

# 1<sup>st</sup> ETH Domain Conference on: Social Sciences on Environment, Technology and Sustainability

**Time** Monday, January 27<sup>th</sup>, 2025, 08:30 –19:00

**Location** Eawag Dübendorf, Forum Chriesbach

**Contact** [socsci.conference@eawag.ch](mailto:socsci.conference@eawag.ch)

**Web** [Conference website](#)

**Program** 08:30 – 09:00 Arrival, Registration & Coffee

09:00 – 09:30 Welcome note

09:30 – 10:30 5 Parallel Sessions

- Room B81: Energy Transition I, Chair: Ivana Logar
- Room C03: Plastic Pollution, Chair: Milena Wiget
- Room C20: Future Mobility, Chair: Muhil Nesi
- Room C24: Climate Change and Sectoral Pathways, Chair: Tural Aliyev
- Room D24: Blue Green Infrastructure, Chair: Manuel Fischer

10:30 – 11:00 Coffee Break

11:00 – 12:30 5 Parallel Sessions

- Room B81: Food System I, Chair: Milena Wiget
- Room C03: Circular Economy, Chair: Lisa Deutsch
- Room C20: Interactive Workshop, Chair: Benjamin Hofmann
- Room C24: Climate Change and Policy Solutions, Chair: Ueli Reber
- Room D24: Energy Transition II, Chair: Rémi Willemin

12:30 – 14:00 Lunch and Poster Session

14:00 – 15:30 5 Parallel Sessions

- Room B81: Science meets Practice, Chair: Manuel Fischer
- Room C03: Water Management, Chair: Sebastian Schär
- Room C20: Interactive Workshop, Chair: Benjamin Hofmann
- Room C24: Energy Transition III, Chair: Rémi Willemin
- Room D24: Food Systems II, Chair: Max Rudolf

15:30 – 16:00 Coffee Break

16:00 – 17:00 4 Parallel Sessions

- Room B81: Biodiversity, Chair: Manuel Fischer
- Room C20: Climate Change and Individual Beliefs and Preferences, Chair: Meike Löhr
- Room C24: Migration, Chair: Fabian Dvorak
- Room D24: Green Spaces, Chair: Nadja Contzen

17:00 – 19:00 Apéro & Networking

1<sup>st</sup> ETH Domain Conference on:

## Social Sciences on Environment, Technology and Sustainability

Presentation Schedule:

09:30 – 10:30

Energy Transition I		
Room B81	Jair Campfens	Promoting System Thinking Using Causal Loop Diagrams and Serious Energy Games: A Lever for Change?
	Meike Löhr	Decarbonising Energy-Intensive Process Industries: Multi-system Interactions in the Concrete Value Chain
	Alyssa Gunnemann	Shades of public investment in addressing low-carbon investment needs
Plastic Pollution		
Room C03	Jenni Kaipainen & Ricarda Fieber	Intermediation in policymaking for sustainability transitions: Longitudinal exploration of Global Plastics Treaty
	Max Hoos	Beyond regulatory pressure: How industry and civil society drive safe-and-sustainable innovation in food packaging
	Giulia Frigo	Assessing Plastic Waste Flows in Indonesian Neighbourhoods: A Geo-Referenced Material Flow Analysis for Targeted Waste Management Interventions.
Future Mobility		
Room C20	Till Beer	Mapping the European public innovation system for sustainable urban mobility – a multilayer network analysis approach based on the case of the 15-minute city
	Michael Wicki	Public Support for Sustainable Urban Mobility: A Survey Experiment on the E-Bike City Concept in Switzerland
	Inga Nienkerke	Future Mobility Africa
Climate Change and Sectoral Pathways		
Room C24	Annina Guthauser	Swiss forest sector pathways and their contribution to net-zero emissions until 2050
	Lena Gubler	Shared Socioeconomic Pathways for Switzerland, SSP-CH
	Jamie McCaughey	Complementary qualitative and quantitative methods for climate risk assessment and adaptation: Urban heat in Lisbon and Islamabad
Blue Green Infrastructure		
Room D24	Natascha Zinn	Policy Instruments for Urban Blue-Green Areas: Integrating Climate Change Adaptation and Biodiversity Conservation for Resilient Cities
	Sebastian Schär	Decision analysis for the evaluation of blue-green infrastructure under future climate conditions
	Giulia Donati	Biodiversity conservation in human dominated landscapes: towards collaborative management of blue-green systems

11:00 – 12:30

<b>Food Systems I</b>		
<b>Room B81</b>	Robert Huber	Quantifying the importance of farmers' behavioral factors in ex-ante assessments of policies supporting sustainable farming practices
	Max Rudolf	Aligning Consumption and Policy Preferences: A Latent Class Analysis of Swiss Citizens' Preferences for the Chocolate Supply Chain
	Maritza Satama	Sustainable cocoa production: a question of taste or survival? Eliciting farmers' preferences with a two-step choice experiment
	Ifeoluwa Abulude	Equity and Inclusion in Food Loss Reduction: Evidence from Nigeria
	Maiken Maier	Field Experiment on the Impact of Meat Substitute Experiences on Meat Reduction and Substitute Adoption Rates
<b>Circular Economy</b>		
<b>Room C03</b>	Paola Yanguas	A socio-technical perspective on Circular Economy related innovations for the building sector in Switzerland
	Denise Reike	Resources and Capabilities for Circular Economy Value Chains: An Integrated Framework
	Harald Desing	Co-creating circular futures with children and scientists
	Tonja Iten	Municipal sufficiency policy, enablers, and barriers - Findings from an empirical study in rural Switzerland
	Muhil Nesi	Valuation in transitions: The case of an Indian textile industrial cluster
<b>Interactive Workshop: The Roles of Environmental Social Scientists in Society</b>		
<b>Room C20</b>	Benedikt Knüsel	Honest Brokerage and when it is appropriate – institutional guidelines for science-policy engagement
	Jeannette Behringer	Transformation and Sustainability: Science between the chairs?
	Augustin Fragnière	Public engagement, activism, and academic freedom
<b>Climate Change and Policy Solutions</b>		
<b>Room C24</b>	Elisabeth Maidl	Knowledge-co-production in climate change and community resilience
	Alma Galicia	Coordinating Acts: Evaluating the Coherence of EU Green Deal Policies
	Tony Patt	Evolution or equilibria: competing economic visions shaping modern climate policy
	Kristiina Joon	The many meanings of just: Distributional justice principles as predictors for mitigation policy support
	Abdulrasheed Isah	Investment plans of the future? Drivers of variation in quantifying climate finance in the Nationally Determined Contributions of developing countries
<b>Energy Transition II</b>		
<b>D24</b>	Lukas Fesenfeld	Assessing the NIMBY Effect on Agri-Photovoltaics: Experimental Insights into Public Acceptance and Voting Behavior in Switzerland
	Alejandro Nuñez-Jimenez	Gear shift: How changes in hydrogen policies reveal Europe's new path to net-zero
	Maria Anna Hecher & Mert Duygan	How solar parties affect the diffusion of solar PV? A longitudinal approach to studying innovation adoption process
	Javier Feller	Do participatory processes and local involvement decrease the perceived trade-offs of local actors?
	Matthias Heinrich	People and spaces: Toward an urban centered approach of adoption patterns of low carbon technologies

14:00 – 15:30

<b>Sciences meets Practice</b>		
<b>Room B81</b>	Jeanine Janz	Education meets Science: Explore the Water Timeline on Expedio
	Swen Bos	Serious games as an academic tool for socio-ecological systems modelling
	Judit Lienert	Behavioral decision analysis helps bridge theory and practice in environmental problems
	Julia Cristina Schegg	About the influence of context on transdisciplinary research projects in the field of natural resources
	Lisa Deutsch	How can researchers and program leaders contribute to establishing enabling conditions for inter- and transdisciplinary integration? Empirical insights from three research programs on sustainability issues in Switzerland
	Anna Cajochen	The critical role of uncertainty communication for informed environmental decision-making
<b>Water Management</b>		
<b>Room C03</b>	Djamila Lesch	How Transformative Socio-Technical Configurations Diffuse in Space: The Case of Small-Scale Water Recycling Systems in the United States
	Matthias Buchecker	Understanding residents' mental models of biodiversity along rivers
	Xuezhu Zhai	Potential of Using Generative Artificial Intelligence for Participatory River Restoration
	Marius Fankhauser	Because it is ours: The impact of public participation on collective ownership and acceptance of local river restorations.
	Christian Binz	How transformative technological innovation travels – Tracing the diffusion of circular district-scale sanitation systems across Europe
	Josianne Kollmann	Mandated on-site wastewater treatment and reuse in San Francisco: The role of distributive fairness perceptions for policy acceptance
<b>Interactive Workshop: Teaching Environmental Social Sciences at the Science-Society Interface</b>		
<b>Room C20</b>	Michael Stauffacher	Teaching example: Transdisciplinary Case Study – a MSc course at the Department of Environmental Systems Science
	Katharina Reidl	Teaching example: The Managing Climate Solutions Certificate– from insight to real-world impact
	Jessica Schneider	Bridging Disciplines: Student Perspectives on Integrating Social Sciences into Environmental Studies
<b>Energy Transition III</b>		
<b>Room C24</b>	Tim Tröndle	What if we designed decarbonised energy supply based on public preferences?
	Simón Ladino Cano	Bridging Science and Policy for Local Heat Transitions: An Empirical Agent-Based Modeling Approach
	Božana Vrhovac	Participatory Visioning for Energy Transition
	Fabian Dvorak	Public Preferences for Low-Carbon Energy Systems in Switzerland
	Marcel Hunziker	To which landscape with the renewables? The opinion of the Swiss Public 2018 & 2022
<b>Food Systems II</b>		
<b>Room D24</b>	Sharmin Akter	Behavioural factors and opportunity costs determine farmers' adoption of integrated pest management: A systematic review for European agriculture
	Ueli Reber	Framing with facts: investigating 'evidence voids' in Swiss pesticide discourse
	Milena Wiget	Anticipating support for strategies in Swiss pesticide risk reduction policy

	Jonas Schmitt	Drought risk management in agriculture: A copula perspective on crop diversification
	Iordanis Parikoglou	Productivity, emissions intensity and pollution swapping in dairy farming

## 16:00-17:00

<b>Biodiversity</b>		
<b>Room B81</b>	Alanis Camichel	Challenges in Swiss Biodiversity Governance: The Stakeholders' Perspective
	Dechen Lham	Role of science in biodiversity policymaking
	Tobias Schulz	Biodiversity offsets in the forest vs. forest area preservation: the perspective of (different types of) forest owners
<b>Climate Change and Individual Beliefs and Preferences</b>		
<b>Room C20</b>	Hannah Busshoff	Climate Risk Beliefs and Extreme Weather Events
	Begüm Özdemir Oluk	Transparency of Carbon-Neutral Labels: Evidence from a Choice Experiment
	Dominik Braunschweiger	Preferences for proactive and reactive climate-adaptive forest management and the role of public financial support
<b>Migration</b>		
<b>Room C24</b>	Dorothee Beckendorff	Unequal Journeys: Unpacking the Differential Impact of Development on Internal Migration across Educational Groups
	Seonga Cho	The impact of amenity facilities in early career population migration pattern
	Wenxiu Du	The Impact of Migration on Age Structure Conducive to Human Development across the Urban Hierarchy
<b>Green Spaces</b>		
<b>Room D24</b>	Maria García-Martín	Exploring Constraints to Psychological Restoration in Outdoor Spaces: An Inductive Approach
	Nicole Bauer	Acoustic and visual influences on psychological restoration in periurban areas
	Tural Aliyev	Cultural Diversity in Urban Park Use and Perception
	Julia Schaupp	Effects of Walking in Forest and Urban Settings with Different Levels of Road Traffic Noise on Psychophysiological Responses

## Program Interactive Workshops

### 11:00 – 12:30: Interactive Workshop: The Roles of Environmental Social Scientists in Society (Room C20)

Organized by Eawag Inter- and Transdisciplinary Research Group (Benjamin Hofmann, Hanna Salomon, Sabine Hoffmann)

The workshop introduces a new role reflection tool developed by the ITD Research Group at Eawag. Participants apply the tool to map their role profiles at the science-policy-practice interface and jointly reflect on challenges encountered with these profiles. The aim is to support reflection on the roles of both early-career and senior researchers and, thereby, provide a basis for further discussion within the ETH domain and beyond. The workshop consists of group discussions and short inputs on:

- Honest Brokerage and when it is appropriate – institutional guidelines for science-policy engagement (Benedikt Knüsel, ETH Zurich Science-Policy Interface Unit)
- Transformation and Sustainability: Science between the chairs? (Jeannette Behringer, University of Zurich & lead author SCNAT report)
- Public engagement, activism, and academic freedom (Augustin Fragnière, University of Lausanne & EPFL)

### 14:00 – 15:30: Interactive Workshop: Teaching Environmental Social Sciences at the Science-Society Interface (Room C20)

Organized by Eawag Inter- and Transdisciplinary Research Group and Swiss Young Academy (Benjamin Hofmann, Morgane Genin, Jana Thierfelder)

The workshop introduces a stock-take conducted by the Swiss Young Academy of innovative teaching formats that foster engagement with society. Participants discuss opportunities, challenges, and ways forward in teaching environmental social sciences at the science-society interface. The aim is to foster exchange within the ETH domain and beyond to inspire future teaching by established lecturers and early-career researchers. The workshop consists of world café discussions based on short inputs on:

- Teaching example: Transdisciplinary Case Study – a MSc course at the Department of Environmental Systems Science (Michael Stauffacher, ETH Zurich D-USYS TdLab)
- Teaching example: The Managing Climate Solutions Certificate– from insight to real-world impact (Katharina Reidl, University of St.Gallen – Interim program manager, Master's Certificate Managing Climate Solutions)
- Bridging Disciplines: Student Perspectives on Integrating Social Sciences into Environmental Studies (Jessica Schneider, Empa/ETH Zurich Environmental Sciences)

## Abstracts

Ifeoluwa  
Abulude  
Justus-Liebig  
University

### **Equity and Inclusion in Food Loss Reduction: Evidence from Nigeria**

Food loss is a major challenge to the sustainable transformation of the global food system. Approximately one-third of all edible food is lost during the pre-consumption phase. This problem not only exacerbates nutritional deficiencies but also leads to unnecessary depletion of natural resources. The complexity of interactions between actors in food systems leads to practices that often compromise sustainability. However, the intricate role of these dynamics in persistent food loss remains underexplored, particularly in the global south. This study addresses the inequality-sustainability nexus by investigating the impact of equity and inclusion on food loss in Nigeria, a country frequently featured in international food loss research due to its current food crises. This study employed qualitative methods, including key informant interviews with government agencies and experts, focus group discussions with farmers, and participant observation by the researcher, to investigate the social dynamics of food loss for three key arable crops in Nigeria: cassava, rice, and maize. Thematic analysis was used to examine different stakeholders' interactions, perceptions, and practices during food production in the Nigerian food system. The findings highlight the need for an inclusive and equitable approach to food security and emphasise the importance of capturing the perspectives of food producers and other stakeholders. By placing equity at the centre of sustainability efforts, this study seeks to inform the development of policies and interventions that enhance the sustainability of the food system.

Sharmin  
Akter  
ETH

### **Behavioural factors and opportunity costs determine farmers' adoption of integrated pest management: A systematic review for European agriculture**

Pest management is crucial for agricultural production and food security. However, current pest management practices often heavily rely on chemical pesticides which have negative effects on the environment, biodiversity and public health. Against this background, Integrated Pest Management (IPM) has become recognized as a viable solution to these problems, yet the adoption rate by farmers is not satisfactory. This study systematically reviews determinants and hurdles in the adoption of IPM by European farmers, particularly focusing on the role of behavioural factors and opportunity costs. This systematic analysis helps to better understand farmers' decision-making processes. This understanding is essential for developing strategies to support farmers in implementing IPM principles and thus improving the sustainability of crop protection management in the heterogeneous socio-ecological environment of European agriculture.

Tural  
Aliyev  
Eawag

### **Cultural Diversity in Urban Park Use and Perception**

This study explores how cultural background influences the use and perception of urban green spaces in Zurich, Switzerland. Through 100 interviews in four selected parks, participants—categorized as Swiss, second-generation Swiss, or non-Swiss—shared their motivations, satisfaction, and nature-related experiences in these spaces. The research assesses preferences across three key areas: motivations for park visits, psychological satisfaction, and the significance of nature and vegetation structure. This approach offers a deeper perspective on user backgrounds beyond simple demographics, highlighting how ecological and cultural factors shape park interactions and perceptions in urban settings.

Nicole  
Bauer  
WSL

### **Acoustic and visual influences on psychological restoration in periurban areas**

Recreation in natural landscapes and green spaces is important for the well-being of the population. Landscape and recreation research has so far focused more on the visual perception of the landscape and landscape beauty in urban and rural areas, as well as the influence of disturbing noises in the immediate living environment. However, less is known about how people perceive periurban landscapes acoustically and visually during recreation, and how this perception in turn influences recreation. The aim of this project was therefore to determine what influence visual and acoustic factors have on perceived recreation in periurban recreation areas. Which sounds disturb and which support recreation? To investigate these questions, this study combines an explorative approach based on qualitative interviews with a quantitative approach based on a standardized survey at ten different locations in Swiss conurbations. A total of 305 people who were engaged in a slow recreational activity (e.g. walking) took part in the survey. The quality of the vegetation, the beauty of the landscape and the acoustic tranquillity had a positive influence on the perceived restorativeness of the landscape. The higher these characteristics are rated, the more restful the landscape is perceived to be. The results of this study indicate that landscape beauty in combination with the acoustic tranquillity of the landscape has a significant influence on perceived noise annoyance. Our results show that improving not only the acoustic quality, but also enhancing the visual quality of the landscape can improve the perceived recreational quality of the landscape.

Dorothee  
Beckendorff  
EPFL

### **Unequal Journeys: Unpacking the Differential Impact of Development on Internal Migration across Educational Groups**

This study examines how internal migration responds to development drivers across educational groups in cities of the Global South. Internal migration plays a critical role in distributing human capital but the knowledge about city level effects is limited. Migrants seeking better education or job opportunities, move between rural and urban areas or between urban centers, leading to overcrowding in cities, depopulation of rural areas, and brain drain from less developed regions, exacerbating economic disparities between regions. To better understand the urban gradients of migration by education over the development process, we use geospatial and census data to unionize administrative units into Functional Urban Areas (FUAs), enabling a sub-national examination of migration at the city level across 30 developing countries including 600 FUAs. We apply Poisson regression models to explore how the relationship between development drivers and migration varies by education level and tiers of the urban hierarchy. Initial results show that most pronounced differences in outmigration occur among highly skilled individuals, with university-educated people leaving less developed cities but remaining in more developed ones as living standards rise. Lower-educated individuals are more likely to migrate out of wealthier cities. Overall migration patterns vary significantly across city tiers and educational groups.

Till  
Beer  
Eawag

### **Mapping the European public innovation system for sustainable urban mobility – a multilayer network analysis approach based on the case of the 15-minute city**

There is an urgent need to decarbonize urban mobility systems in European cities. In recent years, the 15-minute city has gained salience, especially among European cities, as a potentially transformative planning approach for sustainable urban mobility (Büttner et al., 2024). In this paper, we develop a multi-scalar innovation systems perspective on public innovation. We explore how cities co-create and adopt public innovations, and how they mobilize the necessary system resources for transforming their mobility systems from various places and scales. We therefore ask: To what extent has the 15-minute city approach for transforming urban mobility diffused among European cities and been taken up at the European Union level? What multi-scalar organizational, financial and knowledge-related structures enabled the construction and diffusion of this transformative governance template? We use multilayer network analysis to trace how the 15-minute city has developed in certain cities, and became institutionalized at the European level, as well as map how the organizational, financial and knowledge-related structures supporting the diffusion of the 15-minute city template have developed over time. We use available databases on EU-funded R&I projects in urban mobility (CORDIS), and the websites of the relevant European Partnerships and Initiatives (e.g. DUT Partnership, CIVITAS) to extract joint project participation networks, the relevant financial flows, and participation in city networks. We then explore how the embeddedness of cities in these structures relates to their adoption of 15-minute city practices. Semi-structured expert interviews serve to triangulate and validate our data collection and analytical approach.



<b>Christian Binz</b> Eawag	<p><b>How transformative technological innovation travels – Tracing the diffusion of circular district-scale sanitation systems across Europe</b></p> <p>Transitions literature provides ample evidence on how radically novel technologies that challenge the status quo in locked-in sectors like energy, water, or transport develop in local experiments. However, there are limited insights on how transformative innovations like power-to-x technologies, decentralized water reuse, or mobility-as-a-system solutions diffuse across space and by doing so become increasingly transformative to incumbent regime structures. To improve our understanding of the determinants of the spatial diffusion of transformative innovation, we develop a novel framework that combines the literature on the diffusion of innovation with insights from transition studies, organizational institutionalism, and the policy mobilities literatures. Our framework employs a socio-technical system lens for exploring the distributed institutionalization and translation processes that produce ‘configurational templates’ which become increasingly specified over time and enable the spatial diffusion of transformative innovation. The conceptual framework is validated with a case study of district-scale sustainable urban water management solutions and how they diffused across Europe and the world. Based on 54 expert interviews in several European cities we analyze in depth how a highly innovative sanitation and resource recovery system was developed in the Netherlands and subsequently translated into cities in Germany, Sweden, and Belgium. The case study allows tracing in-depth how a transformative configurational template for sustainable urban water management was developed and refined in different spatial contexts and at a global sectoral level. The results have substantive implications for explaining how transformative innovation diffuses across space and how strategic interventions could be developed for speeding up diffusion.</p>
<b>Swen Bos</b> Empa	<p><b>Serious games as an academic tool for socio-ecological systems modelling</b></p> <p>Serious games are a tool for understanding and modelling complex environmental systems, often socio-ecological systems. Within these emersive participatory simulation models, players interact with the system, and each other. Through play, stakeholders can explore scenarios of change and trade-offs, resolve conflicts or test policy interventions, study behavioural responses and changes, and learn about (often unanticipated) system outcomes and their underlying drivers. Through bringing together the right stakeholders in a constructive gaming environment, serious games can help foster dialogue and collaboration, by creating trust and consensus, and help in identifying shared priorities for environmental action. This then allows for formulating transition pathways that are both broadly informed and ethically just.</p>
<b>Dominik Braunschweiger</b> WSL	<p><b>Preferences for proactive and reactive climate-adaptive forest management and the role of public financial support</b></p> <p>The impacts of climate change threaten forest ecosystems and the services they provide. Policies and measures to make forests more resilient to climate-change-induced disturbances are needed, but the success of such efforts depends on their acceptance among forest owners and managers. Based on a discrete choice experiment survey among Swiss forest owners and managers in the canton of Bern, we analysed whether respondents prefer (i) proactive over reactive interventions, (ii) advanced/natural regeneration over plantings, (iii) native over non-native tree species, and (iv) the role governmental payment schemes play in these decisions. About one-third of the respondents belong to the class of forest managers and owners that are open to a transition strategy including proactive interventions and non-native tree species. Two-thirds of the forest owners and managers prefer a reactive restoration approach after disturbances and management that relies on native tree species. The amount of financial support plays a decisive role in the willingness of most respondents to accept adaptation measures. These results confirm the feasibility of diversifying the policy support toolbox to enable more proactive climate-adaptive forest management.</p>

**Matthias  
Buchecker**  
WSL

### **Understanding residents' mental models of biodiversity along rivers**

River restoration is an important measure for promoting biodiversity. According to recent research, the Swiss population is largely in favour of such measures. Nonetheless, the implementation of river restoration projects often meet with local resistance. Evidence suggests that lay people's limited understanding of the importance of natural watercourses for enhancing local biodiversity might be a main cause of resistance. With our project, we aimed to systematically reveal lay people's understanding of biodiversity along rivers using a mental model approach. We conducted the study in two Swiss river catchments where river restoration projects were planned, the Magdener river in the Swiss plateau and the Beverin river in the Eastern Swiss Alps. First we conducted qualitative interview with experts in river biodiversity and elaborated an expert model of biodiversity processes in river areas. On this basis, we conducted semi-structured interviews with a diverse sample of residents living in the study areas to reveal lay people's mental models. In a next step we conducted a standardised online survey involving random samples of 3000 residents in both study areas. In a last step, we analysed residents' quantified mental models of river biodiversity comparing groups with different levels of self-reported knowledge about biodiversity. The findings revealed aspects of river biodiversity residents appeared to have a poor understanding of, such as the role of natural dynamics for biodiversity. Interestingly, residents with different levels of self-reported knowledge of biodiversity showed similar mental model pattern, but with different levels of conviction of the specific beliefs.

**Hannah  
Busshoff**  
University  
St. Gallen

### **Climate Risk Beliefs and Extreme Weather Events**

We revisit the question of if and how agents update their climate risk perceptions against the backdrop of extreme weather events. The study combines 20 years of geo-located panel data with insurance and climate data. We find that community damage prompts individuals to update their risk perceptions. Drawing from causal machine learning, we find meaningful effect heterogeneity for groups as defined by prior political and climate risk attitudes.

**Anna  
Cajochen**  
Eawag

### **The critical role of uncertainty communication for informed environmental decision-making**

Our society faces numerous sustainability challenges, including climate change, water pollution, and biodiversity loss. Effectively addressing these issues requires informed decision-making based on accurate information that reflects reality, along with targeted and strategic action. However, inherent uncertainties complicate this process, arising from sources such as measurement errors, difficulty establishing causal links, expert disagreements, and the unpredictability of future events. These uncertainties must be acknowledged for an accurate understanding of the decision landscape. A key challenge lies in effectively communicating these uncertainties to the public and stakeholders. The complexity arises not only from the nature of uncertainty itself and its multiple sources but also from factors like individual differences in the audience, situational context, and the diversity of communication formats. To address these complexities, further research is needed to improve uncertainty communication, allowing stakeholders to make informed decisions that account for these uncertainties. This work investigates the critical role of uncertainty communication from decision-analytic, economic, and psychological perspectives. We explore key elements such as understanding, perception, and trust, and examine various formats for conveying uncertainty, along with the challenges they pose. Additionally, we emphasize the importance of Multi-Criteria Decision Analysis (MCDA) in understanding how uncertainty information affects decision-making processes. Our contribution aims to identify strategies for more effective communication of uncertainty, ultimately promoting better-informed decisions to address pressing sustainability issues.

- Alanis Camichel**  
ETH
- Challenges in Swiss Biodiversity Governance: The Stakeholders' Perspective**
- Despite its political commitment at the national and international level, Switzerland is still confronted with an ongoing loss of biodiversity. One factor seriously impeding the ability to cope with the loss is insufficient exchange of existing knowledge between science and practice. Syntheses of scientific findings specifically tailored to and co-created with stakeholders could lead to an increased knowledge transfer. Specifically, this could help stakeholders confronted with large amounts of information to identify and assess the effectiveness of different management options; ultimately leading to a higher uptake of effective measures on biodiversity conservation in practice. The recently established Translational Centre Biodiversity Conservation (TCBC) addresses this science-practice knowledge transfer. The TCBC does so by identifying the most pressing questions for Swiss stakeholders working in biodiversity conservation and then providing related syntheses products. Using a transdisciplinary and participatory approach, we conduct a horizon scan among stakeholders to identify hot topics for syntheses. Then we create working groups integrating experts from science and practice to co-produce syntheses on the topics identified. We will present results from the horizon scan and from the working groups on questions related to policy and governance aspects for syntheses on biodiversity conservation topics as perceived by Swiss stakeholders involved in biodiversity management.
- Jair Campfens**  
EPFL
- Promoting System Thinking Using Causal Loop Diagrams and Serious Energy Games: A Lever For Change?**
- This paper explores the innovative application of Causal Loop Diagrams (CLDs) and serious energy games as effective tools for promoting systems thinking within the context of sustainable energy transitions. By integrating these methodologies, the study aims to enhance participants' understanding of complex socio-technical energy systems and the interrelationships among various components influencing energy transitions. Central to this research is a modified version of the card game "La Fresque du Climat," which has been tailored to effectively illustrate the intricacies and complexities of energy systems while engaging players in critical discussions about sustainability. Through case studies conducted in Switzerland (St. Prex) and the UK (Newcastle), participants actively engaged in system mapping, feedback loop analysis, and action planning and intervention analyses. These hands-on experiences fostered a deeper understanding of system dynamics and the identification of leverage points crucial for facilitating effective energy transitions. The findings from this study suggest that the combination of CLDs with serious gaming methodologies not only enhances learning and awareness of critical energy transition pathways but also empowers participants to consider and develop actionable strategies for systemic change. This research contributes to the growing discourse on serious games and their application in public policy, particularly in relation to energy transition measures aimed at achieving net-zero goals
- Seonga Cho**  
EPFL
- The impact of amenity facilities in early career population migration pattern**
- International migration has intensified in recent decades as barriers between countries have diminished. At the same time, domestic migration has also become more prevalent due to increased mobility. While traditional migration research has addressed migration motivations by focusing on economic factors such as employment opportunities and working conditions, amenity facilities have emerged as significant pull or push factors for migrants. Switzerland, with its diverse amenity environments including green spaces and recreational activities, presents an ideal case study for examining how these facilities influence residential migration patterns. We investigate independent impact of amenity facilities on in-migration, after control for the economic drivers. Relying on hectare-level data on internal and international migration from the Swiss Population and Households Statistics 2011-2023 and on data referring to the local economic structure and the availability of amenities from Federal Statistical Office and Federal Office of Topography, we specify geographically weighted regression to account for spatial heterogeneity. Through this analysis, the research advances our understanding of migration motivations and the role of urban environments in shaping population movements.

**Harald  
Desing**  
Empa

### **Co-creating circular futures with children and scientists**

Climate crisis, species loss and waste in every corner of our planet: we are in a deep ecological crisis. Science shows what is needed to build a sustainable society: Reduce resource consumption, recycle materials, use solar energy. But how could everyday life actually work within these biophysical limits? How will we work? How will we get around? Science provides boundary conditions, but leaves many questions unanswered. At the same time, a vision of a desirable future is essential to trigger change. Visions leading to a more sustainable circular future were developed in a collaborative design approach with school children together with scientists and implemented in a storybook entitled "Zukunfts(K)reise". This presentation will show the co-creation process and invite to think on future research directions.

**Lisa  
Deutsch**  
Eawag

### **How can researchers and program leaders contribute to establishing enabling conditions for inter- and transdisciplinary integration? Empirical insights from three research programs on sustainability issues in Switzerland**

Complex phenomena of our time such as climate change or more recently, the Covid-19 pandemic can neither be comprehensively understood nor properly addressed by employing a single disciplinary or sectoral perspective. For this reason, more and more inter- and transdisciplinary (ITD) initiatives are on the rise, intending to open up the silo-like production of knowledge, and to advance the integration of different fields of expertise within academia but also across science, policy and practice. While the need for ITD endeavors also has increasingly been acknowledged by research institutions, funders and public authorities, the question remains to what extent these conditions suffice for making ITD integration really happen in practice. This talk outlines and helps diagnosing where challenges in pursuing integration come from, how they are interrelated and impact inter- and transdisciplinary research projects. It further illustrates these challenges by presenting concrete empirical insights from three inter- and transdisciplinary research programs in Switzerland and makes suggestions how to improve conditions for integration in the future by outlining entry points for action for different actor groups with a focus on individual researchers and leaders of ITD projects or programs. Creating more enabling conditions for integration will be key for making sure that ITD initiatives with the ambition to address the sustainability challenges of our time can unfold their full integration potential in practice – this talk intends to contribute to setting up more enabling conditions by providing both system's and action-oriented knowledge.

**Giulia  
Donati**  
Eawag

### **Biodiversity conservation in human dominated landscapes: towards collaborative management of blue-green systems**

Maintaining ecological connectivity is crucial for biodiversity, yet effectively managing interconnected areas through actor collaboration is challenging. This study examines collaboration through social-ecological fit in interconnected aquatic "blue" and terrestrial "green" areas, encompassing natural and semi-natural elements, in human dominated landscapes. Combining species distribution models and connectivity analyses focused on declining amphibians and survey data on actors' area management and collaboration within interconnected areas, we create a spatially explicit social-ecological network that we analyze using network models. Results highlight diverse ecological dependencies shaping actor interactions. Strong collaboration is observed in interconnected blue-rural green areas, whereas blue-urban green areas lack collaboration, with minor rivers and urban green spaces at the network's core plagued by social-ecological misfit. Strengthening collaboration in these areas is essential to prevent further ecological network degradation. Incorporating a spatially explicit social-ecological perspective covering diverse blue and green areas guides targeted interventions and fosters effective conservation policy and practice.

<b>Wenxiu Du</b> EPFL	<p><b>The Impact of Migration on Age Structure Conducive to Human Development across the Urban Hierarchy</b></p> <p>A larger share of the population in the working ages is beneficial for economic and social development. Many developing countries are currently experiencing this window of opportunity. However, there may be marked subnational inequalities in this development potential, as internal migration flows are age-selective and often redistribute working-age populations from less developed regions to cities for employment and upward social mobility. While many studies have focused on the age selectivity of migration, few have analyzed its impact on subnational age structures, and none have been conducted on an internationally representative sample of the Global South. We aim to fill this gap by using 75 microcensuses in 36 developing countries at different stages of urbanization. We analyze the differential impact of migration flows on the dependency ratio across the urban hierarchy and across national urbanization processes. Initial findings suggest that migration lowers the dependency ratio in higher-tier cities and raises it in lower-tier cities and outside cities, with substantial differences across urbanization stages. In-migration generally lowers the dependency ratio, while out-migration increases it. This analysis contributes to a generalizable theory of the impact of migration on age structure that is suitable for better understanding subnational differences in the demographic dividend.</p>
<b>Mert Duygan &amp; Maria Anna Hecher</b> EPFL	<p><b>How solar parties affect the diffusion of solar PV? A longitudinal approach to studying innovation adoption process</b></p> <p>Solar energy plays a crucial role in energy transitions. Given the limited availability of land and public opposition to Alpine PV, most of the deployment of solar PV is likely to occur by households. Prior studies have mostly used surveys which are cross-sectional to identify the factors contributing to the adoption of solar PV. However, given that innovation adoption is a process consisting of multiple stages, we use a longitudinal research design to understand how the adoption of solar PV unfolds and how various factors such as personal context, social influence, perceived characteristics of innovation and life or building events affect different stages of the adoption process. We specifically investigated the effect of solar parties which are demonstration events hosted by members of the community who adopted solar PV. As a community building activity, solar parties may not only fill knowledge gaps but also help to build trust and legitimacy that are key for innovation adoption. Our findings show that despite the relatively short study duration of 2-3 months, most participants showed progress in their adoption status after attending solar parties. Besides solar parties, an active social influence in the form of recommendations from personal network, co-adoption of other technologies that are compatible with PV such as heat pumps, and events including renovating or buying a new house were found to be important and influence the speed of the adoption process. Insights from our study can be used to design effective interventions promoting and accelerating the diffusion of solar PV.</p>
<b>Fabian Dvorak</b> Eawag	<p><b>Public Preferences for Low-Carbon Energy Systems in Switzerland</b></p> <p>The future decarbonized energy system is expected to rely increasingly on electricity. This will require efficient technologies for heating and energy storage as well as advanced flexibility mechanisms in the residential sector to reduce the load on the electricity system. As part of Work Package 6 of SCENE, we conduct two nationwide discrete choice experiments in Switzerland to identify regional differences in homeowners' preferences for the adoption of low-carbon energy technologies and tenants' preferences for demand-side flexibility measures, which will be integrated into energy system modeling to identify socially acceptable pathways to the low-carbon energy system of the future.</p>

**Marius  
Fankhauser**  
Eawag

### **Because it is ours: The impact of public participation on collective ownership and acceptance of local river restorations**

River restorations are vital for enhancing biodiversity and benefiting both people and nature. Although the Swiss public generally supports these projects, local communities often resist, probably due to perceived personal costs like restricted access to river areas. Collective psychological ownership of the river—where locals feel a shared sense of ownership—could potentially shift focus from personal costs to communal benefits, increasing local support for restoration. Research suggests that engaging communities in planning may bolster feelings of ownership and, consequently, support for such projects. We tested this hypothesis in a longitudinal study across two Swiss regions undergoing river restorations. In both areas, residents were invited to public workshops focused on the planning process, with data collected before and after these sessions. Of the 326 participants, 49 attended workshops. While workshop attendance did not directly increase acceptance or ownership, it did enhance two key precursors of ownership: self-investment and perceived control. After the workshops, participants in the intervention group felt they had contributed more effort and gained greater control over decisions affecting the river. These increased feelings of self-investment and control were linked to a stronger sense of ownership, which, in turn, correlated with greater acceptance of the project. These findings suggest that involving locals in planning through public participation may foster collective psychological ownership, potentially increasing support for local river restoration efforts.

**Javier  
Feller**  
EPFL

### **Do participatory processes and local involvement decrease the perceived trade-offs of local actors?**

Existing research explaining trade-offs around renewable energies has not sufficiently linked them to actor constellations and networks in political processes. Perceived trade-offs related to biodiversity, landscape protection, economic costs, and other factors are often major barriers to their implementation. To address this research gap, this study investigates the role of participatory processes and local involvement in project planning on trade-offs perceived by key stakeholder groups in alpine PV projects – a key pillar of Switzerland's energy policy. We hypothesize that the central problem for alpine PV implementation is a general lack of trust between national drivers (midlands) and impacted local stakeholders (alps). This increases perceived trade-offs, leading to local stakeholders' rejection of the projects at the ballot. While participatory approaches may contribute to lessening perceived trade-offs, lacking trust can more effectively be restored through higher involvement of local actors in the project implementation and understanding the specific perceived trade-offs for each veto player, such as tourism or agriculture. To analyze actor constellations around these trade-offs, we employed a comparative, mixed-method approach with semi-structured interviews and social network analysis in two municipalities, Tujetsch (Sedrun) and Sursés (Savognin). With our analysis, we provide actionable insights for policymakers, highlighting critical factors to enhance stakeholder trust and public acceptance of alpine PV.

Lukas  
Fesenfeld  
ETH

### **Assessing the NIMBY Effect on Agri-Photovoltaics: Experimental Insights into Public Acceptance and Voting Behavior in Switzerland**

As countries expand renewable energy to address climate change, land-use conflicts have intensified, particularly in densely populated areas like Switzerland. Agri-Photovoltaics (Agri-PV) – the dual use of land for agriculture and solar energy – offers a promising solution, yet its adoption relies on public acceptance. This study investigates how proximity to Agri-PV projects affects public attitudes, project support, and voting behavior, addressing potential "Not-in-My-Backyard" (NIMBY) effects. We conducted a field and survey experiment with a representative sample of 4,000 Swiss residents, assessing the influence of proximity, project scale, and design features on Agri-PV support and voting behavior. Using the June 2024 Electricity Law public vote, which promotes renewable energy adoption, as a unique experimental setting we randomly provided tailored information to a treatment group on realistic Agri-PV potential near their homes. Findings reveal that the NIMBY treatment raises knowledge and concern but reduces support for Agri-PV and respective policies, especially for larger projects. However, while the treatment reduces project and policy support, it does not significantly impact voting intentions nor revealed voting behavior in the referendum. Our results also show that a clear majority of respondents support Agri-PV installations over 1,000 meters from their homes. Notably, our additional conjoint experiment, shows that Agri-PV project designs emphasizing project benefits – such as enhanced energy self-sufficiency and increased farmer income – can offset the support-dampening effects of the realistic NIMBY information treatment. These findings stress the importance of benefit-focused communication to mitigate NIMBY concerns. Our study provides actionable insights for policymakers on advancing sustainable food-energy systems and enhancing Agri-PV acceptance in Switzerland's renewable energy transition. Authors: Lukas Fesenfeld, Tobias Schmidt, Jürg Rohrer, Dionis Anderegg, Leon Sistik, Simon Montfort

Ricarda  
Fieber  
&  
Jenni  
Kaipainen  
ETH

### **Intermediation in policymaking for sustainability transitions: Longitudinal exploration of Global Plastics Treaty**

To answer the broad concerns regarding the transition towards a more safe and sustainable plastics industry, a global, legally binding Plastics treaty is currently negotiated between countries around the world. As recognized by sustainability transitions literature, various intermediaries often play critical roles in shaping such policymaking processes. However, intermediaries' ability to not only facilitate, but also hinder policymaking remains unaddressed in sustainability transitions literature. We study this empirically through a longitudinal exploration of intermediaries in transnational policymaking for a plastics treaty that shapes the future of global plastics industry. We analyze qualitative data from action research embedded in the treaty negotiations, related policy documents, and expert interviews with key intermediaries. Along the policymaking process, we identify coalitions as key intermediaries in favor and against the sustainability transition of the plastics industry. We further analyze their strategies along the treaty negotiations, the emerging dynamic interactions and conflicts between the key intermediaries, and the consequences on the overall outcome of the plastics treaty. The findings contribute to an improved understanding of the negative effects of intermediation in sustainability transitions, and support policymakers in avoiding potential pitfalls and successfully navigating policymaking processes for sustainability transitions.

<p><b>Giulia Frigo</b> EPFL</p>	<p><b>Assessing Plastic Waste Flows in Indonesian Neighbourhoods: A Geo-Referenced Material Flow Analysis for Targeted Waste Management Interventions</b></p> <p>This study presents a plastic Material Flow Analysis (MFA) across five neighbourhoods in Bandung, Indonesia, using a bottom-up, geo-referenced approach. It investigates how plastic waste flows are influenced across neighbourhoods by income, education, infrastructure, and local governance. Additionally, hotspots of uncollected waste were localised and quantified through spatial analysis. This highlights disparities in plastic waste consumption and disposal among neighbourhoods, with notable variations across all examined flows. Our findings show that plastic consumption is higher in wealthier households, while waste segregation rates are higher among households with both higher education and income levels. Local governance emerged as the most significant factor influencing waste segregation, with one neighbourhood in particular demonstrating a markedly higher segregation rate. Limited infrastructure and collection capacity leads to higher burning rates, and uncollected waste primarily accumulates along river flows and open spaces near houses. This underscores the need for targeted interventions in these areas and a more comprehensive collection system. This study demonstrates the feasibility of using MFAs in data-limited environments to provide quantitative and qualitative insights into waste consumption and disposal patterns. The findings underscore the importance of implementing neighbourhood-specific interventions that account for local dynamics, where individual and contextual factors are intertwined. Such insights are essential for developing effective waste management strategies tailored to specific neighbourhood needs, offering valuable guidance for policymakers addressing the challenges of plastic waste in rapidly urbanizing areas like Bandung.</p>
<p><b>Alma Galicia</b> ETH Zürich</p>	<p><b>Coordinating Acts: Evaluating the Coherence of EU Green Deal Policies</b></p> <p>Within the European Green Deal Framework, the Member States (MS) have set climate and biodiversity targets for the next decades which crosscut various sectors and policy areas, from biodiversity, land-use, and forestry to the bioeconomy. As policies develop incrementally, goals within one sector may not always align seamlessly with goals in adjacent sectors. For instance, concerning bioeconomy goals, projected increases in the use and demand for biomass for bioenergy and bio-based materials could conflict with the biodiversity and conservation goals. According to a large body of literature as well as the decision-making bodies of the EU, policies should aim to be integrated and coherent to promote synergies and reduce trade-offs. Similarly, when well-circumscribed, coherent policies send a clear message to stakeholders and policy beneficiaries. Using qualitative document and text analysis, we assess the degree of integration of forest-related policies within the EU Green Deal by examining policy coherence in the context of increasing cross-sectoral land use competition for biomass resources and biodiversity protection goals. We aim to contribute to the current debate surrounding bioeconomy and biodiversity goals. Going beyond a simple binary strong-weak coherence dichotomy, we provide a more in-depth analysis of levels of policy coherence, thereby potentially providing new insights into future potential EU-related policy design.</p>
<p><b>Maria García-Martín</b> WSL</p>	<p><b>Exploring Constraints to Psychological Restoration in Outdoor Spaces: An Inductive Approach</b></p> <p>This study investigates the constraints affecting psychological restoration in public green spaces, aiming to inform future research and urban planning strategies. Grounded in the Attention Restoration Theory (ART), our research addresses the gap in understanding constraints to restoration experiences. Drawing on insights from leisure literature and affordances theory, we examine the interplay between personal and environmental factors influencing restoration outcomes. Using an open-ended survey approach, we collected data from 1202 respondents regarding constraints encountered during outdoor restoration activities in their daily environment. Analysis revealed a diverse array of constraints, including biophysical factors, conflicting uses, and intrapersonal distractions. Key findings highlight the significance of noise pollution and crowdedness as prevalent constraints, underscoring the need for attention to these factors in both research and design interventions. Additionally, constraints related to conflicting uses and interpersonal dynamics underscore the complexity of human-environment interactions in restoration contexts. Our study contributes to advancing the understanding of constraints to restoration experiences and emphasizes the importance of considering both demand-side and supply-side factors in planning and designing interventions. By recognizing the multifaceted nature of restoration constraints, we provide valuable insights for policymakers, planners, and designers seeking to enhance the restorative potential of green spaces.</p>



Lena  
Gubler  
WSL

### **Shared Socioeconomic Pathways for Switzerland, SSP-CH**

We developed Shared Socioeconomic Pathways for Switzerland (SSP-CH) as part of the Swiss National Centre for Climate Services (NCCS) programme "Decision-making basis for dealing with climate change in Switzerland." These socio-economic scenarios serve two primary purposes: first, they provide a foundation for decision-making in climate, energy, and other environmental policies, and second, they form a knowledge base for broader environmental research. In our presentation, we aim to demonstrate how we conceptualized and developed these socio-economic scenarios, as well as the challenges we encountered. We further present the resulting five SSP-CH. We developed socio-economic scenarios based on key factors and drawing on extensive expertise of stakeholders from both academia and practice. First, we identified key influencing factors, generated future projections and selected the most critical factors using impact analysis. We then applied consistency analysis to calculate the socio-economic scenarios. We then compared with them with the European SSPs and enhanced them with Switzerland-specific factors. Key variables were then quantified for subsequent modelling. The five SSPs show pictures of Switzerland that places social cohesion and well-being above economic goals (SSP0-CH - the footpath), whose economy and society are highly technologised and based on renewable energies (SSP1-CH - the electric track), which is in a state of economic and social decay (SSP3 - the downhill road), which is characterised by strong inequalities (SSP4 - the divided road) to one which is dependent on fossil fuels and confronted with a severely degraded environment (SSP5-CH - the highway).

Alyssa  
Gunnemann  
ETH

### **Climate Finance and Policy Group: Shades of public investment in addressing low-carbon investment needs**

Achieving the Paris Agreement targets requires a substantial increase in low-carbon technology investments. The requirement has sparked debate over the degree of state involvement in financing the development and commercialization of low-carbon technologies. Traditionally, economic perspectives have supported limited state intervention, focusing on correcting market failures. However, scholars in innovation studies point to additional failures, advocating for a more proactive state role in driving technological change. As industrial policies increasingly prioritize low-carbon technologies, a comprehensive analysis of the benefits and limitations of state involvement becomes crucial. A key element is public investments, where the administration reflects differing degrees of state involvement, which can stretch from public offices to state-owned enterprises and state investment banks. This paper explores how the degree of state involvement impacts public investments in addressing low-carbon investment needs. We first systematically assess the different options based on insights from multiple literatures. The options are characterized by the type of financing—equity, debt, and grants—and their administration. The analysis is guided by key criteria such as efficiency, transition speed, and fiscal capacity and explores the trade-offs between public and private investments. To illustrate the theoretical assessment, we provide a comparative case study of investments in renewable energy assets in Germany and Switzerland, highlighting how different levels of state involvement shape investment strategies and outcomes. Through this analysis, we provide insights into the benefits and challenges associated with public investment in low-carbon technologies.

Annina  
Guthauser  
WSL

### **Swiss forest sector pathways and their contribution to net-zero emissions until 2050**

Climate change is affecting life on earth. Switzerland and many other countries set a net-zero emissions target until 2050 to halt climate change. The forest and wood sector can help reach that target via three climate protection services, the so-called "three S": (1) Sequestration of carbon in forests, (2) storage of carbon in wood products, (3) substitution of mineral-based building materials and fossil fuels with wood. How the "three S" play out, i.e., which S contributes to what extent to the net-zero target, depends on future developments in the forest and wood sector. In our study, we first develop Swiss forest sector pathways, i.e. storylines, to outline potential futures in the Swiss forest and wood sector and second, assess the effect of the different pathways on each of the "three S". Our ongoing study is guided by the following research questions: (i) What are possible future developments/pathways in the Swiss forest and wood sector? (ii) What are the effects of these developments/pathways on the three climate protection services of the Swiss forest and wood sector? Preliminary results point out that the possible future developments/pathways might be quite different. Consequently, their effects on the "three S" differ as well. Ultimately, the final results of this study should serve as a basis for stakeholders and policy makers to take informed decision about future forest management and forest policies that contribute best to reaching the net-zero target until 2050.

**Matthias  
Heinrich**  
EPFL

### **People and spaces: Toward an urban centered approach of adoption patterns of low carbon technologies**

The adoption of technologies in the building and mobility sectors is a crucial lever for the decarbonization of cities. Innovations such as high-performance thermal insulation, heat pumps, district heating networks, electric vehicles, and electric bicycles can significantly reduce greenhouse gas emissions and enhance energy efficiency. However, the uptake and diffusion of these technologies remain low, and our understanding of adoption patterns, particularly at the urban scale, is limited. While the literature extensively documents the adoption of photovoltaic panels and insulation, there is a scarcity of studies that focus on the co-adoption of these technologies and analyze the heterogeneity of adoption patterns across space. This article aims to address this research gap at the city level, where local actors play a pivotal role in climate change policies. We challenge existing knowledge established at broader geographical scales to explore the socio-economic drivers, barriers, and geographic patterns of co-adoption of low-carbon technologies in an urban environment. Using the Lausanne conurbation in Switzerland as a case study, we develop a theoretical framework based on a comprehensive literature review and test it with survey data collected from diverse population segments. Our analysis reveals that technology adoption patterns are highly spatialized, with significant barriers including high upfront costs, complexity of shared decision-making among multiple stakeholders, and infrastructural requirements. By identifying these barriers, we propose targeted public policies to promote broader adoption of low-carbon technologies, ultimately contributing to more sustainable urban environments.

**Max  
Hoos**  
Eawag

### **Beyond regulatory pressure: How industry and civil society drive safe-and-sustainable innovation in food packaging**

The widespread use of harmful substances in the chemical industry is increasingly being recognized as a matter of concern, contrasting the useful functionalities these substances add to products with their negative impacts on human health and the environment. Yet, chemical regulation currently appears ill-equipped to stimulate safe-and-sustainable chemical innovation in a timely manner, as it is found to mostly reinforce patterns of regrettable substitutions and end-of-pipe innovations. Integrating insights from economic sociology and innovation studies, the paper builds on the concept of valuation to analyze how, in the absence of robust regulatory pressures, chemical safety may be internalized in innovation processes to drive the development of safer products. A particular focus is put on the establishment of valuation devices, i.e. specific organizational forms through which values are attributed to products, which bring to the fore and stabilize product qualities relating to chemical safety. Zooming in on the food packaging sector, which faces growing concerns about the migration of harmful chemicals from packaging materials into food, the paper shows how a group of civil society and industry actors have responded to regulatory shortcomings by setting up a system of valuation devices. Consequently, chemical safety is catching up to technological and commercial considerations in the development and evaluation of packaging solutions. However, these efforts run the risk of being undermined by an increasing emphasis on environmental sustainability in the field of food packaging, which pushes for more recyclable and biodegradable materials while neglecting the safety risk they are associated with.

Robert  
Huber  
ETH

### **Agricultural Economics and Policy: Quantifying the importance of farmers' behavioral factors in ex-ante assessments of policies supporting sustainable farming practices**

In the context of sustainable agriculture, understanding farmers' behavioural responses to policy incentives is crucial for designing effective policies. This presentation introduces FARMIND, an agent-based model developed by the Agricultural Economics and Policy Group at ETH. FARMIND is a tool for simulating farm-level decision making by integrating behavioural factors within a bio-economic modelling framework. Traditional models often prioritise income maximisation, which may overlook the complexity of farmers' motivations and decision-making processes. FARMIND addresses this gap by incorporating cognitive, social and dispositional characteristics derived from empirical data on farmer behaviour, providing a more nuanced simulation of how farmers respond to economic policies. The application of the model is illustrated by presenting research using FARMIND to evaluate results-based payments for climate change mitigation and precision agriculture technologies in two Swiss case studies, quantifying the extent to which behavioural factors influence adoption rates of sustainable practices. The results show that cognitive and dispositional factors, such as reluctance to change, can reduce adoption rates by 20-70% compared to income-based models, while social factors, including network effects, can increase adoption by up to 40%. These findings underscore the importance of policies that address not only economic incentives, but also behavioural and social dynamics. By integrating behavioural insights into ex-ante policy assessments, FARMIND contributes to the development of sustainable agricultural practices and highlights the value of policy tools that go beyond economic measures, such as fostering social networks and behavioural support mechanisms. This approach holds great promise for improving the effectiveness of sustainability-oriented agricultural policies.

Marcel  
Hunziker  
WSL

### **To which landscape with the renewables? The opinion of the Swiss Public 2018 & 2022**

In 2018, a representative survey was conducted throughout Switzerland as part of the NRP70 synthesis project 'ENERGYSCAPE'. The aim was to find out more about the preferences of the population regarding the development of energy landscapes in Switzerland. In November 2022, this survey was conducted again. The aim was to find out whether the changed situation in 2022 (war in Ukraine, summer drought, increase in energy prices, political discussion about solar parks) had changed preferences. The results clearly showed that in 2018 the population is more likely to accept the siting of renewables in some landscapes than in others. It was found that such a development is particularly rejected in almost untouched mountain areas, but that it also meets with rejection in the Prealps and in the Jura. It tends to be accepted on the settlement-dominated, but also on the agricultural Central Plateau, as well as in settlement-dominated and tourist-dominated mountain areas. The new survey in 2022 showed that the Swiss population remains just as strongly opposed to renewables in almost untouched mountain areas. In contrast, they now consider touristic Alpine landscapes to be just as suitable as the urban landscapes of the Central Plateau. So, there is definitely potential for acceptance – in the right place! – of Alpine solar parks for generating winter electricity.

Abdulrasheed  
Isah  
ETH

### **Investment plans of the future? Drivers of variation in quantifying climate finance in the Nationally Determined Contributions of developing countries**

Since the Paris Agreement, Nationally Determined Contributions (NDCs) have been the main climate plans that provide information on the global ambition to tackle climate change. For developing countries, NDCs are also important documents for communicating their climate finance needs to implement their climate goals. While previous literature has analyzed the different roles of NDCs and shown wide variation in the specificity of climate finance needs that developing countries include in their NDCs, there has been limited understanding of the underlying factors that explain this variation, particularly given the importance of climate finance in developing countries. This paper combines a new dataset on climate finance specificity, covering 244 developing country NDCs, and 32 expert interviews around the world to fill this gap. We identify both domestic and international drivers that influence the granularity of climate finance needs in NDCs. The main domestic drivers are national institutions, technical capacity, stakeholder engagement, and climate vulnerability. On the other hand, international drivers consist of international organizations, negotiating groups, and climate finance advisors. These drivers operate through unique mechanisms and are often mutually reinforcing. We provide avenues for research and key recommendations for policymakers to inform future NDCs.

<p><b>Tonja Iten</b> WSL</p>	<p><b>Municipal sufficiency policy, enablers, and barriers - Findings from an empirical study in rural Switzerland</b></p> <p>Sufficiency has been proposed as a complementary sustainability strategy alongside the more technology-centered strategies of efficiency and consistency. They have been prioritized so far, but are increasingly criticized as being insufficient in terms of scale and speed to address today's environmental challenges. Recently, researchers and policymakers have therefore become growingly interested in how sufficiency can be integrated into policymaking. This includes the municipal level. Municipalities provide key services to citizens and thus contribute to shaping the framework conditions for everyday practices of consumption. Yet, municipalities have received relatively little attention from sufficiency scholarship thus far—and when they have, the rural context has been excluded. Thus, in our presentation, we empirically investigate sufficiency policies in rural municipalities, using Switzerland as an example. Hereto we define sufficiency policies as policies that aim at changing patterns of consumption and production in order to reduce resource use and respect planetary boundaries while satisfying fundamental human needs. Based on 46 qualitative expert interviews with municipal policymakers, we investigate what sufficiency policy measures are being realized in rural municipalities in Switzerland. Furthermore, we identify influencing factors that enable or hinder the planning and implementation of sufficiency efforts at the municipal level. Thereby, we contribute to a better understanding of local sufficiency policy in general and its implementation at the municipal level and in rural areas in particular.</p>
<p><b>Jeanine Janz</b> Eawag</p>	<p><b>Education meets Science: Explore the Water Timeline on Expedio</b></p> <p>The Water Timeline visualizes the dynamic history of Swiss water management over the past 200 years by presenting roughly 200 milestones through images, text and sound. The project aims to demonstrate how technological, social and ecological changes interact in transformations towards sustainable development, and under what conditions paradigm shifts in our use of natural resources become possible. Based on the Water Timeline, a new online learning unit for students was created on Expedio in collaboration with Naturama Aargau. Through this new learning unit 'Abwasser gestern, heute, morgen', students explore the diverse ways water is utilized, shaped, and influenced by society and the impact this has on both the environment and people. They compare current challenges with past problems and discuss the advantages and disadvantages of several solutions in wastewater treatment.</p>
<p><b>Kristiina Joon</b> ETH Zurich</p>	<p><b>The many meanings of just: Distributional justice principles as predictors for mitigation policy support</b></p> <p>One of the biggest hurdles to climate action -- policy acceptance -- is heavily influenced by perceptions of fairness. However, what fair means is context-specific and highly personal. Here, we ask what kind of considerations people make when assessing whether a policy is fair, and if these considerations are linked to policy preferences. To answer those questions, we first assess support for four distributional justice principles relevant to the decarbonisation context: minimising costs, reducing inequalities, covering basic needs, and limiting excess. Using latent profile analysis, we identify groups with distinct justice profiles. We then apply this concept to two mitigation policy contexts to test whether justice profiles are associated with policy preferences. The two policy contexts relate to phasing out fossil fuels from the heating sector and scaling up renewable energy production and are implemented as choice experiments. By running an online survey among Swiss residents with a nationally representative sample (N=2,230), we show that (1) most people support a combination of principles with the principle of minimising costs receiving the least support overall, and (2) the heterogeneity in policy preferences is linked to justice considerations. We confirm and extend previous findings by confirming that justice is a key aspect in the policy assessment of the public, and thus stress that the many meanings of justice should be considered in both policy-making and policy-driven research.</p>

Josianne  
Kollmann  
Eawag

### **Mandated on-site wastewater treatment and reuse in San Francisco: The role of distributive fairness perceptions for policy acceptance**

In San Francisco, water scarcity poses a critical challenge and raises the need for reducing potable water consumption. One solution are on-site systems that treat a building's wastewater on-site for non-potable reuse. To increase the use of on-site systems, San Francisco issued a policy mandating their adoption for part of the population. The rest of the population continues using the centralised treatment system without reuse. This disparity might impair the distributive fairness of the policy and of water services, potentially reducing public acceptance of the policy and consequently the chances of a successful implementation. Yet, research indicates that not all groups of society are equally considered in peoples' fairness and acceptance ratings of policies, but it has not yet been investigated which groups are considered in the context of wastewater reuse. To examine this question, we conducted an online survey with residents of San Francisco who were not covered by the policy (N=176). We assessed perceived fairness of the policy for six different groups of society as well as policy acceptance. Regression analyses showed that higher fairness for future generations, the population as whole, and owners of buildings mandated to install on-site systems explained acceptance. The fairness for people with low incomes, the environment, and residents of buildings with on-site systems did not explain acceptance. We further investigated which specific implications of the policy explained its perceived (un)fairness for each group. The findings implicate that particularly collective outcomes should be considered to increase acceptance of future policies mandating on-site systems.

Simón  
Ladino Cano  
EPFL

### **Bridging Science and Policy for Local Heat Transitions: An Empirical Agent-Based Modeling Approach**

Achieving the EU's 2050 net-zero emissions target requires effective strategies to drive the energy transition at the local level, especially among households. The ABM4EnergyTransition (ABM4ET) project addresses this critical need by supporting heat transition efforts in the state of Styria, Austria. The project focuses on bridging science and policy through the development of a spatially explicit, empirically grounded agent-based model (ABM) to be used by energy experts and policymakers to simulate a range of policy intervention scenarios. Our ABM recreates household decision-making behavior regarding energy renovations by integrating empirically derived agent rules and parameters that reflect the complexity of these processes. More specifically, we surveyed 2,410 homeowners across Styria to capture decision factors influencing the adoption of thermal insulation and low-carbon heating systems. Using this survey data, we implemented a two-step multivariate analysis strategy. In the first phase, we developed a Partial Least Squares-Structural Equation Model (PLS-SEM) to estimate the effect of contextual, psychological, and social influences on renovation decisions. In the second phase, we performed a Multigroup Analysis (MGA) to determine whether predefined data groups relevant to social tipping dynamics exhibit significant differences in their group-specific parameter estimates. Our contribution is twofold. First, we identify potential leverage points and barriers to behavior change, building on our experience in analyzing and integrating empirical data into an ABM. Second, we demonstrate how ABM simulation offers a promising method for examining the intertwined roles of agency and interventions in driving social tipping dynamics toward sustainability.

Djamila  
Lesch  
Eawag

### **How Transformative Socio-Technical Configurations Diffuse in Space: The Case of Small-Scale Water Recycling Systems in the United States**

A key aspect of sustainability transitions is the emergence of novel socio-technical configurations that can provide essential societal functions, such as energy supply and urban water management, in more sustainable ways (Fuenfschilling, 2019). While previous research has explored how these configurations emerge in localized contexts, understanding their diffusion beyond these areas remains limited. This gap is surprising, as the ability of novel configurations to transform established systems depends on their spatial diffusion into new geographic contexts (Fuenfschilling, 2019). Most studies have focused on simple mechanisms of diffusion, neglecting the structural factors that facilitate it (exceptions include Williams, 2017; Miörner et al., 2024). Without a deeper understanding of these structures, critical barriers and enablers to transformative change may be overlooked. This paper addresses this gap by developing a conceptual model that outlines how the diffusion of novel socio-technical configurations depends on the creation of niche structures and socio-technical configurational templates at supra-regional scales. While configurational templates provide guidance for the implementation of a novel socio-technical configuration in new spatial contexts, supra-regional niches specify and diffuse these templates. To illustrate and validate our conceptual model, we examine how a configuration around small-scale water recycling systems initially emerged in New York City and San Francisco, but increasingly exhibits transformative potential across the US. Based on a thorough document analysis, complemented by a conference visit and 22 semi-structured qualitative expert interviews with sector stakeholders and policymakers, we illustrate how this development can be traced back to the formation of a supra-regional niche structure and the creation of a configurational template around small-scale water recycling systems.

Judit  
Lienert  
Eawag

### **Behavioral decision analysis helps bridge theory and practice in environmental problems**

Most environmental decisions are complex and require interdisciplinary expertise, often spanning the natural, engineering, and social sciences. Various stakeholders may have a say in the decision, or will be affected by its outcome. Ideally, the different interests of stakeholders are included in participatory, transdisciplinary decision processes. Moreover, there is usually high uncertainty, which we need to handle in an appropriate way. These challenges can be addressed with Multi-Criteria Decision Analysis (MCDA). My research especially focuses on stakeholder participation, behavioral decision analysis, and dealing with uncertainty. MCDA allows integrating the scientific evidence with the stakeholders' preferences. Literature reviews summarizing MCDA applications to environmental decision problems indicate that there is insufficient integration of stakeholders in problem structuring and preference elicitation steps of MCDA, potentially increasing the risk of biases. Moreover, these reviews criticize inadequate treatment of uncertainty, using too simplistic models, and neglecting temporal or spatial aspects. In contrast, Operational Research (OR) literature focuses on sophisticated decision models that include e.g., uncertainty, but again this research lacks integration of stakeholders. Research topics addressed in my group include how we can best structure a decision problem, elicit the preferences of stakeholders, and find consensus solutions despite conflicts of interest and high uncertainty. I will present some insights from literature and own experimental and practical environmental cases to help bridge this gap between theoretical requirements and real-world decision-making.

**Meike  
Löhr**  
Eawag

### **Decarbonising energy-intensive process industries Multi-system interactions in the concrete value chain**

Achieving net-zero emissions by 2050 requires decarbonisation efforts across all sectors and industries. Emissions from energy-intensive process industries (EPIs) such as steel, chemicals or cement remain high, with cement production accounting for about 8% of global CO<sub>2</sub> emissions. EPIs producing cement (a precursor of concrete) are characterised by well-established value chains with incumbent ownership, strong institutionalisation, and low innovation. A variety of recently emerging low-carbon innovations promise significant decarbonisation potentials. These innovations address different parts of the value chain. They range from relatively few changes within one segment of the value chain to more complex cases that change the entire value chain. This requires establishing links to new sectors and value chains. We build on transition studies and the emerging literature on multi-system interactions to understand change within an entire value chain that is linked to different sectors. We propose a conceptual framework distinguishing three innovation patterns within value chains. It focuses on the 'site of interaction', where actors such as system entanglers link value chain segments and sectors by establishing technological, institutional, and organisational linkages to introduce incremental and transformative innovations. Empirically, we analyse low-carbon innovations for concrete in Switzerland and Germany. Concrete innovations go beyond fuel substitution and include changes in raw materials or CO<sub>2</sub> capture such as CCUS, biochar and alternative concrete. Building on expert interviews and document analysis in a qualitative comparative case study, we expect to uncover innovation patterns and to contribute conceptually to multi-system interactions in value chains.

**Elisabeth  
Maidl**  
WSL

### **Knowledge-co-production in climate change and community resilience**

The interdependence of climate change and natural hazard goes along with large uncertainties regarding future risks. Regional stakeholders, experts in natural hazards management and scientists have specific knowledge, resp. mental models on such risks. This diversity of views makes it difficult to find common and broadly accepted prevention measures. If the specific knowledge of these types of actors is shared in an interactive knowledge production process, this enables a broader and common understanding of complex risks, and allows to agree on long-term solution strategies. Previous studies on mental models confirm that actors with specific vulnerabilities perceive different aspects of a topic and accordingly prefer different measures. In bringing these perspectives together, there is the potential to reduce uncertainty, and to close blind spots in solution finding. However, studies that examine the mental models of regional actors on future concrete mass movement risks are lacking so far. The project tested and evaluated the feasibility of knowledge co-creation for the anticipatory prevention of climate change-induced mass movement risks in the Alps. As a key element, mental models of the three included groups of actors have been examined using the following methods: qualitative interviews, quantitative pre- and post-measurement (participants and general population), intervention of two interactive workshops applying the method of participatory modelling. Results show insights on the constitution and distribution of mental models on climate change, which is influenced by profession, proximity, values and social norms, and effects of participating in a knowledge-co-creation process on the alignment of divergent opinions. Being integrated into the research program Climate Change Impacts on Alpine Mass Movements (CCAMM2), this project is carried out in two Swiss mountain regions.

**Maiken  
Maier**  
University of  
Bern

### **Field Experiment on the Impact of Meat Substitute Experiences on Meat Reduction and Substitute Adoption Rates**

An emerging body of research highlights food consumption habits, especially among affluent populations, as a vital factor in sustainability governance and climate change mitigation. Especially meat-heavy diets significantly contribute to greenhouse gas emissions, extensive land and water use, biodiversity loss, and negative health impacts. Promoting more sustainable, plant-based diets through the adoption of meat substitutes presents a promising approach, and this market has expanded rapidly in recent years. Substitute products are becoming more affordable and increasingly similar to meat in taste, texture, and appearance. Despite their potential, limited research has explored how high-quality meat substitutes influence long-term consumption patterns and overall meat reduction. This study fills that gap by experimentally examining how repeated exposure to plant-based meat substitutes affects intentions to reduce meat consumption, increase substitute use, and support food policy initiatives. In collaboration with Coop, Migros, and plant-based producers Planted and Green Mountain, we conducted a survey and field experiment with a representative sample of 4,000 Swiss residents. Plant-based meat substitutes were provided to a randomly selected treatment group, allowing us to assess purchasing behaviors and substitution trends over time. With the purchasing data we will analyze whether positive experiences with meat substitutes lead to meaningful substitution effects and higher adoption rates of plant-based alternatives. The survey data analysis shows that respondents have increased intentions to consume more substitutes and plant-based foods, reduce meat intake, and support food policies to shift production and consumption toward sustainability. These insights contribute to informing policy pathways for more sustainable food systems.

**Jamie  
McCaughey**  
ETH

### **Complementary qualitative and quantitative methods for climate risk assessment and adaptation: Urban heat in Lisbon and Islamabad**

The challenges posed by climate change and the ways these can be effectively addressed through mitigation and adaptation are multifaceted problems, hence demand multifaceted methods to gain robust insights. While diverse qualitative and quantitative methods each provide unique and valuable insights, finding points of connection and consilience among these has proven a persistent challenge. Here we show an approach to combine on-the-ground local knowledge with quantitative socio-economic data and high-resolution urban heat modelling of present and future climates in order to gain more holistic insights than could be achieved with any one of these methods in isolation. We investigate impacts of and adaptation to urban heat in Lisbon, Portugal and Islamabad, Pakistan, a comparison that provides diversity in climatic, socio-economic, institutional, and cultural contexts. In both cities we interview key local informants (N=49) in schools, hospitals, construction sites, and other work settings to understand impacts on health, education, indoor and outdoor work, with a focus on how these impacts are unevenly borne by different socio-economic segments of society and on limits to adaptation. We then analyse patterns of societal exposure to urban heat, focusing on socially vulnerable groups as revealed by local interviews, combining spatially explicit census data with high-resolution modelling of urban heat. We further explore how these patterns may evolve under a range of climate mitigation and adaptation scenarios. The insights gained by this combined qualitative and quantitative approach can help provide local decisionmakers with a more holistic picture of where and for whom the impacts of urban heat are most severely felt, as well as the potential and limits of diverse adaptation options.



Muhil  
Nesi  
Eawag

### **Valuation in transitions: The case of an Indian textile industrial cluster**

Concerns over the textile industry's environmental impact are driving changes in regulatory frameworks and consumer preferences demanding responsible production. However, enabling a systematic shift in the industry is challenging, given that it is characterised by dynamic global value chains dominated by small and medium-scale enterprises in emerging economies. Even marginal increases in production costs push brands to shift to competing global regions that offer lower prices. Producers, therefore, have to straddle the dual challenge of remaining competitive in the current global scenario while adopt green practices that are in line with regulatory reforms and emerging global value shifts. The study observes the ongoing green transition of India's largest export-oriented industrial cluster of cotton garments: Tiruppur. In 2010, the cluster faced stringent legal action for polluting river Noyyal, leading to the closure of 750 dyeing companies. We will reconstruct how the cluster is now emerging as India's leader in sustainable textiles. Conceptually, we use the 'valuation lens' to observe the unfolding of a technological innovation system around 'zero liquid discharge'- the practice of recovering and reusing 100% of industrial wastewater. Valuation is the social mechanism by which values are attributed to novel technologies, products and services. We use this lens to observe complex institutional processes that enabled the construction of a new norm around circular water practices in the cluster. We argue that the integration of environmental values with business rationales was a result of internal processes of innovation, cooperation and competition, and not merely driven by regulation or market demand.

Inga  
Nienkerke  
ETH

### **Future Mobility Africa**

The urgent need to mitigate climate change has placed decarbonization of the transportation sector at the forefront of global and regional agendas. Despite contributing minimally to global CO<sub>2</sub> emissions, African countries experience severe climate-related impacts and have committed under the Paris Agreement to significantly reduce their greenhouse gas emissions by 2030. This commitment comes alongside Europe's accelerated transition to electric vehicles (and synthetic fuels) as the European Union phases out internal combustion engines to meet net-zero targets. However, Africa faces distinct challenges in adopting similar EV-focused policies, due to high reliance on imported used vehicles, lack of EV infrastructure, and limited access to affordable and clean electricity. This study employs a multi-level perspective (MLP) framework to evaluate the economic, environmental, and political viability of electric vehicles within the African transport sector of six case countries: Egypt, Ethiopia, Uganda, South Africa, Namibia and Ghana. Analyzing economic competitiveness, environmental impact, and policy alignment, this research assesses whether EVs are suitable solutions for sustainable transport in Africa. The findings aim to provide actionable insights into a balanced approach for Africa's transport decarbonization, potentially enhancing sustainability without replicating the EU's long past of combustion engines.

Alejandro  
Nuñez-Jimenez  
ETH

### **Gear shift: How changes in hydrogen policies reveal Europe's new path to net-zero**

For many years, European countries have benefited from industries that rely on cheap and abundant fossil fuels. Now, confronted with climate change, geopolitical tensions, and technological competition, European governments must find new economic models aligned with their net-zero emissions goals. As a result, energy policy is moving from a niche to a central preoccupation of European governments, encompassing not only environmental but also economic, security and social goals. This paper investigates this shift in European energy policies by analyzing hydrogen policies in the European Union between 2020 and 2024. Hydrogen is an ideal case study because it is still a niche technology whose deployment at scale could affect several industries. The results reveal major changes in European hydrogen policies after Russia invaded Ukraine in 2022. Government priorities shifted from environmental and technological to economic and security goals, emphasizing European coordination for technological leadership. In addition, governments moved from persuasive to coercive policy logics, favoring mandates over voluntary commitments. Finally, despite increased agreement on the need to protect their industries, countries continued to diverge on how to do so. These findings suggest that the goals and logic of energy policies are changing, with major implications for practitioners and researchers.

**Begüm  
Özdemir Oluk**  
Eawag

### **Transparency of Carbon-Neutral Labels: Evidence from a Choice Experiment**

This paper examines the impact of transparency in carbon-neutral labeling on consumer preferences and willingness to pay. The proliferation of climate labels with overlapping characteristics may cause consumer confusion and favor labels with lower environmental quality. This study empirically investigates whether providing information on the percentage of CO<sub>2</sub> offsetting and CO<sub>2</sub> reduction influences preferences. Through a discrete choice experiment survey among UK tea consumers, I compare willingness to pay for standard and transparent carbon-neutral labels. Findings indicate that UK consumers are willing to pay more than the social cost of carbon estimates. I find no significant difference in willingness to pay between transparent and standard labels, although transparent labels with higher CO<sub>2</sub> offsetting shares tend to have a higher willingness to pay on average. Furthermore, relative confusion about transparent labels and limited financial resources may play an important role in consumer preferences.

**Iordanis  
Parikoglou**  
ETH

### **Agricultural Economics and Policy Group Productivity, emissions intensity and pollution swapping in dairy farming**

Promoting technical and efficiency gains at the farm level is a key agricultural policy for increasing food production while reducing environmental pressures. However, improving environmental efficiency improvements may be costly for farmers and could lead to lower productivity. Additionally, efforts to reduce one pollutant can increase another, a phenomenon known as the pollution swapping effect, commonly seen in dairy farming between ammonia and greenhouse gas emissions. Although understanding these trade-offs is crucial for informing agricultural policy, yet no farm-level studies have assessed them together. To address this gap, we examine the relationship between technical and environmental productivity on Swiss dairy farms using a by-production stochastic frontier model. We analyze data from 623 farms between 2009 and 2020, focusing on the trade-offs between technical productivity (the ratio of output to input) and environmental productivity (the ratio of pollutants to output), through technical and efficiency changes. We find that there is a trade-off between technical and environmental efficiencies in relation to greenhouse gas and ammonia emissions, which suggests that is costly for farmers to abate emissions. We also find evidence for a pollution swapping effect between greenhouse gas and ammonia emissions through changes in environmental efficiencies. This implies that changes in the production process to reduce one of the two pollutants may increase the other pollutant. Based on our results, we discuss how policy makers can foster synergies and mitigate trade-offs and pollution swapping effects when enhancing productivity and reducing emission intensities.

**Tony  
Patt**  
ETH

### **Evolution or equilibria: competing economic visions shaping modern climate policy**

For at least two decades, climate policies – like most environmental policies – were primarily informed by a neo-classical economic worldview, addressing the factors this discipline views as the most important drivers of pollution. On the one hand, policymakers employed cost-benefit analysis to identify the efficient level of emissions now and in the future. On the other hand, they designed instruments to correct the market failure seen as standing in the way of efficiency. The Kyoto Protocol embodied both principles, treating climate change as a global commons problem, a product of mis-aligned incentives and free-riding, and fixing it with a global carbon market. In the meantime, research emerged suggesting that over the relevant time scales, market economies do not trend towards an efficient equilibrium, but rather positive feedback create “lock-in” around suboptimal socio-technological systems. In this reading, emissions are a result of path dependency, and the role of climate policy is to foster disruptive changes that can create win-win outcomes. The Paris Agreement embodied this approach, built around financial and accountability mechanisms to promote low carbon investment, and political mechanisms to promote policy evolution. At the national level, political debates between different climate policy instruments can be understood as representing the tension between the two theories of change. My colleague Johan Lilliestam and I are writing a book describing why the second, evolutionary approach is gradually coming to dominate, and why this is a good thing. Here, I will provide a synopsis of our arguments.

<b>Ueli Reber</b> Eawag	<p><b>Framing with facts: investigating 'evidence voids' in Swiss pesticide discourse</b></p> <p>Not only how an issue is framed, but what evidence underpins that framing is critical to policymaking. This is particularly true for the case of complex sustainability problems, such as pesticide risk reduction, where numerous policy solutions can be linked to very different problem definitions in an attempt to promote a particular perception of an issue, i.e. a frame (Entman, 1993). However, political actors may only use evidence to support certain elements of 'their' frame, e.g. the problem definition but not the favoured policy response. This may be because evidence is not available for all frame elements or because actors choose to emphasise a particular aspect. We argue that this could be problematic for policymaking, namely when (parts of) the most salient frames systematically lack a sound basis in factual knowledge. In this paper, we therefore investigate when and where such 'evidence voids' occur. Looking at the political discourse on pesticide risk reduction in Switzerland, we use manual content analysis to collect data on both the framing of the issue and the evidence used in media and policy documents. The results show that evidence is indeed used selectively and that there are differences in evidence use between frames, resulting in specific patterns of frame elements systematically lacking evidence support. We conclude that by helping to understand whether a policy decision is being made on the basis of incomplete or biased information, a framing perspective can be useful in addressing complex policy issues.</p>
<b>Denise Reike</b> ETH	<p><b>Resources and Capabilities for Circular Economy Value Chains: an Integrated Framework</b></p> <p>Modular construction, i.e. the prefabrication of buildings or their components is increasingly linked to advancing the application of circular economy strategies in the built environment (Garusinghe Mackenbach &amp; Zeller, 2020). First, modularity promises higher resource efficiency in design and production (Reduce), second, modular buildings or their elements are typically intended to enable multiple lifecycles (Reuse). The use of digitalized technologies is assumed to facilitate the use of these circular economy strategies (Cetin et al., 2021). We conducted an empirical study of the Swiss construction sector (desk research and 10 interviews) and combine several research aims. 1. Distinguishing four different value chain steps (design, manufacturing, maintenance, disassembly) we explore in which of these value chain steps circular economy strategies are applied by actors active in modular construction in Switzerland, 2. we investigate the use of digital technologies along these value chain steps, and benefits and challenges attributed to their use by different actors in the value chain, 3. We studied whether the value chain actors draw a link between the application of digital technologies and advancing circular economy strategies. First results show that circular economy strategies can be both a main motivation or 'by product' for Swiss actors. The use of more advanced digital technologies (such as BIM, AI) is so far limited across the different value chain steps. Finally, most actors draw no direct linkage between the application of digital technologies and circular economy strategies nowadays, but they see a potential for this linkage in the medium-term future.</p>
<b>Max Rudolf</b> WSL	<p><b>Aligning Consumption and Policy Preferences: A Latent Class Analysis of Swiss Citizens' Preferences for the Chocolate Supply Chain</b></p> <p>The chocolate supply chain exemplifies the social and environmental challenges within global food systems. Growing awareness of environmental impact and ethical production practices is increasingly shaping consumer choices and influencing food policy, highlighting the need for an integrated approach to understanding consumption and policy preferences. A choice experiment with Swiss citizens (N = 1,060), analysed through a latent class model, identifies two consumer segments: a conscious group (71%) and a price-sensitive group (29%). Both favour measures to reduce deforestation, prioritize small- and medium-sized enterprises within the supply chain, and support Swiss chocolate production. However, the conscious consumer group, predominantly younger and more aware of social and environmental impacts, shows stronger support for enhanced labour and environmental standards, voluntary measures, and information campaigns, while the price-sensitive group remains largely indifferent. Aligning consumption preferences with targeted policy measures provides actionable strategies with broad consumer support, moving beyond basic preference elicitation. These findings provide critical insights for policymakers seeking to promote a more sustainable chocolate supply chain.</p>

**Maritza Satama**  
WSL

**Sustainable cocoa production: a question of taste or survival? Eliciting farmers' preferences with a two-step choice experiment**

The transition to sustainable agricultural production (SAP) is a worldwide challenge, especially for farmers in the Global South who face production and commercialization challenges, often compounded by political and economic instability. Despite efforts to promote SAP, farmers often remain reliant on conventional agriculture and dependent on established trading systems. To better understand cocoa farmers preferences and elicit options for a change, we conducted a two-step choice experiment (CE) - before and after a deliberative workshop - in two regions of Ecuador: in the coast and in the Amazon. The CE comprised five attributes: (i) production systems, (ii) commercialization channels, (iii) microclimate, (iv) recommendations from supply chain actors, and (v) a monetary premium on the product price. Despite providing a deliberation space, cocoa farmers' preferences remained relatively stable in both regions. Farmers showed a preference for organic or natural production systems and recommendations from fellow farmers. Regarding commercialization, farmers preferred private enterprises or agricultural organizations over intermediaries. The positive effects on the microclimate by introducing shadow trees did not outweigh the disadvantages perceived. Furthermore, appropriate communication channels and tailored technical recommendations could support the widespread adoption of SAP. Our findings demonstrate that although farmers' stated preferences indicate a willingness to change their production and trade systems, socioeconomic conditions can be a major obstacle for an actual implementation in practice. Therefore, ensuring stable and equitable conditions for organic cocoa production and commercialization is essential for successfully promoting sustainable agricultural practices.

**Sebastian Schär**  
Eawag

**Decision analysis for the evaluation of blue-green infrastructure under future climate conditions**

Blue-green infrastructure (BGI) are natural and semi-natural landscape elements that are designed to protect, manage, and restore ecosystems in the face of environmental challenges. BGI can play an important role in urban water management by mitigating sewer overflows. It offers multifunctional advantages over 'grey' stormwater management solutions, such as heat mitigation, biodiversity facilitation or surface water quality improvement. However, there are a variety of BGI elements with different characteristics, benefits, and costs. Designing and evaluating BGI options is therefore a complex planning problem involving the interests of heterogeneous stakeholders such as the public sector, residents, and conservation organizations. Multiple Criteria Decision Analysis (MCDA) methods allow for the evaluation of alternative courses of action under multiple, possibly conflicting, objectives. In this research, an MCDA model to evaluate different BGI options under current and future climate conditions is developed. We elicit the stakeholders' objectives and preferences and identify attributes that are suitable to reflect the multifunctional characteristics of BGI. We design BGI options that combine different BGI elements, such as green roofs, bioretention basins, or pervious pavements for the municipality of Fehraltorf in Switzerland. The consequences of each option on each attribute are predicted by employing hydrological simulation and climate models, scientific literature, and expert estimations. Sensitivity analyses are conducted to account for uncertainty and to analyse the robustness of the results. This research informs engineers, urban planners, and stakeholders about the multifaceted potentials of BGI in urban environments and uncovers important issues in their evaluation.

**Julia  
Schaupp**  
WSL

### **Effects of Walking in Forest and Urban Settings with Different Levels of Road Traffic Noise on Psychophysiological Responses**

Literature suggests that spending time in greenspaces can alleviate everyday stress and promote restoration and wellbeing. However, in urban areas access to greenspaces is often limited, and urban environments are typically exposed to increased road traffic noise, a major environmental stressor. While various studies have compared the benefits of exposure to greenspaces and urban built environments, the role of noise has been less explored. We present the preliminary results of a randomized, controlled field study comparing the psychophysiological benefits of exposure to forests and urban built environments with different levels of road traffic noise during 30-min. walks on a range of physiological and psychological outcomes. Walking in forests, in environments with lower road traffic noise and longer relative quiet time, was associated with increased feelings of restoration, subjective stress recovery and perceived restorativeness, compared to walking in urban built environments, in environments with higher road traffic noise and with less relative quiet time. These associations were not observed for physiological stress measured with salivary cortisol and for attention. Our results suggest that even when noise exposure is relatively low and complies with legal noise limits, it can still impede subjective restoration and subjective stress recovery. When planning, designing and/or preserving urban environments that support the wellbeing of inhabitants, road traffic noise as an impediment for subjective restoration and subjective stress recovery should be addressed.

**Julia Cristina  
Schegg**  
ETH

### **About the influence of context on transdisciplinary research projects in the field of natural resources**

Transdisciplinary research (TDR) is an approach for providing knowledge and solutions that target societal needs and challenges through knowledge co-production with non-academic actors (NAA). Yet, generalizability and transferability of transdisciplinary knowledge has been questioned due to case specificity in a particular social-ecological context. Given the important role of case specificity and case context, including context when evaluating the processes and effectiveness of TDR projects as well as the transferability of results is crucial. Thus, this study investigates the influence of context factors on TDR projects and eventually on their effects. Empirically, we rely on interviews with 23 researchers and NAAs involved in 9 TDR projects in the field of natural resources. We find that particularly effects of target and transformation knowledge production, social effects and knowledge integration into practice are most affected by context factors. We found the action resources (1) organisation, (2) consensus, (3) personnel and (4) information to be most influential for the achievement of aspired effects in TDR projects as well as the system conditions (5) private sector, (6) policies and (7) science to be relevant with additional influence of (8) external events, in this study mostly COVID-19. We thus conclude that it is important for researchers to take multi-faceted context factors into consideration when planning, executing and evaluating TDR projects to facilitate the achievement of project effects.

**Jonas  
Schmitt**  
ETH

### **Drought risk management in agriculture: A copula perspective on crop diversification**

Drought events are a major cause of large crop yield losses, with implications for food security and farmers' incomes. Growing multiple crops simultaneously during a cropping season is a well-known on-farm risk management strategy to cope with these drought risks. However, the effectiveness of this crop diversification under different levels of drought severity and how this effectiveness is influenced by crop composition is unclear. We, therefore, assess simultaneous farm-level yield losses of different cash crops in German agriculture (winter wheat, winter barley, winter rapeseed, sugar beet, and grain maize) under different drought severity levels (N = 249,756; regionally pooled farm-level crop-yield pairs, 1995–2019). We show that on-farm crop diversification contributes to drought risk management, but its effectiveness varies considerably across regions, crop pairs, and drought severity.

**Tobias  
Schulz**  
WSL

### **Biodiversity offsets in the forest vs. forest area preservation: the perspective of (different types of) forest**

In many countries an obligation exists for an in-kind replacement of cleared forest. Such reforestation often takes place on arable land. During the past decades, however, arable land has become scarcer due to rapid settlement development. In Switzerland, farmers are increasingly called for abstaining from the in-kind replacement of forest clearances and to allow for their compensation by nature conservation projects on areas other than agricultural land, including the forest itself. The latter, however, implies a difficult trade-off for forest owners who adhere to the forest area preservation principle but at the same time support biodiversity offsetting in the forest as a potential new source of income. This paper analyses the stated preferences of forest owners in the Swiss canton of Berne with a discrete choice survey experiment to demonstrate how forest owners reconcile this trade-off and whether an instrument such as the requirement to spatially coordinate offsets affects their willingness to participate in such a scheme. The results show that biodiversity offsetting in the forest is disputed and support is generally low. A substantial share of those forest owners that are generally willing to participate is also willing to offer (less effective) measures on productive forest land if financial compensation is substantial. While the additionality of such biodiversity offsets thus seems to be less an issue (as compared to their durability), forest owners seem to be indifferent to restrictions that improve the spatial coordination of such offsets. Such coordination thus needs to be secured by respective regulation.

**Tim  
Tröndle**  
ETH

### **What if we designed decarbonised energy supply based on public preferences**

People's opinion about decarbonised electricity supply is a crucial factor for a successful energy transition, both regarding the direction and the speed at which it can unfold. While public preferences about single aspects of electricity supply, such as prices and technology, have been assessed before, these preferences cannot be directly translated to preferred energy supply on the system level. This is for two reasons: First, the most preferred solutions may not be technically feasible. Preferences are often assessed at the local level, but it is not possible to assess technical feasibility of decisions on this level in isolation, as the European electricity system is highly interconnected and decisions in one region will impact other regions. Second, people have diverging preferences leading to diverging preferred energy supply systems. Here, we rank decarbonised energy supply scenarios for Europe based on empirically observed public preferences. We ensure technical feasibility by building on results of techno-economic energy system models on the national and subnational scale. To rank these scenarios, we build on random utility theory and data of national choice experiments in four European countries. We find that people do prefer scenarios with medium to high shares of local self-sufficiency and solar power over least-cost scenarios, despite the higher electricity prices these shares are causing. Our approach allows to evaluate energy plans not only by technical and economic aspects, but also by the opinion of the people.

**Božana  
Vrhovac**  
WSL

### **Participatory Visioning for Energy Transition**

Recent academic literature emphasizes that public participation in local renewable energy planning in Europe usually takes place at a late stage and only rarely in the strategic needs assessment phase. It is often limited to one-sided information and convincing the public of a project or site rather than opening discussions on project design. The aim of this work is to promote the energy transition through a planning and participatory visioning approach at the regional level catalyzed by social learning. The approach aims to explore how opening the discussion on spatial and energy development towards a more holistic and strategic approach through visioning helps to develop more acceptable spatial (energy) futures. To test the participatory visioning approach, a field-experimental intervention research design is applied in two Swiss regions, combining repeated qualitative and quantitative measurements and process observation. A field-experimental intervention research design enables the systematic evaluation of the impact of interventions on participants' attitudes towards environmental issues and related behavior. To test whether an intervention was effective or had an effect, an experimental "A-B-A" design (measurement - intervention - measurement) is used. The visions are developed using a mix of methods between the Geodesign methodology and the Three Horizon Framework. In the long term, the results should help to prevent undesirable future developments in the region and demonstrate early participatory planning through visions as an alternative and supplement to project and site-related participation. The first phase of the project and the results of the preliminary survey can already be presented.

<b>Michael Wicki</b> ETH	<p><b>Public Support for Sustainable Urban Mobility: A Survey Experiment on the E-Bike City Concept in Switzerland</b></p> <p>This study explores public attitudes toward a proposed “E-Bike City” concept, which reallocates significant urban road space to support active mobility, sustainable transport, and green infrastructure. As part of a large-scale survey experiment (N=6,495), we assessed public perception of this urban strategy using two hypothetical implementation scenarios that varied in funding, bike purchase subsidies, and ancillary accessibility measures for suburban and rural users. The study focused on measuring acceptance, perceived fairness, intrusiveness, and effectiveness of the E-Bike City model in promoting environmental sustainability and reducing car dependency. Our results reveal distinct patterns in public support influenced by respondents' transport habits and lifestyle choices, with higher acceptance among urban residents and frequent cyclists. The findings indicate that environmental and sustainability benefits, such as reduced pollution and increased green space, are positively perceived, particularly when paired with accessible social infrastructure. However, concerns around loss of amenities and intrusiveness mainly drive (non-)acceptance. These results underscore the importance of addressing equity and inclusivity concerns in policy implementation across diverse demographic groups, contributing to the broader discourse on sustainable urban development and environment-focused urban mobility policies.</p>
<b>Milena Wiget</b> Eawag	<p><b>Anticipating support for strategies in Swiss pesticide risk reduction policy</b></p> <p>Strategic uncertainty exists about how to address the pressing sustainability issue of agricultural pesticide use and reduce adverse health and environmental impacts. To be supported and eventually implemented, new policy strategies must be of utility to various stakeholders. Anticipating support for new strategies can facilitate their development and success. However, it is difficult to do so in the face of existing trade-offs between conflicting objectives and the uncertainty that is typical of sustainability issues. We therefore studied stakeholders' preferences for achieving different policy objectives and their attitudes toward risk in the face of uncertainty in achieving specific objectives. Both may influence support for particular strategies when using the advocacy coalition framework combined with multi-attribute utility theory. We used Bayesian ordinal logistic regression to analyze the preferences, risk attitudes, and support statements of 24 key stakeholders in Swiss pesticide risk reduction policy. We found links between specific stakeholder preferences, risk attitudes, and the support for particular policy strategies. Consequently, we suggest that attitudes and preferences towards uncertain policy impacts for different objectives should be considered to develop future strategies for sustainable agricultural pesticide use in Switzerland and beyond.</p>
<b>Paola Yanguas</b> ZHAW	<p><b>A socio-technical perspective on Circular Economy related innovations for the building sector in Switzerland</b></p> <p>The construction sector is under pressure worldwide; on the one hand, living space must be created for more and more people and, on the other, it is one of the biggest emitters of greenhouse gases, caused by the materials mainly used in conventional solid construction. Given the increased ambition and urgency required to shift to a Paris-compatible pathway of socio-technical transformation, a new wave of innovation in the wider construction sector is needed to reach net-zero emissions by mid-century. Circular Economy innovation will play a central role in this regard, with multiple technologies and business models emerging in the areas of building re-design, substitution of construction materials, reuse, and recycling of cement and concrete and building parts. This work proposes an Expanded Technological Innovation System (TIS+) analysis for circular economy innovations toward a net-zero buildings sector by 2050 in Switzerland, which starts with a narrow focus on cement and wood building innovations, similar to the traditional TIS analysis, but then expands to complementary innovations such around the different “loops” of the circular economy, such as concrete recycling, substitution, re-use. Conceptually, it builds on the literature on technological innovation systems and sustainability transitions. Methods applied include literature review and expert interviews. We highlight potential synergies and trade-offs between the different circularity loops and circular economy applications, identifying key challenges and opportunities of circular business models in the building sector in Switzerland in the coming decades.</p>

**Xuezhu  
Zhai**  
ETH

### **Potential of Using Generative Artificial Intelligence for Participatory River Restoration**

River restoration is essential to address biodiversity loss, enhance water quality, and improve climate resilience; however, long-term success relies on the involvement of various land use stakeholders. Generative artificial intelligence (GenAI) produces new content from scientific data and user input, potentially improving engagement in river restoration by enabling participants to propose and visualise future restoration outcomes in real-time. This study examined the use of Gen AI in participatory river restoration through a visual assessment of existing tools, supported by literature, and insights gained from interviews with practitioners in Switzerland and Scotland. Current GenAI tools show potential for enhancing participatory river restoration; however, significant gaps remain between existing technology and practical implementation needs. AI image generation tools utilising stable diffusion exhibit inherent randomness, rendering them unreliable for consistent scene representation of the same restoration plan from various perspectives. The creative freedom provided by GenAI may lead to challenges in content implementation, potentially increasing the risk of conflict between public servants and citizens. We conclude by highlighting key areas for breakthroughs in GenAI to enhance support for participatory river restoration.

**Natascha  
Zinn**  
Eawag

### **Policy Instruments for Urban Blue-Green Areas: Integrating Climate Change Adaptation and Biodiversity Conservation for Resilient**

With the global population increasingly concentrated in cities, the importance of urban policy instruments around urban climate change and biodiversity loss is growing. This paper examines policy instruments targeting urban blue-green areas (UBGA) such as parks, rivers, and green roofs to explore synergies between climate adaptation and biodiversity conservation. UBGA are essential for ecosystem services like temperature regulation, storm water management, and habitat provision, supporting urban resilience. However, many policies address these issues in isolation, leading to missed opportunities for synergy and creating inefficiencies. To investigate this, we conducted a literature-based analysis, generating matrices from over 1,500 studies to evaluate policy approaches for UBGA in relation to climate adaptation and biodiversity conservation. Findings reveal key overlaps and disparities in how these areas are valued in climate vs. biodiversity contexts, with some UBGA types and ecosystem services—such as “habitat and human health” in parks—emphasized more in biodiversity studies, while “habitat and water provision” is often linked to climate change literature concerning trees and urban forests. Our analysis further identifies policy synergies and trade-offs across UBGA types and ecosystem services, aiming to support policy makers in overcoming siloed approaches and addressing multi-issue challenges effectively. This paper contributes insights into the design of synergistic policy mixes for urban resilience, providing urban planners with strategies to balance the dual objectives of climate adaptation and biodiversity conservation.