents are likely to be essential to enable such an approach viable, socially equitable and ecologically sustainable transformative innovation through co-developing innovative aquaculture ideas in ways that include those most affected by environmental change.

We aim to support a self-organizing transition to sustainable coastal resource use and livelihoods for the poor under new and dynamic environmental change conditions. Donella Meadows’s “Leverage Points” serve to analyze sustainability transformation prospects for one of the earth’s poorest, most densely populated and climate-change affected regions.

A Critical debate on digitalization as leverage point (5.9)

In this session we will critically discuss digitalization and its transformative impacts in the light of the leverage points approach. This will include discussing the role of design and intent, the role of co-creation and power structures, and the patterns and processes related to digital technology.

Session Chair: Carlos Alvarez Pereira

Format: Workshop/special session

Room: 40.254

Session: Digital for Life? A Critical Debate of Digitalization as Leverage Point

Carlos Alvarez, Joséphine von Mitschke-Collande, Maja Göpel, Phoebe Tickell and Markku Wilenius

Our love affair with digital technology promised us the world: more friends, better health, a clean environment and a highway to an optimized future of abundance. Many of us subscribed into the illusion that digital would make the world a better place. We surrendered to this idea. In particular digital innovation was largely perceived as a driver for the transition towards sustainability, hence a powerful lever for a more livable society.

For instance a frenzy that digital tools would halt consumerism and promote energy efficiency was widely shared at the onset of the sharing economy. Recent research however shows that the expected positive environmental outcomes of the sharing economy lack a thorough analysis in particular regarding rebound effects. The so-called digital revolution that took place in the last decades has not been environmentally clean and will be even less dematerialized in the future. Estimates reveal that information technologies could account for as much as 20 percent of total energy use by 2030. Impacts of digital technology on energy use, resource consumption (water, metal, rare earths) and CO2 emissions are serious and are expected to rise further if applications such as Artificial Intelligence and Blockchain actually follow the pathways currently proposed. Not to mention the disruptive socio-economic impacts digital technology has on our societies.

The leverage points approach conceptualized by Donella Meadows is a powerful framework to gain more insights about transformation towards sustainability. In recent years the leverage points approach has gained traction but concepts and concrete applications need to be further investigated. Innaxis is aiming to contribute further to that research using as a testing ground the complex role of digital technology as an enabler of transformations not necessarily headed towards sustainability.

To that end, Innaxis is looking forward to convene at the Leverage Points 2019 conference a critical discussion about digitalization and its transformative impacts in the light of the leverage points approach. This will include discussing with participants the role of design and intent, the role of co-creation and power structures, and the patterns and processes related to digital technology. As well as discussing mechanism heuristic and thus the risk to discredit the promising approach of leverage points. Such as perceiving technological innovation as being exogenous to the system and not a product of the system itself. Nor recognizing the shortcomings of the hypothesis often made by socio-technical transition as well as environmental management advocates, that technological innovation can be managed towards a specific end-state.

Moreover acknowledging that perceived leverage points are framed in a certain way and as Jay Forrester stated very often counterintuitive, thus the difficulty for digital technology to be de-linked from the current paradigm of the system.

Innaxis is looking forward to broaden the discussion on the leverage points approach in the digital context with the participants of the session. Perspectives will be used from complexity theory, emphasizing interactions over separation, process over structure, non-equilibrium over equilibrium and evolution over permanence as elements of a paradigm of self-organized transformation inspired in Erich Jantsch and Nora Bateson’s theory of transcontextuality. Hence reframing digital technology not as an exogenous and unstoppable trend which by all means the system has to adapt to, but as a process which can be modeled and re-adapted iteratively in order to serve a new overall goal of the system, namely a sustainable society.

Emerging financing transformations systems part 1 (5.10)

Emerging financing systems are one of the most powerful societal systems. With respect to transforming financing systems, Session One will: (1) surface leading practice, (2) draft ideas and opportunities for advancing leading practices, and (3) develop inter-personal connections within and across leading practices. A second session (6.6) follows to develop an agenda from the outcomes of this session.

Session Chair: Steve Waddell

Format: Workshop/special session

Room: 40.165

Emerging Financing Transformations Systems

This is an SDG Transformations Forum session, organized by the Financing Transformations Working with its Lead Steward Steve Waddell and Councillor Steven Lovink who will bring in other colleagues.

Emerging Financing Systems are one of the most powerful societal systems, and their transformation involves socio-political-economic issues with huge questions about how to change powerful incumbents. Integrating into their logic social-environmental concerns about sustainability and justice requires deep transformation.

At the risk of over-simplification but for actionable ease, strategies to advance this transformation might be classified as two-fold. One is to change current institutions, and the other is to create “skunk works” to emerge new institutions that become the “new norm”. Skunk works are “…project(s) developed by a small and loosely structured group of people who research and develop a project primarily for the sake of radical innovation.” Skunk works transformative power arises as they become the “new norm” in a system. This proposal focuses on skunk works in finance, with two, two-hour sessions.

The goals of Session One are: (1) surfacing leading practice, (2) drafting ideas and opportunities for advancing leading practices, and (3) developing inter-personal connections within and across leading practices. The goal of Session Two is: (1) drafting an agenda for collaborative action for advancing the ideas and opportunities, with the support of the Financing Transformations Working Group.

Skunk works’ radical innovation almost inevitably involves redefining system boundaries, goals and identity, as reflected in Meadows’ most powerful leverage points. This suggests that financing systems skunkworks should be seen from the perspective of new purposes, such as those associated with “circular” and “regenerative” economies. With this in mind, the sessions will include those working on:

- Ecosystems services: creating new financing systems to ensure the support of the many and varied benefits that humans freely gain from the natural environment
- Impact investing: creating a new investment framework by investing in companies,
Resilience offers escape from trapped thinking on poverty alleviation

Steven Lade, Jamila Haider, Gustav Engström and Maja Schütz

The poverty trap concept strongly influences current research and policy on poverty alleviation. Financial or technological inputs intended to “push” the rural poor out of a poverty trap have had many successes but have also failed unexpectedly with serious ecological and social consequences that can reinforce poverty. Resilience thinking can help to (i) understand how these failures emerge from the complex relationships between humans and the ecosystems on which they depend and (ii) navigate diverse poverty alleviation strategies, such as transformative change, that may instead be required. First, we review commonly observed or assumed social-ecological relationships in rural development contexts, focusing on economic, biophysical, and cultural aspects of poverty. Second, we develop a classification of leverage points for poverty alleviation strategies using insights from resilience research on social-ecological change. Last, we use these advances to develop stylized, multidimensional poverty trap models. The models show that (i) interventions that ignore nature and culture can reinforce poverty (particularly in agrobiodiverse landscapes), (ii) transformative change can instead open new pathways for poverty alleviation, and (iii) asset inputs may be effective in other contexts (for example, where resource degradation and poverty are tightly interlinked). Implications for transformative transformations. Our work (a) offers a systematic way to review the consequences of the causal mechanisms that characterize poverty traps in different agricultural contexts, and (b) identifies appropriate leverage points for rural development challenges. For example, we find that the appropriate leverage point depends on the type of poverty-environment interaction. We show that in some cases, transformation is the only viable strategy.

Urban Climate Resilience by Integrated Roadmapping Labs (IRL)

Jürgen Schultze and Stephanie Lübke

In real life strengthening urban climate resilience is a wicked problem, which needs the best possible collaboration from divergent stakeholders of the quadruple helix. This contribution suggests the holistic approach Integrated Roadmapping Labs (IRL) developed for the two municipalities Dortmund and Cologne. It integrates a vision driven participatory procedure with a quarter rooted social innovation lab. The ambition of an urban climate resilience needs not only technical innovation but complementarity and synergistic social innovation. The challenge is how the often required multi-stakeholder co-creation can be realized beyond occasional cooperation, how can leverage points set up by integrating standards in the urban planning and by mainstreaming pilots. Our contribution is based on climate adaptation process with 400 participants and introduces IRL as a further development for urban social innovation labs. The IRL in the quarter labs are the location and the cultural framing for the roadmap processes. The IRL structure consists of an enabling process team, local focus groups and embedded administrative channels to influence governance. The concept of leverage points holds promise for these organizations as a mechanism for framing internal discussions about access to, and influence on, decision makers, building capacity and potentially enacting transformative change in their systems and beyond. I draw on two case studies of watershed organizations from Canada where a short “resilience analysis” was facilitated by researchers. A leverage points lens is applied to the data to analyze the potential for a short resilience analysis process with watershed organizations to shed light on potential leverage points that were not previously explicit, and which exercises in this process are most likely to be effective in drawing out leverage points.

System features building resilience: Comparing evidence across case studies

Zuzana V. Harmáčková, Albert Norström and Garry Peterson

The resilience of social-ecological systems represents a fundamental precondition of sustainability at multiple spatial and temporal scales. However, while multiple theoretical frameworks of social-ecological resilience have been developed in the past two decades, practical examinations of the specific features influencing resilience have been scarce so far.

In this study, we apply resilience theory on an array of place-based case studies and assess specific features of complex social-ecological systems enhancing their resilience and transformative potential, such as the interplay between disturbance and diversity, the presence of social-ecological memory, the combination of different types of knowledge and cross-scale interactions. We break these broad system
features into over fifty specific factors and compare to what extent these factors differed across various social-ecological case-study contexts. Subsequently, we use the methodological approach of QCA (qualitative comparative analysis), designed to identify which combinations of factors are likely to promote the outcome of interest, in this case, loss of resilience, resilience or transformation. Particularly, we focus on small-scale fisheries as representative examples of local- to regional-scale social-ecological systems, defined around a single key natural resource and its exploitation.

This contribution illustrates how social-ecological resilience theory and place-based research can be combined and synthesised to derive conclusions relevant at multiple spatial scales. By comparing evidence from place-based research and analysing features of social-ecological systems influencing resilience and transformation across cases, we aim to inform sustainability practice in various contexts contexts and identify potential areas of intervention towards sustainability transformations.

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**Hanother film screening**

Hanother film screening and book launch based on the research from the transdisciplinary project "The city as space of possibilities" focusing on bottom-up sustainable urban development.

**Session Chair:** Sacha Kagan

**Format:** Film

**Room:** Audiomax auditorium

**The city as space of possibilities**

Sacha Kagan


**About the Film**

How can urban citizens mobilize cultural resources for a bottom-up sustainable urban development? What and where are Spaces of Possibilities for desirable futures? How do alternative futures, Real Utopia, already take shape now? What alliances, networks and communities are involved? How are sustainable futures prefigurated and experienced as an alternative – hanother – reality?

The documentary film Hanother brings to light another Hanover, away from the German middle-size city’s cliché of a boring, mainstream, and middle-class urban experience. Hanother follows cultural actors – in the widest sense of the term. It opens up multiple perspectives on experiments and imaginations of sustainable futures. Hanoverian change-agents are artists, designers and performers, upcyclers, makers and entrepreneurs, activists, Parkour athletes and journalists, masseurs, skateboarders and storytellers, and are also within the city administration. They are urban change-makers coming from near and far: Hamburgers, Ethiopians, Syrians and long-term Hanoverians alike.

Hanother emerged from a transdisciplinary research project at Leuphana University Lüneburg, “The City as Space of Possibilities”. This documentary film by Dr. Sacha Kagan not only shares insights from the researchers, but is also itself materializing the outcome of a 3-years long transdisciplinary research process through which Dr. Kagan involved his colleagues and students, combining social, cultural and sustainability sciences with video-making walks and actions.
Measuring impact of science (6.1)

This session focuses on science quality assessments of the social impact of research and social learning. Individual talks focus on interactions between research and administration, the social impacts of transdisciplinary institutes and notions of relevance and rigour. This session is organized by the NAWis consortium

Session Chair: Henrik von Wehrden

Format: talks and world café

Room: 40.146

Measuring the societal impact of a transdisciplinary institute as a leverage point for the transformation of the science system

Janina Schirmer, Sophia Becker and Ortwin Renn

Until now, evaluators like the German Science Council apply a rather conservative framework to the quality assessment of research. Even though the evaluations of the SC allow for the adaptation of the criteria according to the respective mandate of the organizations, the core of the evaluations remain focused on "scientific excellence. This approach has its limitations when it comes to the impact assessment of transdisciplinary research institutes such as the IASS. However, there might be a window of opportunity to change the rules of the game:

Recently, the SC has called for new and fitting ideas of how to adequately represent and assess societal impact. At the same time, the SC has voiced strong doubts that this representation can be performed on quantitative indicators only. The IASS is proposing a set of criteria and indicators for measuring societal impact that combines quantitative indicators with qualitative narratives of successful interventions into the policy arenas. The IASS applies output-based indicators metrics measuring the reach and significance. The qualitative uptake of impact will be implemented by a structured approach of composing narratives. In the case of the IASS, these indicators need to be assessed at the institute's level because the SC will evaluate the institute as a whole. Focusing on an entire institute, requires both a reduction of the indicators to a handful in order to make the review practical, and at the same time, a certain robustness in documentation.

If this set of indicators will be accepted by the SC for the next evaluation of the Institute, it might allow for the adaptation of the criteria according to the respective mandate of the organizations, the core of the evaluations remain focused on "scientific excellence. This approach has its limitations when it comes to the impact assessment of transdisciplinary research institutes such as the IASS. However, there might be a window of opportunity to change the rules of the game:

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Relevance and rigor in Sustainability Science – an empirically informed perspective

Daniel Lang, Jens Nevio, Stephanie Jahn, Judith Kahle and Matthias Bergmann

Sustainability Science is aspiring to fulfill the dual objective of producing insights for a rigorous under-standing of human-environment systems and their transformation, as well as contributing to solving – or at least transforming – real world sustainability challenges. Even though this aspiration is widely shared among researchers in this field and it is broadly acknowledged that commonly used metrics in academia are insufficient in this regard there is still a lack of (i) sound operationalization approaches to capture the performance of research projects related to this dual objective; and (ii) evidence on whether successfully meeting this dual objective is possible at all and which factors contribute to its successful attainment. In this presentation we first introduce a straightforward approach to measure scientific and societal impact of research projects. Second, we present the results of using this approach to analyze the impact of more than 60 German sustainability-oriented research projects. Finally, we discuss the gained insights with regard to potential implications for fostering more impactful sustainability research. Even though the ap-proach has its limitations – e.g. it only relies on self-reported societal impacts – the analysis of projects provides clear evidence that attaining the dual objective is generally possible. Furthermore, the results significantly indicate that specific project characteristics contribute to achieving both objectives, such as the active involvement of academia in the deliberate formulation of both societal and scientific aims/desired outcomes already at the beginning of the project.

Implications for sustainability transformation: (i) Our approach is a step towards complementing existing academic metrics and incentive systems to acknowledge also societal impacts besides scientific excellence; (ii) our analysis indicates that "use-inspired basic research", yielding both scientific as well as societal impact, is not a utopia and that its success is supported by certain project characteristics.

Impact as Stabilization of Modes of Interaction Between Research Activities and Administration

Karl-Heinz Simon

Related Theme/Special Session: "Measuring impact beyond publications and citations as leverage point for sustainability transformation"

Most of the FONA induced research activities aim at changing unsustainable (individual and collective) behavior and institutional decisions and performance. There are intensive efforts in order to evaluate the results of the research activities and their practical relevance. Such a relevance could be found on different levels: (1) within the research field in being recognized and taken up for future research activities; (2) in the field of politics in leading to modifications of political programs and declarations of intent; and (3) in the field of every-day practice in new types of operations and activeness, especially on an administrative level. In changing those structures leverage points might be given that have lasting influences and help to establish real problem solving capabilities.

In responding to challenges due to climate change also on a regional / local level a research project as part of the KLIMZUG program was realized in the region of Northern Hesse. The project deals with climate adaptation as a response to threats caused by extreme events and temperature changes. Beside its scientific findings and a broadly conducted communication strategy, special attention was directed to establishing tight connections to administrative protagonists in the region. From the very beginning of the project attempts were made to find (and implement) new administrative (local authorities, regional commission) that are able to provide useful information on problems and capacity requirements, as well as communicating results of the research project directly to the relevant departments.

Experiences with these modes of interaction are presented. A special emphasis is placed on the permanency of the structures and the influences realized.

Strategic sustainability and culture change in local government: a case study from Perth, Western Australia

Jayne Bryant and Giles Thomson

This paper presents, as a case study, my experiences of introducing and embedding a strategic sustainability and culture change program, over a five year period, in a local government in Perth, Western Australia.

A systems thinking perspective, grounded in the Framework for Strategic Sustainable Development (FSSD), Theory U and Leverage Points, was used in order to find the places of agency and power to affect change for sustainability. A key intervention focussed on shifting paradigms through the education of 60 'sustainability champions' and building their competency in systems thinking and strategic sustainability and how to apply these concepts to their own work.

The whole approach was an invitation to collaborate. Through educating, supporting and empowering these sustainability champions, it became possible to bring about considerable transformations relatively rapidly at every organisational level within a traditional hierarchical institution.

Further training sessions invited community leaders and elected members to collaborate with staff. Many of these community leaders volunteered in what was later to be formalised into community reference groups. Another key intervention was to develop a sustainability policy, which defines sustainability, provides a vision and guidelines for success, and requires all officers to consider when making decisions.

A significant outcome was the establishment of a renewable energy revolving fund that enabled electricity savings to be reinvested into further renewable energy projects, to date this has funded photovoltaic panels, solar hot water and LED lighting saving the council over $AU60,000 (c2017) in energy bills annually.

Implications for sustainability transformations: Through education, support and empowerment everyone could (and should) be a 'sustainability manager'. By working collectively and collaboratively across an organisation, greater changes can be achieved than through individual actions. By capturing the collective imagination and power of change agents, the policy direction and culture of conservative institutions can rapidly and profoundly shift.
Institutional design for transformative change in water governance (6.2)

Many water-related problems can be attributed to governance failure rather than to the resource base itself. This session presents insights on innovation for the implementation of integrated, adaptive water management and transformative change towards sustainable water governance from Germany, Spain, South Africa and Mongolia from the project STEER.

Session Chair: Jens Newig
Format: talks and world café
Room: 40.108

Identifying incoherences and coordination challenges as potential points of leverage: A comparative case study of a German and Spanish river basin
Franziska Meergans, Nora Schütze, Andrea Lenschow and Andreas Thiel

This paper builds on studies showing that a lack of policy coherence at the level of policy design (Söderberg 2016), and of coordination at the planning and implementation level, hinder an integrated water resource management (Pahl-Wostl et al. 2012). Policy coherence is understood as the reduction of conflicts and promotion of synergies within and between different policies in order to achieve a jointly agreed policy objective (Nilsson et al. 2012). Empirically, we carry out comparative case studies of two European river basins where agriculture is the main driver of water resource conflicts: In the German river basin Weser-Ems, suffering from agricultural nitrate pollution, we explore nitrate reduction strategies. In the Spanish river basin Guadalquivir, which experiences severe water stress due to irrigated agriculture accounting for 88 % of total water consumption, the focus is on modernization of irrigation. Empirical evidence is collected within the scope of the STEER project, through qualitative interviews with stakeholders and experts as well as through an analysis of policy documents and grey literature.

The paper proceeds as follows: We first identify instances of vertical (in the European multi-level governance system) and horizontal, cross-sectoral policy incoherence relating to water protection and agricultural policies in our two cases. We then analyze the role of formal and informal rules for coordination between actors at various governance levels and across both sectors, arguing that institutional arrangements are crucial to enable actors with conflicting interests to interact and coordinate with each other (Scharpf 1997).

Implications for sustainability transformations: The article suggests that the unraveling of policy incoherence relating to water protection in the policy framework. Whether these reforms truly act as leverage points for more sustainable practices or merely hide a return to business-as-usual is often questionable.

My paper looks at specific obstacles that impede transformative change in such occasions at the example of institutional reforms in Mongolia. Here, a decade ago, mining protests achieved a strengthening of environmental regulations. Implementation, however, still lags far behind. In order to understand why that is the case, I conduct an analysis of the multi-level institutional set-up, adopting the institutional analysis (IAD) framework developed by Elinor Ostrom along with the extensions suggested by Floriane Clement.

Based on an in-depth review of the legal framework and on two rounds of interviews with government officials and civil society representatives in September 2017 and May 2018, I locate factors that impede a transformation to more sustainable practices in all elements of the extended IAD framework. More specifically, obstacles may include (1) incoherencies within the institutional framework, where responsibilities are assigned unclearly and functions that are allocated to administrative bodies are fulfilled by public companies instead, (2) the continued dependency of the state on mining revenues, (3) the combination of vast landscapes, small enforcement bodies and low fines that reduce the risk associated with rule infractions, and (4) the dominance of a neoliberal development discourse.

Implications of Institution Transfers for Regional and Local Governance: The Effects of IWRM Implementation on Water Governance in the uMngeni River Basin, South Africa
Evelyn Lukat and Claudia Pahl-Wostl

Transfer of institutions is a widespread practice in international policy making. A prominent example is the transfer of the Integrated Water Resource Management (IWRM) principles into water policies worldwide. Nevertheless, such panaceas are criticised for providing overly simplistic solutions to complex socio-ecological problems (Ostrom 2009). The critics argue that governance systems can be resistant towards the uptake of new institutions, depending on their fit with the current system (North 1990) and more specifically with existent informal institutions (De Koning 2011).

One particularly interesting case of IWRM transfer is post-Apartheid South Africa (SA). From 1994 onwards, SA’s governance system received a make-over; racist laws were abolished and new institutions aimed to foster democracy and equity were designed. 20 years after its enactment, SA’s water policy shows major implementation deficits despite its progressiveness (Denby et al. 2016). The paper argues that conflictual rather than synergistic interplay between formal and informal institutions is a major reason for the observed deficits.

The paper focuses on the implications of the institution transfer on the local and regional governance levels in the uMngeni river basin in KwaZulu-Natal, SA. The analysis of the institutional frame is based on an in-depth literature review, semi-structured expert interviews and participant observations gained during a three months long field visit. As traditional leadership is an important component of governance in the uMngeni, the traditional governance dimension is of particular focus. The Management and Transition Framework (Pahl-Wostl et al. 2010) will be used to analyse the development and interplay of formal and informal water governance arrangements before and after the IWRM principles have been introduced.

Implications for sustainability transformations: Understanding how formal and informal institutions interact in institution transfer processes is essential for the effectiveness of sustainability policies and the avoidance of pitfalls that panaceas may cause.

Analysing inter-sectoral coordination deficits for sustainable water management: Coupling a network approach with an ecosystem service perspective in the Weser-Em Region, Germany
Daniel Schweigertz, Philipp Gorris and Claudia Pahl-Wostl

Session: Principles for Institutional Design to support Transformative Change in Water Governance

Sustainable water management is challenged by the ubiquitous and multifaceted nature of the water system, by which water problems can often be attributed to various sectors. Although there is sufficient understanding of hydrologic processes and an increased emphasis on integrated approaches to acknowledge interdependencies between different policies and practices, these are seldom reflected in current management practices. Especially inter-sectoral coordination deficits frequently result in conflicting measures, which often have the strongest repercussions in the water sector.

This paper presents a methodological and conceptual approach which aims to assess and put special emphasis on (mis-)fits between governance arrangements and characteristics of the resource management problem. It is operationalized by combining a social-ecological network approach with an ecosystem service perspective. The ecosystem service concept is used to identify connections between different sectoral actors that are mediated by direct or indirect relationships with the natural system. These relationships are then assessed whether they fit or misfit with existing coordination structures and processes between actors.

The potential of this approach is shown for the German Weser-Em region, which constitutes a perfect example of negative environmental impacts due to coordination failures and governance gaps. In the study area, the water policy shows major implementation deficits...
Global perspectives on reconnecting to nature (6.3)

We live in a globalised world. How do global flows of materials and value systems shape sustainability outcomes? This session features work from earth system science, land use science, as well as research on values and paradigms.

Session Chair: Julia Leventon, Joern Fischer
Format: Talks and panel discussion
Room: 40.152

Reconnecting Well-Being to Nature
Tuula Helne

As Donella Meadows has stated, the most effective leverage point for changing a system is to change its paradigm. I illustrate how a paradigm shift from a reductionist conceptualisation of well-being to a relational one could foster transformative change.

A significant reason for the current planetary crisis lies in the workings of how well-being is construed, narrated and pursued. Humans seem to have lost the knowledge of how insurmountably their well-being depends on nature. Hence, a belief in economic growth and a monetary view of well-being dominate the public and policy discourses. This reductionist narrative is archetypical to a holistic and balanced conception of the human being. Well-being is perceived as the satisfaction of desires or material needs; the less tangible needs, such as meaningfulness and the need to connect with nature, are left aside. Well-being is also discussed anthropocentrically, ignoring other species.

Building upon research on sustainable and eudaimonic well-being, need theories, humanistic and transpersonal psychology, degrowth research, deep ecology and non-dualist philosophy, I argue for a wider conception of well-being and for the necessity to reconnect well-being to nature or, in other words, to conjoin well-being and sustainability. This implies adopting a strongly relational paradigm that acknowledges human dependencies on the biosphere. I present a lever for doing so: the Having-Doing-Loving-Being framework – an ecologically embedded, holistic, multidimensional and needs-based conceptualisation of well-being. I particularly emphasise the significance of the dimension of Being for the human–nature connection. I show how the framework could be used to inform and redirect thinking, behaviour, practices and policies in a way that fosters well-being while reducing environmental impacts.

Implications for sustainability transformations: The HDLB framework provides an intuitively appealing tool for rethinking well-being, reconnecting it to nature and restructuring institutions to facilitate a shift towards sustainability.

Christian Derninger, Dave Abson, Henrik von Wehrden, Kuishuang Feng, Klaus Hubacek, Thomas Kastner, Martin Bruckner and Fridolin Krausmann

Global biophysical human-nature connections and disconnections

Human societies are inherently connected to and dependent on the biosphere through the flow of materials and energy. However, by increasingly accessing material and energy flows from distant places or non-renewables drawn from outside the biosphere, societies have been able to gradually disconnect themselves from the productivity of their domestic environment. Here we conceptualize and quantify biophysical human-nature connectedness at national scales and discuss how such knowledge may contribute to transformational processes in the land use system. Whereas the focus is on the national scale, the global social-ecological embeddedness and teleconnections necessitate a much broader, i.e. global, systems boundary.

To measure the biophysical disconnect we apply a mixed but complementary set of social-ecological methods: a HANPP (human appropriation of net primary production) and the direct labor input quantity the biophysical connection to the domestic biosphere. In evaluating the inputs of non-renewables and the internationally traded biomass goods we account for the external inputs into the land use system. Biophysical flows are modelled with a multi-regional environmentally-extended input-output analysis (EXIOBASE) to retrace all upstream flows and connections to every single trading partner in the world.

The results reveal how highly intensified and globalized land use systems heavily rely on both domestic natural productivity and distant ecological and non-renewable inputs. Without those latter two external inputs, pressure on domestic ecosystems would increase. Important for social modes of human-nature connectedness is that people and institutions getting feedback as if they were biophysically disconnected from nature and free from natural constraints. However, as flows of human-nature connections got more global through teleconnections and mediated through artificial inputs, like artificial agrochemicals, which obscure human impacts and reliance on natural processes.

Implications for sustainability transformations: Our research challenges the mainstream perception of the “efficiency” of an industrialized and globalized land use system and provokes discussions for alternatives – i.e. biophysically disconnected land use systems, which would, in turn, imply very different feedback structures between the domestic land use and social institutions.

Hanna Weber, Armin Weik and Daniel Lang

Typology for local-global food nexus for sustainability transformation of the food system

Local food systems, if designed and governed carefully, offer various sustainability benefits compared to the global food economy. International food supply is often associated with negative externalities including imbalance across the economic value chain, significant transportation footprints, and unfavorable working conditions in the regions where food is being produced or processed.

However, consumers demand products, which cannot be provided locally and it is unlikely that they forgo its consumption. Consumers even seem to have lost connection to what they eat, including the people who produced their food, as well as to nature and its ecosystems providing the basic needs to grow food. Such disconnection may drive indirectly the continuation of unsustainable international food supply chains.

Past research has mainly focused on assessing unsustainable patterns or describing prominent cases of optimizing international food supply through supply chain management. However, there is little systematic analysis and empirical evidence provided on the emerging initiatives that attempt to design international food supply chains in line with strong sustainability principles to complement local food systems.

This study provides a typology of sustainable international food supply chains and illustrates each type through two case studies. There is not one, but several different ways of how to design the international and global dimension of food systems sustainably, in which involved actors care for each other and the environment despite geographical distances. The typology details the global-local nexus of sustainable food systems and takes into account socio-ecological material flows. It offers a spectrum of alternatives to conventional international food supply chains.

Implications for sustainability transformations: Evidence from real-world cases provides scholars and practitioners with insights into critical success factors for sustainable international food supply chains. The study results support initiatives and entrepreneurs in taking action and implementing sustainability strategies, which contribute to the transformation of food systems.

An Earth System Science Framework to Assess Ecosystem Service Transitions

Martin Reader, Hanneke van ‘t Veen, Maartje Oostdijk, Vincent De Leijster, Prof. Dr. Maria J. Santos

Ecosystem services (ES) are critical to short-term human well-being and the long-term maintenance of Earth’s life support system. Measuring and presenting the value humans obtain from nature through ES can provide true costings of management options, aid decision-making, and communicate via scenarios the human impacts of ecological degradation. Therefore ES are critically important in re-connecting people and their natural environment. Global change threatens these services across social ecological systems,
but ES may respond differently in different systems and with different levels of modification.

We propose an earth system science framework to assess ecosystem service transitions with human modification of natural environments. Extending the river delta framework of Renaud et al. (2013), this classifies systems into (i) Holocene (dominated by natural processes), (ii) modern-Holocene (increasing human influence), (iii) Anthropocene (ES outputs depend on human management), and (iv) collapsed (system cannot be effectively protected/used) states as human modification increases. These states are linked with representative bundles of ES based on different empirical and modelling approaches, as well as literature review. This is exemplified in systems varying in scale, state and complexity – from collapsed, recovering tree-crop agriculture, to at-risk fisheries which focus on one key ES, to wood charcoal production across forests, and global deltas representing each state, with complex, inter-dependent services.

This provides a generic framework for the impacts of human modification on numerous social ecological systems. It illustrates the benefits and costs as systems are altered, and the trade-offs in ES provision. Individual or grouped ES can be linked to system state, and used as measures of resilience, warnings of state shift, and indicators of recovery.

Implications for sustainability transformations: Illustrate services natural systems provide; illustrate at-risk, resilient, and recovering systems; communicate past ES transitions; this illustrates services natural systems provide; these services vary in scale, state and complexity – from collapsed, recovering tree-crop agriculture, to at-risk fisheries which focus on one key ES, to wood charcoal production across forests, and global deltas representing each state, with complex, inter-dependent services.

Subtlety, positionality and power (6.4)

This session addresses the roles and positions of researchers in transformative research processes. While relationships between persons in collaborative research are created in their interactions, the theoretical and conceptual research approaches often predefine functions, roles or responsibilities of people.

Session Chair: Rebecca Freeth
Format: talks and world café
Room: 40.154

Is this for real? An application of critical realism to enable the practice of strong transdisciplinarity

Jessica Cockburn, Georgina Cundill, Shackleton Sheona and Eureta Rosenberg

Systems thinking is no stranger to the sustainability science community. For many of us it has become a beacon of hope and a means of legitimising our transdisciplinary research practices. This is evident in growing calls for transdisciplinary research to apply systems thinking in addressing complex sustainability challenges. In response, a range of theoretical and methodological innovations have emerged. Yet, the integration of diverse disciplines, knowledges and worldviews remains one of the foremost challenges of transdisciplinary research.

We propose ‘transdisciplinary’ research as a methodology, which can guide knowledge integration towards ‘strong transdisciplinarity’. Drawing on a study of stewardship and collaboration in multifunctional landscapes in South Africa, we demonstrate the application of critical realism’s laminated model of reality as an analytical tool. The model offers integrative and explanatory power in place-based social-ecological studies, enabling research to move beyond analyses of place-based phenomena, towards broader tendencies and patterns. We systematically applied the model to empirical place-based findings to investigate underlying explanatory mechanisms. The analysis revealed four explanatory mechanisms emerging from different laminations of reality. Firstly, the deep-seated conflict between agriculture and conservation poses a fundamental challenge to collaborative stewardship. Secondly, we live in a world in which it is difficult to care and take responsibility for our interactions with, nature and our fellow humans. Thirdly, individual stewards’ ethics and values strongly mediate their interactions with nature and fellow humans. Finally, South Africa is a deeply divided and unequal society, making collaborative stewardship and sharing of landscapes particularly difficult. These mechanisms help to explain our place-based research findings across cases and are indicative of general trends applicable across contexts.

Implications for sustainability transformations: Applied critical realism can enable the practice of strong transdisciplinarity. Explanatory mechanisms which emerge from such analyses can generate a deeper understanding of the challenges of fostering stewardship and collaboration in multifunctional landscapes.

Scientists under construction. Negotiating transdisciplinary subjectivities in the energy transition

Mirko Suhari

As socio-material orders of energy cultures are complex arrangements of infrastructures, people, artefacts, and meaning; diverse kinds of knowledge are necessary to facilitate constant energy flows in modern societies. However, established ways of producing, contesting, ordering, and implementing energy knowledges have come under pressure, since political strategies focus on a transformation of energy cultures to greater sustainability. As a result, energy re-search and governance practices are increasingly opening up towards transdisciplinary modes of producing and governing knowledge. This trend also gave rise to the emergence of new scientific role models, like the knowledge broker, the change agent or the process mediator. Yet, empirical studies confronting these emerging subject positions with concrete practices of scientists are still scarce. A wide range of studies in this context proclaims rather idealized types and characters of the transdisciplinary energy researcher. Therefore, they miss out the fragmented adaptations, oppositions, and frictions scientists are facing in transdisciplinary settings.

The presentation demonstrates that new forms of scientific subjectivities are shaped at the crossroads of rising controversies regarding the diffusion of renewable energy technologies, traditional academic value orders, and stakeholders’ demands for usable knowledge. Transdisciplinary energy scholars are situated in-between the messy spheres of political power, ethical valuation, and scientific quality criteria and not least their very own emotions, values, and competencies. The research is based on my PhD-project and empirically grounded on expert interviews and policy documents, collected in a variety of transdisciplinary research and agenda-setting projects. Theoretically inspired by Foucauldian studies of subjectification and methodologically based on situational analysis, the presentation explores tensions between the discursive framings of transdisciplinary subject positions on the one side and the groundwork of transdisciplinary practice on the other. Hence, transdisciplinary identities, skills, and normativities are negotiated in relation to different social worlds from academia, civil society, etc., and the state.

Plea for a Grounded Theory-inspired transformative methodology

Maria De Equia Huerta

Sustainability research evolves along with and next to transdisciplinarity research. Sustainability challenges of the 21st century shall be approached through research practices of transformational nature which allow for bringing into fruition comprehensive knowledges while transforming an un-sustainable situation under inquiry. To date, the methodological consequences of these endeavours are not fully clarified.

Some of the works on and through Grounded Theory, such as Kathy Charmaz constructivist version (2014), have contributed to create space for a science that is situation-bounded, in which the nature of data is de-concealed and in which various levels of (inter-action are grasped, integrated and, part of the interpretative facette.

We make a plea for a transdisciplinary-adapted Grounded Theory, in which specific elements of both bodies of thought and practice not only inform each other but are combined to sketch a useful methodology, which works within researching society-science constellations of intercultural nature and aiming at contributing to transformative sustainability research by re-framing and inviting to a viewpoint shift. Furthermore, the key, problematic and oft unaddressed role of the researching human beings shall find a comfortable place to stay and be reflected about.

Implications for sustainability transformations: A methodological proposition of an adapted Grounded Theory for transformative transdisciplinary research may open a whole new space of debate and reflection about social, political and cultural issues of researching practices, while concrete inter- or transdisciplinary researching tools may derive from it, accompanying sustainability researchers in the journey of perceiving, understanding, knowing, connecting and interacting. Furthermore, this shall be a further contribution to build those urgently needed bridges between theory and practice.
Resilience approaches for food systems transformation (6.5)

Global modeling for sustainability rarely imagines or accounts for the real system's complexity. This session puts particular emphasis on the dynamics of food systems over time, using resilience as a lens to both identify present and future vulnerabilities but also management strategies that are successful over time.

Session Chair: TBA
Format: Workshop/special session
Room: 40.255

- One approach considers the response diversity of crops within different functional nutrition groups to climate change, identifying vulnerabilities at a country scale.

- A complementary approach modeling crop yield response to climate change compounded by impacts of land-use change on pollination reveals areas where nutritional security is most vulnerable under future scenarios.

- The third approach builds on local examples to explore the existence of "bright spots" - places that exceed the expectation for desirable outcomes given local environmental conditions. Spots that remain bright over time can help identify the particular elements that lead to successful governance and management of food systems and that could potentially be scaled up.

The three different approaches have a particular emphasis on the dynamics of food systems over time, using resilience as a lens to both identify present and future vulnerabilities but also management strategies that are successful over time.

This session will start with three presentations of 15 min followed by an open discussion with the audience on ways of integrating resilience thinking and insights from local successes on global modeling for food systems sustainability.

3 presentations followed by a guided interactive discussion:

Speakers:
Prof. Elena Bennett, McGill University, Canada
Dr. Rebecca Chaplin-Kramer, The Natural Capital Project, Stanford University, USA
Dr. Cibele Queiroz, Stockholm Resilience Centre, Stockholm University

Session: Resilience approaches for food systems transformation
Cibele Queiroz
Substantial change in food systems is needed to meet globally agreed-upon sustainability goals. While these agreements, like the Sustainable Development Goals, provide excellent targets, they say little about pathways to achieve them. Furthermore, the degree of change that is required is context dependent: in some cases transformation is needed, in others gradual change, in others the ability to keep options open to cope or adapt. Global modeling for sustainability rarely imagines or accounts for this complexity. Understanding how local successes, vulnerabilities and capacities for change at a global scale come together helps focus our attention on the kind of change needed in different contexts. In this session, we will present three intersecting approaches to contribute to this understanding.

Session: Resilience approaches for food systems transformation
Charlotte Weil
- A complementary approach modeling crop yield response to climate change compounded by impacts of land-use change on pollination reveals areas where nutritional security is most vulnerable under future scenarios.

Session: Resilience approaches for food systems transformation
Elena Bennett
The third approach builds on local examples to explore the existence of "bright spots" - places that exceed the expectation for desirable outcomes given local environmental conditions. Spots that remain bright over time can help identify the particular elements that lead to successful governance and management of food systems and that could potentially be scaled up.
generate social and environmental impact alongside a financial return.

- Virtual currencies: creating new basis of exchange with electronic representation of monetary value that may be issued, managed and controlled by private issuers, developers, or the founding organization.

**Experience and Inner transformations (6.7)**

This session explores various approaches to exploring leverage points. Ranging from the senses (food and nature) via shifts in language and social norms and by exploring the relations between wilderness art and science.

**Session Chair:** Lorrae Van Kerkhoff  
**Format:** Talks with panel discussion  
**Room:** 40.153

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**From subject-object to subject-subject: new social norms to avert ecological catastrophe**

*Nadine Andrews*

Language matters because it shapes how we think, act and relate to the world. As demonstrated in this paper, in English language human relationships with the rest of nature are predominantly conceptualised with a subject-object frame. This frame, I argue, is problematic because it positions humans as separate from and superior to other beings, and promotes the notion that the living world exists for humans to own, control and exploit for their own ends. These beliefs are the story upon which the project of modernity is founded, a story that pervades our political and economic systems and underpins global responses to ecological crisis. But this story is also a root cause of ecological crisis because it has led us to put human interests first and live as if there are no natural limits that cannot be overcome through human ingenuity. Such hubris has brought us to the brink of mass extinction, ecosystem collapse and climate chaos. This paper calls for a shift from subject-object to subject-subject frame, creating a new social norm in how we relate with nonhuman others. Here, other forms of life are recognised as having needs, intents and purposes of their own. This conceptual shift in salience is experiential; it is an embodied emotional experience not just an intellectual exercise, and it requires practices for cultivating this way of relating, that help develop capacity for close observation, sensory acuity, and qualities of humility, patience and slowness.

Creating new social norms also requires sharing of personal subject-subject experiences and – importantly – sharing our feelings about the harm we are causing these nonhuman beings, at the loss of wild nature that is unfoldng right now before our eyes. These new social norms, I argue, are urgently needed to avert ecological catastrophe and inspire and motivate adaptive systemic change.

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**Civil Wilderness. Evenly Suspended Science**

*Helene Von Oldenburg and Claudia Reiche*

What is it that makes one think about a division between wilderness and civilization or art and science? The problems arising from various (mis)conceptions in this respect can be addressed by some minimal redirections. The Civil Wilderness project should be useful to train attentiveness towards nature once again, this time in a ‘negative’ way. The talk, initiating thought experiments and discussion, is about setting different rules to chosen places/spaces and test the effects of this practice. These rules are based on 3 different exclusions: no humans, no prohibitions, no changes. The productivity of these exclusions will be subject of this presentation.

CIVIL WILDERNESS is a participatory art project which invites to explore the psychoanalytical technique of ‘evenly suspended attention’. Additionally CIVIL WILDERNESS enhances the awareness of the shared area between wilderness and civilization, art and science. Direction- less.

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**Experiential methods as deep leverage points: connecting through the senses**

*Karoline Pöggel and Sadhbh Juárez Bourke*

In this joint session, we explore alternative experiential methods as a deep leverage point. Each contribution will need 15 mins and via embodied methods foster personal experience, and reflection to facilitate the connection between people and nature.

1) Mindful Menu - a guided meditation on food

In this session, we focus on a conscious and intensive experience of food. A meditative setting grounds us in the present moment and lets us explore the different stories coming with food. Via creating a higher awareness for foodstuff we are triggered to re-evaluate our everyday practices around food. The experience of food through one’s senses, lets us create a closer connection to the essence of human existence, remembering food and eating as an essential role in our lives and for nature. The goal of this session is to use a different form of engagement, here meditation, in connection with everyday practices like eating to create an awareness of food as the connection between people and nature.

2) Experiencing Nature through the Senses

As scientists, we tend to approach nature from a cognitive perspective. Terms such as ecosystem, resilience, yield, and biodiversity, often define our relationship to the concept. In this short meditative workshop, we approach nature from an experiential perspective. The aim is to leave ideas behind and allow ourselves to remember the deep connection to nature that is available to all of us, at any time. (To be conducted outdoors)

“Implications for sustainability transformations: an embodied understanding of nature, which will create emotional involvement for participants aiming for personal citizenship in order to facilitate transformative change.”

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**Panel on sustainability transformations (6.8)**

The session explores what we mean by transformations: Which steps make the collective behavior change towards sustainability transformations happen? What is the connection between small scale change and large systems change? And what is the connection between inner processes of transformations and outer processes of deliberate change designs?

**Session Chair:** TBA  
**Format:** Workshop/special session  
**Room:** 40.256

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**Panel on Sustainability Transformations**

*Ray Ison, Petra Kuenkel, Karen O’Brien and Thomas Bruhn*

Donnella Meadows suggested as the highest leverage point for transformative change the “transcendence of paradigms” (Meadows, 1999). Paul Hawkens proposed in 2009 that we find a new “operating systems for civilisation”. Maja Goepel (2016) reminds us that transformations must be radical and incremental at the same time. It is clear that transformations to sustainability require multiple approaches at multiple scales. What they have in common is that they need to take multiple perspectives approach, foster new ways of seeing reality and capacitate actors to navigate complexity (among others). The session should explore questions such as: what do we mean by transformations? Which steps do we need to take in order to make the collective behavior change towards sustainability transformations happen at multiple scales? What is the connection between small scale change and large systems change and what is the connection between inner processes of transformations and outer processes of deliberate change designs. The proposed interactive panel discussion (time-frame about 1h 15 min.) highlights transformation approaches from different perspectives:

- Prof. Karen O’Brien will look at the role of quantum social theory as a new way of seeing transformative actions based on a view of an interconnected world system.
- Prof. Ray Ison will look at the role of a systems practice, for which many more cross-institutional actors need to be capacitated.
- Dr. Thomas Bruhn will explore the inherent relationship between human consciousness development, contemplative practice and its impact on transformative change actions.
- Dr. Petra Kuenkel will explore the understanding transformative change in large systems as a stewarding task and a collective leadership challenge.

The panel should invite other perspectives from the audience. Implications for sustainability transformations are learnings around the fractal and multiple-scale nature of transformations.
Workshop on Formative Evaluation of City-University Partnerships (6.9)

Attendees will be guided through (i) a reflective process of evaluating their own sustainability work, (ii) an inductive approach to review parameters and indicators for evaluation, and (iii) a focused discussion on intercultural differences between institutions and how that relates to collaboration.

Session Chair: Beatrice John
Format: Workshop/special sessions
Room: 40.254

Workshop on Formative Evaluation of City-University Partnerships for Sustainability: International - Intercultural perspectives

Beatrice John, Philip Bernet, Richard Beecroft, Liliana Caughman, Fletcher Beaudoin and Lauren Withcombe Keeler

Collaboration and partnerships are key for building sustainable urban spaces and adapting to climate change. Universities are increasingly aware of their social responsibility and potential to positively impact the immediate local environment. They invest in strengthening transdisciplinary research and partner with city administration and community leaders to contribute to successful sustainability outcomes. While this type of work in the form of projects has been steadily increasing, understanding and assessing the factors that are necessary not only to shape the projects but foremost to build a long-term partnership for sustainability outcomes is lacking. Drawing on the work from city-university partnerships for sustainability in Germany, Mexico, and the United States, we present in this workshop methods of evaluating the development, impacts, and experiences of collaborative projects that explicitly attempt to accelerate progress on climate resilience and urban sustainability. The focus is on our Formative Evaluation Framework (FEF) process which links the evaluation of singular projects to the long-term development of partnerships. The FEF is used iteratively to elaborate on aspects of trust, resilience, collective understanding, relationship building, and outcomes in the respective partnerships and highlights key places for intervention and leverage points for change. Around 15 workshop attendees will be guided (i) through a reflective process of evaluating their own sustainability work, (ii) inductive approach to review parameters and indicators for evaluation, and (iii) a focused discussion on intercultural differences between institutions and how that relates to collaboration. Attendees will gain insight into an active evaluation process and uncover areas where they may be able to leverage partnerships, build capacity, and ultimately deliver on their desired sustainability outcomes.

Implications for sustainability transformations: this innovative method of formative evaluation gauges the progress of collaborative sustainability projects and empowers organizations to forge partnerships and relationships which are the core of resilience and sustainability.

Transformations timeline (6.10)

In this session we will discuss the results of the participatory time line co-produced by the attendees during the leverage points conference and possible strategies for further development and publication of the timeline.

Session Chair: Glenn Page, David Abson
Format: Workshop/special session
Room: Forum

Transformations timeline

Glenn Page and David Abson

(transformation) is a major theme of the leverage points conference, we propose to create a knowledge co-production exercise during the three days of the Conference to engage all participants and co-create an actual timeline with the theme of LEVERAGE POINTS of TRANSFORMATION. The goal is to capture the emergence and development of transformation and key leverage points that have advanced the field regarding research, policy and practice. A well-crafted timeline can be a useful tool that illustrates historical and current dynamics that can be quite useful in considering the potential future trajectory of a given place, sector or thematic area – in this case it would be dedicated to the concept of transformation. There will be designated area in the forum space of the conference building where conference participants can contribute to a collaborative process to document the historical evolution of the concept of transformation, the legacy of past events and their potential to constrain or enhance intervention efforts in the present and future (living labs, T-Labs, brightspots etc.). Developing a timeline of leverage points of transformation, and comparing events across different topics and scales, can bring people together toward a shared understanding of the challenges and opportunities of transformative work. Constructing a timeline together as a group clarifies for a larger group what has been, what is, and helps to set the stage for what could be.

We intend to develop a basic framework for constructing a timeline with both systems thinking and complexity concepts embedded in the final design engaging artists and creative scribing to generate visually compelling systems map over time that could be a model for place-based or thematic based initiatives around the world. Timelines are best considered a work in progress, never fully complete and always subject to refinement and adjustment, however, the process and product could be documented as an action-oriented research endeavor that is published after the conference.
Transdisciplinarity, Research Practice and Learning (7.1)

The posters on this stage are touching upon topics and questions related to innovative research practices and learning processes for leveraging sustainability transformations. Two special foci are real world experimentation and how to better link knowledge and action.

Session Chair:
Format: Speed talks
Room: Forum Stage 1

Regulating the Sharing Economy: A leverage point for the sustainability transformation?
Mirjam Mock

The Sharing Economy has been widely discussed as a promising new pathway to a sustainability transformation. The exceptional pace at which the Sharing Economy has up-scaled from a niche to mainstream nourishes this hope. However, since the rise of global platform capitalism companies, such as Uber or Airbnb, it has also become object of harsh critique. In this current very ambivalent situation, academics as well as policy makers are highly insecure about how to judge this potential new pathway to sustainability. At the same time, the need for taking position on the Sharing Economy and for developing rules and regulations becomes ever more pressing. According to the concept of leverage points, this step – the definition of rules – is a high leverage point. Indeed, the ongoing re-formulation of rules regulating access to goods instead of ownership has a high potential for re-shuffling the unsustainable economic system. While studies on this topic usually focus on explicit rules, such as legal regulations, this paper asks for implicit rules. Applying a practice theory perspective, the focus will be shifted to background rules and tacit practical knowledge. Practice theory argues that this socially shared, incorporated knowledge, e.g. on how to build trust or how to interact with strangers is both, enabling and limiting human agency. Against this background, this paper discusses the Sharing Economy as a potential leverage point for a sustainability transformation; introduces a practice theory perspective on actual sharing practices and the corresponding implicit rules; and re-evaluates the Sharing Economy from this specific perspective.

The implications for sustainability transformations is to present practice theory as a promising lens on leverage points that sheds light on the tacit practical knowledge in explicit rules and practices that determines the scope and limits of transformative action – a blind spot in existing sustainability research.

Leverage points and actionable knowledge: conceptualising relations
Kristina Hondrila and Ariane König

Transformative sustainability science aims at the coproduction of actionable knowledge that informs and inspires stakeholders to tackle problems in human-environment interactions. In this paper, we explore relations between actionable knowledge and Donella Meadow’s leverage points based on insights gained from our transdisciplinary project NUTS FUTURES on water and land-use changes in Luxembourg.

Firstly, we define actionable knowledge in relation to different knowledge types. While most literature deals with systems, target, transformation and futures knowledge, we add practice- and place-based (or experiential) knowledge as central element of knowledge-based action by stakeholders in social-ecological-technological systems.

Secondly, we describe workshop methods by which stakeholders coproduce knowledge about characteristics of the water and land-use system (parameters, feedback, social structures, goals and values) that, crucially, also concerns potential local intervention points identified by participants on the basis of their practice- and place-based knowledge. It is knowledge that emerges from their actions and interactions, from situated experiences, experimentation and learning, from processes of meaning-making.

We argue that, for knowledge to be actionable, it needs not only to relate deeply to leverage points but also to be translated back into participants’ lifeworlds, their professional or local contexts and social practices.

Finally, we analyse relations between the coproduction of actionable knowledge, on the one hand, and design and intent system characteristics (the ‘deep’ leverage points), on the other. We focus on information flows, self-organisation and the power to transcend paradigms, as individuals coming together in transformative research can influence these directly via the modes of their organisation and communication, knowledge- and meaning-making.

Implications for sustainability transformations: by conceptualising actionable knowledge in relation to deep leverage points and by arguing for the importance of practice- and place-based knowledge, we aim to strengthen our capacities as researchers to more effectively leverage science for change.

Conceptual frameworks of Sustainable Development Indicators (SDIs): From the perspectives of the local administrations towards a sustainable society in Japan
Takehiro Hatakeyama

Sustainability indicators not only help monitor and evaluate policy progresses towards sustainable development (SD), but allow concretising what a society needs for it. In particular, a set of comparative indicators enables the “users” to compare policy progress with one another thus promoting effective implementation of sustainability policy. However, the development of this kind of policy tools is hardly existing at the local level in Japan. This research proposes conceptual frameworks of Sustainable Development Indicators (SDIs), using the example of the Japanese municipal governments.

For the purpose, this research conducted a questionnaire to the entire Japanese local governments (n=1,741), inquiring about the extent of the importance of pre-selected thirty indicators for sustainability policy to derive primary data. For the analysis, Principal Component Analysis synthesised given data into five main factors that represent major characteristics of SD determined by the subjects (n= 474). Analysis (k-means) classified the subjects into five groups according to the relevant factors which resonate with the major characteristics. Consequently, appropriate single indicators are selected in respective groups by considering the highest Likert scale scores, which accordingly consist of group-specific SDIs. The results indicate that the five SDIs reflect four differentiated approaches to achieve SD, and highlight the most feasible and the most optimal frameworks whereof. The former had a strong predilection for socioeconomic policies disregarding environmental aspects, which reflected the status quo of local sustainability policy in Japan. By contrast, the latter tended to encompass three dimensions of SD evenly, focusing largely on well-being, which resonate with the global discourse of SD.

Implications of this research for sustainability transformations are: the frameworks of SDIs contribute to Identify the trend and the problem concerning sustainability public policy while having potential to be operationalise the international norms of SD in local practices.

Understanding system dynamics in sustainability transformations – a case study on bioenergy, carbon balance and biodiversity
Anna Repo, Kyle Eyvindson, Panu Halme and Mikko Mörkönén

Understanding system dynamics is crucial when designing sustainability transformations. Otherwise, the solutions we introduce today may result in new problems tomorrow. One example of a sustainability solution involving complex dynamics is climate change mitigation with bioenergy. Bioenergy can be used to replace fossil fuels and reduce fossil-carbon emissions into the atmosphere. However, conflicting climate change with large-scale use of bioenergy may pose a trade-off between forest carbon sink and biodiversity conservation. Analyzing this trade-off requires understanding of interactions, dynamics, feedback loops, and time delays i.e. systems thinking. We demonstrate the importance of considering system dynamics in sustainability solutions with a dynamic assessment quantifying the effects of forest residue harvesting for bioenergy on forest carbon balance and biodiversity in boreal forest landscapes. Through a modeling framework we simulated forest development in four real watersheds located in central Finland with three scenarios: i) with and ii) without forest residue harvesting for bioenergy, and iii) set aside to study the conservation potential of these landscapes in the future without management. We simulated changes in the forest carbon stocks and the quality and quantity of deadwood resources in 100 years, and combined this information with the information of species habitat associations based on expert judgments. This study shows that forest harvest residue extraction for bioenergy changes the carbon balance,which reduces the net emissions savings with bioenergy. The study reveals how extensive bioenergy harvesting affects the availability of suitable habitats for red-listed species. Furthermore, the results indicate a conflict between areas of high bioenergy potential and high conservation potential. Implications for sustainability transformations: The findings of this study can be used to pave the way for identifying leverage points to ensure that the system to
produce bioenergy fulfills the goals: net emission savings without jeopardizing biodiversity conservation.

Transforming paradigms about contradictions – a conceptual tool to approach contradictions dialectically

Leena Helenius

In her seminal work, Leverage points, Donella Meadows states that changing paradigms is a leverage point that has the power to transform systems completely. There are many current paradigms that are in the way of sustainability and some of them deal with contradictions. Every complex system encounters contradictions when striving for a sustainable world: how to combine conflicts of different interests, goals and resolutions, for example? How to form an inclusive relationship to rest of the nature?

In Systems dynamics meets the press Meadows also writes that one of the problematic paradigms of the ‘current industrial paradigm’ is that “all choices are either/or not both/and”. Why do we have the urge to think either-or when facing a contradiction? This presentation proposes that contradictions are dealt with paradigm that rise from the early days of western philosophy, Aristotle and the laws of logic. These ‘laws’ shape our paradigms about contradictions: the Law of noncontradiction and the Law of excluded middle – the latter is where we go wrong in our understanding of contradictions – a conceptual tool to offer unexplored insights into how contradictions happen and what they entail. We particularly focus on three main dimensions: a) the centrality of ethically-informed practices as sites of experimentation and joint-learning; b) a relational view of responsibility as forward-looking commitment to the future; c) the importance of emotional awareness in driving transformative change. We conclude by proposing a novel conception of agency and responsibilty to enrich and expand the debate on sustainability transformations, from both theoretical and methodological action-oriented perspectives.

Both at the national and at the urban level, political discussions and economic choices - also or mainly including the multiple spheres of sustainability - are often made through big proclamations, reassuring slogans, or in response of contingent events. Though, in an era when immaterial inputs are abundant, it is not always clear what the real reasons, goals, and strategies of public operations are. This contribution resorts to systems thinking to analyse the role of information flows – in their widest systemic meaning – as drivers of political and economic action, by attempting to go deeper in the knowledge of a country’s or a city’s system structure and its mechanisms through which our societies take decisions (or consciously or unconsciously let others take them instead). By emerging again with an increased knowledge, it might be easier for scholars, citizens, and decision-makers to be better prepared when called to choose and undertake sustainable and unsustainable patterns of behaviour. After a brief introduction and some preliminary humble insights based on fieldwork research on agro-ecological practices in Finland we will also enrich the discussion.

On the apparent and leveraging information drivers of contemporary societies

Sívio Cristiano

Implications for sustainability transformations: Sustainability transformations require transforming our current unsustainable paradigms. Transforming the way we see contradictions has the power to change the way we deal with them in real life. More comprehensive and plural paradigms about contradictions are vital as sustainability challenges are rarely cases of black or white but black AND white.

Why care matters to sustainability transformations: The importance of ethically-informed practices, relational responsibility & emotional awareness.

Angela Morrigi, Katrina Soiri, Alex Franklin and Dirk Roep

A new awareness is mounting over the need to embark on pathways of radical change to address the multi-dimensional unsustainability affecting our planet. Moving away from a predatory consuming society seems impossible in a world dominated by anthropocentric views based on human-nature dualism. New shared values and ethics must integrate roadmaps to transformation, both at individual and collective level. This paper proposes to re-frame a number of concepts that govern the understanding of the human being and its relations to the world. It does so by drawing extensively from the literature on care ethics and caring practices. For a long time, notions of care for the human and the more-than-human have remained at the margins of the dominant sustainability scholarship, and of the recent debates on sustainability transformations. Conversely, we claim that a care lens can offer unexplored insights into how transformations happen and what they entail. We particularly focus on three main dimensions: a) the centrality of ethically-informed practices as sites of experimentation and joint-learning; b) a relational view of responsibility as forward-looking commitment to the future; c) the importance of emotional awareness in driving transformative change. We conclude by proposing a novel conception of agency and responsibility to enrich and expand the debate on sustainability transformations, from both theoretical and methodological action-oriented perspectives.

The leverage point theory is more applicable on social systems than natural systems, since not all leverage points can even be applied on natural systems such as paradigm change which refers to human conceptions about the reality. A hierarchical logic and pattern can also be spotted in the leverage point theory: weaker leverage points can only have strong leverage if they are in accordance with stronger leverage points. As an example: stricter emissions regulations, which represents leverage point 12 about constants, parameters and numbers, will only be sufficient enough if the ultimate aim of the societal system, which represents leverage point 3 about the goals of the system, is to ensure environmental sustainability. At current state other aims such as economic growth overruns the aims of sustainability which makes sufficient emissions reductions hard or impossible to reach.

Meadows urged focus on the stronger and less evident leverage points. These interventions of high leverage such as paradigm shift or changing the goals of the system are, however, very slow to change in the societal system, which questions whether the stronger leverage points actually are more efficient since they require so much power and time.

Short-term decisions with long-term consequences – learning from time lags in the simulated restoration of a shallow lake

Romina Martin and Maja Schlüter

Humans depend on good water quality in freshwater systems but at the same time they compromise water quality in multiple ways. Many shallow lakes for example experienced an accumulation of nutrients leading to a non-linear shift into the turbid water state which is difficult to reverse. The pollution operates slowly on the catchment scale, while the benefits from clear water (e.g. drinking water, fishing, swimming) are compromised directly at the lake. It is therefore challenging to manage lake restoration while consolidating conflicting activities among disconnected stakeholders. Lake restoration, thus, depends on a common understanding of the ecological as well as social, and social-ecological dynamics. While ecological feedbacks in shallow lakes are well known, the social feedbacks and interactions with lakes are much less understood.

In our case study at a lake in Southern Sweden, we identified multiple time scales of decision making by lake managers and alternative corresponding restoration measures. To project the consequences for water quality, we simulate scenarios of restoration of a eutrophic lake to the clear state using a coupled agent-based and system dynamics simulation model. As an output,
we analyse emerging time lags from societal response to new rules (e.g. improving sewage treatment or reduced fishing) compared to ecological recovery after technical measures (e.g. biomanipulation). The dynamics of water quality together with human activities at the lake indicate when and which ecosystem service can be re-established and further support long-term restoration. Our stylized model enables learning about regime shifts in general, transient dynamics of water quality in particular and supports restoration plans accounting for social and ecological time lags.

Implications for sustainability transformations: Social-ecological, slow variables and feedbacks need to be accounted for when managing regime shift prone ecosystems. Identifying and changing social-ecological feedbacks requires more cross-boundary collaboration among decision makers.

Review of Sufficiency-based Businesses Practices and their Relation to Sustainable Consumption

Maren Ingrid Kropfeld

Addressing contemporary sustainability challenges requires deep socio-technical transitions changing institutional and social rules in the businesses sector bottom-up towards more sufficient practices.

Few studies have looked into how sufficiency-based business models can contribute to sustainability goals and none so far has researched them from a social practice-theory view, identifying key practices and structural factors that have an impact on the institutions themselves and on consumers’ behaviour.

This paper identifies and evaluates the practices that are key to the sufficiency approach based on the body of literature on sufficiency-based business models.

The study includes a traditional configurative literature review using methods from full systematic reviews. The business models are structured along the value chain and are analysed under a social practice-theory view to reveal key sufficiency-based business practices. Marketing practices as the main contact point with the consumer are of special interest. By drawing on previous research on the effectiveness of sufficiency practices, the organisation’s practices’ effect on sustainability is evaluated.

It is argued that sufficiency-based businesses not only make practices within the organisation more sustainable by reducing absolute material throughput and energy consumption, but also that their products and services moderate end-user consumption by encouraging consumers to do more with less.

Implications for sustainability transformations: Sufficiency-based business models can support the establishment of more sustainable institutionalised practices for businesses and consumers.

Outwitting the Red Queen: Mechanisms in leverage for a city’s transition

Leonie Anika Eisig, Ursula Weisenfeld and Antoniya Hauerwaas

This article explores mechanisms that work at leverage points for system transitions towards more sustainability. Leverage points are places of intervention in a system to further change, and we investigate mechanisms that bring about significant leverage (at high leverage points) – change that achieves transition rather than just staying in the same place (outwitting the Red Queen). Analyzing several ‘alternative economy’-oriented niche innovations in a city as a potential transformational mechanism triggering transition in the system’s structure, we ask which core social mechanisms activate high leverage points like new mindsets or new system goals that support the diffusion of these niche innovations in the system. We thereby aim at contributing to a better understanding and steering of system transitions towards sustainability in cities.

Implications for sustainability transformations: We find that niche innovations striving for a paradigm shift and implying new goals are strong mechanisms which however are hindered bottom-up because of only weak internal drivers and a lack in stabilization and top-down because of only moderate external pressures. Moreover, these strong mechanisms need to be complemented by mechanisms at lower leverage points to unfold their full potential. We thus outline various social mechanisms operating on or between different levels which may explain how high leverage points in the city as a system can be addressed successfully.

How to bridge the intention behaviour-gap and promote a societal change? A qualitative interview study with experts from science, politics, and economy exploring the transformative potentials of sufficiency

Josephine Tröger and Gerhard Reese

The German Nature Awareness Study from 2015 reports a constantly high level of acceptance for environmental protection in the population. It shows a significant approval for stricter political measures to ensure a liveable nature and people’s willingness to actively protect the nature. This raises the question why political and economic actors often fail to implement strategies promoting a socio-ecological transformation such as the sufficiency sustainability strategy is argued to serve for? By means of an expert interview, we aim to analyse interactions between implementation of knowledge about the sufficiency approach and ways to encourage sufficiency-oriented behaviour on a broader societal level. We identify opportunities, barriers and societal drivers towards the implementation of sufficiency-oriented behaviour. We also ask how people could more actively be involved by addressing the power of collective norms and collective identities as key factors to engage in transformation.

We present results of the interview study with experts from politics, science, and economy (N=30) in which we found narratives, rewards and social infrastructures, time structures and responsibilities to serve as key factors towards transformation. Additionally, we want to present first findings of the second study in which we focus on changes of collective norms (infrastructures & time structures) and collective identities (narratives). Furthermore, in an online experiment we measure people’s intention to change their current life-style towards a more sufficiency-oriented one.
The Role of Sustainability Pioneers in Transforming the Meat Industry

Charlott Huebel

The negative impacts of modern-day meat production and consumption patterns are endangering the future of our planet. Every year the meat industry is fattening and slaughtering 70 billion animals in predominantly industrialized systems that imply detrimental consequences for the natural environment, animal wellbeing and human health. Given these highly unsustainable practices, the meat industry is challenged to profoundly transform towards sustainability.

The literature on sustainability transitions and sustainable entrepreneurship suggests that crucial levers for transformations could be niche innovations. Sustainability pioneers enter the market and disrupt established production patterns and industry structures through product novelties and structural reconfiguration. In the case of the meat system, proposed innovations that could profoundly challenge current production and consumption patterns include alternative protein sources such as insect-, algae- and plant-based meat substitutes as well as in-vitro meat products. To date, the role of sustainability pioneers in disseminating these innovations and shaping the industry has not yet been investigated.

This study will close the research gap and adopts two foci in the analysis of the role of sustainability pioneers: First, to identify their impact on established industry structures, the study examines the pioneers’ interaction with and influence on incumbent firms. Second, to determine their potential to change the deeper structures, values and goals underlying the current system, the study further analyses the interactions between pioneer activities and the wider institutional setting. Analysis is based on a multiple case study conducted with niche pioneers.

The implications for sustainability transformations are the following: Niche pioneers could play a fundamental role in not only redefining industry structures, but also the values, shared ideas and goals that underlie the entire system. Second, sustainability transformations in industries are complex and could therefore crucially depend on deep interactions amongst actors as well as between actors and society.

The agroecological transformation of French Dairy Mountain farming systems: From the identification of leverage points and their interactions to new action-research activities.

Cyrille Rigolot, Chantale Chassaing and Patrice Cavre

French mountain dairy farming systems are associated with several sustainability issues. Agroecology has been identified as a promising pathway, which consists in relying on ecological processes as an integral part of the farming activity. As part of a project aiming at fostering the agroecological transformation, we are combining complementary descriptive and action-research activities. The concept of leverage points appears particularly structuring for our approach. First, comprehensive surveys with 36 conventional and agroecological dairy farmers have shown that agroecology is associated with specific worldviews, defined with ontological, epistemological and axiological (values) dimensions. Possible shifts in worldviews correspond to deep leverage points. Secondly, from the analysis of the narratives from conventional to agroecological and literature, we propose a conceptualization of the farm transformational process. Particularly, we identify two important turning points: i) when the conventional farmer first begins to consider the agroecological alternative, and ii) when he later definitively adopts the agroecological alternative. In between, the farmer builds a new social network, search for new information sources and key relevant agroecological tools, and practice “trial and error”. Sometimes, farmers give up the transformation process and come back to a conventional system, finding too difficult to deal with new know-how and a “whole job change”. This conceptualization of the transformational process can be interpreted in terms of dynamic interactions between different leverage points (parameters, feedbacks, design and intent). As a perspective, from our emerging understanding of the transformation process, we will develop several action-research activities corresponding to leverage points at different levels (from technical to value-based mediations among farmers, agricultural students, teachers and researchers).

Implications for sustainability transformations: The identification of leverage points and their interactions at farm scale suggest new action-research activities to foster agroecological transformation.

Exploring the interdependent nature of individual decision-making in the socioeconomic context: the case of bioenergy from GM crops

Olivier K. Butkowski, Chad M. Baum, Ashkan Pakseresht, Stefanie Bröning, Carl Johan Lagerkvist

Efforts to promote the greater consumer acceptance of novel technologies have usually focused first and foremost on communication about the respective and, if this is shown to be insufficient, greater consideration of the way in which this information is framed or presented. And yet, this more information-focused approach to technology acceptance has been determined to have a number of shortcomings, not least its more limited consideration of the practical context of actual decision making. For instance, what is the specific influence on decision outcomes of the type of end-use (e.g. bioenergy versus food), the socioeconomic circumstances in which this takes place, and the (upstream) decisions of other actors within the supply chain? Focusing specifically on the influence of the practical context on potential support for green genetic engineering for bioenergy purposes, we conducted a framed field experiment with German consumers (N = 322) wherein we divide the sample into three groups and then present information about the technology in three different respects (i.e. positive, negative, neutral). By thereby controlling for the different ways in which information can be presented, we are able to investigate the extent to which some overlooked aspects – notably the upstream decisions of supply-chain actors, the level of trust in different types of information and the existence of a labeling scheme – impact processes of consumer decision-making. Overall, we determine that consumer support (rejection) declined (increased)

Leverage Points and Sustainability Science (7.2)

The posters on this stage are revolving around topics and questions related to conceptual, methodological and empirical contributions to the Leverage Points concept and Sustainability (Science).

Session Chair:

Format: Speed talks

Room: Audiomax

Resource Revolution in Europe? Circular Economy as a novel transformation pathway to sustainable production and consumption

Sina Leipold and Tim Griebel

Understanding how sustainability transformations are imagined is crucial for assessing their implications for political and practical action. We study the Circular Economy (CE) as a novel EU policy discourse, which is connected to considerable hopes of a transformation to sustainable production and consumption systems. Up to now, scholarly analyses of the CE as policy paradigm have focused on (potential) technological and economic applications. Political expectations and logics behind the CE as novel EU policy paradigm remain underexplored.

To fill this gap, we analyze the EU policy discourse on the circular economy as a novel transformation pathway towards sustainable production and consumption systems. To do so, the paper draws upon 28 in-depth interviews with key political, civil society, and business representatives, 84 policy documents, and 320 press articles from a prominent EU press outlet (euractiv.com). We apply corpus linguistic methods (e.g. keyword and collocation analyses) to reconstruct the semantic field around circular economy in different media and an interpretive discourse analysis to demonstrate emerging narratives and agency constellations.

Our results demonstrate that although the imagined future state of a CE and its specific features vary considerably, stakeholder and press perceptions show a certain belief in the steering power of certain “intervention” or “leverage” points (e.g. entrepreneurs, innovators, technology diffusion). At the same time, the expert interviews highlight also considerable adverse “leverage” points of the circular economy concept while media debates largely ignore potentially adverse effects.

Implications for sustainability transformations arise from our insights into (a) the large influence of the belief in the steering power of certain “intervention” or “leverage” points, and (b) the identification of contentious and adverse leverage effects of this transformation. Our results contribute a first stepping stone for political science analysis of the CE and may serve stakeholder debates for future-oriented policy development.

WEDNESDAY 6th 18:30-20:00
Unmaking meat – Transforming practices
Minna Kanerva

It is broadly accepted that the current meat system needs to be transformed. At the same time, the ‘unmaking’ of meat is still resisted at many levels. This resistance is similar to the resistance to other necessary changes towards sustainable societies, but at the same time it has a somewhat different character, as (not) eating meat is a more emotive issue than many other practices.

This paper examines meat eating as an obdurate, but nonetheless changing social practice, focusing on discourses reflecting the processes taking place at the collective level. The new alternatives to conventional meat (cultured meat, insects and plant-based meats) are argued to have agency, affecting meat eating practices to discursive consciousness, and open them up discursively, paving the way for a potential transformation of practices, and therefore also the broken meat system.

The qualitative data analysis explores current online discourses in the United Kingdom regarding these new meatways, in order to obtain more insights into the process of change. This paper aims to contribute to the understanding of the process of transforming social practices in general, and the meat system in particular. Implications for sustainability transformations include several leverage points regarding both benefiting from the existing discourses, and directing future discourses towards transformative change.

Reconnecting people and nature cognitively by providing an integrating and easy way of understanding the ecosystem
Ina Küddelsmann

With our western way of understanding nature, we are used to analysing, explaining and saving the natural ecosystem by focussing primarily on different parts of it, such as on climate, biodiversity, soil or open waters. Interconnections between those parts are recognized, but only on a subordinate level.

This separated way of thinking is manifested structurally, e.g. by correspondent governmental institutions and their different objectives, resulting in a high degree of information, making assessment, planning and coordination complicated (for skilled labours as well as for private persons intending to do something meaningful for nature protection). Furthermore (according to existing structures) people often focus ecological activities on one aspect, like on reducing CO2-emissions for climate protection. When other negative news about other aspects arise (such as about water or biodiversity) this can result in resignation and helplessness.

Besides, a limited view without seeing the overall entity “ecosystem” often triggers isolated measures with contra-productive effects on other parts of the ecosystem.

Therefore, I will present

- a holistic but easy way of understanding the ecosystem and its services as one dynamic entity while integrating disciplines, institutions, problems and objectives.

Water is the key-element in this holistic way of thinking as

- the evolvement and persistence of ecosystem and its services are recognized as results of water behaving with specific properties under specific frame conditions, and
- current environmental problems are recognized as results of disturbing the “blue skin” of our planet.

This interconnecting role and importance of water is missing in most recent perceptions.

Furthermore, two trend-indicators for measuring the overall quality of ecosystem’s functioning will be induced, which additionally reduces complexity and opens up a more focused, lean, robust, dynamic and probably more successful and cost-efficient way towards ecosystem stabilization.

One essential implication for ecosystem transformation is “Blueing”: An integrating concept of sustainable land cover development, re-establishing the “blue skin” of our planet somewhere.

If the basic principles of the presented holistic understanding of natural ecosystem are applied as well to the anthropogenic system – taking emergence into account – additional requirements for the implementation of “Blueing” can be identified (a “leverage points” question!),

Multilevel governance in a payment for hydrological services program in Pixiquiac subwatershed Mexico.
Alfonso Langle Flores, Adriana Aguilar Rodriguez, Julia Ros-Cuellar, Humberto M. Romero-Uribe and Juan J. Von Thade Ugalde

Mexico is one of the countries that allocates the most resources to Payment for Ecosystem Services (USD 1.4 billions in the last 8 years). It is strategic to understand how and under which conditions, collaboration improves governance of complex and boundary-spanning ecosystems in Payments for Ecosystem Services. This study addresses two broad questions: (1) How can effective collaborative environmental governance arrangements be established in order to secure the provision of hydrological services for urban areas? and (2) How can scale-mismatches be overcome to align socio-political arrangements with the spatial extent of ecosystems processes? To investigate these questions, we used a social-ecological approach to disentangle a multi-level governance network in a payment hydrological
The Knowledge-Action Gap Related to Meat Consumption in Sustainability Scientists and Its Relevance for Societal Transformation

Anna Falkenstein

Eating meat leads to several environmental threats, hence reducing one's consumption can be a direct way to avoid environmental degradation. While sustainability scientists know about the environmental degradation due to meat consumption, many of them still choose to eat meat. It is questionable whether a broader societal transformation towards sustainable consumption is likely if people with the necessary knowledge and values already struggle and fail to implement a sustainable behavior. How can they expect others to change if they do not change themselves? This paper addresses the knowledge-action gap that is prevalent among sustainability scientists regarding their meat consumption and how they deal with it. Qualitative semi-structured interviews and thematic content analysis are applied to analyze the main internal barriers to pro-environmental behavior sustainability scientists face as well as what narratives and rationalizations they use to overcome the dissonance between their knowledge and actions. The internal barriers they demonstrated were emotional non-involvement and a perceived lack of power of the individual. The strategies used to overcome the dissonance were conscious consumption narratives and rationalizing the value of meat consumption specifically its perceived sustainable dimensions. This paper also highlights that sustainability scientists do feel responsible to lead by example, but do not always follow through with behavior change.

Implications for sustainability transformations: In the context of societal transformation, sustainability scientists can be an important element to help trigger and accelerate change. They need to realize and embrace their responsibility to role models and use their personal behavior as a way to provide conscious, informed, and content examples of sustainable behavior.

Collective Landownership and the Crisis of the (Re)Productive

Janina Dannenberg

A '(re)productive economy' (Bieseker/Hofmeister) is a crucial factor for transformation(s) towards sustainability. It means, that every process/service in nature/society is acknowledged not just for producing the originally intended natural/societal product, but for reproducing desirable/undesirable societal relations to nature. The 'crisis of the (re)productive' occurs when unpaid forms of labour or natural processes are identified as excluded from monetary valuation by the economic system but not so from exploitation.

In the Philippines, Indigenous Peoples hold the right to their Ancestral Domain which goes along with obligations for a sustainable development of these lands. This collective form of landownership is based on an ascribed 'indigenous concept of ownership', that includes all generations and also non-material entities in the area and is codified in the Indigenous Peoples Rights Act (IPRA). To a large extent, the IPRA demands a (re)productive economy. At the same time it is based on a binary structure dividing indigenous and non-indigenous rural populations.

Based on fieldwork among the Matigsalug (Mindanao, Philippines) I discuss the following: How does collective ownership of land shape the crisis of the (re)productive? What are the methodological implications for the research on (re)productivity, when looking at the recognition of distinct Indigenous Peoples within the IPRA and 'doing indigeneity' in landownership? What does it mean to study the 'crisis of the (re)productive' beyond the context of an 'industrialized western society' the approach originally refers to? Drawing on Latour's notion of nonmodernism I analyse discursive exclusions and hybrid practices and suggest a relational approach for conceptualising (re)productivity.

The presentation is a short paper of a PhD-thesis to finalize.

Implications for sustainability transformations: The research draws attention to power relations in transformation processes, helps to understand which crises to transform and which hybrids to develop and offers the chance for inspiration through practices of contemporary collective landownership.
Subsistence grazing to nature-based recreation: Land use transitions and drivers in a mountain case study of a global biodiversity hotspot

Petra Holden, Gina Ziervegel, Timm Hoffman and Mark New

An understanding of the causal mechanisms of land use change and associated ecosystem service trade-offs in mountain areas is important for sustainable management. In many parts of the world, the abandonment of farmland in mountainous areas has occurred. Farmland abandonment is viewed as a conservation dilemma with drivers and impacts varying per context. We aim to contribute to the theoretical understanding of the causal mechanisms of land use change in mountain environments with a focus on the role of cultural ecosystem services in ecosystem service trade-offs associated with land use change. We use mixed social science methods and historical aerial imagery to understand trade-offs in the biophysical and social aspects of several land use types including ecotourism, personal nature-based recreation and wilderness. Hundreds of areas typically excluded from remote sensing-based land use change studies which have investigated farmland abandonment in mountain environments. Uniquely, this included repeating a questionnaire and interview process originally conducted 40 years ago. Drawing on the concepts of socio-ecological systems, ecosystem services and land use transitions, we both quantify and contextualise private land use change over the last 40-70 years in the Great Winterhoek, a mountain catchment important for regional water supplies in the Cape Floristic Region, a global biodiversity hotspot in South Africa. We particularly focus on understanding the drivers (both exogenous and endogenous) of land use transitions from livestock-based, subsistence agriculture and small-scale farming to agricultural intensification and the utilisation of the mountains as recreational lands. We highlight the importance of understanding socio-economic factors that encourage the emergence and growth of personal nature-based recreation and ecotourism when modelling land use change associated with farmland abandonment in mountainous regions.

Engaging with Resourcefulness and Transformation in the South Wales Valleys (UK)

Gloria Giambartolomei

Resilience has been criticised for privileging the stability of an existing system made of highly unequal social, economic and political structures and relations. This is to the detriment of more proactive and transformative narratives, aimed at strengthening communities’ self-determination, according to their own needs and priorities. The apologetic and pre-determined, managerial nature of resilience thinking, as generally applied to the analysis of social systems in global environmental change, is hence deemed to critically gloss over structural and power relations. In response, a radical interim politics of resourcefulness has been proposed to overrun resilience narratives in favour of the cultivation and proliferation of the capacity of (marginalised) communities to fully vision and actively shape competing economic and environmental visions for the future. In this context, research is conceived as a power- and value-laden act, through which scholar/activist(s) practically and reflexively engage with multiple processes of knowledge (co-)production and social transformations. In so doing researchers come to<footer>and within the “researched” communities. This paper presents some interim findings from the ongoing endeavour of the author to embrace this approach, through her engagement in a collaborative project named “Skyline”. The purpose of Skyline is to investigate the potential of a large-scale community land transfer to act as a catalyst for economic and social transformations in the South Wales Valleys (UK). By participating in this project and using PAR-inspired methods, the author aims to gain a nuanced understanding of the interaction of “deep leverage points” such as social structures and (formal and informal) institutions, as well as people’s worldviews, values and beliefs. Specifically, she investigates how place-attachment and a sense of ownership towards the surrounding environment develops and influences wider engagement in collaborative and resourceful practices of natural resource management.

Implications for sustainability transformation: researchers’ contribution to sourcing communities’ capacity towards self-determination and rationality behind sociological and cultural transformations: Advance disciplinary debate on how humans’ impact is overwhelming the planet earth. In this context, the contemporary debate on climate change adaptation emphasize on the need to tackle the wicked problem of climate change in a dynamic and systemic way. Such emerging realities demand not only a deep social transformation in the way adaptation is conceptualized, but also rethink the approach framed within sustainability concept. This is an important departure point that led to significant shifts in thinking among scientists and policymakers on the value that place based and local knowledge play for effective policy outcomes. Despite this shift, effective integration of such knowledge within mainstream adaptation discourse is a big challenge. The challenges arise from gaps related to research on and application of place based and local knowledge within mainstream climate change adaptation practice. In this context, there is theoretical, empirical and practical imperatives into researching the science of knowledge system, backed by fundamental inquiry and framing that help to understand and develop a more nuanced concept of adaptation, attentive to context and scale specific construction of adaptation knowledge.

Place based and local knowledge on adaptation has much to do with social construction of knowledge about climate change, and has strong correlation with the human environmental interaction, the intangible processes of knowledge construction, operating in a space beyond geographic imagieres. Social science application and extensions of the adaptation paradigm from cultural, human geography and sustainability science provide important entry points in this regard. “Implications for sustainability transformations: Advance disciplinary debate on and rationality behind sociological and transdisciplinary research for effective adaptation policy outcome”.

Integrated Roadmapping — a new tool for collaboration and collective learning in
cross-sectoral issues
Katharina Schrot and Marina Berchem

Natural disasters are projected to become more frequent and more severe as a result of global climate change. Nevertheless, the field of climate change adaptation is only slowly gaining acknowledgement and acceptance by authorities and actors, therefore the specific framework conditions on regional and local level require innovative approaches and processes. Another factor that complicates the work in that field is the multi-sector concernment. This leads to the question on how collaboration and engagement in cross-sectoral issues and a collective learning approach among all participating interests in a region can be fostered.

The "Integrated Roadmapping" approach reacts on that problem by enabling regional stakeholders to plan proactively and in an integrated manner. The methodological key aspect is the creation of a desired future and their attainment, which is subsequently planned backwards.

Parts of the approach are currently implemented in the "Regionenprojekt" which marks the preparation phase for three regions in NRW and focuses on bringing together different affected stakeholders for a first approximation to the subject of climate change adaptation and to reach a common level of understanding.

By integrating new ways of knowledge exchange a particular level of the topic can arise. Especially in municipalities, the involvement of all important stakeholders is a crucial point to encourage an integrated view and thereby change the communication culture and cooperation within this system. Through the development of visions, scenarios and stories, sensitization of important actors in the field takes place and it triggers the reflection of assumptions, beliefs and values.

Implications for sustainability transformation: through the interval key informants of the topic can arise. Especially in municipalities, the involvement of all important stakeholders is a crucial point to encourage an integrated view and thereby change the communication culture and cooperation within this system. Through the development of visions, scenarios and stories, sensitization of important actors in the field takes place and it triggers the reflection of assumptions, beliefs and values.

The “Integrated Roadmapping” approach reacts on that problem by enabling regional stakeholders to plan proactively and in an integrated manner. The methodological key aspect is the creation of a desired future and their attainment, which is subsequently planned backwards.

- “AudaCity” tasks players to develop a systemic sustainability strategy in a backcasting approach, beginning with a broad sustainability goal, that is broken down into different urban lifestyles, tangible potential actions, and first steps that the participants could personally commit to. AudaCity has a resilience component as well.

Game-based workshops to build transformative capacity.
Lea Reutter, Lauren Worthyome Keeeler, Richard Biczecroft and Beatrice John

There is a need in municipal governments to build transformative capacity so that municipal administrators can design, test, and implement plans, projects, and policies that are capable of transforming society towards sustainability. In City University Partnerships in Tempe, AZ, USA, Lüneburg, Germany, and Karlsruhe, Germany, series of game-based workshops have been successfully conducted to build transformative capacity. This conference workshop presents two successfully tested games:

- "Future Shocks and City Resilience" tasks players to consider municipal assets that can be used to tackle sustainability issues and how these assets can be adapted to be resilient against a foreseeable shock.
- "AudaCity" tasks players to develop a systemic sustainability strategy in a backcasting approach, beginning with a broad sustainability goal, that is broken down into different urban lifestyles, tangible potential actions, and first steps that the participants could personally commit to. AudaCity has a resilience component as well.

Both games have been shown to build a set of competencies for sustainability transformation (systems, values, futures, strategic thinking) and players' confidence in their own ability and power to implement sustainability actions. Presenting game-based workshops by playing key stages of the games in parallel small groups allows the 10-15 participants to experience the potential of the tools first hand. Results from evaluation and analysis of these games will be presented briefly to enable an integrative discussion on the implications for sustainability transformations: capacity building for individuals and groups, gaming as transformative practice, facilitation of capacity-building.

Personal approaches toward education for sustainable development
Pascal Frank and Laura Stanszus

25 years after the World Summit on Environment and Development, a lively debate on higher education for sustainable development (HESD) has arisen. The overarching aim is to encourage the acquisition of key competences that enable students to master challenges in individual life practice, professional action and the co-determination of social changes as citizens in a self-determined, self-reliant and reflexive manner. More recently, within the framework of a UNESCO report (UNESCO, 2015), demands have been made to counteract a too narrow focus on cognitive learning processes by addressing the affective-motivational dimensions more prominently. Personal and experience-based approaches are deemed to have a special potential in that regard.

Within the first conference on personal approaches toward SD ("Sustainability & me" conference, Lüneburg), the concept was defined as an approach that focuses conditions, resources, possibilities, challenges and limits of individual actors to contribute to sustainable development. Among the key aspects, personal approaches are deemed to have a special potential in this regard.

This presentation provides an overview on various teaching formats run at Leuphana University applying personal approaches. It also gives reasons for and lays out a strategy to integrate these approaches as a constant component of the sustainability science curricula. In particular, I will emphasize the implications for a broader sustainability transformation, arguing that personal approaches do not only carry a great potential for personal transformation, but for sustainability science research and related teaching institutions alike.

Sustainability in African Higher Education Institutions (HEIs): Shifting the focus from researching the lacks to existing activities
Nico Ulmer and Kerstin Wydra

Sustainability in HEIs has made significant progress in the last few years, yet research on this topic is distributed unevenly globally: Existing publications on Sustainability in HEIs so far have had their focus mainly on the Global North. Literature on Sustainability in African HEIs on the other hand has been described as scarce or even non-existent. This paper aims to address this lack...
and presents a Delphi study: 69 experts from 24 African countries have been contacted considering existing sustainability activities in their respective HEI. 32 participants (response rate 46.4 %) from 29 HEIs in 16 African countries have taken part in the first round of the study. The answers showed 30 out of 32 participants (no response from two participants) agreed with the presented Grundtland definitions of Sustainability and Sustainable Development (SD). Eleven of the participants however commented that these definitions are problematic since they lack essential components such as cultural issues. Two thirds of the participants stated that African elements were included in their sustainability activities. In the second round of the study, participants deemed more realistic strategies for improving these strategies which included solving the challenges of people in and around the university as well as the promotion of local languages in order to create identification. Implications for sustainability transformations: More thorough research in African HEIs considering successful implementation strategies will be needed in order to connect people and sustainability.

Initializing transdisciplinary engagements with non-academic stakeholders: processes of mutual selection between women’s groups and researchers in Nigeria and Ghana

Margareta Lelea, Katharine Tröger, Simon Adékunle Oyebilte, Olade Adetibigbe, Joseph Kudanam Korese and Brigitte Kaufmann

The involvement of individuals from non-academic stakeholder groups, or participants, in research is commonly a one-sided process steered by scientists. However when the goal is co-production of knowledge for transdisciplinary transformation, participants need to be willing and able to commit to a longer-term engagement and need to have more ownership throughout the research. Thus, an explicitly two-sided involvement process can be designed to shift more power towards participants. In a research project to improve nutrition of women and children while increasing availability of food products that contain underutilized species in Nigeria and Ghana, an African-European research team including the disciplines of Geography, Sociology, Animal Science, Nutrition Science and Engineering, need to work together with rural women’s groups of producers, traders and food processors. After an initial characterization of more than 35 women’s groups, those with advanced decision-making and communication skills were invited to propose their ideas for participation through a structured application process. We analyze how this type of application influenced the co-selection process for research engagement in on-going fieldwork that started in 2018. Rather than simply targeting easy-to-access groups, this process helped improve joint understanding of specific problem situations and enabled common goal-setting. Implications for sustainability transformations: such methods for selection in transdisciplinary research practice function to improve motivation of participants and create improved equity between academic and non-academic stakeholders which takes on added importance when projects span between Global North and Global South contexts.

Real world experiments: a closer look at four exemplars and results from the accompanying research

Helena Trenks, Colette Waltz and Sarah Meyer-Sový

In real world labs researchers become active parts of transformation processes in society. They shape these processes and gather knowledge on how to push sustainable development forward. In the eastern part of Germany Karlsruhe "Oststadt", these change processes are stimulated through the real world lab "District Future − Urban Lab". Since 2012, the real world lab is contributing to a sustainable transformation of this district in a joint process with citizens, stakeholders and urban administration. Topics are brought into the lab from bottom-up processes. The vision of the lab is to establish a sustainable community, connecting global challenges and scientific discourses on sustainability with everyday life. The intention is to reflect people’s daily routines and to develop alternatives.

Real world labs offer an infrastructure, networks and space for experiments. Such "real world experiments" take place in a closed and controlled laboratory setting but right in the middle of society and within the living environment of local actors.

With this in mind the lab in Karlsruhe initiated the so called "sustainability experiments". These experiments can be understood as an intensive combination of research and transformation activities. Based on a competition for action related to "community" and "deceleration", four teams of local actors carried out their experiments in the urban space for nine months (in 2016/17).

They were supported and accompanied by the researchers through organizational support (in form of group meetings, networking, offering of a meeting place and public relations) and intensive accompanying research (series of questionnaires, group interviews and a focus group).

In our presentation we will describe the format of these sustainability experiments, taking a closer look at their activities and describe the findings of the accompanying research in detail.

Bridging agriculture and conservation: exploring the motivations behind local heathland farmers forming and joining a nature conservation association

Fiona Specht, Maraja Riechers and Vicky Temperton

Ibolar biodiversity is experiencing substantial challenges. Main drivers are increasing demands on land, especially for intensive agriculture leading to a decrease in soil quality. Correspondingly, farm land will further be intensified and expanded. Hence, there is a need to find solutions that combine agriculture with biodiversity conservation. In 2017, the association "United Heathland farmers for nature conservation" (Vereinigte Heidehilfe für Naturschutz e.V., VHN) was established. Today the roughly 90 members are mostly farmers who have been farming in the Lüneburger Heide for generations. In our transdisciplinary cooperation we worked with this newly established association to survey how they aims to work within the landscape whilst also conserving landscape heritage and surrounding nature. Since farmers are potentially a key player when it comes to the combination of biodiversity conservation and agriculture, we investigated the motivational factors that led the VHN members to join the new association. We therefore explore the motivational drivers and the general understanding of nature conservation of the VHN members through a web survey, created in close cooperation with the VHN. In our study we used a survey with current nature conservation processes motivated the members to join the VHN, (b) if they aimed to protect the Lüneburger Heathland due to regional identity, (c) if the members were more driven by intrinsic motivation or (d) if they felt increasing pressure to act sustainably (extrinsic motivation) or (d) for monetary gains related to their livelihoods. Implications for sustainability transformations: understanding and tapping into the motivations of farmers for meaningful long-term nature conservation can be an effective leverage points for a sustainability transformation, as it empowers local actors, local knowledge and could potentially create more sustainable agriculture practices.

Social connectedness about the agricultural landscape through Participatory Mapping

Irene Pérez-Ramírez, Marina García-Llorente and Antonio J Castro Martínez

This investigation will address, based case studies, the enhancement of the agricultural landscape in urban and rural contexts, from a participatory and territorial perspective through the approach of ecosystem services and Public Participatory Mapping. The role that such an approach can play in promoting and strengthening dialogue between local community knowledge and know-how, and in making cultural services associated with the agrarian landscape visible will be highlighted. This methodology is based on the principles of the European Landscape Convention based on the need to promote the direct participation of the local population in order to contribute to the protection, management and planning of the landscape as a key element of individual and social well-being and as a fundamental component of the natural and cultural heritage of the territories.

The aim of this communication is to go deeper into participatory methodologies that help to highlight all those significant elements of the landscape associated with the collective and cultural dimension, and that allow us to differentiate a territory from the others, in order to strengthen the recent strategies of protection, management and territorial planning that seek to reconnect the countryside with the city, and that are taking place in the current Spanish context. The results obtained from using participatory mapping as a method to improve the analysis and spatial and temporal identification of places attachment value linked to the history and tangible and intangible heritage of agricultural systems are presented, while at the same time trying to dignify the link with agriculture. The results obtained will be used to assess possible future actions to strengthen the place attachment of large cities and other peri-urban areas and even rural areas.

WEDNESDAY 6th 18:30-20:00
Combining transdisciplinarity and transition management: a translocal European learning process on prossumerism in the energy sector: mainstreaming guaranteed?

Timo von Wirth and Julia Wittmayer

To fulfil the European Unions’ goal of providing “Clean Energy for All Europeans”, a transformative shift of the energy market from centralized, fossil-fuel based systems to more decentralized systems based on renewable energy sources (RES) is needed. RES prossumerism, especially in its collective form, is expected to be a key success factor in achieving a clean and fair energy system. Increasing our understanding of the range of factors that enable or disable prossumerism to become mainstream requires the inclusion of knowledge from different societal actors. Approaches such as transdisciplinary case studies, or transition management have been proposed as procedural frameworks in response to the demand of tackling such grand societal challenges. Both claim to facilitate knowledge integration but also capacity building, and learning, and seek to empower participants. However, they differ significantly in their scientific origins, their choice of actors and their initial purpose. Little is known about adequate forms of process designs that incorporate and complement, both, principles and stepwise approaches of transdisciplinary research, such as transdisciplinary case studies, and transition management. Within the international H2020 project PROSEU, such a process design is supposed to support a European-wide, translocal learning process about prossumerism in energy. We build on the ideas of a functional-dynamic process design in order to serve an action and impact focused process. The paper presents the ex-ante, nested process design integrating elements from transdisciplinary research and transition management, which establishes an international, transdisciplinary research process. Doing so, we critically reflect upon synergies, but also potential frictions and contradictions between the principles and process approaches. Our work will suggest first ideas about how to observe and evaluate such an international, transformative learning processes.

Implications for sustainability transformations: New methodology for a European-wide, translocal collective searching and learning process towards a more inclusive and clean energy system.

The Sustainability Profile Matrix (SPM) – a tool supporting participative sustainability assessment and learning

Clemens Mader and Lorenz Hilty

Assessing sustainability processes is inherently a collective searching and learning process towards an impact focused process. The Sustainability Profile Matrix (SPM) is a sustainability assessment tool primarily tested in processes of private and public institutions who create impact on society and the environment at various geographic scales. In course of the assessment process, the SPM supports facilitators and stakeholders in getting a systemic understanding of the impact they create in course of their operations. SPM enables stakeholders to actively contribute to the sustainability assessment by having access to the content management of the assessment tool and provide contents for the assessment itself. At the same time, stakeholders can learn from the assessment as they realize their systemic impact. This learning may directly improve a positive impact for the sustainability process itself.

After testing the tool in the context of different cases the SPM is currently being programmed into an software, and to be implemented at University of Zurich.

Urban place attachment, cultural capital and civic engagement on a district level in Wuppertal

Matthias Wanner

Living somewhere means constant interaction with an environment, including socio-psychological and physical aspects. These and further factors make somewhere or a space into a place (Buttimer & Seamon, 2015). Place attachment (PA) is the term mostly used for describing the affective bond between people and places. PA has also been researched as being a moderator or mediator of societally desirable behaviour. Significant connections between political opinions, place attachment, the attitude towards climate change and finally pro-environmental behaviour (Scannell & Gifford, 2010) were found. Going beyond a uni-dimensional construct of PA, Lewicka (2011a) confirmed the existence of five types of attachment (active vs. traditional) and non-attachment (alienation, place relativity, placelessness) which have been found by Hummon (1992). Our study focusses on PA on a district level, an entity which hasn’t been researched so far. In the context of PA and civic engagement (CE) as a contribution to the debate of PA as an influencing factor on societally desirable behaviour. Up to now, the connection between PA and CE is not clear: CE is sometimes reported to be more influenced by cultural capital (CC) than PA (Lewicka, 2005). Our aim is to measure the prevalence of the five types of PA (Lewicka, 2011a), cultural capital (CC) and civic engagement (CE) in several districts in Wuppertal. Furthermore, the connections between the constructs of PA, CE and CC will be analysed in order to achieve a better understanding of those constructs in general and on a district level. Implications for sustainability transformations: The study will give answers to the following three questions: Does place attachment in urban areas support civic engagement and transformative actions? Which forms of place attachment are meaningful conceptualisations in today’s migration society? Do people feel attached to small-scale urban entities like district which are discussed as one very important niche for sustainability transitions?

How relational values influence sustainable landscape change: a case study on nature conservation regulations in a landscape under change

Theresa Hofmann, Dr. Maraja Riechers and Prof. Julia Leventon

Landscapes are shaped by global drivers, and currently face many unprecedented changes. Leading drivers are climate change (IPCC 2014) and global land use change (Millenium Ecosystem Assessment 2005), driven by global population growth and changing consumption patterns. Underpinning these drivers of landscape change are paradigms and value systems subscribing to economic growth, functionality and consumerism (Meadows et al. 1972; Fischer et al. 2014). A potentially important but poorly understood consequence of rapid landscape change is that it may affect the relational values, especially the human relationships (Chan et al. 2016). Generating a better understanding of relational values influence communication structures and patterns when it comes to nature conservation regulations could be important to foster sustainability. In this study we aim to uncover possibilities for a change in the communication structures and values and improvements of this structures and values as a possible leverage point to foster sustainability. For this we build on extensive qualitative research in that area and conduct a network analysis with actors in the region. Those may be directly related to nature conservation regulations or influential actors for the commune. Prior research found externally driven, rapid landscape changes influenced inhabitants own involvement and responsibility towards ‘their’ landscapes and indicators pointed to a decrease of human relationships due to hardened ideological front. To uncover specificities of this interaction we highlight the main actors in the region and how those communicate with each other. We expect certain actor ‘bundles’ having similar paradigms being connected with less cooperation and connection to actors bundles with contrasting paradigms. Through uncovering those communication structured and how those were influenced by relational values we aim to indicate leverage points to foster sustainability. Implications for sustainability transformations: Finding ways to improve nature conservation regulation and understanding relational values will help for a sustainability transformation.
All the keynotes, parallel sessions and plenaries will be held in Leuphana’s new central building:

Zentralgebäude
Universitätsallee 1
21335 Lüneburg

The morning keynotes and afternoon will be held in the Libeskind auditorium on the ground floor and the parallel sessions on the first and second floor (accessible by lifts and stairs). Please allow plenty of time to get to the parallel sessions.

Toilets can be found in the basement, and first and second floor.
GETTING AROUND

By Train

From the airport: In Hamburg, the S-Bahn runs every 10 minutes and takes about 25 minutes to the main station. In Hannover, the S-Bahn runs every 30 minutes and reaches the main station in about 20 minutes. In Bremen tram line 6 runs every 10 minutes.

For information on local transportation and timetables

In Hamburg see HVV timetable https://www.hvv.de/en/
In Hanover see GVH timetable https://www.gvh.de/linien-fahrplaene/fahrtauskunft/
In Bremen see BSAG timetable https://fahrplaner.bsag.de/hafas/query.exe/en?

For general train information https://www.bahn.de/

Approximate train times to/from Lüneburg - Hamburg 30 mins (ICE)/1 hour 10 mins (regional trains); Hannover 1 hour (ICE)/1 hour 50 mins (regional trains); Bremen 1 hour 25 mins.

By bus

At Lüneburg train station, there are three bus lines that stop at the university. Line 5001 (at the same platform where the trains arrive from Hamburg) will take you directly to the main campus in 13 minutes. (note that there is one stop before the main campus.)

The bus lines 5011 (direction Rettmer / Häcklingen) and the 5012 (direction Bockelsberg) also stop at the main campus. The stop at the university is called "Blücherstraße". Tickets for the buses can be purchased on board the buses.

https://www.nimmbus.de/fahrplanbuch/plaene/5001H-1.htm
https://www.nimmbus.de/fahrplanbuch/plaene/5011H-1.htm
https://www.nimmbus.de/fahrplanbuch/plaene/5012H-1.htm

By bike

There are city bikes (StadtRAD) available at the train station that can be picked up and dropped off in various locations (most cycle paths are segregated). You have to register to use the city bikes. More information can be found at (in German only) https://www.stadtradlueneburg.de/kundenbuchung/

By Taxi

Taxi / Cab: Telephone: +49 4131 2222 or +49 4131 2230200

By Car

From the south: Follow the A7 Hannover-Hamburg until the exit Soltau-Ost. Then follow the federal road 209 to Lüneburg. From here the directions to the university campus are signposted.

From the north: Follow the A39 Hamburg-Lüneburg and then the eastern bypass until the exit Lüneburg-Häcklingen. From here the directions to the university campus are signposted.

Parking: Please note the parking regulations on the campus and park your car in one of the designated parking spaces. Parking violators must expect that their vehicle will be towed and parking spaces are limited. We highly recommend arriving by public transport.
USEFUL INFORMATION

Emergency Phone Number: 112

Hospital: Klinikum Lüneburg, Bögelstraße 1, 21339 Lüneburg Tel. 04131 77 0

Prescriptions: If you need particular mediation, take an adequate supply with you, although most pharmacies are well equipped. It is wise to carry a legible prescription with you to show that you legally use the medication.

Currency, Banks and Post Offices: The national currency in Germany is Euro. Banks are open from Monday to Friday between 8.30 am and 5 pm. Post offices are usually open between 8.30 am and 6 pm.

In Germany, the most commonly used credit cards are: Visa, MasterCard and Maestro, but be aware not all shops in Germany accept credit cards and it is not common to pay in restaurant via credit cards. Therefore, have enough cash with you.

Germany has a national network of cash machines (ATMs) from which you can withdraw cash 24 hours a day. Most shops are closed on Sundays.

Climate: Lüneburg in February is cold (average temperature -1.4 to 4.4 degrees C).

Time Zone: The time zone in Germany in winter is UTC +01:00.

Electricity: In Germany, the power sockets are of type F (two-pin plug). The standard voltage is 230 V and the standard frequency is 50 Hz. Travellers’ from the US, Canada and most South American countries will require a voltage converter. Travellers’ from the UK will require a plug adapter and this is best bought in the UK as they are hard to find in Lüneburg.

In the vicinity of the conference venue

There is a Bank (with ATM) and a supermarket (Penny) on campus. The nearest pharmacy Apotheke am Bokelsberg is approximately 5 minutes walk south from the conference venue.

DISCRIMINATION, HARASSMENT AND ABUSE

The University of Leuphana does not tolerate an insulting, discriminating, sexist or racist behaviour. If you feel discriminated against, harassed or abused please contact Anne Jo Berkau (via the conference reception desk).
THE LEVERAGE POINTS TEAM

This conference arose from the project: Leverage Points for Sustainability Transformations. The project is funded by the Volkswagen Stiftung, and is hosted by Leuphana University Lüneburg.

Prof. Dr. Daniel J. Lang (project speaker): Professor of Transdisciplinary Sustainability Research.

Prof. Dr. David J. Abson: Junior Professor of Sustainability Economics.

Prof. Dr. Joern Fischer: Professor of Sustainable Landscapes.

Prof. Dr. Julia Leventon: Junior Professor of Sustainable Development.

Prof. Dr. Jens Newig: Professor of Governance and Sustainability.

Prof. Dr. Thomas Schomerus: Professor of Public Law, in particular Energy & Environmental Law.

Prof. Dr. Ulli Vilsmaier: Professor (Juniorprofessorin) of Transdisciplinary Methods

Prof. Dr. Henrik von Wehrden: Professor of Natural Science Methods

Dr. Liz Clarke: Postdoctoral Research Associate

Dr. Moritz Engbers: Postdoctoral Research Associate

Dr. Nicolas Jager: Postdoctoral Research Associate

Dr. Lotte Lutz: Project Manager
THE LEVERAGE POINTS TEAM

Dr. Andra Ioana Horcea-Milcu: Postdoctoral Research Associate

Dr. Maraja Riechers: Postdoctoral Research Associate

Cristina Apetrei (MSc): PhD Candidate

Pim Derwort (MSc): PhD candidate

Mag. Christian Dorninger (BA): PhD candidate

Ioana Alexandra Duse (MSc): PhD Candidate

Rebecca Freeth (MPhil): PhD candidate

Kathleen Klaniecki (MSc): PhD candidate

David P. M. Lam (MSc): PhD Candidate

Daniela Peukert (Diplom): PhD Candidate

Annelie Sieveking (MSc): PhD Candidate

For more information on the Leverage Points project please see https://leveragepoints.org/
Humanity sits at a crossroad between tragedy and transformation, with seemingly little idea of where we wish to go, or how we intend to get there.

Leverage Points 2019 seek to explore the deep leverage points that can lead to sustainability transformations.