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Earth System Governance

Governing global sustainability in a complex world

Book of Abstracts

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Universiteit Utrecht

Earth System Governance

Architectures of Earth System Governance

Participatory Consent in Blue Economy Decision-Making

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Conflicts over government decisions on economic development projects in the marine space are common and geographically widespread. Under the agency aspect of Earth System Governance, this paper focuses on how and what official decisions are reached for marine development projects. It considers governmental institutions functioning as agent trustees under a public trust model of ocean governance.[1] Legal recognition of the marine space as public property that is an asset of the public trust corpus, commonly owned by humankind as trust beneficiaries, can have significant effects in the process of marine project decision-making. The model envisions a legal framework under which grants of governance authority are in a fiduciary capacity, encompassing uncompromisable substantive and procedural governmental duties. It is proposed that one of these procedural duties is upholding a right of participatory consent by stakeholder beneficiaries before reaching significant decisions affecting trust assets, i.e. the marine space and its natural resources. Introduced is a preliminary rubric for decision-making protocol that follows the principle of Free, Prior and Informed Consent (FPIC). Under conventional usage, the FPIC principle is limited to indigenous rights agreements. Under this proposed ocean governance protocol, marine-based economic development projects incorporate all affected citizen stakeholders in the decision-making process by legal mandate. The author hypothesizes that embedding elements of the FPIC process of participatory consent into official approval procedures for marine development activities provides a template for mutually beneficial social licensing relationships between stakeholders. To test this hypothesis, preliminary results of empirical research with diverse stakeholders in two marine development industries—aquaculture in Tasmania, Australia and proposed offshore oil and gas drilling in proximity to Nova Scotia, Canada—will explore whether there is a positive relationship between levels of social license in diverse marine stakeholder relationships and the government decision-making processes utilized. Included is an early overview of the potential for and benefits of legal reform in ocean governance.

Decision Tools for Earth System Governance

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The rapid socioeconomic changes that have occurred in the last decades have led to increasing interdependencies between humans and the environment across regions, sectors and scales. As a result, complexity in governance has increased, with policies often having unintended consequences. Decision tools exist to help policy makers navigate some of the interdependencies arising from human-environment interactions within the earth system. For example, Integrated Assessment Models (IAMs) provide estimates of how driving factors induce a range of impacts across sectors and regions. IAMs capture these processes at high aggregation owing to a history of data scarcity and computational limitations as well as a stated desire to maintain transparency. As a result, IAMs cannot capture the surprising and non-linear changes we see in human-environment systems. There is a recent recognition of the need to capture these complexities in a new wave of Earth System Models. As these new generation of decision tools begin to emerge, it is critical to establish what the governance community regard as relevant dynamics to include in such models. In addition, how can these new generation of models be developed to increase engagement with governance end-users? In this paper, I sketch out the history of interaction between the governance community and previous generation of decision tools. I outline the directions being taken in developing a new generation of decision tools and how these new tools may be developed to meet the needs of governance end-users.

The Design and Diffusion of Carbon Markets: Implications for Applied Policy Research

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This paper discusses findings from and policy implications of a large-scale research project on the design and diffusion of emissions trading systems (ETS) around the world. Because that project was designed to contextualize our understanding of national and regional trading systems, the tenor of the case studies presented in this article find much more ETS design divergence than might be expected from theory on policy diffusion. Moreover, contrary to expectations of a more interconnected, global carbon market emerging, we find that emissions trading is increasingly becoming an "introverted" policy instrument, serving primarily as a national or regional policy tool. Our findings of divergence and introversion have sobering implications for the vision of a global carbon market. With this backdrop, we discuss three key implications for fundamental and applied policy research. First, we discuss the micro foundations of convergence and divergence. Why do we see convergence in some areas but divergence in others? And why is this issue area so different in the case of carbon markets from the rest of the diffusion literature, which has tended to see convergence? Second, we discuss processes of learning and adjustment. How to different jurisdictions process or construct information about the success or failure of policy in other jurisdictions? We examine this question by investigating reactions to perceived ETS "success" and "failure" in different jurisdictions. Third, we examine implications for linking of trading systems that have different rules and institutions. Here we discuss our finding in relation to all the ETS linking debates in the literature on carbon markets We argue that research needs to operate in the "real world" of political economy, where deep underlying forces, mainly within jurisdictions, act as strong intervening variables and have an impact on the actual design and implementation of trading systems. Insofar as one believes that these forces are robust and will not change even in the presence of international carbon markets, then they will be THE central issue when it comes to the globalization of carbon markets.

Security and Environmental Change: An Indian Perspective

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The contemporary discourse on environmental security, a concept that began to be discussed in the 1960s and 70s, has until recently struggled to attain an eminent position in the International Relations/security studies discourse. It has been torn between 'traditional' and 'non-traditional'; 'national' and 'human'; and 'global' and 'local'. This largely makes the act of theorising environmental security a critical or analytical exercise at the outset.

India is considered one of the most environmentally vulnerable countries in the world with adverse implications for all major sectors. Environmental issues form an important part of academic and policy discussions in India, but environmental change is not securitised according to conventional definitions of securitisation. The security establishment does not perceive environmental change as an 'existing' security threat, although concerns exist regarding their probable effects in the 'future'. There are a growing number of references to the relevance of environmental issues in security discourses (both academic and policy) in recent times, but these are at best a representation of existing perspectives based on discourse analysis (mainly of the West) and not entirely policy-oriented or directed towards integration with security strategy – like the incorporation of environmental security in the Joint Doctrine Indian Armed Forces 2017. The reasons for non-securitisation or "partial securitisation" include *theoretical*, *academic*, *constitutional*, *geopolitical* and *strategic* factors. For instance, India has steadfastly opposed introduction of security implications of climate change at the United Nations Security Council (UNSC) on several grounds including differences with the Western model of securitisation. The Western discourse on environmental security is dominated mainly by resource scarcity, environment-conflict nexus (intra-state, inter-ethnic and inter-state rivalries) and now environmental risk assessment, while the Indian thought process on the environment encompasses issues such as socio-economic justice (distribution of resources, poverty alleviation/reduction), development (for better adaptation to environmental problems) and socio-economic viability/sustainability. In this context, the paper will

explore various theoretical approaches and emerging debates on environmental security from both global and Indian perspectives. It will analyse differing perspectives on and responses to challenges, risks and threats posed by environmental change to India's security, which will include references to regional (South Asian) security dynamics. The paper will then delve into the various reasons for non-securitisation or "partial securitisation" of environmental change in India. Finally, it will provide a futuristic perspective on environment (and environmental change) as a factor in the security discourse and strategy of the country, specifically in policy terms.

Urban Infrastructure Regimes: Uncovering the Structural Barriers to Upscaling Nature-based Solutions

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One of the key challenges of our society as defined by the UN's Sustainable Development Goals is the sustainability of cities and communities. Nature-based solutions (NBS), such as green roofs, urban agriculture or natural urban drainage systems, are a specific category of interventions that contribute to sustainable cities. NBS employ natural elements to enhance urban resilience and regeneration, and aim to address social, economic and ecological challenges simultaneously. They are increasingly recognised in policy and research as promising innovations with potential to wider urban transformation. However, NBS initiatives appear notoriously difficult to scale up. Drawing on insights from transition studies, NBS can be conceptualised as a 'green niche' that challenges incumbent 'urban infrastructure regimes' – the configurations of institutions, techniques and materials that shape urban development processes. The potential for scaling up niches is structured by regime conditions. We construct a conceptual framework of urban infrastructure regimes to analyse which structural conditions obstruct or enable NBS upscaling and through what mechanisms. As an innovative alternative to engineered or 'grey' infrastructures, the uptake of NBS is mostly influenced by the regulatory, financial and urban development domains. We hypothesize that the urban infrastructure regime is a patchwork of different interconnected domains. Previous research acknowledges that regimes are socio-spatially embedded, which explains spatial variation in niche development. Urban infrastructure regimes can therefore be conceptualized as place-specific assemblages of institutions rooted in diverse domains and functioning at different spatial scales, yet collected around the shared objective of giving shape to urban fabric and function, by structuring the development of innovative interventions such as NBS. Additionally, regimes are also conceptualised as constituted by several interlinked dimensions, e.g. industrial organisation, knowledge paradigms or policies. The alignment of niches to these regime dimensions enables upscaling, i.e. if NBS logics and structures on these dimensions 'fit' with those of the urban infrastructure regime, they will be more easily adopted. Our framework of urban infrastructure regimes explores how space-specific conditions structure urban development processes. The utility of the framework is illustrated with NBS examples from Utrecht (The Netherlands) and Edinburgh (United Kingdom), drawing on data and case studies from the Horizon2020 NATURVATION project. It provides insights into the dynamics of and potential for NBS upscaling in an urban environment, while giving an empirical account of the spatial variety of configurations of the urban infrastructure regime, thereby making spatiality more explicit in the study of transitions.

Governance for Achieving the Sustainable Development Goals (SDGs): How Important Are Participation, Adaptive Governance, Reflexivity, Coherence and Democratic Institutions?

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In 2015, member states of the United Nations (UN) agreed on the 2030 Agenda for Sustainable Development. With its 17 Sustainable Development Goals (SDGs) and 169 targets, the Agenda demonstrates strong international commitment to achieve sustainable development in its social, economic and environmental dimension. To this end, all states are called upon to integrate the SDGs into their national sustainability and development plans. However, the implementation of the Agenda poses challenges for different actors at different levels: The complexity and interrelation

of the SDGs requires holistic, integrated and coherent policy-making, where decision-making, implementation and monitoring involve actors from the public and private sector as well as civil society. Many agree that governance is of utmost importance to cope with these challenges. Despite years of academic debate, governance – and sustainability governance in particular – remains a contested concept. Although individual aspects of governance such as participation, reflexivity or coherence are key components of the sustainability governance discourse, empirical studies mostly analyse them in isolation. Furthermore, these studies mainly follow a case study approach, while a systematic cross-country analysis still represents a research gap. Against this backdrop, the article examines the correlation between different aspects of governance (such as participation, adaptive governance, reflexivity, coordination and coherence, and democratic institutions) and the achievement of each SDG on a national level. Specifically, we will conduct a cross-country analysis among 35 OECD countries and additional 6 European Union member states (Non-OECD countries). By doing so, we aim at deriving insights about which aspects of governance are particularly important for achieving sustainable development in its different dimensions. To measure the level of achievement for each individual SDG, we draw on official empirical data from the UN Global SDG Indicators Database, the OECD and other UN organizations. We will utilize the Sustainable Governance Indicators (SGI) published by the Bertelsmann Stiftung to ensure comparability of governance indicators on a national level. The selected SGI rely on qualitative assessments by country experts that undergo a multistage peer review. The article contributes to examining criteria for successful sustainability governance and helps investigate the importance of distinct governance features in different country contexts. Examining which governance mechanisms are vital for achieving the SDGs in different political, geographical and cultural contexts is of great scientific and sociopolitical interest. Finally, we aim at contributing to the debate about the conceptualization of sustainability governance, particularly in the context of the 2030 Agenda and the SDGs.

The Governance Conditions for Adaptive Fresh Water Management in the Vietnamese Mekong Delta

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The Vietnamese Mekong Delta is a region of utmost importance to the Vietnam's national food security. However, the availability of the freshwater resources that have sustained agricultural productivities in the Delta is currently under threats due to global climate change, rising sea level, and upstream and *in situ* development activities. Problems affecting freshwater resources in the VMD are interrelated and include dry season salinity intrusion, surface water pollution, and over-exploitation of groundwater. Considering the growing complexities and unpredictability of freshwater problems in the VMD, adaptive management may be a promising strategy for sustaining the region's freshwater resources. In the past decades, adaptive management has emerged as a new paradigm and has been strongly advocated as an appropriate approach to address water issue. The ability to deal with uncertainties is an essential requirement for sustainable water management in times of global climate change. An adaptive management strategy, however, must be embedded in and supported by the existing water governance regime. So far, studies exploring water governance issues in the VMD are limited. Existing research has shed light on the legal framework for water management, institutional structures and prominent actors, irrigation policy development. None of these studies has comprehensively investigated the prospects for adaptive water management in this region. Our study, therefore, addresses this knowledge gap by identifying the extent to which the freshwater governance regime in the VMD exhibits conditions that are likely to promote adaptive management for coping with growing future uncertainties. By doing this, our study also provides a comprehensive overview of this region's water governance regime that can guide more in-depth future research. First we design a normative framework consisting of five dimensions (governance structure, leadership, knowledge and information management, policy development and implementation and financial management) which are further specified into 17 variables and 30 assessment criteria. Next we conduct an assessment using primary data and qualitative analysis to identify the extent to which the governance regime in this region exhibits conditions that are likely to promote adaptive freshwater management. The result of our assessment indicates that those conditions are only partially present. We, therefore, conclude that the prospects for adaptive water management

in this region are still limited with many challenges standing in the way. Based on the findings, we make specific recommendations for policy interventions and future research.

Variety of Private Sustainability Standards: a Club Theory Approach

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This research investigates how various “sponsors” of private sustainability standards are associated with differences in standards’ design. Sponsors are actors who initiate standards. While many articles have been written on the important role of private sustainability standards, little research has been done on understanding how different agents in the society (private firms, civil society organizations) with different interests, are incentivized to set the standards. It is important to realize here, that existing research tends to look at industry’s private sustainability standards holistically and from an aggregate level. So far, the differences between industry standards are undervalued. My interviews with standard setters in the flower sector --- which is an important African export product --- showed that there are startlingly different incentives and motivations for producers setting standards; relative to retailers or civil society organizations starting their own standard. Different motivations have influenced preferences on the stringency of the requirements and the desire to keep the standard exclusive or inclusive. Retailers and producers obviously operate at different levels of the value chain, but a more important difference appeared to be the difference between those protecting a brand name and those producing ‘generic’ products. For example, the faith (reputation) of an average Kenyan rose farm is usually associated with the faith of the group that the farm belongs to. The farm has its reputation in common with the other farms in the sector. This creates different incentives for the firms. Therefore, the behaviour of the firms - within the group - can be seen as more cooperative and collective with positive synergies instead of antagonistic. This difference is reflected in the standards they set. In general, the relationship among reputable brands is different and more competitive. For example, a negative announcement (or a scandal) for Nike, may have a positive impact on Adidas, that is likely to see its sales raising. Similarly, sales at Coop might increase after a negative announcement for Migros. The emergence and shape of sustainability standards, is therefore expected to be different, depending on the role of brands in the sector. How these strategic considerations impact the shape and design of the standard, has to my knowledge not been researched before. This project will build a theoretical framework, based on the “club theory” approach of Prakash and Potoski (2007) as well as inspired by my observations in the flower sector, and will test these expectations on three sectors (bananas, coffee, and cotton).

The Fragmented Nature of International Ocean Acidification Governance

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Ocean acidification is a complex global issue, resulting primarily from the emission of anthropogenic carbon dioxide and exacerbated by a myriad of local stressors. Its impacts are present across many scales with biological and physiological impacts likely to create flow on effects across ecosystems and global processes. Its consequences are not limited by geography and are felt in national jurisdictions and areas of the global commons. Impacts are not experienced evenly, sometimes with those least responsible the most vulnerable. Its effects have implications for biodiversity, economic stability and sustainable development and its solutions are intimately tied with other complex global problems, such as climate change. Ocean acidification poses a substantial threat to the ocean, marine wildlife and the goods and services they provide and, in turn, presents a great regulatory challenge across all scales of governance. In the international space ocean acidification is of relevance to many treaties and yet, does not fall neatly within the mandate of any causing it to sit “within a very complex institutional landscape, at a rather cracked interface between the climate, biodiversity and oceans regimes” (Kim 2012, p.257). In addition, ocean acidification is not the primary focus of any international instrument or stand-alone agreement, nor does there appear to be any attempt to create a comprehensive treaty to respond to this issue. Yet, there are a number of international institutions, including treaty

bodies and specialised UN agencies that have expressed an interest in ocean acidification and have begun to initiate an array of relevant activities. With this is mind this paper offers a review of these responses and an examination of the governance architecture they provide. This research finds that there are over two-dozen international actors currently active around the issue of ocean acidification in some capacity. The vast majority of these are engaged in knowledge production or awareness raising and in these areas cooperative fragmentation appears to exist. Very few actors, however, are pursuing normative activities in the form of rule-making or implementation and the scope of these existing activities is very limited in their ability to actually address ocean acidification in any meaningful way. Thus, this paper asks whether ocean acidification should be deemed a case of non-governance.

Challenges for Polycentric Governance of Water and Forests in Chile: Critical Review in the Context of the Chile´s Nationally Determined Contribution

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At an international level, initiatives have been implemented to promote a more sustainable society-nature relationship. Examples of this are the multilateral agreements on climate change and plans which are manifestations of new forms of "hybrid" and / or "polycentric" environmental governance that involves multiple actors, scales and dynamics. In September 2015, in the context of the Paris Agreement, the State of Chile presented its intended nationally determined contribution (INDC) to the UN, indicating that Chile was committed to adapt to afforestation of 100,000 hectares, subject to the extension of the Decree with Force of Law (DFL) No. 701 and a new Forestry Development Law was approved. This commitment seems to ignore that DFL No. 701 - in force between 1974 and 2012 - established incentives for forestry activity wish resulted in the loss of 19% of the native forest coverage of the country, mainly because of its replacement by monoculture plantations. Along with the effects on ecological biodiversity, the loss of native forest affects eco systemic services such as the provision of water to basins. It is estimated that an increase of 10% in native forest coverage increases the basin's flow by 10.4%, while a 10% increase in the coverage of monoculture plantations reduces it by 20.4%. This situation directly affects the rural population, which depends on the availability of water in the riverbeds to provide drinking water. Of the total rural population of Chile, 25% live without potable water services, which is why they are currently supplied with water by tanker trucks. The largest expense for this concept is concentrated precisely in the regions that have the highest rate of forest plantation. Although academia and NGOs have already warned of the negative consequences of the application of DFL No. 701, the State insists on extending its effects, thus favoring forest entrepreneurs. Faced with this scenario, the question arises as to which agents actually act in the design and promotion of these measures, and in what way a governance architecture can be designed that integrates all the agents involved in the governance of water and the forest in Chile in a context of global environmental governance in order to promote economically, socially and environmentally sustainable outcomes?

Decarbonisation and Polycentrism: The Politics of Transformation

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Decarbonization implies attacking climate change at its fundamental core—global reliance on fossil energy—and it is a daunting task as overlapping technical, political, social and economic dynamics generate continuing and taken-for-granted use of fossil energy. A polycentric governance system would appear to an ideal approach for decarbonization because fossil fuel dependence is a multi-dimensional and multilevel phenomenon, existing simultaneously locally and globally. The response to climate change also appears ripe for a polycentric governance approach to decarbonisation – in the sense of that there are many diverse locations of authority arranged largely non-hierarchically. The global response to climate change encompasses both multilateral governance and a broad array of activity outside the international negotiations. The global response to climate change thus already includes diverse activities at multiple levels of politics, engaging a wide array of actors that are (ostensibly) seeking to address climate change and pursue

decarbonization by: taking action in and among cities, subnational governments and individual countries; seeking to alter market systems and corporate behaviour; and changing the range of technologies available to individuals and societies. There are now truly multiple centres of authoritative climate action. However, what we have now is a weak or nascent polycentric governance system for decarbonization. The coordination, interaction, and interdependence of initiatives characteristic of polycentric systems are not yet in evidence. Decarbonization initiatives emerged in specific places with specific goals and do not necessarily have common purpose (like managing a common pool resource). If the goal is to *build* a polycentric governance system from the diverse, multilevel initiatives that have emerged in the past two decades, we contend that this project, and analysis of decarbonization, must begin not with the collective goal, but with an understanding of the politics of individual decarbonization initiatives *and* the way that they are linking and self-organizing (nascently) to better understand the possibilities for and potential of polycentric governance of decarbonization. In this paper we discuss a framework for analyzing the politics and trajectories of individual decarbonization initiatives that provides a way to understand how extant decarbonization initiatives may be the constitutive elements of an emerging polycentric governance system. We also consider the normative implications and potential effectiveness of moving towards a more polycentric governance system for decarbonization.

Harnessing the Market: Trading in Carbon Allowances

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This paper describes and evaluates the dynamically evolving web of carbon markets at various government levels around the globe – a web which can be conceived of as polycentric in nature. Individual but interdependent carbon markets have developed in many jurisdictions since the late 1990s. The Kyoto Protocol and the Paris Agreement provide an overarching umbrella for a wide range of designs, but international agreements are not the only factor contributing to the inception, design and diffusion of carbon markets. Individual countries, subnational entities and the European Union (EU) have taken initiatives in response to various domestic and international dynamics. No existing carbon market is an exact replica of another: each has been tailored to domestic preferences, contexts and politics.. The adoption and proliferation of ETSs is one of the illustrations of the emergence of polycentric structures used in Elinor Ostrom's (2010) pioneering article on coping with collective action and global environmental change. Our paper adds a more systematic discussion of the polycentric structure of carbon markets. Since the late 1990s, carbon markets have developed at many levels of governance, ranging from the municipal and subnational to the supranational and international. The momentum and upward trend in the proliferation of ETSs makes harnessing the market in the name of climate mitigation an increasingly important element of global climate governance. Against this backdrop, our paper begins by describing the origins of the current global landscape of carbon markets. Both local and international dynamics have contributed to the polycentric structure in evidence today. Second, we conceptualise the interaction and linkage among ETSs today. Various ties can be identified, from formal market linkages to informal exchanges of lessons learned. Third, we highlight key carbon market design challenges and opportunities, including those related to a polycentric architecture. Here we discuss the interaction with other climate policies and carbon price management. We conclude with some suggestions for future research on harnessing the market for climate-policy purposes, including the role of polycentric governance.

The Evolving Architecture of Intergovernmental Biodiversity Governance

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The international politics of biodiversity are now known to encompass several international institutions. This phenomenon has been recently analysed as a "regime complex". While the biodiversity regime complex is one of the most established one, studies have tended to favour the qualitative analysis of its core elements (the Convention on biological diversity (CBD), CITES, etc.), instead of capturing the overall architecture of intergovernmental biodiversity

governance. To fill this gap, this paper investigates the external and internal links that the core institution of the biodiversity regime complex (the CBD) has drawn and is drawing with other intergovernmental institutions. The external links are studied by analysing all the intergovernmental institutions that asked and obtained an observer status to the CBD negotiations. The internal links are studied by analysing all the partnerships that the CBD has developed with other intergovernmental organisations. After presenting general statistics on both observers and partnerships over the period 1992-2018, the communication comments qualitatively the characteristics of such links. Analysing the links helps us identify the elements of the international architecture on biodiversity that could be adjusted: new links to create, reinforce or soften. This helps assess in which ways biodiversity governance could be transformed to improve its efficiency. The paper importantly contributes to the architecture debate by using the literature on regime complexity and fragmentation. It focuses on a relatively under-researched part of global environmental governance, namely the biodiversity regime complex. Such a mapping exercise of the relationships between the main regimes is needed for better global governance.

Explaining Variation in Institutional Structure across Global Environmental Regime Complexes

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Research in the tradition of neo-liberal institutionalism has recently started to analyze regime complexes, loosely coupled sets of institutions within one issue area, rather than focusing on individual regimes or dyadic interlinkages. Discussion to date have been preoccupied with conceptualizations and ideal-type assessments of regime complexes and their properties, for example with the question whether regime complexes are institutionally fragmented or polycentric. What is missing are theory-based explanations for the observed variation in regime complexes across issue areas. To address this research gap, this paper tests four explanations for institutional variation: an explanation evolving around the idea of problem-structure, i.e. that specific properties of the governance challenge at hand (e.g. climate change) informs observed institutional structures set-up to address the very same problem; second, a political economy explanation that assumes similar structural features (e.g. distribution of winners and losers) to inform the institutional structure; third, an explanation that starts from institutional theory, namely the idea of path-dependency; finally, an explanation that assumes that framing of the problem and available solutions at hand will influence observed institutional structures. These theories are tested on three policy domains: climate change; forestry, and fisheries using new empirical data gathered in the CONNECT project (www.fragmentation.eu).

Legitimacy and Accountability in Polycentric Climate Governance: Challenges to Democracy in a Contested Terrain

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Polycentricity is characterised by institutional fragmentation as well as a new quality of interdependence where non-state and state actors are both regulators and regulated. This complexity raises new questions for democratic governance beyond the nation state: What is the state of legitimacy and accountability in the emergent polycentric system of climate governance where the state is not the primary source of authority? And how can the legitimacy and accountability of the system or its parts be enhanced? To address these questions, we first develop the argument that certain legitimacy and accountability challenges are inherent to polycentricity in general, with the policy field of climate change as a prime example. We discuss these challenges for both normative and sociological legitimacy and different forms of accountability (external, internal, networked). We then illustrate an analytical research agenda on accountability and legitimacy dynamics for two sub-sets of polycentric climate governance: corporate climate action and minilateral climate clubs. For the first domain, we largely find limited normative legitimacy. Dominated by international actors and rational scientific understandings of sustainability, initiatives often exclude local discourses and critical voices. At the same time, the sociological legitimacy of private environmental governance remains fragile and in

flux. Internal challenges arise as industry and civil society actors struggle over influence and policy outcomes, sometimes destabilising multi-stakeholder processes from within. External challenges include the legitimation politics surrounding creation of industry-sponsored competitor programs. Likewise, we observe a considerable lack of normative legitimacy for the early days of climate minilateralism, i.e. roughly between 2000 and the Copenhagen summit 2009. This picture only changed with a new wave of climate minilateralism that broke after Copenhagen. This wave not only brought clubs particularly targeted to developing countries, but also a certain opening of some of the older minilateral arrangements. Still, the sociological legitimacy of climate minilateralism remains low, also due to the sheer ignorance of legitimacy audiences about most of these clubs. We conclude our paper with a short outlook on how to address legitimacy and accountability gaps in the light of the renewed role of the UNFCCC after Paris. We acknowledge that there is no 'one-size-fits-all' approach to strengthen the legitimacy and accountability of the diverse arrangements of polycentric governance. The task should be to pragmatically identify fitting measures for every particular context of transnational climate governance.

Collaborative Governance Architectures in Dutch Flood Risk Management: A Historical Analysis

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The safety standards for flood protection in the Netherlands have been revised recently. It is expected that all major flood-protection structures will have to be reinforced to meet the new standards. The Dutch Flood Protection Programme aims at accomplishing this task through innovative integrated projects such as construction of multi-functional flood defenses. In these projects flood safety purposes will be combined with spatial planning, nature development or other sectoral objectives. Therefore, implementation of dike reinforcement projects requires early involvement and collaboration between public and private sectors, different governmental actors and agencies. The development and implementation of such integrated projects has been an issue in Dutch flood risk management since long. Therefore, this article analyses how cross-sector collaboration within flood risk governance in the Netherlands has evolved over time, and how this development can be explained. The integrative framework for collaborative governance is applied as an analytical tool to map external factors framing possibilities as well as constraints for cross-sector collaboration in Dutch flood risk domain. Supported by an extensive document and literature analysis, the paper offers insights on how the *system context* and different *drivers* changing over time either promoted or hindered cross-sector collaboration between flood protection sector, urban planning, nature conservation or any other sector involved in flood risk governance. The system context refers to the multi-layered and interrelated suite of conditions that influence the formation and performance of complex governance systems, such as collaborative governance regimes, whereas the drivers initiate and enable the overall process of collaboration. In addition, by applying a method of process tracing we identify a causal and chronological chain of events shaping cross-sectoral interaction in Dutch flood risk management. Our results indicate that in order to evaluate the performance of complex governance systems, it is important to firstly study the system context that shapes it. Clear understanding of the system conditions and drivers for collaboration gives insight into the possibilities of and constraints for effective performance of complex governance architectures. The performance of the governance system is affected by the system conditions, while at the same time the governance system can also change the system conditions. Our results show that the sequence of changes within the system conditions and drivers over time affect how cross-sector interaction in Dutch flood risk governance system happens now. Moreover, we have traced the potential of this governance system to shape and change the system context.

Managing Institutional Complexity in Geoengineering Governance

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This paper approaches institutional complexity in global geoengineering governance from the perspective of interplay management, that is, purposive attempts at realizing synergies or mitigating conflicts between international institutions. While interplay management has become a key concept in the broader debate on institutional complexity and –fragmentation, few empirical studies analyze its practical relevance from an actor-centered perspective. Focusing on the European Union (EU), we connect the analysis of interplay management to the existing scholarship on EU performance in international negotiations. Specifically, we assess the conditions under which the EU is able to shape institutional interactions in geoengineering governance in line with its policy objectives. We focus on dyadic interactions between the Convention on Biological Diversity (CBD), the London Convention / London Protocol and the Paris Agreement on Climate Change. We analyze the effectiveness of EU interplay management in regards to the respective geoengineering-related policy choices and design elements under those institutions: CBD Decision X/33, which invites parties not to undertake or permit geoengineering activities in the absence of scientific- and regulatory oversight; the London Convention's Assessment Framework and the London Protocol's 2013 marine geoengineering amendment; as well as Article 4 of the Paris Agreement, which affirms parties' commitment to net-zero greenhouse gas emissions by mid-century and thus encourages the use of Negative Emissions Technologies. Drawing on a range of primary sources, many of which are not in the public domain so far, our initial results suggest that a) EU effectiveness is undermined by the need to accommodate diverging member state interests in regards to geoengineering-related research and development; b) EU effectiveness is similarly constrained where international negotiation partners dispute the very existence of institutional interplay and thus the necessity of interplay management; and c) EU effectiveness is high where pre-existing international law gives clear precedent for management decisions.

Twenty Years of Regional Governance in Mountain Areas: Key Lessons and Challenges

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In this presentation we outline the findings in a multi-author paper that provides an up-to-date synthesis of core lessons and challenges concerning governance arrangements for international mountain regions around the world. During the last twenty years, such arrangements have spread from the European Alps to many parts of the world. With the involvement of a broad variety of local, national, and international actors, institution building at the scale of mountain regions has aimed at making progress towards implementing sustainable development. While recognition of the spatially patterned repercussions of human-induced climate change increasingly underline the importance of regional action and adaptation, governance for mountain regions faces many challenges. On the one hand, the delimitation of mountain regions is typically contested and rarely commensurate with state boundaries, which complicates consensus-building at the national and international level. On the other hand, many problems to be addressed in mountain regions are often subject to already existing and potentially competing global or regional agreements, including for biodiversity, climate, desertification, water management, disaster risk reduction and trade; moreover, setting the scope and depth of governance arrangements for mountain regions frequently faces constraints set by the dynamics of broader regional integration efforts. These challenges underline how governing in mountain regions has to navigate a complex architecture: multi-level, multi-actor, and multi-sector environment. The aim of this paper is to shed light on these challenges, provide a systematic comparison of regional mountain initiatives, and identify a number of specific recommendations for policy makers. The paper will assess the origins, evolution, and institutional performance of mountain initiatives; identify key lessons learned from implementing sustainable mountain development; and outline the principal challenges ahead, particularly in light of Agenda 2030 and other global policy arenas. It tentatively concludes that regional mountain areas are justifiably regarded as laboratories for sustainable development and that existing mountain initiatives point to promising pathways for integrating responses to global environmental change.

Governing Tropical Agriculture through Voluntary Standards: A Mapping Analysis

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As a new mode of governance, voluntary sustainability standards (VSS) have proliferated in recent years. Many of these programs, focus on the production of agricultural commodities in the global south, such as coffee, oil palm, and tea. Partly, this can be explained by the heightened political controversy surrounding the sustainability impact of tropical agriculture. As a low cost option and unconstrained by state borders, VSS are an attractive policy instruments to govern global commodity chains. However, the potential of voluntary standards to create win-win situations by reconciling environmental, social, and economic policy objectives remains uncertain. In particular, the implications of VSS for developing country producers is a topic of much debate. Often mentioned problems include the growing multiplicity of standards, their lack of transparency, unfair cost sharing practices, and insufficient capacity-building. This paper uses a new data set to shed some light on these issues. Examining global and domestic diffusion trends, our analysis suggests that the population of voluntary standards is reaching saturation and that fragmented VSS landscapes are a problem in some developing country markets but not in others. Investigating the institutional design of voluntary agricultural standards, our analysis lends support to concerns about unfair cost sharing practices and insufficient support mechanisms.

Next Generation Governance Architectures for Sustainable Global Value Chains

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Global value chains are embedded in polycentric governance systems, characterized by high levels of uncertainty, complexity and volatility; increasing cross-sectoral and cross-scale interdependencies and growing institutional interplay between the socio-cultural and political contexts of producing and consuming states. Traditional state-centred governance architectures have failed to effectively tackle the sustainability problems of these chains. To fill this 'institutional void', industries and NGOs established a series of global partnerships that designed voluntary standards and certification schemes for global commodities. Nowadays, these partnerships such as the Round Table on Sustainable Palm Oil (RSPO), the Marine and Aquaculture Stewardship Councils (MSC/ASC) or the Forest Stewardship Council (FSC), are widely considered as best practices. They bring together key market players (producers, processors, buyers and retailers) and international non-governmental organisations (NGOs) in networked arrangements for sustainable Global Value Chains and contribute to problem-solving of both environmental and social issues across different governance scales.

However, despite their relative success, these partnerships face some serious challenges, which if not adequately addressed threaten their overall legitimacy and effectiveness, such as losing credibility due to unproven performance; the necessity to improve transparency and traceability of products; the search for synergy with public sustainability policies; and their limitations in addressing land conflicts and smallholder concerns. This paper argues that a 'next generation' governance architectures for sustainable global value chains is required, that successfully addresses these challenges.It concludes that all key players recognize these challenges and develop abundant initiatives to learn and adapt. Initiatives vary from landscape certification and public standards to advanced traceability systems and harmonizing programs. Most innovations, however, are constrained by the boundaries of the current system and its underlying assumptions. The ample investments in an infrastructure of standards, certification and traceability systems have not only lead to a fertile breeding ground for new certification programs, but have also resulted in a path dependencies that likely constrain more radical transformations of the governance architecture.

Blue Growth and Arctic Ocean Governance Architecture

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Unevenly and gradually, the representation of the economic future of the Arctic is changing. An enthusiasm for the ocean's broader potential riches is slowly replacing the notion of the Arctic as a petroleum and minerals treasure chest, which was a framing that fuelled much of the growth of circumpolar international cooperation and national-level resource allocation to Arctic affairs since the end of the Cold War. There are many questions remaining about how such blue growth will be governed nationally and internationally/regionally in the Arctic and in the world's oceans more broadly. In this paper, I present aspects of my research on Arctic Ocean diplomacy and security dynamics that may shed light on broader questions of ocean governance and emerging maritime economies.The paper first makes an argument for the importance of considering how divergent aspects of Arctic politics, which would often be handled by different analytical communities, are part of a broader regional governance puzzle . Often, studies of cooperation/multilateralism/diplomacy are divorced from studies of conflict/rivalry dynamics in global relations. This stark division probably says more about sub-disciplinary divisions in international relations and political science as disciplines than the empirical contours of global governance. Rather, what we see in the Arctic is a longstanding, slowly growing portfolio of international cooperation in a region that is marked by significant security tensions, including displays of military strength, active politics of mutual deterrence and other behaviours associated with a regional/global security rivalry (between Russia and NATO). I argue that the main repertoire of politics in the region is one of cooperation *in* conflict (rather than regional actors making a choice for cooperation *or* conflict). I further argue that there are some specific sets of interests and practices that undergird the viability of this ambiguous yet firm intersubjective agreement about how to cooperate in conflict in the Arctic. This first point ties into 'architectures of earth system governance'. Secondly, the paper will zoom in one set of non-state actors actively engaged in this Arctic Ocean foreign policy repertoire of expanding cooperation in rivalry/distrust, specifically the role of the private sector. How have corporate actor influenced Arctic Ocean governance – and what might that tell us about how to think of the role of business in broader ocean governance questions?

Analysing the Nexus Between Global Governance Domains: The Case of Climate and Energy

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Notwithstanding the theoretical and empirical achievements of the scholarship on institutional complexity, it exhibits at least three major research gaps. First, it has mostly provided insights into dyadic relationships between two international regimes or public institutions composed by national governments, while placing less emphasis on broader governance interactions that also include hybrid, private and informal institutions. Second, encompassing attempts to analyze a whole nexus between two domains are few and almost all start from either one of the two policy silos. Third, there are no theory-guided systematic comparative analyses about how exactly complexity affects the effectiveness and legitimacy of individual institutions or entire institutional complexes, or how certain actors may benefit or be disadvantaged in a complex governance landscape.

Against this backdrop, the main objectives of this paper are: first, to introduce a novel analytical framework for examining the institutional nexus between two policy domains; and, second, to apply this framework to the global governance nexus between climate change and energy, thereby presenting findings of a major research project. We introduce the main components of our analytical framework in four steps that build on each other. (1) Inventory: We present our approach to create a dataset covering 108 institutions that govern the climate-energy nexus and to classify them according to major types of governance themes and functions they address. (2) Systems perspective: Building on the typology from our first step, we identify the distribution of institutions in the climate-energy nexus along these sub-fields or primary themes and governance functions. (3) Interactions perspective: We assess to what extent the respective institutions cooperate, co-exist or conflict with respect to their consistency (in terms of governance functions and mechanisms) and their management (in terms of deliberate attempts to manage the institutional overlap). We will apply this part of the framework to three sub-fields in the climate-energy nexus: renewable energy, fossil fuel subsidy

reform and carbon pricing. We examine a set of hypotheses to analyze whether the observed synergies and conflicts can be linked to the position of the policy fields in the climate-energy nexus or to scope conditions underlying the constellation of actors (e.g. problem and normative structures). (4) Sociological perspective: We establish a set of analytical tools to scrutinize consequences of a fragmented governance landscape on the understandings of key groups of stakeholders. We capture effects on their legitimacy and effectiveness perceptions of institutional authority in such a governance nexus.

Renewable Energy Transition Tensions in the Global South: Interactions between India and China in the UNFCCC and WTO and Implications for Global Climate Change Governance

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The biggest collective action problem facing nation-states today is climate change governance. This becomes even more complicated when there are different economic and political groupings within the world system that weaken the international climate change negotiations. Research on nation-state groupings has largely focused on the North-South divide that has stalled a successful governance framework. However, as the global climate change governance system transitioned from a top-down to a more bottom-up approach of emission control post the Copenhagen Accord in 2009 and with the coming in of the Paris Deal in 2015, there has been a strong division in the Global South especially between two strong international players-India and China. Both the countries have aggressively adopted renewable energy transition policies domestically resulting in a growing competition and tension between the two regionally and internationally. The tensions are pertinent to renewable energy resource access and dependence especially hydro and solar technology respectively. Existing World Trade Organization (WTO) regime on renewable energy trade further complicates this tension between India and China. Literature on the intersections between multilateral environmental governance structures and other non-environmental regimes like the WTO have primarily focused on a Global North perspective of renewable energy trade conflicts specifically in relation to the Kyoto Protocol. Most of this literature calls for a rethinking of functionalities and the role of power and authority between the WTO and United Nations Framework Convention on Climate Change (UNFCCC) for better environmental governance outcomes. However, there is no literature that focuses on the interactions of the Global South within the WTO and the UNFCCC post the adoption of a new governance structure in 2015. As India and China try to maximize the best possible energy transition path, the growing tensions between them have implications on co-operation among the Global South for a just climate change outcome and on the overall international climate change governance framework. The main purpose of this paper is to highlight renewable energy transition tensions between the Global South and ambitions in the UNFCCC negotiations inter-linked with complex governance architectures in non-environmental domains like the WTO. The paper will showcase a framework of authority and interactions within the WTO and spillover effects onto the UNFCCC as climate change governance regimes have changed post 2015 along with the inter-play of power dynamics amongst the two most important nation-states of Global South with implications for the international climate change governance regime.

Fragmentation in the Climate Change Negotiations: Taking Stock of the Evolving Coalition Dynamics

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The increasing fragmentation and institutional complexity of global environmental governance is mirrored by increasing fragmentation *within* individual institutions. The global negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) are a clear example of growing fragmentation and complexity, as the increasing number of partially overlapping coalitions and negotiation groups indicate. In this paper, we scrutinize this changing landscape of climate coalitions within the UNFCCC. While bargaining coalitions are a fundamental feature of multilateral negotiations and have historically been a key feature of the climate negotiations, the number of coalitions has increased dramatically since the inception of the negotiations. Despite their importance, the changing coalition

dynamics in the climate negotiations have not yet been addressed comprehensively in the negotiation or climate literatures. We still lack a broad overview of the coalitions that have emerged over time as well as an understanding of the causes and effects of their emergence. We start to address this gap by taking stock of the evolution of coalitions in the global climate negotiations, and by discussing its possible implications for cooperation in the climate change negotiations. Our analysis uses UNFCCC documents and other secondary sources, notably the *Earth Negotiation Bulletin*, as well as academic and grey literature. We map all coalitions that have spoken as a group in the climate negotiations since COP1 in 1995. This mapping indicates that we can distinguish two "phases" of coalitions in the climate negotiations, as a large number of coalitions became active after 2005, when the Kyoto Protocol entered into force and discussions on a successor agreement started. These "new" coalitions almost exclusively emerged within the group of developing countries; as a result, most developing countries are on average active in four different coalitions, with some participating in seven or more different coalitions. These multiple memberships may on the one hand help forge new partnerships and find support for one's own position. On the other hand, it is also plausible that increasing coordination costs and potential conflicts among coalitions spreads limited resources even thinner and hinders countries to effectively engage in the negotiations. With this paper, we set the frame for the overall panel. We contribute to discussions about the increasing institutional complexity of global environmental governance and in particular seek to draw attention to increasing complexity and fragmentation *within* individual institutions, such as the climate negotiations.

Cooperation in the Climate Change Negotiations: A Network Approach

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Why do states form ties with some states, but not with others? In this paper, I propose that certain characteristics induce states to coordinate their positions and to make joint statements. For example, small, relatively powerless states with only limited domestic greenhouse gas emissions might want to increase the pressure on big, powerful emitters by showing them that they act in unity. This is clearly the case when Tuvalu bonds up with other small island states such as Micronesia or Barbados. On the other hand powerful states are attractive partners. Hence, when interests on certain issues overlap, smaller countries have an incentive to issue joint statements with these players and thus amplify their opinion. For this reason, countries like the US, China, or India tend to form a greater number of ties than smaller states. Similar interests, or an increased level of prominence, can stem from various country characteristics such as democratic status, vulnerability to climate change impacts, integration into the international community, or cultural similarity. In this paper, hypotheses regarding these attributes are proposed and tested on the network formed through joint statements. In addition, I also test whether working together in official negotiation groups also leads countries to increase their bilateral cooperation.Making use of ERGMs I explore coordination of bargaining positions within the UNFCCC context and examine on the one hand which characteristics increase a single country's likelihood to form ties, and on the other hand whether shared characteristics enhance the probability of position coordination among dyads. Conventional approaches to analyze international relations and cooperation, such as neorealism and liberalism, focus on actors attributes to understand cooperative behavior, most prominently power. Traditional network analysis, on the other hand, is concerned with relational data, i.e. ties, connections, and structures formed among players within a policy network. ERGMs combine these two ways of studying international relations by allowing the researcher to test hypotheses regarding actors' characteristics on a policy network. In the case of this paper the network is generated through the issuance of joint statements during the various negotiation rounds of the climate change negotiations. Thus, the network serves as the dependent variable of the analysis. The findings suggest that countries from the same negotiation coalitions do work more closely together when it comes to these less formalized bilateral forms of cooperation. Other important factors explaining cooperation are power and democratic status, and to a lesser degree vulnerability.

Understanding and Visualising the Evolution and De-evolution of Complex Multi-Scale Global Sustainability Governance

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The space for global sustainability governance is becoming both increasingly complex and interdependent. Powered by globalisation - across the economic, social, environmental, and political dimensions - actors are interacting at multiple scales of global governance. In the process, the principal actors - states, International Governmental Organisations (IGOs), and Non-State Actors (NSAs) - are beginning to develop interdependent relationships. Such complex multi-scale and interdependent relationships allow these actors to develop comparative advantages when developing the institutions that govern global sustainability. Yet, traditional governance models, which range from strict hierarchies to poly-centric networks, provide only partial explanations for complex interactions among diverse actors. Specifically, these models provide incomplete explanations for how governance systems go through virtuous cycles of evolution or vicious cycles of de-evolution: either becoming more complex and effective or becoming simpler and ineffective. Yet, such models present valuable insights into the comparative advantages and motives of the various actors. By synthesising these key insights, this paper presents a "Gears and Cogs" model that has three advantages over traditional models of sustainability governance. First, the model helps understand and visualise both institutional evolution and institutional de-evolution. Institutions evolve when principal actors develop, synthesise, and internalise institutional changes that enhance the effectiveness of the governance systems. Institutions de-evolve when the principal actors, often states, decide to disengage from the development process because the opportunity costs of engagement become intolerable. Second, the model visualises the roles of the principal actors and the complex interactions between them. Three types of relationships are shaping global sustainability governance: first, traditional bi-lateral and multi-lateral relationships among the key actors; second, the consultative and co-productive relationships between the principal actors that emerge within the frameworks of IGOs; third, the transnational advocacy and epistemic networks that allow non-state actors to exercise influence across multiple dimensions of sustainability and across multiple scales of governance. Third, the model integrates different conceptions of power to help explain the complex interactions between the principal actors at various stages of institutional evolution or de-evolution. The model explores and integrates two broad forms of power: first, the formal power to implement institutional changes through executive, legislative, bureaucratic, and judicial measures; second, the informal power to influence social expectations for institutional change through the diffusion of ideas, technology, and the broader ethical frameworks that guide behavioural change among the principal actors.

Environmental Provisions in Trade Agreements: Defending Regulatory Space or Pursuing Offensive Interests?

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Trade agreements frequently include several detailed environmental provisions. For example, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), concluded in March 2018 by 11 nations from the Pacific Rim region, includes a chapter of 26 pages on the environment. This chapter provides specific commitments on a wide variety of environmental issues, including fisheries conservation, endangered species, forest governance, ship pollution, invasive species, the ozone layer, energy efficiency, and corporate social responsibility. In some respects, the CPTPP includes environmental provisions that are more precise and more enforceable than those of multilateral environmental agreements. The effects of these environmental provisions are not trivial. Recent studies suggest that they can significantly reduce pollution levels. It remains unclear, however, what trade negotiators' motivations are for including such significant environmental provisions in their preferential trade agreements (PTAs). So while the increasing uptake of environmental provisions in trade agreements is well documented, little is known about why countries prefer certain types of provisions over others. We exploit a fine-grained dataset on environmental provisions

in PTAs and hypothesize that provisions preserving countries' policy space are more likely to be adopted. We find indeed that the likelihood of adoption is higher for defensive provisions, but this likelihood decreases if there is a large variation in PTA members' environmental commitments, in particular for PTAs with asymmetric power relationships. The results suggest that while countries first and foremost attempt to preserve their regulatory sovereignty, countries with a high level of environmental commitments and bargaining power vis-à-vis their trading partners also try to level the playing field and pursue more offensive interests.

Comparative Analysis of the Effects of the Multi–Level Regime on Seed and Variety Commons in Germany and the Philippines

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Since the 1940s, the introduction of plant variety registration legislations, private property rights such as variety protection schemes and the institutional support of new bio-technical breeding methods has promoted an immense market concentration in the seed sector, a high loss of cultivated genetic diversity and accompanying ecosystem services. Commons initiatives in the field of seed production and variety breeding (Seed and Variety Commons) pursue an alternative governance approach to this dominant pathway and could potentially contribute to a democratization and more sustainable constitution of this sector. However, initiatives in this field are strongly affected by a complex set of fractured legal frameworks that tends to hinder their work. This paper raises the question which legal scope exists for Seed and Variety Commons initiatives to experiment with and upscale alternative Commons practices in Germany and the Philippines, and what can be learned for the respective design of institutions from a comparative perspective. To evaluate the facilitation or hindrance of Commons approaches in variety breeding and seed production, in a first step, essential functional principles of Seed and Variety Commons are derived. These include 'collective responsibility', 'collective ownership', 'breeding of reproducible seeds' and 'effective polycentric institutions for collective management'. These principles are used as analytical categories for a document analysis to evaluate the influence of institutions in the multi-level governance system on Seed and Variety Commons in Germany and in the Philippines. The legal regimes that are reviewed include the Biodiversity convention, variety registration regulations, intellectual property rights including variety protection schemes, and the plant genetic resource law. The analysis is supplemented by expert interviews and a literature review to assess the interaction between legal frameworks and relevant informal institutions. This paper provides a systematic analysis of these legal frameworks and their interaction to assess the scope for action that exists for Seed and Variety Commons initiatives under the current institutional system. Moreover, it highlights which elements need to be adapted to support a Commons pathway in the future and what insights can be derived from a comparison of the legal systems in Germany and the Philippines.

Cooperation and Differentiation under the Paris Agreement

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The 2015 Paris Agreement enshrined climate commitments known as Nationally Determined Contributions (NDCs) in a country-by-country legal architecture unprecedented in the conventions of international law. Under the Paris Agreement, each country's Nationally Determined Contribution (NDC) is informed by its perception of its domestic development circumstances, climate capabilities, and responsibilities, rather than by the distinctions between developed and developing countries enshrined in the Agreement's parent convention, the UN Framework Convention on Climate Change (UNFCCC). While this approach to differentiation represents a significant departure from that of the Paris Agreement's predecessor, the Kyoto Protocol, further research is needed to understand how the Paris Agreement's structure uproots or re-entrenches existing alliances and power dynamics in international climate governance. Most existing research analyzes the way countries self-identify by joining alliances and coalitions and the ways they describe themselves in written international commitments as two distinct processes. However, prior

research suggests that a country's decisions to join or forego alliance formation (where alliances include both formal negotiating blocs and informal or UNFCCC-independent coalitions, such as the Climate Vulnerable Forum) may influence the content of their policy proposals and affect which issues receive attention in international negotiating processes. Nonetheless, few studies have specifically addressed how the content of countries' NDCs affects their participation/non-participation in international climate alliances (inside and outside the Paris Agreement's UNFCCC parent convention), and how participation in climate alliances, in turn, affects the content of countries' NDCs This presentation will preview the initial findings of current empirical research, rooted in interviews and surveys of individuals who represented governments in UNFCCC and UN Sustainable Development Goals (SDGs) processes between 2013 and 2018, which addresses this gap by interrogating the intersections of cooperation and alliance/coalition formation, differentiation, and NDC content (specifically, references to development status and vulnerability) in new ways. The research makes a theoretical contribution in interpreting decisions to join or avoid international alliances, much like submission of NDCs, as a mode of differentiation, albeit of a different legal character than submitting written commitments. The research hypothesizes that membership in alliances affects what priorities member countries choose to reflect in their NDCs. Comparing NDCs, in turn, may illuminate countries' shared priorities, leading them to join new alliances and form new cooperative partnerships. The research further hypothesizes that working through these dynamics, differentiation under the Paris Agreement may affect historical power balances, equity, and national agency in international climate governance.

Difficult Travels: Why Delta Plans Don't Land in the Chao Phraya Delta

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River deltas across the globe are increasingly seen as salient objects for planning. Deltas are loci for economic and agrarian development and for rapid urbanization and population growth. As such, deltas are vulnerable to the variability imposed by climate change. Deltas are already prone to drought, flooding, cyclones, land subsidence, and salt intrusion. Unsurprisingly then, international governing organizations, private sector operators and globally operating knowledge institutes all take an interest in the future governance of these complex and dynamic objects, exporting expertise and governance formats for a variety of motives, but always having the reshaping of the delta in mind. Nowhere is this more the case than in South and South East Asia. Bangladesh, Myanmar, Vietnam and Thailand all have large river deltas. In this paper we focus on one influential example of exported delta-expertise: so-called 'Dutch' delta plans. These large scale planning efforts find their way abroad via global networks of environmental governance. The first three mentioned deltas in Asia thus have international commitments for delta plans: large scale national efforts to reshape deltas in light of future economic growth and climate change. Thailand's Chao Phraya delta, the seat of Bangkok, has no such international commitments. Why is this the case? This paper proposes as hypothesis that delta plans rest on a historically grown corpus of assumptions that fit poorly with a corpus of Thai assumptions in a way not present in the neighboring deltas, making the travel of the delta plan difficult. This paper first discusses conceptual traits of delta plans. Second, it provides a history of settlement in the Chao Phraya delta. Third, it discusses salient elements in Thai culture: Buddhism, Kingship and a local development philosophy called the Sufficiency Economy. We conclude that if Earth systems are to be governed effectively, efforts must take stock of local variation in a more thoroughgoing manner than is currently exemplified in the export of delta plans. This paper relies on literature and original research in Thailand collected on three separate field visits.

Transnational Sustainability Governance in the Extractives Sector: Lessons from the Gold Lifecycle

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This paper seeks to bring literatures on global value/supply chains and transnational environmental governance into conversation to explore the challenges of realizing sustainability goals in the global extractives sector. In both of these literatures, analyses tend to focus on particular types of actors, power dynamics and/or products or governance mechanisms, which we contend limits our understanding of the governance and sustainability challenges as minerals flow through the global economy. In contrast, our analysis is organized around five (analytically distinct, but overlapping) stages of the mineral lifecycle: 1) exploration, extraction and mine closure; 2) transport; 3) processing and manufacturing; 4) retail, purchase and use; and 5) disposal, re-use and recycling. This approach enables us to identify a diversity of sustainability challenges and spaces where transnational governance efforts have emerged to address these challenges as well as spaces where there are gaps. We use the gold lifecycle to illustrate the value of this approach. Gold provides a useful lens through which to conceptualize sustainability and governance challenges along the mineral lifecycle given that it is mined in virtually all world regions and is used in a diversity of products, from precious metal jewelry and high-end electronics to lower end industrial uses. It is mined through large-scale industrial processes as well as through artisanal mining. Through gold, we can consider both consumer-facing and industrial products and consider how the unique features of these different types of uses affect the nature of governance challenges and responses.

Bridging the Gap Between Integration and Fragmentation in Sustainability Governance: A Framework of Mechanisms Linking Governance Architecture and System's Sustainability Performance

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The vast sustainability challenges characterizing the Anthropocene are in many respects governance problems. Established institutional structures and procedures have thus far failed to secure the sustainability of social-ecological systems, and only insufficiently take into account the complex nature of sustainability problems, which transcend sectoral and scalar boundaries, span multiple environmental policy domains, and thus pose complex trade-offs, dilemmas and contradictions.These trade-offs have provoked a number of ideas for alternative institutional responses, such as integration and central coordination around focal issues, or ideas embracing the benefits of fragmentation and polycentricity. These developments are described in a scattered body of literature addressing concepts such as policy integration, mainstreaming, meta-governance, and nexus approaches. These concepts share a common concern with which governance structures and processes might best address complex and multi-sectoral sustainability issues, each taking a particular stance on how to institutionally accommodate the tension between integration and diversification of policy goals and procedures. However, beyond this common goal, the study of those institutional responses remains itself highly fragmented, with very few links established between the different approaches.With this paper, we contribute to the synthesis of the field and provide a mechanism-based framework of integrative sustainability governance. We look beyond the normative prescriptions of the various approaches and distil the concrete mechanisms through which different configurations of the governance architecture are assumed to enhance the sustainability performance of the political system.We identified more than 16 different approaches in the multi-disciplinary literature, ranging from approaches of fragmentation and polycentricity to policy integration and whole-of-government ideas. We analyze those approaches by extracting the normative claims included in these approaches, i.e. how different governance architectures affect the system's sustainability performance. Particular attention is paid to the specific causal mechanisms and argumentative chains linking architecture and sustainability performance, and to the kinds of issues and contextual conditions under which these mechanisms apply. We look beyond overt contradictions between the different approaches by locating them in the wider governance architecture and their specific contextual environment.With this exercise, we contribute to the ongoing dialogue between different approaches to integrative sustainability governance. The mechanism-based nature of our framework especially provides for subsequent empirical analysis, both qualitative and quantitative, and contributes to the consolidation and advancement of current knowledge on 'what works' in Earth System Governance.

The National Vision of the Blue Economy in China

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Global discourses of marine conservation, marketisation and exploitation have now converged in an increasingly powerful governance agenda – the 'Blue Economy' – that aims to reconcile economic growth and ocean conservation. However, the specific ways in which the concept of the Blue Economy unfolds on the ground varies significantly and depends on, among other factors, national policy frameworks. Because of the scale and scope of ocean issues in China, it is one of the most significant countries in which to study how the Blue Economy concept is realised in practice. While in some contexts the Blue Economy is invoked to promote biodiversity conservation, in China there is also a strong emphasis on exploiting marine resources for their extractive commercial potential (e.g. energy). This presentation draws on 1.) a critical discourse analysis of Blue Economy policies, programs and policies in China, and 2.) Interviews with key informants in China, to discuss how Blue Economy knowledge, discourses and policies are constructed and contested in China. We map the range of concepts, institutions and actor networks – the 'policy assemblages' – involved in the Blue Economy in China in order to understand how knowledge of and discourse on the Blue Economy is constructed, translated, modified and made legitimate. Additionally we investigate the linkages between Blue Economy policies and other government policies; examine how problems and solutions relating to the Blue Economy and ocean governance are represented, including the role of scientific expertise; and analyse the outcomes of policy processes in terms of implementation across scale.

The Coevolution of the Trade and Environment Systems

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States have negotiated and adopted thousands of international environmental agreements and preferential trade agreements. These agreements have given rise to two distinct regimes displaying key characteristics of complex adaptive systems with distinguishable but overlapping boundaries. Their inter-regime relationship has been of particular interest from a global governance perspective. However, the trade/environment interface has not been empirically studied due to methodological challenges, with most work focusing instead on the normative dimension of regime conflicts. Where the two systems meet are important as multifaceted sites for cooperation, competition, and coevolution between two open systems whose boundaries are fluid. Where do the two systems meet? How has the interface changed over time? What are the underlying mechanisms that would explain the emergent patterns of coevolution? Here we answer these questions through the construction and analysis of a dynamic, agreement-level connectivity map between approximately 3,500 international environmental agreements and 700 preferential trade agreements, which have been adopted over a 70-year period since 1945. The network model was constructed using two types of institutional linkage: membership overlap for internal regime structures and textual references for inter-regime relations, for which, in turn, four different types of references were coded: cooperation, implementation, ratification, and prevalence. This pioneering study on how two treaty systems interact at the resolution of agreements has been made possible through the development of two datasets, namely TREND and TIPEA. Key findings will be presented at the conference.

'Incantatory' Governance. Post-Paris Climate Politics and the Transformation of Global Environmental Governance

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The paper analyses the fundamental shift in climate governance resulting from the 2015 Paris agreement and the post-Paris process. It complements the existing literature, which generally focuses on formal negotiation outcomes and (the

implementation of) the agreement's legal dispositions (e.g. Dimitrov, 2016, Bodansky, 2016) through an approach drawing on international political sociology and grounded in ethnographic observations at different COPs. From this starting point, the paper analyses the post-Paris process as relying on two characteristic features: first, UN climate conferences incorporate an increasingly diverse set of actors and issues – development, energy, migration, security, etc. – while simultaneously, climate governance extends "beyond" the UN arena through the individual or combined efforts of countless public and private actors and governance initiatives, carbon markets and offset schemes (Okereke et al., 2009, Moncel and van Asselt, 2012). This, we suggest, points to a (sometimes partial and selective) "*climatisation of world politics*", whereby a growing number of issues are framed using a "climatic lens" (Aykut et al., 2017). Second, the new climate governance is fundamentally *promissory* or "incantatory" in nature. The 2°C warming threshold adopted in Paris – presented as a 'signal' for political and economic actors rather than as a legal norm – and the ritualised re-actualisation of the 'Paris spirit' through the staging of high profile meetings, success stories and global campaigns, construct and substantiate the performative narrative of an on-going, unavoidable '*planetary transition'*. Combined, these evolutions pose formidable challenges to established scholarly approaches to global environmental governance, which have historically centred on the notion of "regime" and envisioned governance primarily in terms of steering and authoritative rule-making (e.g. Zartman, 1994; Keohane et al. 1995). Also, while promises and narratives are widely acknowledged to be central features of social, political and economic life (Merton, 1948, Roe, 1994, Beckert, 2013), they have remained under-researched in global governance. By foregrounding the discursive dimension of the new climate governance, its unclear extension and contested boundaries (Keohane and Victor, 2011; Bulkeley et al., 2014), we hence propose to conceptualise this governance as an on-going, multi-faceted and experimental *process of social coordination* (Botzem et al., 2009) enacted through diplomatic practices and performances (Schüssler et al., 2014), global discourses that have a normalising effect on the everyday (Paterson and Stripple, 2010), and in networked relations between state and non-state actors (Bernstein et al., 2010). This, we hope, might shed new light on its dynamics, effects, paradoxes and limitations.

Measuring Policy Integration in Multilevel Governance Environments: An Analysis of vertical Policy Coherence in Six Countries

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Institutional fragmentation presents a key challenge for overcoming misalignments between climate change vulnerability and the jurisdictional boundaries that define the contours of decision-making environments. The multilevel nature of these environments creates significant challenges for the design of coherent adaptation policy mixes, and the effective reduction of climate change vulnerability over the long-term. This study contributes a new approach within the debate on policy integration for the analysis of policy coherence based on overlap in adaptation framings and goals among levels of government. It takes as its starting point the conceptualization of adaptation governance environments as nested institutional arrangements where decision-making authority is dispersed and adaptation policies emerge within and through the vertical interactions between levels of government. The study design follows a text-as-data approach to data collection and analysis; this approach is increasingly being used in social science research to analyze the massive quantities of textual information now being produced daily. Latent Dirichlet allocation (LDA) is used to identify key topics in adaptation policy documents and legislation and in climate change strategies for 150 cities and 52 regions in six countries (Canada, France, Germany, Netherlands, Spain, United Kingdom). LDA is a probabilistic statistical approach to topic modelling that can be used to rapidly estimate similarity across large collections of documents, enabling comparative content analysis on a scale previously unreachable due to feasibility considerations. The models generated from this analysis indicate the topics most commonly covered in adaptation policy documents and how this varies by geography, jurisdiction, and over time. The selection of these six countries was made based on key institutional differences theorized in the governance literature to influence the emergence of different "styles" of decision-making. Relevant documents were identified based on systematic online searches of local government records (city council meeting minutes, staff reports, and key decisions), web-based searches of regional and national government websites, and expert consultation. The results of the topic models are interpreted in light of

key hypotheses in the policy mixes literature about the role of institutional characteristics such as cultures of decision-making, vertical dispersion of authority, and the nature of policy problems. The study sheds light on the role of vertical institutional arrangements in shaping the emergence of adaptation policy coherence, contributing to our understanding of policy integration in multilevel governance architectures. It also proposes a promising methodological approach for rapidly measuring policy overlap in complex governance environments.

The Climate and Clean Air Coalition as a Transnational Governance Club?

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Not only is the climate changing, but so is climate policy. The global environmental and climate governance architecture has been shaped by fragmentation and polycentricity in the last decades[1]. Climate policy initiatives have proliferated within and beyond the UNFCCC regime. Recently, a special research focus has emerged on 'climate clubs', referring to a smaller group's greater ability to frame climate deals compared to large global forums[3]. Against this background, our paper reflects on a specific case: The Climate and Clean Air Coalition (CCAC). This voluntary partnership with a unique membership of state- and non-state actors promotes action on short-lived climate forcers (SLCFs). We examine whether its mandate, structure and performance qualify the CCAC as a 'climate club' and what this implies for its position in global climate governance. Thus, we first study the CCAC's objective as well as the political niche it fills. Secondly, we scrutinize the CCAC's performance of political and technical activites and analyze to what extent its transnational character contributes to these objectives. Finally, we consider in how far the CCAC succeeds in filling existing governance gaps, providing benefits to its members, and therefore qualifying as a 'climate club'. Our approach situates the CCAC within the polycentric governance approach and analyzes whether it is an example of cooperative fragmentation or rather reduces fragmentation by bridging different regimes[4]. Further, our article contributes to the applicability of the 'climate clubs' concept as well as to understanding the complex architecture of today's transnational climate policy.

(R)evolutions of Global Cooperation? Prospects of Global Polycentric Governance for Sustainability in the Digital Age

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Humans are cooperative beings and human history is one of cooperative challenges and an increasing ability for cooperation. However, collective action for essential sustainability transformations, for the protection of the global commons and for the rigid implementation of the 2030 Agenda is still insufficient. Recently, we learned to respond to the complexity of these problems with a polycentric approach by identifying leverages for action on many interdependent scales, policy and issues areas. Today, we begin to realize that digitalization might not only become one of the biggest sustainability issues of our times, but has also the potential to fundamentally impact and change global cooperation from individual mindsets and interactions to transnational networks and international multilateralism. This contribution aims to systematically pinpoint prospects and challenges of cooperative global polycentric governance for sustainability in the uprising digital age. It reveals some of the key reconfigurations for earth system governance and societal interaction in the face of digitalization to focus on requirements for successful cooperation within a polycentric system. In this perspective, impacts of digitalization have to be analyzed for i. the space for autonomy and self-governance of individual and group actors ("dot"), ii. the design of the multitude of specific interdependencies between actors ("connections") and iii. the conditions for trust- building and trust catalysts among actors ("network"). Digitalization has the potential to fundamentally impact and reconfigure many of the earth system governance core topics, from Equity and Access, Legitimacy and Democracy, to Agency and overall Architectures. This contribution hopes to have a share in enhancing our understanding of polycentric governance for sustainability and the related role

of digitalization for cooperative efforts from individual empathy, knowledge production, societal organization and institutional design, up to collective consciousness.

Exploring Local-National Linkages in Climate Change Governance: Argentina and Buenos Aires, Brazil and São Paulo, and Mexico and Mexico City

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There is a consolidated tradition in International Relation's literature to approach Climate Change as a polycentric governance issue, this is, a social problem which equation derives not from a central authority, but from the aggregate actions of a multiplicity of actors located at diverse levels of analysis. However, those wide-ranging actions – generated by a broad spectrum of incentives, ideas, and identities - might not be coordinated or even harmonizing. Accordingly, whereas we acknowledge the appropriateness of addressing climate change from a global governance perspective, we highlight that part of that literature is inclined to be over-optimistic regarding the outcome of polycentric arrangements and does not offer adequate tools to analyze some of the linkages among different agents. In this paper, we are particularly interested in the linkage between cities and nation states. Accordingly, we propose an analytical framework to assess the characteristics of the linkages between the legal, political and governance responses of global cities and nation-state's governments. This is, to what extent does the national climate laws, politics and arrangements of governance ties with the ones carried by its global cities, if they do at all? Is there some synergy amongst these levels of government? Are these connections fostering or raising obstacles to mitigation and adaptation? The proposed framework focuses on three types of interaction between those levels, namely: connections in policy design; links in international action and; implementation interference. These three dimensions allow us to categorize the climate policy linkages in a broad spectrum that range from negative to positive, this is, reinforcing and weakening connections, To test the framework, we applied it to three cases - the climate responses from Mexico, Brazil, Argentina, Mexico City, São Paulo and Buenos Aires between 2007 and 2017. The empirical research was based on primary sources – documents and interviews in loco – and secondary sources – an extensive review of the literature on the cases, both at the national and city level. We conclude that the climate responses' linkages between the Federal government of Argentina and the City of Buenos Aires were weak. In the case of Brazil, climate linkages were also weak, even when both levels were generating noticeable climate responses between 2009 and 2010. The Mexican case is the one that shows the stronger linkages, although they are not strong enough to conclude there was a reinforcing connection between both levels.

Governing Climate Change: The Promise and Limits of Polycentricity

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Elinor Ostrom's primary contribution to the debate about climate governance landscape was to describe it as 'polycentric'. She invited other scholars to employ that framing to understand its emergence and modes of operation, but this requires clarity about its defining characteristics, which does not always exist. Here we argue that polycentric governance can be recognized on the basis of five theoretical propositions: 1) Local action: it is assumed governance initiatives are likely to take off and prosper at a local level, through processes of self-organization; 2) Mutual adjustment: actors are likely to freely develop collaborations with one another, which over time produce more trusting relationships; 3) Experimentation: the willingness and capacity to experiment is likely to facilitate governance innovation, which in turn leads to learning about what works best; 4) Trust: units are likely to freely and spontaneously develop collaborations with one another, which over time produce more trusting relationships; and 5) Overarching rules: local initiatives are likely to work best when bound by a set of overarching rules that enshrine the broader goals to be achieved and allow any conflicts to be satisfactorily resolved. Together, these propositions arguably constitute the

core of polycentric governance theory, which is of descriptive, analytical and normative use. On the basis of 18 contributions to a new book on polycentric climate governance, we discuss the degree to which polycentric governance theory could help describe, analyse current events in climate governance, and whether it could serve as a normative basis to further guide the regime. For instance, on the notion of local action, we conclude that there is indeed a rapid increase in local actions. However, at the same time it is unclear why actors feel compelled to spring into action (is it really self-organization?), the capacity to act seems divided very unevenly across actors, and finally the overall result does not yet add up towards a rapid transformation towards decarbonization. Overall, we conclude that a polycentric governance regime might indeed be emerging, but that much more research is needed to understand the potential implications of this development. It does seem possible to conclude already that direction from the global level, plus systematic evaluation of local action will be key ingredients for making polycentric climate governancea success.

Adaptation of Environmental Regimes in the Anthropocene: The Case of Fisheries Regime, 1937 to 2016

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Environmental regimes as complex adaptive systems constantly interact with institutional and ecological transformations. A major condition for environmental regimes to successfully fulfill their institutional objectives is to adapt to these changes. This particularly demands the multilateral environmental treaties of the environmental regime to permanently adjust laws and regulations. This paper presents a case study of the fisheries regime for illustrating regime adaptation through multilateral environmental agreements related to fisheries. In my longitudinal analysis, that covers the time from 1937 till 2016, I inquire the systemic patterns and structures of adaptation in the fisheries regime at the multilateral level, adding to literature that considers adaptation mainly as a management issue and regime shifts as abrupt changes from one regime to another. I define the fisheries regime as a polycentric system, which pursues to balance out conservation goals and exploitation interests of various actors and institutions. In order to analyze regime adaptation, I apply the Institutional Analysis and Development framework that utilizes multimodal and multiscalar responses to closely related problems in the regime. I follow in my work the earth system governance approach of defining adaptation as broader institutional responses to geophysical transformations which transcends policy integration as global governance efforts. My case study was performed on 74 fisheries-related agreements, selected from the International Environmental Agreements database. Of these agreements, I analyzed amendments and annexes to the treaties and protocols as well as decisions, resolutions and recommendations of the agreements. A mixed-methods analysis of these documents allowed to identify structural patterns and substantial adjustments of agreements which were manifested in regime adaptation. I conclude that adaptation of environmental regimes take place at different levels of norm setting, from general to operational to basic levels of rule and decision making. Further, whether or not adjustments of agreements increase the adaptive capacity of the whole regime depends on the quality of interinstitutional cooperation within and across the agreements which can improve learning effects of the regime. I argue for flexible and dynamic attributes of governance systems to enhance capacities to adopt. My paper provides novel insights to the architecture of earth system governance with regard to the complex system structure of the fisheries regime including different organizational and substantial goals and asymmetric power structures between fisheries-related multilateral environmental agreements.

Beyond Targets and Indicators: Measuring the Impact of the Sustainable Development Goals

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The SDGs represent the newest and most ambitious attempt at global governance through goal setting. Unlike their predecessors, the Millennium Development Goals (MDGs), the SDGs do not demarcate between developed and developing countries and involve a much broader range of issue areas such as energy, infrastructure, urban

development and more. For perhaps the first time, these goals enshrine a truly global vision of international development. Complex governance architectures can involve multiple context-specific solutions to common global problems. This is certainly reflected in the bottom-up and country-driven nature of the SDGs which gives states a significant amount of leeway in how to achieve the goals domestically and contribute to their achievement globally. This flexible nature of governance through goal setting complicates efforts to measure their impact. While the SDGs have an extensive list of targets and indicators through which to measure progress, this paper argues that only using progress made on these numeric indicators as a measure of SDG effectiveness misses other crucial behavioural, institutional and cognitive impacts that the SDGs may have. Therefore, this paper asks, how can we best measure the impact of complex governance architectures like the Sustainable Development Goals (SDGs)? This paper proposes alternative ways of evaluating the impact of the SDGs. Drawing from the literature on compliance, norms and policy diffusion I assess the applicability of concepts such as compliance, localization and buy-in as measures of SDG impact. However, I find that these concepts are unable to capture the unique aspirational logic of global governance through goal setting. As an alternative to these approaches, this paper suggests that analysing *responsiveness* can capture whether global development goals influenced behavioural and cognitive change towards the vision of global sustainable development the goals represent. I propose four specific measures of responsiveness: policy, practice, disbursement and institutional. The feasibility of this evaluation framework is tested on Canada's domestic and foreign policy responsiveness to the SDGs. Thus far, theorizing around global governance through goal setting has focused largely around the politics of their emergence, how and whether they will be met (particularly in developing countries) and the reasons for failure (and occasionally success) in meeting them. However, there is still a poor understanding of the political mechanisms through which global goals produce behavioural and cognitive outcomes. This paper represents an important first conceptual step in evaluating the broader impact of the Sustainable Development Goals, as an innovative global governance architecture.

The Complexities of Climate Change Policy Development and Governance: Insights Gained from Examining the Role of Health Co-Benefits

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The complexities of policy development for a cross-scale, cross-sectoral issue such as climate change are exacerbated by the influence of many state and non-state actors in the policy process. To gain insight into how these complexities are navigated, and implications for governance, we investigated the role of health co-benefits in the development of climate change mitigation policies in Australia and the European Union (EU). There are numerous health benefits that can result from the implementation of climate change mitigation policies, and accounting for these health co-benefits can help to justify increasingly ambitious climate action. To investigate the consideration of health co-benefits, we interviewed Australian and European Commission (EC) climate change policy-makers and analyzed Australian Government and EC publications. We developed case studies for Australia and the EU around six key themes: i) the policy-making process; ii) factors influencing the prioritization of health given multiple considerations; iii) barriers and enablers for the consideration of health; iv) the evidence base for policy; v) the role of external actors and stakeholders; and vi) communicating policy decisions. We found that complexities surrounding the policy-making process, along with politico-economic and institutional realities, create barriers for the integration of health co-benefits into climate change mitigation policies. The insights we gained from our research have several implications. Firstly, they facilitate a better understanding of the complexities of climate change mitigation policy development and governance for two Parties to the United Nations Framework on Climate Change. Secondly, they assist in identifying possible strategies to enhance the role of health co-benefits in the development of climate change mitigation policies. Thirdly, they highlight key

research gaps that if addressed, will advance our understanding of climate change policy development and governance. In summary, our research provides a unique contribution to the literature on climate change policy development and governance from a health perspective.

Transcending City Limits: Progress and Paradoxes in Metropolitan Governance for Climate Adaptation

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Enchantment with the metropolitan region as a new platform for climate adaptation governance is growing worldwide as scholars and practitioners confront local adaptation deficits. Dozens of regions on all continents have developed initiatives to tackle climate change at the metropolitan scale. As an indication of the shift in adaptation governance discourse, climate scientist Cynthia Rosenzweig remarked at a 2017 symposium, "All adaptation has to be metropolitan now. People just have to accept it." This paper examines the progress of metropolitan regional adaptation efforts (hereafter, collaboratives) in the United States. What challenges at the local level did collaboratives seek to redress and to what extent have they overcome (or exacerbated) these challenges? Do variations in collaboratives' organizational arrangements affect their strategies? What accounts for gaps between perceived challenges and response strategies, and what are their implications for future regional adaptation? I explore these questions in the context of collaboratives in Metro Boston, Southeast Florida, and the San Francisco Bay Area. Collaboratives could help overcome three types of local challenges: limited local adaptation (few cities adapt), limitations of local adaptation (that can be inefficient, uncoordinated, and produce spillovers), and limits to local adaptation (geographic, fiscal, and political structures constrain scope of response). I apply this framework to the cases, which draw on 10-15 interviews per region, participant observation, and document review. I code interview transcripts and planning documents, and compare the challenges, goals, and strategies identified by interviewees with those addressed by adaptation plans. Collaboratives are most successful in overcoming limited local adaptation. Diverse organizational arrangements have increased local adaptation planning, even in states opposed to climate action, by being welcoming, apolitical, and non-regulatory. Collaboratives have helped overcome limitations of local adaptation through staff-level coordination, regional-scale studies, and voluntary local conformance to regional strategies. They have made the least progress on addressing structural causes of economic, fiscal, or socio-economic drivers of vulnerability and limits to local adaptation, although regional agencies with land use powers have made more headway. Paradoxically, regional collaboratives advocate for state and federal enabling legislation that supports local adaptation, but not regional governance and institutional capacity. Although some practitioners recognize a need for long-term institution-building to tackle harder adaptation challenges, such efforts stand in tension with the collaborative and non-conflictive stance of most regional collaboratives. This may result in competing local-centric adaptation plans and challenge efforts for regionally consistent and equitable outcomes.

Governing Complexity: The Impact of Institutional Interplay Among Recent Multilateral Environmental Agreements on the Effectiveness of International Market-based Climate Policy Instruments

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Institutional interplay is an increasingly relevant theme in the literature on complex earth system governance architectures. Recent years have seen a dynamic evolution of new multilateral environmental agreements (MEA) that are to shape climate change governance for the coming decade. The institutional interplay among major new MEAs including the Paris Agreement, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and the Kigali Amendment to the Montreal Protocol has not previously been studied systematically. Yet, this interplay has

consequences for international market-based climate policy instruments, which have been a central feature of the Kyoto Protocol, and have been thoroughly studied in the academic literature. The 2015 Paris Agreement established a new generation of market-based mechanisms in its Article 6. In contrast to the Kyoto Protocol era, however, several recent MEAs will strongly impact the scope and effectiveness of these emerging Paris Mechanisms. The ICAO Assembly in 2016 established CORSIA, which will commence in 2021-2026. CORSIA creates a link to the Paris Agreement by establishing a mechanism to deal with anthropogenic emissions from aviation that are not included in countries' nationally determined contributions (NDCs) to the Paris Agreement. However, CORSIA will rely on emission reduction certificates that are generated within the sectoral scope of NDCs. Therefore, issues of "double counting" can arise. Moreover, the 2016 Kigali Amendment to the Montreal Protocol has transferred the responsibility for reducing emissions from highly potent industrial gases (HFC-23) from the UNFCCC to the Montreal Protocol and introduced a phase-out schedule for HFC production and use in developing countries. Reduction of HFC-23 had been a dominant but controversial source of carbon credits in the early phase of the Kyoto Protocol's Clean Development Mechanism (CDM). As a result of the Kigali Amendment, the potential of Paris Mechanisms to cover HFC-23 emission reductions will be severely curtailed, while the CDM infrastructure including baseline and monitoring methodologies may remain relevant. Understanding the institutional interplay among these MEAs is crucial to advance academic and policy debates about the implementation of the Paris Agreement. This paper therefore examines institutional interplay among major new MEAs and the resulting impact on the effectiveness of climate policy instruments. The study builds on existing literature on institutional interplay within the earth system governance architecture and draws on document analysis related to these MEAs as well as semi-structured expert interviews.

A Framework for Evaluating Global Climate Governance through a Sectoral Systems Perspective

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The global climate governance architecture is characterised by a growing number of international and transnational institutions and initiatives that together form a 'polycentric' governance complex. In order to assess the performance of this governance complex, we need to know what the specific contribution is that inter- and transnational governance institutions and initiatives ought to and can make. Defining the need and potential of global governance enables us to establish a benchmark against which to assess the current contributions and identify gaps and further potential. In contrast to existing approaches that either assess the workings and effects of individual institutions/initiatives or try to analyse the governance architecture as a whole, we argue that we should systematically distinguish between key functions of international governance institutions and break down the amorphous overall complex into sectoral 'sub-complexes'.

We will develop our argument for a sectoral approach to the analysis of global climate governance in three steps. First, we will, building on the literature on global (environmental) governance, derive five main functions that international governance institutions can perform in general: provision of guidance and signal; setting rules to facilitate collective action; transparency and accountability; delivery of means of implementation (capacity building, technology and finance); and knowledge diffusion and learning. Second, we build on the insight that different sectoral systems have their specific features and transformation challenges. Consequently, the need and potential of global governance to help advance the deep climate transformation required varies across key sectoral systems. On this basis, we develop a sectoral approach to the analysis of global climate governance. In the third step, we conclude by outlining how a sectoral approach can help us assess the performance of global climate governance concretely. Sectoral 'governance needs assessments' provide the benchmark against which we can evaluate the performance for the various governance 'sub-complexes' by addressing the following questions: What governance institutions are relevant for the sectoral system under study? What governance functions are these institutions supplying, individually and collectively? Is this governance supply satisfying the identified needs? Answering these questions allows us to identify unmet governance demands and provides a firm basis for thinking about how these gaps may be filled by developing existing institutions

or establishing new ones. Throughout the analysis, we will draw on examples from different relevant sectoral systems (transport, finance and investment, power, energy-intensive industries, etc.).

Global Governance for the Decarbonisation of Energy-Intensive Industries

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Energy-intensive industries (steel, chemicals, cement, aluminium) are a major contributor to greenhouse gas emissions. The transformation of these industries is thus crucial for addressing climate change and realising the objectives of the Paris Agreement, including the phase-out of net greenhouse gas emissions in the second half of this century. At the same time, options for decarbonising these industries are comparatively under-developed. New breakthrough technologies will need to be developed and deployed to make the transition. Technological challenges, the costs involved, and fierce international competition constitute important barriers that need addressing – including by means of international cooperation. What international and transnational institutions exist to address the challenge, what do they deliver and how may their potential be enhanced? We address this question in two major steps. First, we analyse in more detail the sector-specific conditions as well as transformation challenges and barriers in order to identify the need and potential for international governance institutions to overcome these challenges and barriers. In so doing, we distinguish five principal functions of international governance: guidance and signal, setting rules to facilitate collective action, transparency and accountability, providing means of implementation (finance, technology and capacity building), and facilitating knowledge creation and learning. We find a need for performing all these governance functions, albeit to varying degrees and with specific foci. Second, we analyse to what extent existing international and transnational governance institutions meet the sectoral need for international governance. To this end, we map relevant institutions and investigate what they contribute to the performance of the aforementioned governance functions. We identify an overwhelming demand for an enhanced contribution of international governance to advancing the decarbonisation of energy-intensive industries. Overall, the analysis demonstrates that there is a dearth of governance delivery by existing international/transnational institutions for the phase-out of greenhouse gas emissions in energy-intensive industries. A single overarching international organisation/institution addressing the issue is absent. While existing institutions together perform most governance functions to some extent, the overall impact is awfully insufficient. On the basis of this finding, the paper identifies specific options for enhancing inter- and transnational governance for supporting the sector's decarbonisation. Given the preexisting governance landscape and the characteristics of the sectoral system, efforts to enhance international governance may in particular be targeted at building and strengthening institutions that address each of the energy-intensive industries separately in order to advance their decarbonisation.

Global Governance of Fossil-Fuel Extractive Industries: Exposing and Addressing the Gaps

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Climate policy, at domestic and international levels, has focused almost exclusively on controlling emissions through curtailing demand for fossil fuel energy, neglecting the issue of supply. But it is increasingly recognised that effective policy requires action on both demand and supply, cutting with 'both arms of the scissors' (Green and Denniss 2018). Without this, free riders in terms of mitigation effort will tend to benefit from cheaper fossil fuels. However, the potential role of international institutions in tackling unsustainable levels of fossil fuel extraction is only just beginning to be examined. A range of inter- and transnational governance institutions have a relevant remit and could in principle have a role to play in addressing the transformation challenge facing extractive industries and the regions and countries that are currently dependent on them. These include those with a remit to address levels of fossil fuel subsidy, without which much extraction (and current consumption levels) would not be possible, and without which over 37 Gt CO2 emissions from 2017 to 2050 would not occur (Gerasimchuk *et al.* 2017). This paper proceeds through broadly two

analytical steps. Firstly, governance needs that would need to be met to adequately tackle the extractive industries are set out (based on an analysis of the challenges and barriers and the potential of international governance to address these). Secondly, the extent to which existing inter- or transnational institutions meet these needs and exploit potential opportunities is assessed. As a third step, options for enhancing the contribution by international institutions (adaptation of existing institutions, creation of new ones) are identified. The analysis shows that despite increasing rhetoric (for example on the need to reduce subsidies), key governance needs are currently far from being satisfied. Fossil fuel production and consumption decisions, as with energy policy questions more broadly, are closely linked to national sovereignty and perceived national interests; an enduring feature of international governance that appears unlikely to change much for the foreseeable future. Nevertheless, steps that could be taken by international organisations and fora including the World Trade Organisation, the Group of Twenty and the UNFCCC are set out, including setting out clearer rules on subsidies and offering more concerted support for just transitions to those most dependent on extractive industries.

Active Citizens and Urban Green Governance: Understanding the Diversity of Stewardship Practices through a Mosaic Governance Lens

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Governing urban nature for health, social cohesion, and biodiversity has become a major challenge in the highly dynamic and socially fragmented urban context. Next to efforts from municipalities and NGOs, active citizens increasingly engage with conservation efforts. In this paper, we focus on the agency of active citizens in protecting urban nature and how this agency is embedded in and influence existing multi-level governance structures. We discuss the concept of “mosaic governance” as a way to combine the strengths from strategic planning by local governments with the strengths of active citizenship. We define mosaic governance as the hybrid mix of governance modes and policy interventions tailored to the socio-ecological context of individual communities in an urban landscape. Mosaic governance may facilitate local governments in stimulating the upscaling of community initiatives to protect and improve local greenspace. It suggests an enabling and stimulating governance style that harnesses the transformative potential of active citizenship to maximise social and environmental outcomes of active citizenship. Based on cases studies from 8 European cities, we investigate how mosaic governance can contribute to the scaling-out and scaling-up of active citizenship. Scaling-out, the horizontal pathway, refers to either an increase in an increase in existing practices of active citizenship or to an increase of impacts of these practices. Scaling-up refers to changing the institutional context in which active citizenship and urban green management is situated. Better fit between institutional rules or resources and active citizenship may help emerging or existing examples of active citizenship to thrive and to scale-out. Based on this analysis, we argue for developing hybrid governance architectures that allow for effective collaborations across the array of people, institutions, and spatial practices associated with active citizenship.

Consciously Coupling in the Chemicals and Wastes Regimes

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Global governance of hazardous chemicals and wastes is often overlooked, yet, it offers much to teach us about how regimes interact. While many areas of global governance continue to fragment jurisdiction of issues among several regimes, some chemicals regimes are “consciously coupling” with one another, and with the hazardous waste regime, through cooperation to manage and create overlap among them. This decade-long cooperative effort is dubbed “synergies” among the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and its Disposal, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, and the Stockholm Convention on Persistent Organic Pollutants, now called the BRS

Conventions. Synergies has included the creation of a joint Secretariat, joint meetings of the decision-making bodies, and harmonized procedures and policies. This case of regime cooperation is not due to natural connections among the issues, as other chemical conventions, such as for ozone depletion or air pollution, are not part of the BRS effort, and many support bringing the, a metal convention, for mercury, into the synergies process. Instead, the synergies process is inherently political, both in its origins and consequences. For a literature often focused on fragmentation, the causes and consequences of de-fragmentation are worth exploring to demonstrate how regimes can, through negotiation and learning manage regime overlap cooperatively. This case also shows some of our hypotheses regarding fragmentation are applicable to de-fragmentation; for example, both fragmentation and cooperation are strongly shaped by powerful states' preferences and show strong path dependent characteristics. Cooperation to de-fragment the regime complex can lead actors to create new areas of overlap, on substantive and procedural issues. Cooperation among regimes, however, has some unique consequences, including diffusion of new ideas, creating (some) entry points for weaker actors, while empowering actors such as the Secretariat. The collective, although not easy or conflict-free, efforts to bring the BRS conventions together holds implications for our understanding of the conditions leading to cooperative regime management, and the desirability of de-fragmentation.

Identifying Sustainable Configurations with Shared Benefits in Forest Governance

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In light of growing pressure on shared natural resources across the globe, the concept of benefit sharing has been gaining an increasing importance. It has been recently proposed that benefit sharing can help transform unsustainable trends in forest use and governance, particularly within REDD+ initiative (reducing emissions from deforestation and forest degradation and the enhancement of forest carbon stocks) under the UN Framework Convention on Climate Change (UNFCCC). Knowledge about the processes and outcomes of REDD+ architecture is still scarce. Through the lens of benefit sharing architectures in other resource domains (water, biodiversity, land), we aim to initiate discussion on how economic, social and environmental dimensions of benefit sharing can be configured in REDD+ to support more sustainable forest governance on all—from global to local—levels. We investigate emerging benefit sharing trends within REDD+ and look more closely at examples from Ghana, Tanzania, and Uganda. In the context of REDD+, prioritization of economic, social or environmental dimensions of benefit sharing seems to be determined at the national level that could be explained by the less tangible and measurable outcomes of carbon sink activities and climate change mitigation. REDD+ benefit sharing clearly refers to the distribution of both monetary and non-monetary benefits generated through the implementation of REDD+ projects. In Ghana, the main challenge of REDD+ as well as of the envisioned benefit sharing is identified as those related to unclear and complex land tenure arrangements. It poses also the question of carbon rights that have no legal framework in Ghana. A second example is Tanzania whose REDD+ strategy is closely integrated into national development policies. The impacts of REDD+ here are weakened by different well-funded initiatives stimulating agricultural activity that collide with the conservation of forests. In Uganda, equitable sharing between all actors is the main emphasis, where "loss" of benefits by the powerful actors constitutes the main challenge. Even though the main idea derives from the environmental considerations of reducing emissions from deforestation, it is the system with economic returns that makes REDD+ attractive. Comparing REDD+ with trends in the other resource domains, here environmental benefits regarding climate change are mostly impossible to observe, despite environmental concern being the theoretical starting point of REDD+ benefit sharing. Therefore, social equity in terms of implications and economic returns remain the strongest drivers for REDD+ implementation.

Hardwired towards Transformation? An Assessment of the Governance Sub-Complex for the Power Sector

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Transforming the power sector is key to addressing climate change. Historically, the sector has contributed the bulk of energy-related CO_2 emissions. On the other hand, it is perhaps the sector in which the transformation has advanced furthest with renewable energy and storage technologies approaching a breakthrough. The power sector is also extremely important because electrification is considered a key mitigation strategy for many other sectors such as emission intensive industries and transport. A wide range of inter- and transnational governance institutions exist that address various aspects of the remaining transformation challenges in the power sector. But are these governance efforts collectively sufficient to address the sectoral challenges? We will address this questions in two major analytical steps. First, we identify governance needs on the basis of sector-specific transformation challenges, barriers as well as the potential for inter- and transnational governance to resolve them. We will specify the needs according to five governance functions: guidance and signal, setting rules to facilitate collective action, transparency and accountability, providing means of implementation (financial means, technological support and capacity building), as well as knowledge creation and diffusion. Second, we will survey existing international/transnational institutions and assess to what extent they meet the identified governance needs and exploit the opportunities. The analysis shows that many of the governance needs are already being satisfied to some extent. The signal to phase-in renewable energy is strong. Transparency is high in the sector. A wide range of activities exist that provide capacity building and foster research and innovation. Even the supply of financial means of implementation has been improving. That said, our analysis shows that a significant blind spot of international governance remains: the phase-out of not only coal but also oil and gas as fuels for electricity generation. The detailed analysis enables us to identify specific options for enhancing inter- and transnational governance by adjusting existing institutions and/or creating new ones to fill the remaining governance gaps.

Governing the Water-Energy-Food Nexus Related to Hydropower on Shared Rivers – the Role of International River Basin and Regional Energy Organizations

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In international river basins, hydropower projects (HPPs) generate multiple cross-border, cross-sector interdependencies related to the water–energy–food nexus. Governing them relies on voluntary negotiations between the respective sectoral institutions of the countries involved. It has been argued that such negotiations may be facilitated by regional organizations, such as international river basin organizations (IRBOs). This paper asks how regional organizations and further factors may influence such coordination. It compares three cases of hydropower planning on shared rivers. The Rusumo Falls and the Ruzizi III HPP are joint investments in Africa's Great Lakes region facilitated by an IRBO and a regional energy organization respectively. On the Mekong, Laos is constructing the Xayaburi dam despite reservations by the Mekong River Commission. The paper finds that IRBOs and regional energy organizations may play a role in facilitating cross-state nexus governance, in particular by fostering the application of due diligence instruments, such as strategic environmental assessments, environmental and social impact assessments and the legal principle of prior notification. However, it also shows that the influence of the regional organizations vary, and how successfully they support intersectoral coordination also depends on whether the HPP is planned unilaterally or jointly, the membership and functional scope of regional organizations, data availability and the presence or absence of donors and private sector capital and investors.

Integrating Climate Concepts Within a Unified Framework to Understand Complexity and Interdependence

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Climate change is an overarching boundary on sustainable development. The most important climate concepts - mitigation and adaptation - are now sharing a common space with emerging concepts that are explicitly and implicitly linked to climate change. Explicit concepts include loss & damage, low carbon development, and sustainable consumption and production. The implicit concepts revolve around the 17 Sustainable Development Goals (SDGs). Moreover, the climate concepts raise governance issues across multiple levels of governance - from the local to the global. Such complex multi-scale governance drives the increasing interactions and growing interdependence between the principal actors - states, Intergovernmental Organisations (IGOs), and Non-State Actors (NSAs). Existing approaches, however, study these climate concepts independently of each other; thereby, limiting the space for analysing complexity and interdependence. This paper proposes a risk management model that integrates and visualises climate concepts of mitigation and adaptation at multiple scales of governance. It also brings together the explicit and implicit climate change concepts across the same scales. The link between climate change mitigation and adaptation is understood as the space in which climate shocks are translated into climate impacts. Mitigation accounts for the emergence of climate shocks through emissions and the carbon sinks. These shocks translate into specific impacts that are managed through adaptation, which is a function of exposure, sensitivity, and risk management measures. If states engage in sustainable adaptation, they can reduce both the impact of the shocks and increase resilience by reducing the emergence of further shocks. Importantly, the adaptation choice - either sustainable or unsustainable - is linked to other communities through a change in emissions or adaptive-capacity. This mitigation-adaptation model forms the basis for integrating other the explicit and implicit climate change concepts, which illustrates complexity. The model also visualises these relationships across multiple communities at different scales of governance, which illustrates interdependence. Thus, understood this way, climate concepts are a part of a unified framework that illustrates both complexity and interdependence.

Form Follows function? Problems of Interplay in Mongolia's Water Governance Framework and Lessons for Water Governance Architectures in Developing Countries

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Water resources worldwide are threatened by overuse and pollution. Different users pursue diverging interests and a variety of political and administrative actors are usually involved in governance processes, creating complex cross-sectoral and cross-scalar interdependencies and problems of horizontal and vertical institutional interplay. Governance research by Eleanor Ostrom and others has identified a set of governance functions, which, if well-defined and implemented in a coordinated manner, may promote a sustainable resource use (e.g. rule setting, gathering and dissemination of information, defining property rights, monitoring and enforcement, mobilizing finance, coordinating actors, and conflict resolution). In practice, these functions are usually split across a variety of administrative entities that cross governance levels as well as administrative boundaries at one level. In particular in developing countries, overlaps and gaps may place additional coordination burdens on the entities in charge of water resource management and, and oftentimes exceed their capacities. This raises the questions what water governance architectures are conducive towards dealing with problems of interplay and how the allocation of water governance functions influences vertical and horizontal interplay and eventually natural resource use. We present a case study of Mongolia where simultaneous processes of decentralization and the institutionalization of River Basin Management have been ongoing since 2012. Based on a comprehensive review of legal and policy documents and semi-structured stakeholder interviews we analyzed how responsibilities for water governance are allocated within the institutional framework and how the translation of governance functions has played out in practice. Our case study finds that significant overlap exists regarding monitoring, gathering information, enforcement and the implementation of measures between different sub-national administrative entities. We also identify a number of gaps between the de jure and de facto application of rules. Combined with low human capacity and limited budgets, River Basin Organizations and other water governance bodies remain far away from contributing towards a sustainable resource use. However, we also illustrate how the lack of guidance on how to deal with shared and overlapping functions has resulted in provisory agreements among administrative entities.

Conceptualizing the Governance of Global Telecoupling

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Complex global interconnections are increasingly challenging environmental sustainability. This is not only because of globally experienced environmental problems such as climate change, but also because local human action has environmental repercussions in far-away places. More and more, global interconnections driven by commodity chains, production networks or human migration have produced negative socio-ecological effects in both sending and receiving systems. For example, European meat production is dependent on imported Brazilian soy and, coupled through the global soy commodity chain, is causing surplus nitrate accumulation in several European regions, and tropical deforestation in South America. Different strands of literature have described such phenomena as 'telecoupling' which, for their characteristics, pose challenges to global environmental sustainability, and to governance. These phenomena, connecting distal places through multidirectional flows of capital, production and information, escape typical governance frameworks that tend to focus on a particular spatial scale (global, transboundary, local), problem area (e.g. climate change or soil contamination) or type of governance actors (public vs. private) because they might cut across all of these dimensions. Against this backdrop, the aim of this paper is to conceptualize the governance of telecoupled phenomena, with a particular focus on sustainability problems, governance types and governance challenges. By doing so, we draw on different strands of literature that tackle the governance of telecouplings – albeit often using different terminology – such as global environmental governance, global commodity chains and production networks, and private or multi-stakeholder governance initiatives. We empirically ground our discussion on first findings from comparative case study research and one in-depth case study. We aim to stimulate the debate by reflecting about the governance of telecouplings regarding (a) accomplishments and limitations of state, private and multi-stakeholder initiatives and the links between them, (b) scalar governance, particularly the "fit" of governance institutions to the addressed environmental problems, (c) problems of traceability and uncertainty regarding complex social-ecological linkages across continents, and (d) issues of effectiveness of currently proposed governance architectures. With this paper we aim to pave the way for more systematic and comparative empirical research on the governance of telecoupled phenomena. We also seek to progress the conceptualization of important but relatively under-researched aspects of global environmental governance, thus advancing conceptual debate in the field of earth system governance more broadly.

Governance Architecture for Planetary Management: Assessing the Institutions for Geoengineering in the Arctic

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In the Anthropocene, numerous challenging problems are planetary in scale requiring transboundary, multilateral, and global institutional arrangements. These complex governance architectures typically are polycentric consisting of multiple, sometimes competing, forums where diverse interests strategically bargain exacerbating, the typically, suboptimal provisioning of public goods. To examine the challenge of complex governance architecture, we focus on an exemplary empirical case, governing geoengineering in the arctic. Geoengineering is a strategy for dealing with climate change that is fraught with controversy. Our scientific understanding of various engineering solutions is limited at best, while moral and ethical concerns often derail any discussion about this as a "planetary management" strategy. Yet, there is also an increasing body of evidence indicating that climate change, and climate goals such as "2 degrees," may require geoengineering in addition to mitigation and adaptation. The governance architecture for geoengineering provides a case where legal frameworks are largely untested. Institutional arrangements designed for other supranational challenges, but applied to geoengineering may be insufficient. Even though the social, economic, and environmental costs are not fully understood for geoengineering, it is imperative that we grapple with the thorny issues of "who decides" and "who benefits and loses." Utilizing the case of geoengineering in the arctic, we are able to explore these questions and develop a set of propositions regarding governance architecture for the planetary scale. We

conduct an institutional analysis of governance in the arctic of geoengineering. We rely on analysis of archival materials including case law, policy documents, organizational and agency reports, and public hearing transcripts and summaries. Because this is a new domain, we also draw upon the growing theoretical and empirical literatures on global governance. Our findings illustrate opportunities, and challenges, associated with the governance architecture for geoengineering in the arctic, specifically, and planetary management for the Anthropocene generally.

Green Courts, Governance, and the Domestic Implementation of International Environmental Law Norms

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In recent years, diverse actors have promoted the establishment of specialist judicial bodies ("green courts") to facilitate the resolution of complex environmental disputes. Many advocates further urge that green courts are ideally equipped to implement international environmental law ("IEL") within domestic legal contexts. However, the tremendous institutional diversity among green courts suggests that not all institutions are equally equipped to apply IEL in their decisions. Accordingly, this study evaluates the IEL implementation capacity of existing green courts. It does so by first developing a typology to characterize green court diversity and the attendant governance capacities of various green court architectures. The typology concludes that national-level green courts with broad jurisdiction and discretion are best-equipped to incorporate IEL principles and norms into domestic decision-making. On this basis, it next conducts a census of existing national-level green courts, and characterizes the identified institutions using variables relevant to their IEL implementation capacity. The effort concludes that very few national-level green courts have been established to date, and that the existing institutions exhibit broad diversity with respect to their jurisdiction, discretion, and orientation to IEL principles. In reviewing the implications of these findings, this project urges two conclusions. First, the limited distribution of national-level green courts suggests that relatively few existing institutions are ideally-equipped to perform an important environmental governance function. At the same time, the existing institutions also demonstrate that diverse institutional models can effectively exercise agency, advancing domestic implementation of IEL principles and meaningfully supporting further diffusion of a norm favoring domestic green courts.

Approaches to Enforcing Environmental Commitments in Trade Agreements: Available Avenues and Potential Influence on the International Environmental Protection Regime

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States have concluded an exponential number of international treaties since the 1990s. The fields of trade and environment are no exception to this trend. Through their multiplication and their widening scope, the agreements in these two fields have become increasingly interdependent and subject to legal overlap. Scholars have already produced numerous studies on the potential impacts, both positive and negative, of the expansion of trade flows on the environment. In addition, the literature has extensively discussed whether trade institutions constituted appropriate fora to push forward an environmental protection agenda. More recently, a growing body of research has started to examine how the inclusion of environmental provisions in trade agreements could contribute to the evolution of the international environmental protection regime. This article aims to contribute to this latter strand of literature by providing an analysis of the ways in enforcement mechanisms in trade agreements can contribute to the reinforcement of States' environmental priorities. I first look at how four key enforcement mechanisms found in trade agreements, namely general dispute settlement mechanisms; investor-state dispute settlement mechanisms; consultation procedures specific to environmental disputes; and procedures for public submissions on the enforcement of environmental commitments, can be applied to legal obligations that traditionally originated from international environmental law. In turn, I examine how the application of these processes to environment-related matters could

transform the current implementation of international environmental instruments and shape the content of future treaties. My analysis is conducted through the lens of the complex adaptive systems theory, which suggests that heterogeneous actors in both the trade and environment systems are governed by simple rules of operation, but that their collective behaviour is complex. In this context, the causal processes that shape these systems cannot be explained through strictly exogenous factors, but also depend on endogenous variables. My research aims to complement the current literature by focusing on the interaction between interlinked norms in distinct fields, rather than solely studying the reasons for the inclusion of certain norms in each specific field, as was done in the past. In addition, my research could advance the capacity to conceptualize complex interactions on the international scene in a more global, exhaustive and systematic fashion. Moreover, it will provide key elements of analysis regarding the use and efficiency of international agreements by States, which could contribute to the strengthening of the international environmental protection regime through coordinated and effective enforcement mechanisms.

A Framework to Understand the Diversity in the Relations within Transnational Municipal Networks

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Transnational Municipal Networks (TMNs) allow cities to engage in international climate processes and to get support to promote urban climate action, without the involvement of national governments. The simple description of TMNs in governance literature does not represent the differences in cities as members of a TMN other than distinguishing active and passive members. The complexity incorporated in the network from the diversity of the cities beyond this binary classification generates a diversity of potential relations between the members of a TMN and between those members and the TMN management entity. These relations define the way a TMN works and its results, and could potentially be steered to change the network. However, the impact of the diversity of cities in the structure and governance of TMNs, and the elements that affect this haven't been explored enough. As an initial step to understand the differences in these relations and the factors that affect them, this paper proposes a framework to explore these differences. This framework draws on the functions of the networks reported in the literature and identifies possible elements characteristic of each of them. Future steps of this research will check empirically these elements to revise and validate the framework. This ongoing research will contribute to the understanding of TMNs, the way they integrate cities into the global climate framework, and how to govern them more effectively.

An Overview and Assessment of the Increasing Role of Climate Finance Within the UNFCCC Process Since COP21 and Beyond

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This paper addresses part of the dynamics behind the current paradigm shift of the international climate negotiations, in particular relating to financial mechanisms. Not only the Paris agreement (P.A) departs from the top-down architecture inherited from the Kyoto Protocol, it has also redefined international policy instruments aimed to coordinate the implementation of climate policies (e.g NAMAs). The new landscape of instruments institutionalized by the P.A to help countries achieve their National Determined Contributions (NDCs) is a bifurcation compared to the Kyoto approach based on market mechanisms. It then raises the issue to make these mechanisms operational in particular through their financing. This is a key condition to create a circle of confidence between developed and developing countries in the implementation of the P.A and overcome the long standing North/South misunderstandings about the practical ways of implementing common but differentiated responsibility principle. Many developing countries (in particular least developed countries) have indeed conditioned the achievement of their NDCs to the financing support of the international community. On top of that, developed countries committed to transfer '$100 billion a year and beyond' by 2020 to developing countries in the P.A. This paper scrutinizes the introduction since COP15 of new financial mechanisms within the UNFCCC. We analyze more in depth the emergence of a new building

block that took two directions. First, new financing instruments were put in place such as the Green Climate Fund. Part of the '$100 billion a year" funds will go through it. But they will not be sufficient to comply with the huge needs of investments for ensuring the successful implementation of the low carbon transition in developing countries and achieving SDGs. Second, accountability rules regarding financing commitments are painfully discussed since COP21 in order to be included within the global stock take process, reflecting still major divisions between parties. We then review the varied parallel initiatives or alliances beyond the UNFCCC, including countries, international organizations, financial institutions, firms, etc. which have flourished over past years to foster climate finance. We highlight the increasing role played by the finance community, assesses the articulation of these initiatives with the UNFCCC (as an orchestrator or not), and finally explores how they can enhance the chances that the UNFCCC process delivers in 2020 an agreement on the full implementation of the P.A.

The Geopolitics of Food Security: Constituting a New Security Object in the Postwar Era

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A decade past the 2008-2009 global food crisis, amidst increasing international attention to the consequences global environmental change and concern about natural resource competition – the securitization of food warrants some reflection. Universal agendas embedded in the activities of Rome-based food organizations and the United Nations' Sustainable Development Goals (SDG2: 'ending hunger') suggest a governance framework that takes a human-centered approach to security – irrespective of political boundaries. However, for many states food production and food trade are afforded a special security status; policies oriented towards national supply security and self-sufficiency suggest existential concerns with state-level or unit-level survival within an anarchic system. This paper explores these contradictions through an application of securitization theory, arguing that much the postwar global food governance architecture is predicated on an incomplete, or only limitedly successful, 'macro-securitization.' Macro-securitization is a concept relatively underutilized in the international relations and security studies literature, but refers to the construction of higher levels of threat (with broader or even system-wide referent objects, including 'to humanity') that are able to coordinate or subsume the lower-level securitizations posited by more limited collectivities. 'Food security,' a concept first formulated at the 1974 World Food Conference, arguably constitutes such a macro-securitization. This paper engages in discourse analysis and process-tracing of crucial moments in food security governance reform, specifically the 1970s and 2000s global food crises, as evidence of this. It also examines broader questions regarding the construction of (food) security, including the agency, context, and ensuing dynamics of specific speech acts. The theoretical framework of macro-securitization suggests that the security constellations are often unstable and vulnerable to breakdown due to tension across levels of securitization. This also has important explanatory value in the most recent global food crisis and in the incoherencies of the postwar global food security governance architecture more broadly.

Cages or Carpets? National Domestic Contexts of Urban Climate Actions

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The importance of cities and non-state actors in reaching international goals to limit global warming to 1.5° C are recognized in the Paris Declaration. Many countries seek to reach their National Determined Contributions (NDCs) in part by reducing GHG emissions from urban activities. However, while technical solutions and best-case practices for cities are promoted by actors as transnational city networks, complicated matters of climate governance in the respective countries are often left aside and underresearched, particularly in countries of the Global South. Important factors shaping urban climate governance are national legislations and sectoral policies, as they can enable, conflict with, or prevent local climate action. In addition, they often remain prone to reform, as they represent economic and power structures that are deeply engrained within the domestic context. Even frontrunner cities in climate action as

Cape Town and Rio de Janeiro are confronted with barriers in the national context that threaten the achievement of their voluntary emission reduction targets. This suggests that cities' actions on climate change do not take place within a void and that no matter how ambitious they are, they cannot entirely break free from their domestic contexts. This puzzle has been addressed by recent scholarship, but only a few empirical studies have explored it. This contribution seeks to analyse the domestic context of urban climate governance by comparing the interplay between national policies and urban climate action in Brazil and South Africa. Guided by the question to what extent the national policy framework provides incentives or poses barriers to sustainable urban transformation, the different roles of levels of government are explored, as well as policy responses in three sectors relevant for mitigation (transport, spatial planning, and energy) . Based on the concept of polycentricity, channels of incentives and disincentives between the national and local levels of government are traced, and centres of decision-making in relevant sectors mapped. Using data from document analysis and interviews, this paper finds that both countries have, more or less, not adapted their existing legal and policy framework to enable urban climate actions to tap their full potential. And while partial national initiatives recognize the contribution of urban climate governance and seek to upscale experiments, they often restrain or block the implementation of transformative solutions on a larger scale.

Agency in Earth System Governance

International Diffusion and Domestic Policy Processes: Developing a Framework for Exploring the Adoption of Carbon Pricing Policies

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Since the Paris Agreement we have seen a surge in carbon pricing policies such as carbon taxes and emissions trading. Carbon pricing is rooted in neoclassical economics, has positive fiscal impacts and is supported by powerful economic and environmental actors, including finance ministries and the IMF. Considering this, it is puzzling that these policies are not more widespread. Just as puzzling is the lack of correlation between countries subject to international climate commitments and those adopting carbon pricing. While the current surge points to international commitments as an explanation, countries adopting carbon pricing without such commitments and countries not adopting carbon pricing despite such commitments point to other factors. Explaining carbon pricing adoption in terms of market-liberal policy paradigms is contradicted by the adoption of carbon pricing in corporatist countries (e.g. Scandinavian countries) and dirigiste countries (e.g. China). Similarly, there is little correlation between fossil fuel imports or income and fossil fuel pricing. Addressing this puzzling pattern requires cross-fertilization between policy process theories and theories of policy diffusion and international influences on domestic policy, which can generate valuable insights into how international and domestic factors, as well as economic and environmental factors, interact in processes leading to national decisions to adopt carbon pricing policies. In our paper, we develop a theoretical framework for studying the adoption of carbon pricing as an issue area highly connected to the international agenda. This framework allows for addressing the puzzling diffusion of carbon pricing, while potentially being applicable to other climate mitigation policy instruments. The framework draws on the commonalities between policy process and policy diffusion theories, andfocuses on the role of international and domestic, environmental and economic factorsinfluencing the policy process via theoretically derived mechanisms such as ideational change, learning and changes to the relative material power of actors.These mechanisms influence agency – i.e. the possibility of actors to act according to their beliefs and goal – and are translated into strategies for instigating policy change. Ideational change, for example, opens for reframing and change in power relations might strengthen coalitions, while learning is more open to different strategies. To demonstrate the usefulness of our framework, we draw on a mapping of countries adopting carbon pricing policies and in-depth case studies of Sweden and Mexico. Sweden is representative of the countries adopting carbon pricing early without being subject to international climate commitments, whereas Mexico the wave of countries recently adopting carbon pricing.

A research Agenda on Water Governance for Latin America

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Latin America faces water crises and related policy challenges across the region, as rapidly growing and ever wealthier urban populations, expanding agribusinesses, diverse industries, extensive mining, power generation, and tourism deprive water from or degrade its quality for use by marginalized populations of smallholder farmers and the urban poor, as well as for ecosystems. To develop integrated frameworks for water governance under the normative framework of sustainability is urgent and paramount. Respondingto this, a Regional Workshop “From Global Governance to Local Policy” was held in 2014 in Chile under the umbrella of the Earth System Governance Project. After three days of discussions among researchers, practitioners and NGOs, six themes were identified: (1) governance frameworks capable of transcending different scales (the panarchy of water governance) – between watersheds at sub

national and international levels, (2) governance frameworks capable of incorporating uncertainty (adaptive governance); (3) governance frameworks engaging explicitly with the 'double exposure' of socio-economic vulnerabilities (water poverty); (4) governance frameworks capable of establishing socio-cultural values associated with water and not only commodification of the resource (water values and rights); (5) governance frameworks capable of incorporating multiple water uses and users (energy-water-food nexus); and finally, (6) stakeholder decision-making processes that democratise water governance through participatory arrangements that ensure equitable outcomes through equitable participation.

Transnational Sustainability Governance: Understanding Legitimacy Challenges in the Global South

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Transnational sustainability governance arrangements are recognized as important regulators in global value chains by developing and implementing sustainability standards. These arrangements are mostly initiated by Northern-based multinational corporations and NGOs, with the objective to change the conditions of agricultural and food production in the global South. These initiatives are generally perceived as 'best practice' in setting sustainability standards as they bring together key market and social and environmental NGOs to jointly tackle severe global sustainability challenges. Nevertheless, these initiatives face several challenges constraining their acceptance as legitimate governance arrangements, which relate in particular to Southern stakeholders. Research shows that they face challenges in connecting to producers and Southern governments. These legitimacy challenges constrain the ambition to sustainably transform entire sectors of industry. This paper uses crisp-set Qualitative Comparative Analysis (csQCA) to study configurations of conditions that can explain the legitimacy challenges faced in relation to Southern stakeholders. The outcome under investigation in the csQCA design is whether or not the sustainability standards that arise from transnational governance arrangements are perceived as legitimate by Southern stakeholder groups. QCA is especially appropriate for research of a small to medium number of cases where standard qualitative methods for comparison are not sophisticated enough and mainstream statistical techniques are not suitable. For this study eleven transnational sustainability governance arrangements have been selected on the following criteria: the arrangement targets global value chains; exists only of private actors (businesses and NGOs), works on sustainability issues regarding food and/or agriculture by developing and implementing sustainability standards. By using these selection criteria a number of relevant explanatory variables is held constant. To provide suitable and in-depth data for the csQCA, secondary data of existing case studies is used, which allows for a large set of cases to be included and avoid duplication of research efforts. Furthermore, minutes and documents are analysed to provide additional input data for the csQCA. This paper advances current theories on transnational governance by studying how configurations of legitimacy criteria determine the ability of transnational governance arrangements to connect to Southern stakeholders. From an extensive literature review, three main conditions that are claimed to enhance the legitimacy of governance systems are identified: inclusiveness, accountability and participation. The results of this research will enable us to explore how MSIs can overcome legitimacy challenges related to Southern stakeholders and to generate critical knowledge on how to rethink the governance of global value chains.

Fuzzy Concept or Robust, Elastic Approach? Framing Urban Green Infrastructure

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Concepts such as green infrastructure, nature based solutions, urban ecosystem services or biophilic cities have entered into recent discourses on the governance of urban nature. Most of these new concepts are highly related and share a certain degree of ambiguity and fuzziness. This is partly due to the difficulty of applying nature-based concepts to cities as complex socio-ecological-technical systems, but also due to the terms' ongoing conceptual evolution. This presents a couple of questions. Are these concepts simply new buzzwords for old ideas, or do they present qualitative

improvements such as guiding principles which help steer sustainable planning and governance of urban nature? And to what degree can this fuzziness help guide further conceptual refinement? In this paper, we will discuss how we framed urban green infrastructure (UGI) planning as a distinct, robust but elastic approach across two research projects inhabiting differing complex architectures: one at the EU-level, the EU FP7 project GREEN SURGE "Green Infrastructure and Urban Biodiversity for Sustainable Urban Development and the Green Economy", and the other at the national level, the German Nature Conservation Agency project "Green Infrastructure in Urban Areas". The paper traces the evolution of the UGI concept from a consolidation and synthesis of underlying principles (i.e., the core principles of connectivity, multifunctionality, integration of green and grey infrastructures, and socially inclusive planning) and related concepts, to the modification of these through collaboration with practitioners in five Urban Learning Labs across Europe and further with stakeholders in Germany. The importance of conceptual elasticity became especially evident when the framework was put to a "practice test" and discussed with German green space planning experts. While largely agreeing with the framework, the experts also widely agreed that adequate social, ecological and aesthetic quality of green infrastructure is essential to making such an approach to planning and governance "work", and that appropriate criteria for this are needed. Our research points to the need to frame emerging concepts for governing urban nature while leaving room for interpretation and adaptation to specific contexts. Harnessing the innovative potentials of these approaches for planning and governance thus requires a balance between fuzziness and conceptual precision. Only with this balance, we argue, can such concepts guide shared understandings about governing urban nature while still accounting for complex architectures, including differing policy emphases and operating systems across governance contexts.

Institutional Arrangements and Governance in Coastal Communities in the Philippines

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This study evaluated the capability of the local institutional mechanisms in the implementation of various fisheries policies in the Philippines using the Structure, Systems, Style, Staff, Skills, Strategy, Superordinate Goal (7S) McKenzie Framework; and Strengths, Weaknesses, Opportunities, Threats approaches. These organizations are mandated to perform developmental and/or regulatory functions on fisheries. The developmental function consists of carrying out fisheries related projects to improve the lot of the fishermen. Except for one, they are all involved in the implementation of projects for the fisher folk. The regulatory function consists of monitoring the conduct of fishing activities and apprehension of those caught committing fishing violations. While most institutions are involved in monitoring fisheries activities, only one has police power to apprehend violators. Despite the mandate, all mechanisms are constrained by limited physical, financial and manpower resources. While membership to institutions is highly representative of the fishing sector, members are not really prepared to perform functions expected of them. One institution is able to keep its manpower complement because it is a regular department of the local government unit. Operations of one institution ceased after a few months of activity. While all the institutional mechanisms have linkages with the government and some NGOs in the implementation of projects, these are not sustainable. There are no systems: information, and monitoring and evaluation (M & E) in place. The leaders of these organizations claim that they are consultative but a big problem lies in the lack of skills of the members to perform assigned tasks. This study recommends that the institutional mechanisms should perform for the welfare of the fishermen through the development of an M & E system to monitor compliance to fisheries policies anchored at the village level. It also proposes the provision of proper education and training to members of institutions.

An Exploration of the Impact of Training on Community Governance; A Case Study of Communities Affected by Bui Dam Construction, Ghana

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This paper contributes to the discussions on community governance by focusing on thirteen communities near Bui dam and Bui National Park in Ghana. This paper seeks to address the impacts of dam construction and related resettlements through analysis of community competence training. The paper assesses the impacts of Bui dam and resettlement on community leadership, the impact of Bui Dam construction on traditional leadership, and the impact of Bui Dam resettled communities on the management of Bui National Park. For each of these questions, further analysis was undertaken to assess the role of resettlement, ethnicity, age, livelihoods, and gender. Data was gathered through multiple methods. In the design of a survey, questionnaires were administered to 339 respondents across the thirteen communities, document analysis and interviews were conducted. Interviews were conducted for 24 key informants and used for data collection. ANOVA and Scheffe test scores were used to assess impacts of Bui dam and resettlement. The paper resolved that people perceive training opportunities in community leadership to have failed to meet the core needs and focus of the impacted communities. The number of training modules were few, and the modules failed to focus on the core skills domain of traditional leadership, management of Bui National Park, and structures to build the livelihood needs of communities. Training opportunities did not provide adequate inputs to explore opportunities in areas such as traditional leadership, and management of Bui National Park. Ethnicity (Nafana, Ewe, and Mo) and relocate were perceived to provide weak influence on community leadership skills and options available to communities to address the impacts of dam construction and resettlement. Gender and age do not predict community leadership. The need to provide practical hands-on training for communities in the phase of the construction of a hydro dam is critical in providing better coping strategies to deal with changes in traditional leadership.

Between Greening and Grabbing: Transnational Environmental Actors, Domestic Institutions, and Indigenous Land Rights

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In April 2016, human rights activists in India accused the World Wildlife Fund for Nature (WWF) of collaborating with local police forces to evict the indigenous Ghond people from a tiger reserve. Only a few months later, the WWF issued a report that was used by a Brazilian court to revoke the expulsion of two indigenous groups from their lands. The contradictory influence of the same transnational environmental actor's interventions illustrates the research puzzle of this paper. Transnational NGOs are increasingly involved with environmental politics in the Global South. In the more recent academic literature, it is acknowledged that they strongly affect the livelihoods of vulnerable groups such as indigenous communities. However, the impact of transnational environmental actors is fiercely debated. While liberal scholars expect them to connect environmental goals to the recognition of indigenous land rights, critical authors assume that they support the eviction of indigenous groups to the benefit of environmental protection. Both sides, however, tend to ignore that the interventions of transnational environmental actors are shaped by domestic institutions.This is exactly where this paper steps in. It investigates how domestic institutions (governments, legislatures, and courts) influence the contributions of transnational environmental actors to the recognition of indigenous land rights. Most particularly, the paper analyzes the relationship between the allocation of decision-making competencies on the domestic level and the political goals and strategies of transnational environmental actors during the course of ongoing land rights reforms. To grasp the full complexity of the research problem, the paper connects the institutional analysis to the insights of the postcolonial and post-developmental literature. Empirically, it focuses on the influence of transnational environmental actors on ongoing land rights reforms in India and Brazil.

Dam and Reservoir Systems: An Interdisciplinary Analysis of American Water Infrastructure

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In 2017, the American Society of Civil Engineers (ASCE) released the United States' quadrennial infrastructure report card, giving the Nation's dam and reservoir systems a "D" grade. With more than 90,000 dams in the United States,

most of them averaging well past the expected lifespan, it is no surprise that the ASCE recommends increasing appropriated funds for dam rehabilitation and repair, as well as developing emergency action plans for all 15,498 high-hazard dams by 2021. Although obtaining congressional support for increased water infrastructure funding may pose a problem to dam rehabilitation efforts, other significant issues stem from agencies' fear of triggering environmental protection statutes, in addition to the inter/intra-agency inconsistencies in managing dam and reservoir systems. Currently, the bulk of dams in the United States are owned and operated by private individuals. Only 4.7 percent of all dams are owned and/or operated by federal agencies – the United States Army Corps of Engineers (USACE), the United States Bureau of Reclamation (USBR), the Federal Energy Regulatory Commission (FERC), and the Federal Emergency Management Agency (FEMA). The majority of the agencies' missions in terms of dam operation and maintenance pertain to dam functionality, safety, and risk reduction, addressed through each agency's own set of regulations, manuals, and guidelines. Aside from posing irregular government management issues, the federal regulation of dams also creates problems for state and privately owned and operated dams faced with crisis. What are the consequences of inconsistent dam and reservoir system operations, both scientifically and legally? As the political and natural environments constantly change, rehabilitating key pieces of water infrastructure is not only important to resource management, but also necessary to the safety and security of communities. By exploring three case studies – Oroville Dam, Hoover Dam, and Kinzua Dam – this Article highlights the need for regulatory clarification in regards to discretionary and obligatory agency actions, focusing on rule curves, operation manuals, and the National Environmental Protection Act. Additionally, this Article assesses dam and reservoir infrastructure in the Era of Trump, specifically addressing how dams and reservoirs can be used to reduce the federal deficit while operating effectively, as well as pose national security threats to the nation's electrical grid and water channels. Finally, this Article concludes with a brief update on the current status of each dam case study, emphasizing the everyday impact of dams on water management schemes and the importance of agency regulation.

Local Meets Global in Earth System Governance: Collaboration of Local Governments and International Agencies in Climate Change Adaptation and Mitigation in Turkey

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Climate change is a truly global environmental problem and a perfect example of complex interdependence on planet earth. Although states are the major players in global environmental politics and responsible of climate change mitigation and adaptation some states may not be so keen on committing themselves to reductions in their carbon emissions. In parallel, non-state actors have an increasing impact on global environmental politics, in either negotiations or implementation of regimes. In fact, NGO's, international organisations and business interests regularly contribute to climate change negotiations. Meanwhile, local and subnational level players ranging from local NGOs to local governments act independent of their governments in committing themselves to emission reduction targets as a part of global networks of local government initiatives against climate change. Overall, a number of players share their knowledge and resources through communication, and new policy ideas and discourses flow across different localities and scales, thereby connecting different spaces and the human and non-human players that inhabit them. This paper aims to focus on practices of some Turkish municipalities, which played relatively progressive roles in mitigating and adapting climate change through their activities as a part of global networks of local governments. This is a particularly interesting topic for earth system governance because sub-national players bypass the national level, which is not so keen on having climate change as a priority area, and translated and brought international impulses, into sub-national and local policy development processes. In this context, local government, cities and their international networks emerge as significant players in their own right and there is an image of shifting authority in earth system governance towards local and subnational players.The paper argues that although there is a rising impact of sub-national players through municipal voluntarism and strategic urbanism approaches, international actors also play a very crucial role in facilitating policy change providing news ideas and finances for policy change. Along with international local authority networks, a number of other international players emerge and have a potential to influence earth system governance. In Turkish case, international organisations, international development finance institutions, foreign governments,

private entrepreneurs, and consultancy firms facilitated policy change towards climate change adaptation and mitigation at the local level. Yet again, there are further challenges associated with future policy directions since almost all those projects are ecological modernisation projects and interventions of central government agencies are likely to develop contradictions for a climate friendly policy change.

Confronting the Nitrogen Challenge: Options for Governance and Targets

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Excessive human-induced nitrogen is a global environmental problem, which is not governed globally. At the level of the United Nations there is no framework convention on nitrogen, while no single treaty can handle all the threats posed by anthropogenic nitrogen. Few studies suggest governance solutions to mitigate the consequence of the altered nitrogen cycle in the coupled human and ecological system. My paper contributes to this research agenda from the perspective of global targets, an approach adopted to address global environmental problems like ozone-depletion, climate change, biodiversity loss, or unsustainable development. The articulation of the nitrogen problem and the multiple international institutions dealing with it, underline the existence of a nitrogen regime complex characterised by limited coordination and targets with partial coverage of sources and impacts. Such a state calls for improving governance in the direction of more integrated approaches in a way to set meaningful targets for nitrogen. Among many possible options for organising the governance of nitrogen, I consider two opposite responses at the extremes of the governance spectrum that can make targets effective tools for curbing nitrogen pollution. Considering opposite governance cases presents advantages: it provides the widest theoretical extent; it offers – by contrast – several insights for critical reflections; it provides indications for similar cases not located at the extremes. In the paper, the two options analysed are labelled as 'holistic' and 'source-based' (referring to nitrogen-pollution sources). Conceptually, the opposite options correspond to the categories defined by Barrett as "broad-but-shallow" and "narrow-but-deep". The 'holistic' case implies full participation and compliance among all actors involved, and the 'source-based', among a limited number of key actors. In fact, the first case is about governance arrangements and institutional designs (broad legal regime, inter-agency cooperation etc.), while the second considers governance solutions organised around well-identified industries. 'Holistic' and 'source-based' options are investigated and evaluated according to their capability to define and develop targets that fit the multifaceted nitrogen problem. The preliminary results offer an innovative view on possible adjustments to the current nitrogen regime and suggest future research avenues to deepen viable answers for a novel governance of nitrogen.

Cities as Policy Entrepreneurs in Polycentric Climate Governance

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The Paris Agreement identifies cities and other subnational authorities as one of the key drivers of climate governance by recognising the importance of the engagements of all levels of government. The Talanoa Dialogue launched at the UN Climate Change Conference in November 2017 to start in January 2018 continues along this path by opening up policy windows for cities and other subnational authorities. This paper starts with conceptualisation on what role cities' entrepreneurship can play in polycentric climate governance in the years ahead. Based on this theorisation, the paper analyses a climate governance challenge of steering and coordination, taking into account the current landscape of voluntary climate actions and commitments led by local and regional governments and mechanisms under which cities induce ambitious measures in relation to Nationally Determined Contributions (NDCs). Building upon the rapidly expanding literature on climate entrepreneurship, this paper analyses the following aspects of cities as policy entrepreneurs under polycentric climate governance: 1) whether cities influence the distribution of authority in polycentric climate governance; 2) mechanisms through which authority is granted to cities; and 3) entrepreneurial strategies utilised by cities to exercise authority in polycentric climate governance. Cities as policy entrepreneurs have

been playing an increasingly important role in decision-making in the domains of international climate governance coordinated by the United Nations Framework Convention on Climate Change (UNFCCC). The Talanoa Dialogue can be viewed as yet another policy window for subnational governments to present a type of climate governance that promotes the role of entrepreneurship in achieving the long-term goal of the Paris Agreement. By paying close attention to the use of decision-making procedures and venues, this paper attempts to argue that cities as policy entrepreneurs play a key role in establishing polycentric governance patterns. Given the complexity of the contemporary climate governance landscape, the main contribution of this paper would be to provide a case study on a set of specific governance measures that cities and other subnational authorities have utilised which proved to be productive in advancing polycentric climate governance. Furthermore, the mapping of entrepreneurial strategies that cities utilise presented in this paper will shed further light on what specific role cities play in promoting coordination of actions in polycentric climate governance and on ways in which this can be linked to the enhanced framework for transparency under the Paris Agreement.

Bringing Nature into the City? Transnational Governance and the Urban Politics of Nature-based Solutions

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Over the past decade, cities have become firmly established on the international agenda as both a critical sustainability challenge and a key part of any solution. Whilst engagement with questions of urban sustainability stretches back for a quarter of a century and the inception of the Rio Agenda, the gathering momentum behind the strategic importance of the city as a vital site for addressing climate change has propelled urban sustainability to the front and centre of global environmental governance. Multiple visions of how future urbanism can respond to the climate challenge and foster broader sustainability have emerged, including the eco-city, low carbon city, smart city and resilient city. Most recently, these competing visions have been joined by an agenda that seeks to deploy 'nature based solutions' – which are "solutions to societal challenges that are inspired and supported by nature" (EU Commission 2015) – as a means through which local and global challenges can be addressed. This discourse of bringing nature back into the city has attracted a range of new actors to the urban as an arena through which environmental goals can be pursued, from conservation organisations to architects and from utilities to the investment and insurance industries. In this paper, we seek to chart the transnational emergence of the 'nature based solutions' agenda and examine the extent to which it is being mobilised through existing transnational networks (e.g. municipal networks active on climate change or public-private partnerships working on biodiversity) or is leading to the formation of new forms of transnational governance architecture. Drawing on data and case-studies from the NATURVATION project, we consider the relative significance of transnational actors in shaping the urban politics of nature based solutions and explore the ways in which transnational narratives and practices are taking hold in different urban contexts. Our aim is to consider how the vision of bringing nature into the city acts to reconfigure existing narratives, institutions and practices of governing urban sustainability and with what consequences.

Identifying the Key Actors for Ecological Knowledge Diffusion in Urban Environmental Governance Networks

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This paper presents a method for identifying the most influential actors within a urban governance networks regarding turning new ecological knowledge into urban green infrastructure projects. The method integrates social science-based work on social influence and social network analysis. Actor's influence has a significant impact on the knowledge diffusion and consequent decision making processes in governance networks. The influential actors in a urban areas can be found in elected officials, corporations, commercial establishments, developers, neighbourhood associations, NGOs,

universities. New knowledge aquired in one of them sooner or later flows into advanced groups through network contacts. The hypothesis advanced here is that the way groups or individuals tackle knowledge diffusion does not reflect identifiable institutional processes. The assumption is that the speed and success of implementation largely depends on whether and how the idea is flowing across the "bond of influence". The core questions are: Whose understanding of Urban Ecosystem Services/Urban green Infrastructure (UES/UGI) matters so the new knowledge about UES/UGI makes it into project? How do those influential actors take on their role within urban settings? What is a correlation between variables as network centrality, the nature of their activities and individual characteristics of the influencers with their perceived influence? A way for dealing with these concerns is to identify common characteristics - centrality, formal position, individual attributes, activities - among actors evaluated as influential. I assume that combined effect of degree centrality, formal level of authority and a specific set of individual characteristics coincide with perceived level of actual influence in the governance networks, and that individuals that not have the right set of the characteristics will be ranked lower in terms of influence. The use of the method reveal the traits of "hidden leaders" or most influential actors in a process of using the new knowledge for implementing it into a UGI project. The work presented here has implications for future studies for identifying actors who can contribute in preferable way to the management of ecosystem services and help design appropriate governance network. Influence can be managed, that is, influencers can be targeted and directed by network management strategies once there is reliable method in use to identify them via their relevant characteristics. This proposed method can be exploited to maximise the diffusion of desirable knowledge with respect to UGI implementation.

Diagnosing Strategic Influences of Different Agents in Governing Transition Towards Green City in Surabaya, Indonesia

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A paradigm shift towards promoting urban sustainability can be noted in the ubiquity of eco-city concepts and practice since beginning of the 21st century. To intervene in such transition, mainstream scholars have generally focused on recommending 'new patterns of governance' that facilitate wider engagements and collective learning. Such pluralist turn has promoted a plethora of participatory and collaborative arrangements into, some would argue, a panacea. Despite proliferation of urban best practices and governance concepts, there is limited understanding on how different agents can strategically influence decisions and investments towards wider adoption of novel solutions. With regards to developing urban contexts, recent debate increasingly questions whether the lagging formation of conventional regimes might mean that those cities are better placed to accelerate adoption of sustainable solutions. Against this background, this paper aims to provide empirical insights into the strategic influences of different agents in governing transition towards green city in Surabaya. Recently, Surabaya's success has garnered national and international recognitions. Strategic agency is diagnosed through practice and institutional perspectives operationalised as *the capability to respond to relevant institutional contexts with a range of institutional works that are fine-tuned and combined into coherent practice sequences*. This theoretical underpinning allows agency to be examined as the exercise of power coupled with reflexivity. A qualitative case study was conducted to construct a chronology of the green transition over the past five-decade. Data used consist of in-depth interviews with 21 research participants—including present-day and former mayors, key government officials, technical and policy advocates, community leader, media partners, and NGO representatives—triangulated with content analysis of policy and regulatory documents, media reports, relevant books, and scientific literatures. This study confirms the interrelated nature of actor-networks and governance levels (from bottom-up local initiatives to state-sanctioned programs), strategically set up to steer collective actions for addressing environmental quality degradations throughout history. Political elites exerted authoritative power to creatively respond and shape 'episodes of disruption' (e.g. waste crisis, political unrests, and nationally-imposed targets). Other strategic capabilities displayed by non-state actors, such as, science networks, grassroots leaders, interest groups, and opinion makers are also elucidated. These findings suggest that governance interventions need to be specifically tailored around such 'episodes' and geared towards modifying and diversifying the field of interaction among agents. As such, this paper contributes to advancing the debate on agency in contemporary

literatures by clarifying context-specific effectiveness of different agents in influencing urban transition outcomes in Surabaya.

Linear Versus Adaptive Approaches to Green Infrastructure Policy, Planning and Place-making

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This paper reflects upon the emergence of the term *green infrastructure* and the associated policy, planning, and placemaking architectures and agents involved in framing and implementing this concept within urban, peri-urban, and rural environments. We introduce a new conceptual framework to help researchers, policy makers, planners, and practitioners consider the links that exist between the different governance architectures and agents involved in designing, implementing, managing, and using green infrastructure. The conceptual framework draws attention to an inherent tension between top-down technocratic and bottom-up participatory approaches to policy, planning, and placemaking within green infrastructure projects. We examine two distinct typologies for conceptualising green infrastructure: (i) linear plan-led approaches; and (ii) adaptive place-led approaches. We conclude by highlighting the need to build bridges between the diverse stages, sectors, and stakeholders engaged in this sustainability discourse.

Agency in the New Earth Politics of the Earth System Governance Project: A Theoretical Critique with Suggestions

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The Earth System Governance Project has aimed to address five analytical problems which all relate to how we can best construct the optimal planetary polity or a New Earth Politics. On its own terms a future political structure for the world would be deemed optimal if it is accountable, legitimate, just, fair, equal, adaptive, and flexible. In addition it can be inferred that it must have a systemic architecture that exists in a normative relationship to the agents that will ultimately sustain it, since this would create a bond that makes the structure legitimate and durable. The identified areas of concern and the desirable characteristics to aim for are arguably beyond critique from a global, progressive, perspective. But I would like to criticise the theoretical blueprints for achieving these aims that have been developed so far in the works *Earth System Governance: World Politics in the Anthropocene* and *New Earth Politics: Essays from the Anthropocene*. My argument is that these do not satisfactorily address the problem of creating a political architecture which could bond a majority of humanity to a globally overarching political structure. The literature overwhelmingly assumes that a world polity must include nation states in its composition. A reform of the international system is therefore the only avenue deemed theoretically permissible, retaining nation-states as major units. This severly limiting notion is unhelpful for the aim of creating a New Earth Politics. Emerging actors that could in theory usher in a functioning planetary polity are adopting a truly global normativity that goes beyond mere internationalism. This normativity is best understood as shaped in *opposition* to the national normativity sustaining the current world order. Consequentially, the assumption that a planetary polity could come about through a compromise with national normativity only leads us to a theoretical impasse. Too much is being done in the literature to accomodate the essentially nationalist worldview behind the current system. It is more helpful to look at for instance Manfred B. Steger's notion of national and global imaginaries and see these as two essentially competing paradigms. I argue here that once these premisses are adopted instead, it becomes evident that the New Earth Politics which the Earth System Governance Project should be advocating is the kind supported by the new global paradigm rather than the old national paradigm. At the moment the position is not clear, but a clarification would make for consistent theory.

Trustworthy Scientist – Trustworthy Knowledge Production: Studying IPCC's Introduction of Early Career Scientists as an Effort to Regain Trust

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In the context of increasing doubts about the effectiveness of global environmental assessments, the key strategy to become trustworthy have for many expert organizations, such as IPCC and IPBES, been to enroll world leading scientists to 'speak truth to power'. However, trust is gained and trust can be lost. This fact became a reality to IPCC in November 2009 when Climategate broke. From being seen as the most trustworthy expert organization on climate change, IPCC lost its trustworthiness in the eyes of many and was forced to work to regain its trust. The aim of this study is to further the understanding of the dynamics and importance of trust in science-policy-practice relations. By revisiting the time after Climategate to explore the relation between modes of knowledge production and the development of trust, this current study will add knew knowledge to what is already known about IPCC, the effects of Climategate, and how to regain trust. How to become a trustworthy organization is in this study understood as a question about epistemic ideals, legitimate knowledge systems, and science-policy relations. The study use a theoretical framework which combines concepts on knowledge systems, science policy relations, and trust. Using this theoretical framework, the study analyses the introduction of early career scientist as an example of IPCC's efforts to regain trust in the aftermaths of Climategate. During the fifth assessment report, IPCC for the first time officially enrolling early career scientists to assist in the assessment. With this decision, IPCC partly diverted from its previous strategy on how to gain trust (by enrolling world leading scientists). The decision raises questions. If trust is gained by enrolling world leading scientist; why was early career scientists enrolled in IPCC, what role were they supposed to play in the organization as well as in the relation between science and policy, and how could early career scientists contribute in IPCC's effort to regain trust? The analysis is based on a document study, consisting of official IPCC documents and scientific articles. The study shows how the introduction of early career scientists is an example of a changed relation between science and non-science, and an acknowledgment that trust in a positions, such as 'leading scientist', does not automatically mean trust in an assessment.

Non-State and Local Leadership in Europe's Climate Governance: New Drivers of Climate Action?

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The European Union has, on several occasions, claimed global leadership in climate action. Arguably, in terms of climate policies, the EU and its Member States fall short of the low-carbon and climate resilient future they committed to under the Paris Agreement. Yet, according to the latest Yearbook on Global Climate Action, a majority of climate commitments registered with the United Nations Framework Convention on Climate Change (UNFCCC) are initiated by Europe-based organizations, including non-state and local actors. The EU expressed political, and occasional financial, support for non-state and local climate initiatives. Moreover, outside the few EU and Member State financed initiatives and networks, Europe-based actors commit to climate action in ever growing numbers from the bottom-up. This growing number of commitments seemingly warrant the importance accorded to 'non-Party' action since the Paris Climate Conference. Despite this trend, significant knowledge gaps remain. This study addresses the following gaps. First, the effectiveness of non-state and local commitments are still largely unknown; are they kept, and are actors effectively responding to climate mitigation and adaptation challenges? Second, what factors promote or inhibit non-state and local engagement? Without a better understanding of needs and challenges, or any indication of the performance of non-state and local initiatives, it is difficult or impossible to develop informed policies at the EU-level to stimulate bottom-up, non-state and local efforts. The aim of this study is to investigate the extent to which European non-state and local actors provide leadership through effective climate actions; and to identify unfulfilled needs and challenges that stand in the way of accelerating efforts. Moreover, the study discusses how the EU can improve the policy environment for non-state and local climate actions, and identifies knowledge gaps that should be addressed in future research. This study follows an iterated, mixed methodology, approach. First, it maps Europe-based non-state and local actors in the context of the UNFCCC through a database analysis of European-led climate actions. Then it

investigates needs and challenges as perceived by individual actors using a survey analysis conducted among ‘social partners’ associated with the European Economic and Social Council. Finally, semi-structured interviews with selected actors render insights into specific cases and help to contextualize findings.

Marine Space Decision-Making Under a Common-wealth Model

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Conflicts over government decisions on development projects in the marine space are common and geographically widespread. Under the agency aspect of Earth System Governance, this paper focuses on how and what official decisions are reached for marine development projects. It considers governmental institutions functioning as agent trustees under a public trust, common-wealth model of ocean governance. Legal recognition of the marine space as public property that is an asset of the public trust corpus, commonly owned by humankind as trust beneficiaries, can have significant effects in the process of marine project decision-making. The model envisions a legal framework under which grants of governance authority are in a fiduciary capacity, encompassing uncompromisable substantive and procedural governmental duties. It is proposed that one of these procedural duties is upholding a right of participatory consent by stakeholder beneficiaries before reaching significant decisions affecting trust assets, i.e. the marine space and its natural resources. Introduced is a common-wealth vs commodity view of the marine space compared to Woods' commonwealth vs commodity view of land [1], juxtaposed with conventional property and marine legal regimes. Also discussed under this proposed model is a preliminary rubric for decision-making protocol that follows the principle of Free, Prior and Informed Consent (FPIC). Under conventional usage, the FPIC principle is limited to indigenous rights agreements. Under this proposed ocean governance protocol, marine-based economic development projects incorporate all affected citizen stakeholders in the decision-making process by legal mandate. The author hypothesizes that embedding elements of the FPIC process of participatory consent into official approval procedures for marine development activities provides a template for mutually beneficial social licensing relationships between stakeholders. To test this hypothesis, preliminary results of empirical research with diverse stakeholders in two marine development industries (aquaculture in Tasmania, Australia and proposed offshore oil and gas drilling in proximity to Nova Scotia, Canada and the United States' eastern seaboard) will explore whether there is a positive relationship between levels of social license in diverse marine stakeholder relationships and the government decision-making processes utilized. Included is an early overview of the potential for and benefits of legal reform in ocean governance based on this model.

Both Structure and Actor: The Elaborated Strategy of Transnational Municipal Networks to Influence Global Climate Governance

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The study of networks has recently gained a lot of interest in International Relations and studies on global environmental governance. Witnessing transnational processes that might influence world politics, scholars have looked at a variety of phenomena, among which epistemic communities, transnational advocacy networks or public-private partnerships. Recently, they have also applied the network lens to global climate governance. Despite the greater attention given to these sets of interconnected nodes, there is still room for investigation. In International Relations, networks have often been thought of as structures; in other cases, they have been envisioned as actors. With a few exceptions, no study has analysed them as both. How can a double perspective of structure and actor improve our understanding of the influence of networks in earth system governance? To answer this question, the example of Transnational Municipal Networks (TMNs) engaged in climate action proves interesting. TMNs, as structures, influence the behaviour of their city members, guiding them toward climate action and resilience. As actors, they also develop strategies to gain weight in the wider system of global climate governance. I conduct a case-study of 100 Resilient Cities

(100RC), a TMN founded by The Rockefeller Foundation to work on urban resilience that, in the course of five years, has managed to become a prominent actor of the system. Inside its network of cities, it has oriented the behaviour of its members towards the design and implementation of projects that follow its definition of resilience. Outside of it, it has partnered with major TMNs and non-TMN actors and become part of global initiatives dealing with climate action. To understand its rise, we must take into account the capacity of 100RC to connect to specific actors, without ignoring its internal work with its city members. This paper thus joins the International Relations agent-structure debate by focusing on the double-perspective of networks. Furthermore, it seeks to bring new insights on TMNs, a rather recent phenomenon whose influence we are still trying to measure. Finally, as it focuses on one entity of global climate governance, it hopes to offer a innovative contribution to questions dealing with the diverse actors of Earth System Governance and how they influence the system.

Financialization Of Municipal Water Agencies: A Case Study in the American West

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The expansion of large-scale water infrastructure—primarily dams, aqueducts, and pipelines—beginning in the early 1900's enabled the population growth and development of the arid Los Angeles basin and surrounding areas. Not only do the public institutions overseeing this hydrological infrastructure control assets worth tens of billions of dollars, but in the modern day they also maintain investment portfolios worth additional billions. This paper seeks to understand how these public agencies came to be large players in global financial markets and explain what this means for environmental outcomes. The financial story has two key sides: On one hand water agencies invest surplus moneys on financial markets, and on the other they issue debt through municipal bond instruments. In sociology and political economy, the concept of "financialization" is evoked to describe macroeconomic changes of recent decades related to a shift away from productive activities and toward an embrace of financial instruments. Using archival research methods, focusing on major municipal water services in Southern California, this paper tracks the rise of financialization in public water municipalities since the mid 20th century and analyzes the role of market logics in the realm of public institutions. With this in mind, I consider how concerns like exposure to market risk, financial evaluation, and changing revenue streams affect the broader mission of stewarding the water supply. This study contributes a sociological perspective to the management of water by exploring the contradictions that may inhibit ecologically sustainable policies and characterizing commodification in light of recent macroeconomic trends.

Meaning Work: Reworking Institutional Meanings for Environmental Governance

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Effective environmental governance requires institutional change. While some actors work to change institutions, others resist change by defending and maintaining institutions. Much of this institutional work is 'meaning work', which we define as the practice of crafting, adapting, connecting and performing meanings to purposively create, maintain or disrupt institutions. Here, meanings refer to the immaterial, ideationally and symbolic components of institutions, including norms, narratives, story-lines, discourses, cultures, myths and texts. The Earth System Governance Project already recognises the importance of such meaning work in its research agenda, identifying 'norms, values and broader ideational structures' as one of its four crosscutting themes.This paper constructs a concept of meaning work that highlights agency in carrying meanings across scales and between discursive layers, while noting the structuring and constraining role of prevailing discourses. It positions meaning work as a practice that is performed by agents but becomes evident through textual artefacts. We ground and test the concept using two environmental governance cases at very different scales: a local democratic innovation employed by Noosa Council in Queensland, Australia; and the international campaign to divest from fossil fuels. We draw on a combination of interviews and archival documents to reconstruct meaning work, focusing on cases where interesting meaning work seemed likely. The cases demonstrate

the diversity of meaning work and the challenges that agents face when seeking deep discursive change. They also point to opportunities for agents to be more effective Skilled meaning workers craft and perform compelling stories to recruit actors to their cause and mobilise discourse coalitions around new institutions. They draw liberally on the discursive context – reworking, rewriting and connecting existing meanings from other scales and places to create stories that suit their purposes. They also identify and take advantage of narrative openings to disrupt and create institutions. In doing so, they must strike a delicate balance between having meanings heard and providing enough provocation to drive change. Constant contestation over meanings and routine institutional work to maintain institutions means that new meanings are readily accommodated into the surface discourse of established institutions without achieving deeper discursive change. Meanings that are too alien to an institutional discourse may be rejected outright, while meanings that are closely aligned will not be transformative. There is an art in identifying opportunities to deploy meanings that provide just the right amount of challenge to trigger institutional change.

NGO Discourses about the International Governance of Geoengineering

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Geoengineering – active removal of atmospheric CO_2 or modifying the planet's energy balance – is looming on the horizon as climate mitigation efforts have not been successful at halting the rate of global warming. Both proponents and opponents seem to agree that geoengineering may soon become a reality. Yet governance implications of geoengineering are poorly understood. In order to contribute to the emerging scientific debate on international governance of geoengineering, this paper explores current NGO discourses on geoengineering. The paper, first, identifies NGO discourses and analyses different ways in which realities are constructed in written and oral NGO communications. Second, the paper identifies dominant discourses and the most prevailing constructions of reality through NGO position papers. In a third step these discourses are analysed using interviews, background knowledge, NGOs' worldviews and belief systems, social political context, and academic literature on geoengineering governance. This paper finds stark differences between NGO discourses on geoengineering governance in terms of their preferred governance arrangements, such as pursuing further cooperation within climate change governance or pursuing a ban or moratorium. These differences are expected to align with their respective fundamental judgements of geoengineering. The paper contributes to a more comprehensive understanding of discourses of NGOs on geoengineering governance, which serve as an important piece in working toward robust governance of geoengineering and leads to a better understanding of civil society in their potentially crucial role in further developing and possibly enhancing governance structures for a challenging emerging issue in earth system governance.

The More the Merrier? Non-state Actions for Climate Resilient and Sustainable Development

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The 2030 Agenda for Sustainable Development, including the Sustainable Development Goals (SDGs), and the Paris Agreement stand as great diplomatic achievements; their success will be humanity's best hope to inter alia prevent catastrophic climate change, and to eradicate extreme poverty. However, from the outset, critics have warned that the discrepancy between political commitments, and governmental action is immense. For instance, in climate change combined national climate commitments simply do not add up to the 1.5/2C development pathways that governments have committed to under the Paris Agreement. Only a handful of countries keep their commitment to raise their share of Official Development Aid to 0.7% of their national products, leaving an enormous financing gap in international cooperation to achieve sustainability targets. In view of these public shortfalls, across both the international sustainability and climate processes, actions by nonstate actors such as NGOs, businesses and local communities, have increasingly become touted as new and additional contributions. Political leaders and many commentators suggest that an increasing momentum in non-state actions demonstrates that low-carbon and sustainable development are unavoidable, and that current progress is irreversible. This paper investigates rationales underlying optimistic discourses of non-state engagement. It outlines optimistic narratives in public discourse by reviewing scholarship, official statements, and commentators, and critically assesses them in view of governance risks and challenges. We identify four assumptive stances that underlie optimism about non-state engagement, namely: (1) 'the more the better'; (2) 'everybody wins'; (3) 'everyone does their part'; (4) 'more brings more'. This paper engages a uniquely diverse and transdisciplinary group, including young scholars and practitioners from around the world. Based on an extensive literature review, and transdisciplinary inputs from both developing and developed countries, this paper identifies risks to non-state engagement across the international sustainable development and climate processes, as well as across different scales of governance (national, local). Moreover, it formulates key research and policy challenges that need to be overcome, to make viable and tangible contributions toward the full implementation of global sustainability and climate targets.

Agency and Accountability in Earth System Governance Research

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Accountability was one of the five analytical problems of the 2009 Earth System Governance Science Plan. The Plan linked accountability to legitimacy and emphasized that problems of accountability and legitimacy have profound policy implications for governing earth system transformations. The Plan invited an analysis of the nature of accountability in democracy theorisations and accountability's relevance for institutional effectiveness. This responded to two related issues. First, the theoretical and normative foundations of accountability as it applies to state, inter-state, public-private and private models and relationships of governance. Second, the practical or structural forms of governance that best guarantee accountability from private to state and national to international scales. This paper presents a new analysis of how this element of the 2009 Science Plan has been employed in research and scholarship over the last 10 years. The paper is part of a larger project on how *agency* has been addressed in earth system governance scholarship. The paper uses a database of hundreds of articles on environmental governance scholarship on the influence, roles and responsibilities of actors, the ways in which authority is granted to these actors, and how agency is exercised. The paper reports on the geographical and thematic distribution of the published papers including their conceptual, theoretical and empirical perspectives. The paper analyses the articles in three areas: accountability of whom, to who and for what. We found that the research addressed the growing concern for systems of accountability, not only for state agents, but importantly for non-state actors, including networks and individuals. Similarly, accountability to whom has been increasingly addressed as the heretofore disempowered - from marginalised groups to the biosphere - are given a voice to demand accountability from the state and the private sector. Finally, many studies recognised the multiple forms and effects of accountability and their relationships to power, knowledge norms and scale. Accountability, by its presence and absence, has had profound impacts on governance, effectiveness and earth system transformations. Finally, the paper recognises the gaps in the present literature on agency and accountability and suggests new areas of research that may be worth exploring in the next ten years of earth system governance research. These include

additional research in African and American settings, on how allocation and access interact with accountability, and how these are influenced by knowledge and norms.

Social Tipping Elements Instrumental for Decarbonisation by 2050

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Achieving the goals of the Paris Climate Agreement demands a world-wide transformation to a fossil-fuel-free socio-economic system within the next 30 years. While other researchers are focusing on next-step targets such as gradually phasing out coal, we investigate whether there is any evidence of human tipping-like interventions inducing nonlinear changes leading to a rapid global decarbonization. We propose a definition of social tipping elements, social tipping points and social tipping interventions based on the distinction of the subsystem control parameters that by a small change can lead to substantial reductions in anthropogenic greenhouse gas emissions. The empirical material is based on an expert elicitation involving 133 international experts, an expert workshop and a literature review. We identify six socio-economic subsystems that show the characteristics of social tipping elements instrumental for the decarbonization: i. the energy production and storage system, ii. human settlements; iii. financial markets; iv. norms and values system; v. education system; and vi. information feedbacks. Each of the social tipping elements could be activated independently, however, due to the networked character of the global socio-economic system, activating the tipping interventions simultaneously could lead to a mutual reinforcement effect and a faster breaking off the existing social, economic, and political inertia. In addition, we argue that in order to understand social system transformations the focus should be redirected from the “fast” changes occurring at the resource allocation level to the “slow” changes at the higher social structure levels. The required transformations might be triggered by external factors such as environmental pressures, but their ultimate success depends on the societal ability to restructure and rewire social institutions. Social and natural scientists should work hand in hand to understand the interactions between tipping elements in the Earth system and tipping elements in social system.

Private Rule-Makers as Lobbyists: Exploring the Interest Representation Activities of Transnational Private Sustainability Governance

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The traditional perspective of transnational private sustainability governance is that it entails novel rule systems addressing problems of public concern. As a result, interactions with public policy have been researched predominantly as rule-based interactions, whereby researchers assess the potential for rule diffusion or complementarity. Yet, this perspective overlooks that situated behind the private rules are organizations that have political agency and interests that they may want to bring to bear on public policy. Yet, after 20 years of research on private rule-making we know remarkably little about the political activities of transnational private governance schemes. The paper addresses this topic by conceptualizing transnational private governance schemes as interest groups and by examining their lobbying activities. In doing so, the paper brings together two literatures—on private governance and on interest groups—that so far have not been discussed together. First, the paper argues that while private governance schemes can act like traditional interest groups, they are nonetheless different. In particular, they differ in terms of the types of interests they represent and their rule-making capacity. Since private governance schemes can claim to be representative of a wide range of interests (both economic and socio-environmental interests) and have policy relevant knowledge through their private rule-making activities, they have a potentially important voice in the policy process. Scholars have highlighted that interest groups’ influence is determined by three types of goods they can provide: policy-relevant information, citizen support, and economic power (e.g., Klüver 2013). The paper argues that unlike traditional interest groups, private governance schemes can potentially provide all three of these goods at once. At the same time, these

features of private governance may result in a more conflictual relationship with public authority than is the case for traditional interest groups, since private governance schemes will try to defend their own rule-making authority against governmental intervention. Second, the paper empirically examines lobbying activities of transnational private sustainability governance schemes. The analysis is based on a new original dataset of around 200 private schemes. The dataset is used to identify the schemes that lobby the European institutions by using the information that is publicly available through the EU's Transparency Register. The paper assesses differences between private governance schemes that do and do not engage in lobbying activities based on, among other things, their resources, problem focus, organizational features (rule-making capacity, membership, corporate participation, compliance verification mechanisms, etc.), and issue salience.

Switching Between Lenses for a Better View: A Critical Review of Theoretical Approaches to Private Regulatory Governance

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The emergence of scholarship on private regulatory governance in a variety of disciplines has led to a rich, hitherto underappreciated range of theoretical approaches that are grounded in assumptions, ontologies, and epistemologies – some unique, some overlapping – which shape what they perceive to normatively matter and how research can and should inform our understanding of private regulatory governance as a phenomenon. For the purposes of this paper, we focus on ontological differences and argue that there is value in comparing theoretical traditions to cast in relief what they illuminate and what they obfuscate when examining private regulatory governance. In this critical review, we couple a broad literature scan with insights derived from our respective cross-sectoral research over the last two decades to inductively identify and describe six ideal-type categories of theoretical approaches that have been used in the literature to date: Calculated strategic behavior (of individual consumers, firms and private regulatory organizations); learning, experimentalism and deliberative processes; socio-legal perspectives; political institutionalism; global value chain and convention theory; and grounded critical theory. Our descriptions include the focal actors and interactions; the relative explanatory power of agency or structure; the use of synchronic or diachronic perspectives; and the empirical emphasis of the lenses in question. We further illustrate these findings by contrasting different approaches' analyses of private governance in the forest sector. These examples, woven into the description of the theoretical approaches where applicable, show that interpretations of a single case can range from showcasing a triumphant success of collective action to the abject failure of civil society groups to challenge the hegemonic position of capitalist actors, depending on the approach used. We find that the respective focal scope – that is, which actors and relationships theoretical approaches put into focus, and to what factors they assign 'ceteris paribus' status – has a decisive influence on the conclusions they draw on the potential of private regulatory governance to contribute to solving the problems they were created to address, as well as the role of public policy within this process. Furthermore, we identify a number of additional ontological differences: inter alia, whether interactions of actors are based on conflictual or deliberative processes; whether horizontal or hierarchical interactions are highlighted; whether rules in the book or rules in practice are seen to decisively influence behavior; and whether power dynamics matter, all of which shape both what type of evidence is presented and how that evidence is interpreted.

Can We Govern Geoengineering Research? Political Perspectives from the Global Climate Society

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Is it feasible to regulate research on large-scale interventions into the Earth's ecological system, in the name of combating climate change? Many scientists involved in the geoengineering debate argue that some form of public governance is necessary to ensure safe and ethical research, and to enable enough scientific progress to know the

benefits and side-effects that geoengineering technologies would bring. This article discusses geoengineering research from the perspective of practitioners involved in the design and negotiation of climate policies. It argues that the long-term experiences and social networks that shape the international network of climate policy professionals calls for more research into the sociological aspects of geoengineering governance. This stands in contrast to much of the existing literature, which tends to discuss rational-choice informed scenarios of bargaining, coalition building and rogue actors. Based on interviews with key informants that participate in the multilateral process on climate change and that are familiar with the idea of geoengineering, I discuss the issues that policy makers associate with geoengineering, and the diplomatic difficulties that negotiators would face in bringing the governance of geoengineering research to a global agenda. A key insight here is that scale and jurisdiction of the intended technology matter greatly for the perceived need to govern research internationally. Early international oversight is considered necessary to ensure widespread involvement in the design and understanding of approaches that would be deployed in the global commons. Yet, the continued association with wanting to avoid mitigation responsibilities makes it costly for industrialized countries to raise the topic, while developing countries face lack of capacity and trust in western technologies. The article then discusses pathways through which governance for research on geoengineering in the global commons might be brought to the global agenda despite the discussed difficulties.

Domestic Norm Glocalization

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In this paper, I analyze the dynamics between the global climate negotiations in the UNFCCC and domestic climate governance in India by combining theoretical approaches of International Relations and comparative politics. I center on the puzzling research question of *why India played a very instrumental role in negotiating the global climate governance arrangement "Reducing Emissions from Deforestation and Forest Degradation" (REDD+), but has largely stayed absent from domestic REDD+ implementation*. Therefore, my contribution focuses on the successful global uploading of India's national forest conservation perspective into the REDD+ mechanism, and the reasons for the belated and partial domestic downloading (and reshaping) of REDD+ norms and rules to India. Furthermore, I analyze to what extent the Indian government substituted REDD+ by a domestic program – the Green India Mission – which is an unilateral domestic "Nationally Appropriate Mitigation Action" (NAMA) under the UNFCCC. However, I also look in the possibility that India has rather substituted REDD+ through programs which are in line with longstanding national forest policy targets, while not being connected to UNFCCC's climate governance arrangements. Therefore, I address three existing research gaps. Firstly, the dynamics between the global climate negotiations in the UNFCCC and domestic climate governances have not yet been sufficiently scrutinized. Secondly, several scholars of climate politics have observed a lack of in-depth analyzes of domestic climate politics in the Global South. Thirdly, few studies incorporate domestic reshaping or even substitution of global instruments or norms when accounting for impacts of the global level on domestic politics. Given these shortcomings, I develop a theoretical framework comprising elements from research on global and multi-level governance, rational choice, constructivist norm research, as well as institutional and policy change. For answering the research question, I use primary and secondary sources, semi-structured expert interviews, and process tracing for the period of 2005 (i.e. when REDD+ negotiations started) until 2018. Research on climate politics in India is particularly relevant as it is the third largest greenhouse gas emitter in the world. The paper fits nicely in the Earth System Governance research focus on architecture and agency as it shows the relevance, but also the limited impacts of international climate institutions on domestic climate politics in the Global South. It is thus a research contribution to the current discussions on global-domestic multi-level climate policy-making in the run-up to and aftermath of the Paris Agreement.

Governing a Volcanic River Basin: the Water-Lahar-Volcano Nexus. Case of Opak Sub-Basin at Mt. Merapi, Indonesia

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This paper embarks on the research question of “What are the interrelations of lahar management in integrated water resources management of a volcanic river basin?” It highlights the governance process of a volcanic river basin in Indonesia, using the case study of Mt. Merapi as one of the most active volcanoes in the world. The study is a part of a Ph.D. project and was conducted post-2010 eruption of the volcano as it marks the 100-years cycle and impacted the whole Yogyakarta Special Region, also discerned as a national level disaster. The theoretical framework focuses on the interrelation of integrated water resources management (IWRM) and the resources management nexus approaches. Meanwhile, a greater research framework for overall research is on the cultural ecological knowledge (CEK) influences in the IWRM-Nexus with the boundary spanning concepts in water governance. The CEK is defined as a body of knowledge passed down generations by the indigenous either in oral or written forms. It uses exploratory research design to investigate the timeline of end 2010-early 2018. The methods used are qualitative, with ethnographic intentions divided into 2 fieldwork observations and interviews of 47 respondents (2016) and 10 respondents (2018). It also incorporated the researcher’s 5 years’ experience since 2010 as participant observer directly immersed in the river basin organization. The paper evaluated and uncovered the governance of earth system into policy setting, managerial contexts (agencies and actors involved), and the interaction attempts of the governance, where patterns of possible interrelations forms are clustered. These clusters indicated the shifting forms of IWRM style used in governing the basin. Each correlates to the status of the volcanic activities (pre, onset, post-eruption) and the water management cycle (conservation, utilization, and hazard control) as (1) normal, (2) disaster and (3) normal. Further analysis indicates the implication of the shifting governance in the managerial contexts and interaction attempts, where it is more effective during the disaster and normal+ than in normal condition, due to more existences of the CEK in the two earlier conditions. A deeper analysis also displays integration level of water-lahar-volcano nexus, which categorized into 3 levels: (1) coordination, (2) collaboration and (3) cooperation. This categorization emphasizes the emergence of boundary spanning activities important for the future, through boundary organizations and individuals, as they perform important connective capacities between the shifting governance forms.

Governing Sea Level Rise Induced Retreat and Relocation Through Insurance: A Risky Business?

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Multiple international organizations view insurance as an instrumental form of climate change adaptation. However, insurance, in its current form, may not provide the answer that the international climate change community hopes. This paper uses the growing body of theoretical and empirical literature on insurance as explicit and implicit governance to critically examine its potential implications for two extreme forms of climate change adaptation: retreat and relocation. This analysis reveals that insurance as adaptation governance, basic insurance principles and goals, and, concurrent biophysical effects of climate change diminish the effectiveness of insurance as adaptation. Moreover, relying on insurance as an adaptation tool presents three key risks: 1) it may unintentionally shift authority over adaptation away from communities and States to private insurance companies and other non-state actors; 2) it could enhance telecoupling issues already in play through globalization; and 3) it will structure climate change adaptation to the demands of indemnity and index insurance which could have long-lasting unintended consequences.

Fertile ground without seeds: Re-visiting Limitations of Transnational Sustainability Governance in China’s Tea Sector

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Eco-certification is a promising mode of transnational governance to address sustainability issues in global commodity sectors. But many certification schemes face significant challenges in increasing their uptake in the Global South where most commodities are produced and also consumed. To explain limited shares of sustainable products in globe

markets, past studies often underscores that conditions in terms of market characteristics, industry structures, and political contexts in large emerging economies as highly unfavorable for the growth of eco-certification. Using the case of sustainable tea certification in China with original data collected in the field, the paper argues that supporters of transnational private governance can misinterpret domestic economic and political contexts in emerging economies, and consequently overlook many opportunities to gain support from local stakeholders. The case study shows that, in contrast to conventional expectations, China's tea sector has become a fertile ground for the rise of eco-certification, but leading transnational schemes have yet to sow their seeds there. The paper also considers businesses' incentives for eco-certification by conducting a survey experiment with senior managers of tea producing firms in China, showing that both the expansion into international markets and support for the government's sustainable development strategy can significantly generate firms' interest in adopting transnational sustainability standards. By offering new insights into eco-certification in China, the study suggests that, in order to increase their impact in emerging economies, transnational governance schemes need to carefully interpret changing domestic contexts and actively engage local stakeholders.

Restricting Finance for Fossil Fuels: Examining the Role of Export Finance

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Export Credit Agencies (ECAs) are public bodies that provide government-backed loans and other forms of financial guarantees in order to promote their own countries' exports and foreign investments. ECAs are important actors in international finance; collectively their investments far exceed those made by multilateral and regional development banks. The investment decisions of ECAs can have significant implications for the environment and, in particular, for efforts to mitigate climate change. While commercial banks are increasingly acknowledging climate change related risks and moving away from funding fossil fuel projects, ECAs—which have a higher risk tolerance and no pressure from shareholders or customers to comply with norms of corporate social responsibility—appear, in many cases, to be stepping in to fill finance gaps. Although ECAs are publicly funded, they are not always constrained by national legislation (e.g. they may not have to take the Paris Agreement targets into consideration when making an investment). ECAs also often operate with limited transparency or opportunities for public scrutiny. This paper examines the agency of ECAs in Earth System Governance as well as the limited efforts to govern them at the global level (e.g. through the OECD Arrangement on Officially Supported Export Credits). It does so through a systematic analysis of the climate policies of ECAs, including a comparison of the policies that have been adopted by ECAs with those of major commercial and development banks. A focus is given to OECD ECAs, but given its significance the Export-Import Bank of China is also included in the study. The paper argues that the failure of ECAs to adopt stringent climate policies threatens the integrity of the Paris Agreement. Options to further restrict the fossil fuel lending activities of ECAs through various global governance mechanisms are explored.

New Alliances in Global Environmental Governance: International Bureaucracies and Sub- & Non-State Actors

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In the past few years, it has become increasingly obvious that the existing global governance framework is not sufficient to cope with transboundary environmental challenges. In fact, there is a growing discrepancy between the need for adequate governance solutions and the capability of international institutions to provide them. With reference to the concept of planetary boundaries, it can be argued that humanity is now at a critical juncture to identify new sustainability paths for the 21st century and beyond. Consequently, structural changes in global environmental governance are urgently needed both within and outside United Nations institutions. In this regard, an important process currently underway is that the bureaucracies of international institutions have started to reach out to cities,

civil society groups, and business associations in order to commonly pursue policy goals. After a long period of neglect, we recently witnessed a growing scholarly interest in the role and function of international bureaucracies. A number of skeptics continue to doubt that the bureaucracies of international regimes and organizations have any significant impact beyond that of technical assistance and services to national governments. Yet, numerous authors argue that international bureaucracies exert an autonomous influence in global affairs. These scholars perceive international bureaucracies as distinct actors and contend that they have attained several important tasks in contemporary global policy-making. Several authors have conceptualized international environmental bureaucracies as actors that pursue certain policies which cannot entirely be controlled by national governments. While these studies have provided important insights into the growing importance of international bureaucracies, the question of how these international institutions interact with sub- and non-state actors has only lately attracted wider scholarly interest. This knowledge gap is important to fill with regard to the crucial role that these actors have come to play in global policy-making. Against this backdrop, this paper seeks to contribute to bridging this research gap in the study of international bureaucracies and focuses on their interplay with sub- and non-state actors in global environmental governance. In particular, the paper outlines a broader research project which traces the evolution of the interactions between international bureaucracies and sub- and non-state actors over time and aims at enhancing our understanding of how, why, and with what consequences these actors work together.

Non-state Actors and the Diffusion of the 2030 Agenda in Brazil: An Interpretive Research on the Sense-making and Social Engagement with Global Norms

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The ratification of the 2030 Agenda for Sustainable Development by UN Member States in September 2015 marks the agreement on 17 Sustainable Development Goals and 169 targets for dealing with the complex and interrelated challenges the world faces. Unlike the former goal setting processes that took place at the global level, this agenda was defined after wide and intense consultation and negotiation processes that included an unprecedented number of stakeholders. As a result, the 2030 Agenda presents an innovative approach to global and local governance which is based on goal-setting strategies. Notwithstanding the inclusion of non-state actors into the consultation and negotiation processes and into the means of implementation of the 2030 Agenda, state actors are the main responsible to enact, follow up and deliver it. Against this background, why would non-state actors engage with an agenda that was ratified by and is mainly attributed to state actors? How might non-state actors exercise agency in the enactment of this novel approach to global governance? Recently, the 2030 Agenda and its Sustainable Development Goals have attracted growing interest from non-state actors in Brazil. In particular, a wide range of NGOs, advocacy networks, private companies and academics have been diffusing and working for the implementation of this agenda across the country. While many of these non-state actors have been cooperating and scaling up their initiatives, little is known about how they make sense of this global agenda, and how they disseminate and translate it into practice at the local level. To address these gaps, this paper draws on an empirical research conducted in Brazil and on approaches to diffusion research in Sociology and International Relations. In doing so, it investigates the sense-making of and social engagement with the 2030 Agenda by non-state actors in Brazil. This interdisciplinary approach to diffusion research is particular useful to unearth the role of agency and cooperation within diffusion and implementation processes. The empirical data were gathered during ethnographic fieldwork carried out from September 2017 to February 2018 in Brazil. During this period, the author conducted several interviews and participant observations in almost all regions of the country (i.e. North, Northeast, Federal District, South and Southeast), across different social and organizational contexts. This paper seeks to discuss the main findings of this empirical research and the role of non-state actors in Earth System Governance.

The Impossible Energy Transition: Identifying Obstructing Legal Structures and Underlying Goals

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Legal barriers for sustainable action arise from static legal frameworks due a lack of knowledge, lengthy political decision making procedures or even political unwillingness to lift certain barriers. As a result, law generally significantly lags behind on innovation and development. This is rather apparent in the sustainability debate. Although the issue and importance of sustainability is emphasized for decades, the realization that this requires sustainable legal frameworks has only just begun to set in. Current legal frameworks therefore reflect that they in principle seek to resolve other issues strongly linked to the development of welfare and comfort. A legal discrepancy has arisen in hierarchy between sustainability and other issues, which creates ample legal barriers for sustainable action. Sustainable action requires enabling legal frameworks that are flexible, open and reactive but that can also in principle remove barriers for innovation – without knowing precisely what this innovation entails. This would be the ultimate goal of sustainable agents and lawyers alike. In this paper we investigate how we can create legal frameworks that enable sustainable action rather than limiting it. To do this we chose to investigate legal frameworks applicable to the energy transition from fossil to renewable energy resources. Firstly we will shortly describe the energy transition in Europe and what regulation is applicable to this development. Herein we also examine the underlying goals of those regulations, so we can understand choices made. Here we will show that a majority of regulation applicable to the energy transition does not aim at sustainability, but to goals of consumer protection, security of supply, affordability and more. Through this examination, we secondly identify what regulation creates barriers and to whom, as the subject of legislation may differ between industry, government and citizens. We will further investigate how this regulation limits these parties in their sustainable action. Businesses for instance can be limited by competition regulation, preventing them making sector wide sustainability agreements, as these agreements may effectively create barriers for third party access, including for those from developing countries. Understanding these traditional structures and their functioning is essential for creating these sustainable centered legal frameworks. Lastly we will focus on such legal frameworks and identify core principles and how we can incorporate sustainability as a core principle on equal footing compared to more traditional goals.

Auditors of Sustainability: Exploring the Role of Supreme Audit Institutions in the Implementation of the Sustainable Development Goals

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The United Nations agreed in 2015 on 17 Sustainable Development Goals with 169 targets, all to be achieved by 2030. While achieving these goals is a major challenge for public and private actors alike, a key question is: how to actually measure progress on these 169 targets over time? In most countries, this challenge lies with their Supreme Audit Institution, that is, government agencies of substantial size that function as an independent body designed to ensure public accountability. Such agencies normally oversee the management of public funds and the credibility of government's reported financial data, and check policy conduct. Often, Supreme Audit Institutions also audit compliance with the international obligations of their countries. And, importantly: in most countries, Supreme Audit Institutions have been mandated to measure the sustainability policies of their governments in achieving the Sustainable Development Goals. Measuring progress on something so politically charged as sustainable development is of course different from more traditional auditing functions, such as the use of public funds. In becoming main agents in measuring progress in the sustainability policies of their governments, Supreme Audit Institutions also gain new sources of influence on the implementation of international obligations of their governments, and generate new sources of societal influence and even power through the knowledge they produce and disseminate. This paper is one of the first to systematically analyse under what conditions and to what extent Supreme Audit Institutions are able to exert influence on policy processes and specifically the implementation process of the Sustainable Development Goals. On the basis of a comparison of 18 Supreme Audit Institutions using a detailed research framework that draws on institutional theory, the extent of their cognitive influence was assessed. Our research shows that a Supreme Audit Institution's institutional design, legal independence, and political mandate do not seem to affect its influence.

Freedom and strength in communication, autonomy in decision-making, a full-functioning follow-up system, and sufficient resources, however, can account for differences in cognitive influence between Supreme Audit Institutions. These variables, we argue, can henceforth also further be utilised to increase the political contributions of Supreme Audit Institutions. Nevertheless, until now the Supreme Audit Institutions that we studied have shown limited commitment to the process of measuring the Sustainable Development Goals.

Climate Governance Under Geopolitical Change: A Cluster Analysis of States' Contributions to the Paris Agreement

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The 2015 Paris Agreement established a hybrid climate regime centered on domestic climate governance combined with an international review process. Through the Nationally Determined Contributions (NDCs), parties to the Agreement advance their individual approaches to climate governance, which breaks with the top-down structure of previous international agreements on climate change and creates a new playing field for actors in international climate governance. The hybrid nature of the Paris Agreement reflects a time in which the geopolitical landscape has become increasingly polycentric. Multiple actors have emerged as prominent players in terms of diplomatic strength, economic weight, and greenhouse gas emissions. In addition, continuing environmental and climate change creates new geopolitical challenges to which states need to respond. In light of this changing landscape of both geopolitics and international climate governance, previous state groupings can be expected to be challenged, change, or dissolve, while new coalitions may emerge. In this paper, we examine this changing landscape of international climate governance by asking if clusters of states emerge from the NDCs that break or convert with traditional patterns of international politics. We conduct a cluster analysis of the NDCs based on four variables: sectors included for emission reductions; use of market-based mechanisms; the inclusion of non-state actors; and the inclusion of short- or long-term targets. We compare the clusters to conventional patterns of states, such as the United Nations Framework Convention on Climate Change's (UNFCCC) annexes, levels of national income, and traditional negotiation coalitions to examine whether the dynamics of international climate governance are changing. In light of the commencement of implementation of the Paris Agreement, the paper suggests that examining state clusters gives insight into to how states' have responded to the changed geopolitical landscape in terms of climate governance and what can be expected as regards the future development of the Paris Agreement and the UNFCCC.

The Effects of Transnational Partnerships in Global Fisheries Governance

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Illegal, unreported, and unregulated (IUU) fishing is a widespread global problem: contributing to overfishing and biodiversity loss, undermining fisheries management and legal fishing activities, negatively affecting livelihoods and food security. In recent years, IUU have also been increasingly linked to transnational crimes and human rights issues, with poor labor practices and even slave-like conditions being detected within the fisheries sector. IUU also cause big economic losses, being estimated globally at between US$10-23 billion annually, representing between 11-26 million tones. Eliminating IUU fishing is at the top of the international agenda, being put forward both within the 2030 Agenda for Sustainable Development and in the internationally agreed Sustainable Development Goals (SGDs). In this context, the international community is increasingly recognizing and promoting transnational partnerships, between public actors, the private sector and civil society, as a strategy for mobilizing and sharing knowledge, expertise, technologies and financial resources and for engaging the private sector to implement the SDGs. The role of transnational partnerships has also gained significant attention by the research community. Recent decades have seen a burgeoning

literature on public-private and multistakeholder partnerships, collaborative initiatives and private transnational regulatory organizations. These studies have successfully developed typologies and more recently, added to our knowledge about the effectiveness of partnerships, yet we still know little about the pathways through which partnerships shape the implementation of global policies. What strategies do transnational partnerships use, and in what ways do transnational partnerships make use of (or are limited by) global and domestic political opportunity structures to shape implementation of IUU policies? The paper aims to address these questions by constructing a theoretical framework that combines insights from the interest group literature and the literature on the role and agency of non-governmental organizations (NGOs) in global environmental governance. The paper uses original data collected through semi-structured interviews with representatives of more than 15 transnational partnerships in global IUU policy-making. Partnerships were identified using existing case study literature and lists of participants in international organizations (IOs) relevant for IUU, and then corroborated with 5 experts in global IUU policy-making, from academia, IOs, NGOs and the fishing industry. This paper contributes to the literature on global environmental governance and the emergence of new collaborative arrangements beyond the state, to the interest group literature by applying theoretical expectation in a global context and to the ongoing discussion about the role of partnerships for implementing the SDGs.

Agency in the Shadow of Hierarchy: Exploring the Role of Small- and Medium-Sized Enterprises in Environmental Governance

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Environmental governance is characterized by fragmented, multi-sector interaction and non-state actor participation in formulation and implementation of collective goals. Private stakeholders are central to these processes of interaction, due to their significant contribution to resource consumption and production of waste, leverage over policy making, and ability to block or realize implementation of decisions. The ability of businesses to advance sustainability objectives is also enshrined through global and local partnership agendas. There is ample knowledge of private sector contributions to environmental governance. Yet, this research systematically overlooks the potential of small- and medium-sized enterprises (SMEs) to advance sustainability agendas. As a result, debates on environmental governance are characterized by a dearth of strategies to engage with, and conceptual tools to explain the contribution of SMEs to sustainability initiatives. Drawing on primary data collected through 80 in-depth interviews conducted in Toronto and Vancouver, Canada, this paper addresses this gap by examining governance challenges associated with mobilizing SMEs in environmental policy processes. Our contribution to theory and practice revolves around two concerns. First, the paper explores the failure of traditional governance strategies to recognize SMEs and support sustainability action in this domain. We conceptualize this problem as a governance 'divide', which captures the absence of overlapping discourses and lack of communication between public authorities and small business communities. This divide produces ineffective governance in multiple ways, including: inadequacy of traditional policy tools, failure to inform SMEs about available policy support, inability to recognize the multiform needs of this group of actors, and lack of support for existing efforts. Simultaneously, analysis of alternative governance strategies illustrates the potential for new policy approaches to more effectively encourage involvement of SMEs in action for sustainability. Second, we examine the ability of SMEs to formulate and realize sustainability objectives in the 'shadow of hierarchy'. These efforts constitute an expression of self-governance and illustrates the emergence of agency in the absence of targeted policy engagement. We demonstrate that contributions of SMEs to environmental agendas are multifaceted and that this diversity calls for closer attention the *forms* of agency associated with environmental governance processes. This encompasses introduction of new sustainability practices, alteration of material structures, and diffusion of beliefs, values and identities related with sustainability. Focusing on formal representation in policy processes has hitherto rendered these contributions invisible; adoption of broader perspectives on agency allows for recognition of the informal, multiform contributions of SMEs to sustainability-oriented change.

EU Climate Leadership Revisited

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Literature on international climate politics has long analysed the role of the EU in pushing and pulling climate action forward. EU international leadership on climate change has moved from 'rhetorical' in the 1990s to 'leadership-by-example' in the 2000s, to a more modest 'leadiator' role in the 2010s. Following the adoption of the Paris Agreement in 2015, the international community has entered a phase of implementation in climate policy that is unprecedented in the breadth of actions and actors involved. However, in the wake of President Trump's announcement, on 1 June 2017 that the US would withdraw from the international Paris Agreement on Climate Change it seems clear that international action cannot be taken for granted. In the immediate aftermath of Trump's announcement, a surge of commitment from other Parties to the Agreement seemed to suggest a new era of political mobilisation on climate change. The EU and China together announced their determination to lead the world in combating climate change. Networks of city mayors across the world (and in the US), reiterated their commitment to fulfil plans to transition towards a climate-friendly society. On the flipside, commitments to action fall short of what is called for under the Paris Agreement's objective to limit global temperature increase to below two degrees Celsius. This paper revisits the long-standing literature on the importance of climate leadership within the context of the withdrawal of the US from the Paris Agreement. We explore the contextual changes between a US withdrawal from international climate politics in 2017 and its withdrawal in 2001 under President Bush. Will the EU step up to be the climate leader it became in the 2000s? Will policy decisions, investment flows and fulfilment of commitments be pursued in line with the immediate rhetoric in the aftermath of President Trump's announcement? Is such leadership necessary given the polycentric governance arrangements promoted by the Paris Agreement? Drawing on explanatory factors outlined in the leadership literature (internal unity, political salience, domestic support, international momentum, international political context, among others), we highlight the contemporary challenges and opportunities for (renewed) EU leadership on climate change. The paper contributes specifically to the theme of 'agency' (of the EU) in Earth System Governance, while contributing in a second step to questions of 'accountability' of supranational actors (such as the EU) in climate governance.

Public Policies and Transnational City-networks: Strengthening the Agency on Global Climate Change Governance

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In the past two to three decades cities have acquired increasing prominence in the global governance of climate change. Particularly, the configuration of city-networks to deal with climate change has emerged as a new (and complex) model of agency. ICLEI and C40 are two well-known examples of this type of network. While these networks increase their power and legitimacy in the global arena, some authors argue that this represents a gradual shift in authority in earth system governance from a position centered at the nation-state to the emergence of new powerful actors influencing climate governance. In spite of the growing number of city-networks, little is known about how these structures exercise agency in earth system governance. In addition, up to this date there is no practical mechanism to evaluate their relevance and influence, for example, in the implementation of public policies related to climate change governance. Is there room for these city-networks to become legitimate actors in the global and local (i.e., glocal) governance of climate change, in terms of municipal public policies implementation? While some authors have studied how mayors "go global", representing their cities in international meetings related to climate change governance, none of them have analyzed the influence of these meetings in municipal public policies, after mayors come back to their home cities. Others have stated that city-networks are very limited in their type of governance that, while providing information and some services to cities, lack coercion and more robust forms of agency. Based on this scenario, this paper will investigate in the literature on Public Policies and Global Governance of Climate Change existing opportunities (and possible constraints) for city-networks to strengthen their agency and relevance at the municipal

level. In terms of methodology, the paper will rely on a systematic literature review, representing an exploratory study. With this study, we hope to bring some light to future possibilities of action for city-networks engaged in climate change governance. Similarly, he hope to advance the understanding on how cities, as emerging actors, will influence earth system governance in the next decades.

Mapping Gaps in Polycentric Governance: What Earth System Governance Demands are the Private Sector Making of the State?

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This paper makes a contribution to debates on the influence, roles and responsibilities of both state actors and non-state actors (such as corporations) in Earth System Governance. Polycentric governance theory has emerged as a helpful tool for understanding current evolutions in Earth System Governance. Polycentric governance systems are those in which political authority is dispersed amongst a range of bodies that operate in overlapping jurisdictions which are not in a hierarchical relationship to one another. Key characteristics of polycentric governance (in comparison with monocentric governance) are emergence and self-organising. Polycentric governance theory, through principles of local action and mutual adjustment, acknowledges the possibility that multiple governance initiatives could emerge to address governance demands. This potential proliferation of governance initiatives is not seen as a problem (Jordan, A., et al., 2018; Ostrom, 2010). However, these same characteristics of emergence and self-organising also run the risk that governance gaps could occur. Without the kind of overarching design associated with monocentric governance, self-organising emergent approaches run the risk that certain governance needs might not get addressed, which is more of a problem (Oberthür, S., et al, 2017). In the polycentric governance debate, much has been made of the capacity for private governance initiatives to address governance gaps left by an absence of state action. Many examples of private governance initiatives involving the private sector have now emerged and have been examined as potential contributions to Earth System Governance. However, some governance needs are more amenable to private governance solutions than others. This paper makes a contribution to these debates by analysing what Earth System Governance demands the private sector are making of the state. The paper does this by analysing the contribution private sector organisations made to the process of agreeing the UN Sustainable Development Goals (SDGs) over the period 2012-2015. The paper reviews written and verbal statements made by corporations during consultations to develop the UN SDGs, distinguishing between areas where corporations were proposing that existing private governance initiatives could make a contribution to the UN Post-2015 Development Agenda, and areas where corporations were identifying governance gaps and calling for governance solutions from the state (articulating governance demands). In discussing this data, the paper will comment on implications for understanding how far authority has been shifting in Earth System Governance, and on implications regarding the opportunities and limitations of polycentric approaches to strengthening Earth System Governance.

Forest Carbon Offset in Brazil: Actors and Networks of Resistance

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In 2016, States agreed at the International Civil Aviation Organization to establish the Carbon Offset and Reduction Scheme for International Aviation (CORSIA). CORSIA is a carbon offsetting scheme in which all the GHG emissions from international air transport above the baseline will need to be offset though the purchase of carbon credits. The offset mechanism allows shifting the global scale of aviation emissions problem to the local scale of compensation, thereby disassociating civil aviation from its contribution to climate change. Carbon offset projects have been implemented around the world with different implications to local communities and environment that hosted these projects, and CORSIA increase the interest in them. The paper aims to contextualize the debate about CORSIA in Brazil, one of the main potential suppliers of carbon credits from offset projects, especially if we consider the forest offsets. By analyzing

reports, meetings memories and interviews, the paper describes different actors' views about the local potentialities and implications of the scheme in order to map their interests and alliances. The main actors debating CORSIA in Brazil are the federal government, subnational state actors, especially municipalities and states from the North of the country (the Amazonian region), private sector, including international airline companies, local and transnational organizations and social movements, traditional communities and indigenous groups. These actors have different views about the implications of CORSIA and seek to exercise authority by invoking different scales: the global benefits of combating climate change and preserving forests or the local impacts of land use, like shifting of property rights and interdiction of traditional living. In this sense, we argue that CORSIA has specific impacts in Brazil, specially related to land use, and the local, national and transnational actors are struggling to defend their points of view – with different capacities of organization, financing and influencing decisions. The lack of public debate about these impacts and the absence of coordination with the national climate policy have been central to the prevalence of market interests, and the discussion about forest offsets in Brazil occurs at the same time that the federal government and the National Congress are operating a drastic setback of protective environmental laws and policies. CORSIA may encourage the expansion of offset projects, changing local political dynamics and resulting in different environmental impacts without a public dialogue, especially with the local communities affected.

Emerging Principles for Enhancing Global Governance and Sustainable Development through Climate Finance and the Informal Economy

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Climate change is a global development and global governance challenge as it is a collective action problem whose remedy is beyond the reach of any singular actor. Moreover, climate change is anticipated to exacerbate inequality and impede the achievement of the Sustainable Development Goals (SDGs). Consequently, the United Nations Framework Convention for Climate Change (UNFCCC) introduced the Intended National Determined Contributions (INDCs) framework as a novel mechanism for improving climate change governance and promoting sustainable development. However, the INDCs are still far from achieving a collective plan to keep the global temperature increase to well below 2°C and the world is also at risk of being caught in a cycle of low and uneven growth and, with it, of failing to reach the SDGs to eliminate poverty and provide a better life for all. The world is therefore arguably in dire need of transformative and innovative governance and development architectures that can simultaneously promote sustainable development and enhance climate change governance. Non-state actors from the informal economy may be considered as important actors that will have an important role in ensuring that the INDC framework is successful and that the SDGs are successful. For example, much of the urban population growth occurring in developed nations is taking place in slums and informal settlements and 54% of all employment in Africa is in the informal economy in comparison to only 3% of employment being in the informal economy in Highly Industrialized Countries, meaning that industrialised country climate change policies and strategies may not easily be transposed or be successful in developing countries. This paper is therefore an inductive inquiry to determine how the capacities and resources of the informal sector can be adapted to contribute towards the enhanced implementation of the INDCS and improve earth system governance. The paper identified that the global architecture for climate finance marginalises non-state actors in the informal economy even though they serve the least resilient communities and businesses. Consequently, earth system governance and climate change adaptation may be improved should policymakers support the enhanced utilisation of new climate finance modalities such as South-South Climate Finance mechanisms to mobilise and disburse financial and technical support specifically for the burgeoning urban informal economy.

The Roles of South-South Climate Change Governance Systems and South-South Climate Finance in Fostering Sustainable Development and Enhancing Environmental Management in Developing Countries

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Africa might already be at risk of not achieving the Sustainable Development Goals (SDGs) as eradicating extreme poverty by 2030 is feasible only under very optimistic scenarios. Africa is also very vulnerable to climate change hence is arguably the region whose development may be adversely impacted the most by climate change. On the other hand, climate adaptation can potentially address some of the mistakes and shortcomings of conventional social and economic development pathways that have contributed to social inequity, poverty, and environmental problems. However, more climate finance goes towards mitigation efforts such that mitigation activities accounted for approximately 93% of climate finance between 2015 and 2016 and adaptation costs are now projected to be up to five times higher than previous estimates whereby adaptation costs in developing countries are estimated to be between US$280 and US$500 billion per year by 2050. Arguably, achieving the SDGs and improving climate change resilience will require the development of innovative mechanisms to improve the management of financial and natural assets and resources. Local governance systems can play a significant role in improving environmental governance and enhancing climate change resilience as they are the closest entities for planning and implementing environmental programmes and adaptation strategies suitable for the particular geographic and social context in which they are located. However, in Africa, many local governments and local governance systems have problems in mainstreaming environmental management and climate change adaptation into local planning, policy and implementation due to (financial and technical) strains on resources and capacity. This paper therefore sought to determine how South-South Climate Finance mechanisms could be harnessed to improve the mobilisation of climate finance at local level to reduce strains on local governments. The methodology used included analyses of case studies, project reports, policy reviews, policy briefs, and academic literature reviews on the mobilisation and disbursement of climate finance. The study highlighted that most Global North climate finance mechanisms do not provide capacity building support to enable local actors to develop skills for developing effective climate change programmes and environmental governance systems. It was therefore concluded that South-South Climate Finance mechanisms can improve earth systems governance and climate change management by focusing on the provision of financial and technical resources to local state and non-sate actors to enable them to develop local capacities for developing viable climate change projects and new financing mechanisms for climate change policies.

Activity-based Graph Structure of Climate Companions Cooperative Network Between City of Helsinki and Businesses

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Private sector plays an essential role in urban climate action, since public sector can only partially control the carbon footprint of a city. One way to build public-private partnership is to form voluntary-based cooperative networks. Often, the aim of networking is to support learning processes and innovation by bringing different actors together. Here, we describe the activity-based structures of Climate Companions (CC) network of City of Helsinki. Goals of CC include increasing innovative ways of cooperation to reduce emissions and sharing knowledge on best practices. If these processes are to happen, the network activities should bring members together and induce genuine collaboration between them. Participation in activities creates a connection structure between network members. Here, we study this structure with methods of network science. For the sake of clarity, we use the term “graph” when referring to network as a unit of analysis. Term “network” refers to the organisation. From the data offered by the network coordinator (City of Helsinki Environment Services), we construct an event participation graph. This graph is a bipartite that consists of two classes of nodes, and links are allowed only between nodes belonging to different classes. The node classes are members of CC and events organised by CC. A link between a member and an event indicates that the member has participated in the event. Members connect to each other through the events. We analyse the structure of the participation graph in the light of the aims of the network. In particular, we explore how the module structure of

the graph evolves in time: do the network activities manage to mix companies from different lines of business, enabling efficient knowledge sharing? We interpret the results of the graph analysis in the light of qualitative data on the actions, motivations, and experienced benefits of the members. The qualitative data include available documents, such as climate reports, and interviews. The article relates to the theme "Agency in Earth System Governance". We study how the functional structure of a city to business network supports the agency of private actors in urban climate change mitigation. The results help to evaluate the performance of the network and if the current ways of working support sufficiently the goals of the network. By introducing the bipartite graph analysis as a tool for evaluating the performance of city to business networks, the article also contributes to the theme "Architectures of Earth System Governance".

The Effect of Transnational Municipal Network Participation on Urban Climate Change Adaptation. A Study of 401 Cities Around the World

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Cities have increasingly recognized the risks caused by climate change. Global networks of cities, such as C40, ICLEI, and Global Covenant of Mayors for Climate & Energy (former Covenant of Mayors and Compact of Mayors) have been formed to support cities in climate change mitigation and adaptation. However, there is lack of scientific evidence when it comes to the impact network participation has on city level climate action. Especially in the context of adaptation, the impact of network participation remains unclear: does network participation contribute to urban climate change adaptation? The previous literature on transnational municipal networks has concentrated mostly on theoretical issues or case studies. In this study, we analyse a unique global data set of 401 cities from all over the world to investigate whether cities that are members of these networks are more advanced in their climate change adaptation process than non-members are. Adaptation process is measured with a process index defined in earlier studies. The results show clear and statistically significant increase in adaptation process index score for membership in each network, although there is considerable variation in the scores of individual cities. The increase is especially evident for C40 membership. Also, longer the city has been C40 member, higher the process index. This might mean that network participation encourages cities in the climate change adaptation process. However, it is also possible that active cities tend to join the networks more often and earlier than other cities. Our material supports the view that global networks are strongly overlapping: certain cities tend to be members of several networks, while significant amount of cities stay outside. We analyse the possible explanations based on previous literature and information gathered from the networks. The results of our study can be used to develop transnational municipal networks further, and to activate the cities in the climate change adaptation work. Our research contributes to wider knowledge about the potential leadership of institutional networks in urban climate change adaptation. The paper relates to the conference theme "Agency in Earth System Governance", and especially, to the questions how do different agents exercise agency in earth system governance, and how can we evaluate their relevance. As the paper discusses the role of global institutional networks in urban climate change adaptation, it also relates to the theme "Adaptiveness, Resilience, and the Transformation of Earth System Governance".

Governing Stakeholders in the Anthropocene: Pipelines, Power and Private politics

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Several recent oil pipeline projects in Canada and the United States – including the Keystone XL pipeline and the Trans Mountain expansion project – have been substantially delayed and re-routed, and have attracted campaigns and lawsuits by a range of stakeholders. Although contention around energy infrastructure projects is not new, the

landscape against which pipelines are being constructed in Canada and the U.S. has changed significantly in the last two decades. Notably, the oil and gas industry has developed new governance tools like Impact Benefit Agreements in order to build a “social licence to operate" for pipeline projects. At the same time, there is unprecedented and increasingly professionalized opposition to large energy infrastructure projects. Some pipelines have become symbols of carbon “lock in” for the climate movement, politicizing the relationship between the environment and the economy, and some have become the centre of a new wave of contention around indigenous land claims and treaty rights. These trends create a number of puzzling dynamics, namely: why do some projects generate more contentious politics and mobilization than others? And why do similar companies respond differently to contentious stakeholders? Existing theoretical approaches fail to explain this empirical variation. This paper will provide an analytic framework to understand how and when authority shifts in energy infrastructure governance. This framework will be supplemented by preliminary insights from fieldwork on the politics of transboundary pipeline governance and resistance in Canada.

Governing and Accelerating Transformative Entrepreneurship: External Factors Influencing SME Sustainability and Innovation in the Greater Toronto Area, Canada

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Small and medium sized enterprises are under-analyzed actors when studying large scale transitions in urban areas. SMEs significantly contribute to unsustainable modes of production and consumption in cities and surrounding regions. This then requires SMEs to redirect practices of production and consumption in order to contribute to altered sustainability trajectories internally and externally. Internal processes of change have been studied significantly, often looking at corporate social responsibility, energy efficiency upgrades, and waste reduction strategies. External factors such as integration into business networks, collaboration with other companies, and engagement with government have begun to receive attention more recently. The significance of external participation is often viewed in-terms of: cost reductions when participating in group environmental management or audit schemes and shared human resources. These benefits alone however, have not spurred SMEs to act on sustainability due to continued knowledge gaps and increasing complexity due SME participation. Our study demonstrates a key element missing from the work of external participation of SMEs, is the role of intermediaries in guiding SMEs, in order to fill knowledge and resource gaps, and act as boundary spanners in an increasingly complex web of actors, actions, and goals. Our study was completed in the Greater Toronto Area, the largest urban area by resident and SMEs population. From the results of our survey and semi-structured interviews, we found that local government, and more specifically economic development units where often significantly disengaged from encouraging SMEs to participate or engage with sustainability-oriented initiatives. Further, sustainability units within local government where not engage with SMEs. Key results in our paper indicate the need for local government units to seek synergies, but more importantly, identify key business intermediaries to resolve sustainability related gaps local government or current business networks and associations are unwilling or unable to address. This paper contributes to the earth system governance theme of agency, where it is increasingly recognized that multiple actors are needed to steer society towards sustainable trajectories. Further, this contributes to discussions of agency as we build on the concept of intermediaries serving as powerful agent to complement or support principal actors in the advancement of sustainability solutions in urban areas.

New Finance, New Actors: Reshaping Flows of Finance Beyond Carbon

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The landscape of climate governance has radically changed since the initial formation of the first multilateral agreement at Rio in 1992 and initial efforts at policy design at the level of the national government and European Union. In parallel, analytical attention has shifted from these intergovernmental arenas to examine the multiple

initiatives through which climate governance is taking place. Climate governance is now characterised by initiatives which use a range of different tools/techniques – from labelling, certification, monitoring to the development of targets and collective commitments for emissions reductions. While the challenge of moving beyond existing fossil fuel economies are increasingly configured in financial terms, this has been seen as a particular commitment for countries to provide funding through e.g. the Green Climate Fund. In recent years, multiple initiatives have emerged to reshaped different flows of finance. Initiatives range from within pension funds in New York City and Sovereign Wealth Funds in Norway to Institutional Investors group on climate change, Ceres investor network on climate risk and sustainability, Green Century funds and Task Force on Climate-related Financial disclosure. These different initiatives form what might be identified as a 'governance complex' of finance targeting decarbonisation. New kinds of actors are now coming to be involved in the governing of low carbon transitions within/across the supply chain and through transnational governance arrangements. We pay particular attention how flows of finance are attempted to be reshaped in sectors that has so far not been at the forefront of 'climate finance' or 'divestment' such as steel, plastic, and meat and dairy. How does (no) carbon come to have value in these sectors, and which new actors are being corralled in the name of climate change?

Technological Arguing: How New Business Practices Shape the International Environmental Regulation of Maritime Shipping

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This paper introduces the concept of technological arguing and empirically probes its explanatory power in the study of international environmental regulations. Neo-pluralist and neo-Gramscian scholars have noted that business can shape international rules, standards, and guidelines through its technological power. They have shown that innovation can enable stringent regulation, while lack thereof impedes regulation. Underlying this research is the assumption that the state of technology is largely undisputed and informs rather stable preferences of states and interest groups in regulatory bargaining processes. I question this rationalist assumption and develop a framework for understanding the role of technology in regulatory negotiations by drawing on the 'logic of arguing.' I posit that technology is subject to contestation in argumentative struggles that unfold throughout negotiations. Coalitions with stabilized preferences argue over the availability, costs, and benefits of the technologies needed to meet higher environmental standards with a view to convincing negotiating parties with less stable preferences. I submit that the outcomes of such argumentative struggles flow from the distribution of argumentative power. The power to persuade in technological arguing arises from the ability to substantiate one's claims in terms of credible and informed references to existing or emerging corporate practices. I probe my argument using the case of new standards for sewage discharges from passenger ships in the Baltic Sea that will become effective from 2019. I trace the regulatory process that led to the adoption and confirmation of the effluent standards for sewage treatment plants by the International Maritime Organization (IMO) in 2012 and 2014. Most contentious in this process was the level of limit values to be set for nitrate and phosphorus; two substances that contribute to the eutrophication of the Baltic Sea. The analysis shows that technological arguing played a key role in negotiating the two limit values. Underlying the negotiations was a business conflict between progressive manufacturers of advanced wastewater treatment systems and reluctant cruise lines. I find that arguments referring to existing and emerging business practices successfully mobilized a majority of states to support the more ambitious effluent standards. Strikingly, the argumentative power of the cruise line association was severely undermined by progressive environmental practices of one of its member companies. The paper concludes that technological arguing based on corporate practices forms a distinct causal mechanism in regulatory policy-making as it contextualizes technological power beyond rationalist assumptions.

From Ladder to Circle: A New Model of Citizens' Participation in Resources Governance

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Most models on participation focus on the assessment of levels of participation within formal planning processes. Focusing on existing institutions, this perspective widely excludes new or alternative forms of participation outside such predetermined paths. There are, however, various ways to transform earth system governance; changes can be introduced by public, private or civic actors, from “the bottom” or from “the top”, through formal or informal processes.To broaden the view on participation to a systemic governance perspective, a multi-dimensional circular model is proposed that expands upon traditional ladder models of participation. Based on a case study of the Venezuelan comunas (self-administered communities), the model includes state and non-state actors, their engagement and multi-level interaction. It focuses on urban and rural governance of resources based infrastructures, such as mobility services, and energy and water supply systems. Based on the gradient of intensity of collaboration of actors, the model arranges the forms of participation on a circle which pivots around central management. To the one hand the state enables participation in granting authority, decentralising and sharing responsibilities, through the "images" of co-management proposed by Carlsson and Berkes (2005), namely "exchange", "joint-organization", "state-nested" and "community-nested" to community self-management. To the other hand a neglecting authority creates a state-vacuum, from where again community (self)-governance derives. By closing this loop and explaining the two directions by two different power mechanisms, the paper distinguishes actors from agents, clarifies their engagement and explains allocations and shifts in authority and roles over time. The article conceptually deducts the model and exemplifies it for the case of the Venezuelan comunas. Limitations of the model are discussed and further potential applications explored.

Investing and Divesting in Fossil Fuels: Pension Funds in the Netherlands and the United Kingdom

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Addressing the Paris Agreement on Climate Change implicitly requires phasing out fossil fuels (FFs). The existing literature focuses mostly on the production, use and consumption of FFs, but scarcely discusses divestment of FFs or the role of pension funds (PFs), which are estimated at 1/3rd of the global Gross Domestic Product, in such investments. Hence, this paper addresses the question: How do Pension Funds see their role in climate change mitigation, and invest in or divest from fossil fuels (FFs)? In addressing this question, we examine the literature on investment/divestment of PFs, and undertake case studies in the Netherlands and the United Kingdom. The paper concludes that: Even though PFs are major investors, they focus more on their role as shareholder than in divestment; and rely on the state to promote the energy transition. If these powerful financial institutions fail to be proactive, the Paris Agreement may fail. However, if the Paris Agreement is implemented seriously without the cooperation of PFs, the latter will become very vulnerable as 5-6% of their assets are invested in FFs.

Development Cooperation and Fossil Fuels: The case of US, UK and German aid to India

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The long-term objective of the 2015 Paris Agreement implicitly requires the phase-out of fossil fuels. Although there is significant research on countries fossil fuel policies, there has been little research on the role of aid agencies in sending clear signals to recipient countries in relation to fossil fuels. Hence, in light of the Climate Convention of 1992 and the Paris Agreement of 2015, this paper examines the role of US, UK and German development cooperation programmes with India, and how these programmes can be improved to facilitate the meeting of emission targets? Based on an analysis of 104 policy documents and 154 interviews, this paper concludes that while these three donors largely integrate climate mitigation and sustainable development principles within their development policies and instruments, they have not coherently mainstreamed them. This undermines decarbonization goals and may unwittingly lead to the simultaneous encouragement and discouragement of fossil fuel infrastructures, and thus, carbon-intensive

development pathways. This paper concludes that US and UK development cooperation play contradictory roles, while Germany plays an ambiguous role, in the decarbonization of India's energy system.

Governing Coalitions and Municipal Climate Change Policy

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Despite the wide interest in climate change politics over the past years, Canadian cities have received little scholarly attention. This is surprising since Canada is an oil extractor country, which presents a great opportunity to understand what cities do toward climate change in the context of high dependence on fossil fuels. The studies that have looked at Canada have focused their attention on barriers and opportunities municipal governments face when it comes to climate change mitigation, and the impact of network governance on GHG mitigation policies. While this work is crucial, we still know very little — both practical and theoretical — of the unfolding processes of climate change governance at the local scale, and who is involved in governing coalition (i.e., actors taking frequently part in policy making). Larger questions about "who governs", and the influence of actors within governing coalitions on the decision-making process remain still unanswered. Thus, this research project contributes to the literature on urban climate change by answering the following questions: Who is involved in governing coalitions, and why? What is the influence of actors in governing coalitions on climate change policy adoption? This qualitative study compares the politics and influence of actors within governing coalitions in the energy sector in the City of Calgary and the City of Saint John in Canada. The energy sector at the municipal level offers valuable insights into the dynamics between state and non-state actors because several municipal governments in Canada have adopted decarbonization initiatives in that policy domain since it remains one of the biggest sources of GHG emissions in most cities in the country. Data on energy policy initiatives is collected through municipal policy documents consultation, and through interviews with policy actors from municipal governments, the private sector, environmental NGOs, and other civil society actors in each city. By combining the urban politics literature on climate change and the literature concerned with democratic legitimacy in decision-making, the paper argues that although several state and non-state actors are involved in the policy-making process, the private sector has more influence over policy outcomes than others. However, other actors, such as environmental groups and environmental NGOs, are also critical as they bring democratic legitimacy to the policy-making process. By combining these two literatures together, this paper explains why environmental groups are involved in governing coalitions despite their lack of influence on policy outputs.

It's Not (Only) Trump! The Challenges of Climate Cooperation in an Increasingly Conflictive World

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The conditions for international cooperation on climate change have declined sharply since the adoption of the Paris Agreement. Part of the IR literature has reflected that, highlighting how changes in national climate preferences – particularly in the US after Donald Trump's election - might difficult the path of global responses to the climate crisis. However, part of the literature also argues that the retraction of US climate commitment could be balanced by the rising commitment (or even leadership) of China and other actors, stimulated by the universal coverage of the Paris Agreement and the breaking of the negotiation gridlock. In this paper, while we acknowledge the impact of domestic developments in climate preferences – particularly in the major GHG emitters: China, USA, UE and India – we argue that the increasing level of conflict in the International System in the last two years is the major challenge to climate cooperation in the foreseeable future. In other words, it is the dramatic shift in international politics – and not primarily the lack of climate commitment of Trump's US – the major obstacle to climate global governance. The main features of this new scenario are the increase of geopolitical rivalry among major powers, particularly between the Western democracies and China and Russia and; the rise of trade protectionism. In the first case, there is a growing consensus that the expected convergence between China and the West was incorrect, based on the growing assertiveness of

Beijing in the South China Sea and in cyberwarfare, the authoritarian centralization of power in Xi Jinping with growing control over society and repression over political dissidence and, the claim of the Chinese model of governance as superior to the Western one. The growing confrontation between Russia and the West accelerated with the Crimea annexation in 2014 and, expanded further with the Russian meddling in key elections – US, UK, France, the support to anti-European movements in Europe and, the expansion of investment in conventional and non-conventional weaponry. The rise of trade protectionism, on the other hand, have been stimulated mostly by the US under Trump, generating protectionist reactions from other trade powers. Accordingly, the acceleration of Nationalistic and authoritarian trends in major powers of the system has been shifting national priorities from the partial management of global commons to a more Hobbesian/sovereign agenda. Consequently, there is a declining level of priority of climate change, beyond the discourses of national governments.

Creating a (Hydro)Nation of Engaged Communities? An Exploration of Policy and Regulatory Professionals in Scotland in Shaping Community Involvement in Water Governance

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Policy and development narratives around the world advocate community involvement - through consultations, participatory budgeting, co-management or ownership of water resources – on the basis that it leads to equitable and sustainable outcomes. Despite the growth of discourses of community engagement in water governance, it is still unclear how people make decisions in these arrangements and how communities can contribute to governance.Research on the inclusion of communities tends to be couched in terms of techniques, strategies and methodologies to carry out, evaluate and encourage participatory processes. Others, caution that participation can exclude, oppress and further embed unequal power relations. Further, scholars focus on the institutional factors which influence attempts to include communities and other stakeholders, with a focus on structures, processes and individual resource usage. However, questions still remain on how those charged with the implementation of water governance - including policy-makers, regulators and politicians - shape the role of communities in water governance, the practices of engagement, and the implications of community engagement in addressing water governance priorities. Through empirical research carried out in Scotland with professionals working in regulatory and policy roles across three water domains (private water supply, mains water supply and flood risk management), we explore how community involvement in water governance is constituted, and what its effects are on human-water relations. We show how the role of communities is mapped out quite differently across these 'waters', each creating different configurations and visions for governance and where communities fit in. We take a coproduction approach (Chilvers and Kearnes, 2017) to argue that these modes of public engagement across waters are imbricated in relationships with water. In this paper, we consider the cumulative effect of water policy across water domains and how messages about what is expected of communities, and how they are envisioned by policy and regulatory professionals may sit in tension and may have lasting effects in how people relate to, and use water resources

How Business Conflict in the Global South can Support Sustainable Supply Chains

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Top-down measures for earth system governance developed by global Northern actors have received greater attention in research on sustainable global supply chains. There is, arguably, no better example of this than the lack of scholarly attention given to the power and agency of Southern business actors located at the bottom of global supply chains. In fact, the existing literature sometimes seems to deny any agency to developing country firms, instead treating them as rule-takers simply responding to changes in the global political economy and the needs of Northern markets and firms. The potential for environmental impacts of current and future domestic economic activity in emerging economies underscores the importance of problematizing this perspective. Particularly, there is a serious lack of research on the

role of conflicts among developing country business actors at the bottom of global supply chains in environmental policy development and implementation. Drawing on original interviews and ethnographic research in Tirupur, India, we explore business power and preferences in the global South through an in-depth case study of the industrial poisoning of the Noyyal River, and the key role of business actors in Tirupur in its gradual recovery. Tirupur and surrounding regions in South India produce apparel for both the domestic and export industries. In its more than hundred years history, a strong industrial cluster has formed, consisting of all stages of the supply chain, from spinning mills to tailoring and packing and all the related processes between. Dyeing the yarn and fabric is an integral part of this process, and a process that proved to have considerable environmental impact. From small enterprises in the informal economy to larger, more formal companies, the dyeing industry was significantly under-regulated. Over the years, highly toxic effluents were discharged, untreated, directly into the Noyyal River. In this article, we unravel the preferences of business actors and the divisions within and across industries that eventually led to tightened regulations and efforts to clean the river and its surrounding environment. Drawing on studies of business conflict and policy development, we extend existing insights to the global South and, in so doing, contribute to this growing literature while also unsettling assumptions about the power and preferences of Southern firms. By highlighting the importance of business conflict as an explanatory factor for earth system governance at the bottom of the supply chain, we also contribute to the literature on sustainable global supply chains.

Analysing Power Dynamics in Global Environmental Governance

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In recent times, governance arrangements have generally shifted to hybrid, multi-level, and complex modes. The inclusion of non-state actors as interested parties in global environmental governance represents a key advance in this perspective. It has been argued that the course of interactions between different actors at different levels in governance is determined to a large extent by inherent power relations. In addition, multi-stakeholder participation may result in different reconfigurations of power and authority as new actors come on board. The changing nature of power as non-state actors become more involved in global environmental governance necessitates a more nuanced understanding of power dynamics in such arrangements. This paper uses the 'power cube', developed by John Gaventa (2006), as an analytical framework to identify and analyse these dynamics using, as a case study, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which is a global biodiversity management regime. The power cube framework was developed as a means for understanding the ways in which power operates, particularly in processes of citizen engagement in development work. It outlines three dimensions of power: spaces which refers to the opportunities and channels for participation including closed, invited and claimed spaces; forms which refers to the ways in which power manifests itself including its visible, hidden and invisible forms; and levels which refers to the various layers of decision-making and authority, including global, national and local levels. As argued by the framework's author, the dynamics of power depend on the type of space in which it is found, the level at which it operates and the form it takes. On the basis of secondary data obtained from a literature review, we first define the convention as a space for participation, and examine how and by whom this space was created, as well as the terms of engagement within the space. We then analyse how and by whom decisions are made and how actions are implemented in order to understand the forms of power operating within the regime. Finally, we investigate how actors and policies at local, national and global levels influence decision-making in this international environmental regime.

Transnational Multi-actor Interactions: Implications for Domestic Climate Governance

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Transnational interactions among state and non-state actors regarding climate change, energy and sustainability became a common practice. These interactions can be formal and institutionalized but also informal, fragmented and unstructured, and can be performed by multiple actors across scales and jurisdictions. However, our understanding of these kinds of interactions is incomplete, especially in "messy" settings where interplays and overlaps between actors, jurisdictions and authority occur. Moreover, real and potential outcomes of these kinds of interactions at domestic governance levels are under-researched. This bears importance as interactions increase and so is the engagements of subnational and non-state actors in developing and implementing policies and practices to react to environmental challenges.

The study aims to address this lacuna. It examines sets of interactions between the European Union (EU) and German state/non-state actors with Israeli state/non-state actors, for the purpose of tackling climate change and promoting sustainability. Israel presents a mix of developmental trends and political environment that is not commonly analysed in transnational environmental setting and climate governance contexts. Drawing on orchestration and policy transfer frameworks, the study examines the nature of interactions (e.g. structured/un-structured), dominant and weak actors (e.g. cities, NGOs), their mutual relationships and barriers that are embedded in these settings. In addition, it discusses real and potential outcomes of these interactions in Israel, e.g. contributions to changes in ideologies, policies and participation. The study draws on qualitative research approach of semi-structured interviews and reviewing official publications regarding these interactions, and on complementary quantitative approach for analysing the outcomes. Intermediate findings provide that interactions bear mostly ideational rather than practical contribution, and that German actors have greater influence in this regard than the EU. Moreover, interactions meet limited audiences with a growing share of Israeli non-state and subnational actors. Furthermore, Israeli politics and contesting public discourses are among the main barriers that restrain interaction's influence. Under this constellation, foreign-local multi-actor engagements seem to have only a limited role in domestic climate governance developments. With that, the study aims to contribute to: 1) the understanding of complex transnational interactions, their outcomes and their contributions to changes in actors' authority and influence within domestic settings. 2) suggesting an integrated outlook in this context by examining diverse engagements and encompassing state, non-state and supranational entities. 3) adding insights from case-country (Israel) that is not commonly studied in this regard.

Granting Rights to the River? An Exploration of Potential Governance Implications

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The traditional focus on river basins is anthropocentric. River basins fulfil several, often conflicting, functions for humans like drinking water provision, shipping, sewer or amenity. These interests are protected by multiple legal regimes. Moreover, over the years rivers have been regulated – both physically and legally – to protect people from flooding. A recent development in several countries is the granting of legal rights to rivers. So far literature has not addressed the governance implications of this development. The aim of this paper is to address this gap. The question comes to the fore what the governance implications might be of granting a human right, therefore agency, to non-human entities. In order to answer this question, we first conceptualize the rights of the river, clarify their ecocentric focus and argue that granting rights to the river implies that humans have the duty to keep the river's integrity. The latter ask for governance initiatives, that is, abstract rights have to be translated into visions, actions, knowledge, norms and compliance mechanisms. This is challenging because rivers cross borders and as a result multiple governmental levels, policy sectors and societal actors have a role to play in this. We use the Rhine basin as a good practice single case study to explore and further specify the governance implications. Next, the paper engages in a discussion of the relevance of granting rights to the river. We will argue that granting rights to a river is a balancing act between human duties and eco-centric entitlements and only relevant in particular contexts. We conclude this paper with some suggestions for further research.

Competing Interest Groups in a Changing Climate

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Organized interests play a crucial role in sustainable energy and climate politics where an increasingly polycentric and bottom-up pattern of governance invites diverse groups from business and civil society to become involved alongside state actors. Against this backdrop, gaining a better understanding of the influence of interest groups in national climate policy making is highly relevant. On the one hand, interest groups and private sector action can help to enhance national climate action and to push states to ratchet up the ambition of their climate policies. On the other hand, we see strong mobilization of groups against potentially costly climate regulations targeting energy-intensive industry and fossil fuel producers. The existence of such competing interest groups begs the question about their impact on national climate legislation. In this paper, we argue that the influence of climate policy supporter groups such as renewable energy industries and environmental NGOs depends on the strength of opposing groups such as fossil fuel producers and energy-intensive industries and vice versa. We test our arguments using data from the Global Climate Legislation Study, which identifies patterns of national climate legislation in 94 countries from 1997 to 2015. We compare this to interest group mobilization in these countries during this period, for which we rely on an extensive dataset of interest group mobilization at climate conferences (over 8,000 organizations). This way we provide a unique quantitative empirical test for the influence of interest groups on national climate legislation.

Urban Climate Finance and Decentralization in Centralized States: A Case Study on Authority Shifts in Da Nang and Ho Chi Minh City, Vietnam.

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Cities are expected to play an increasingly important role in financing urgent climate change mitigation and adaptation measures, reflecting a downwards shift in government authority. In Vietnam, however, such decentralization is still tightly controlled by the Vietnamese government through various laws and regulations, making this an important case to study changes related to authority in the context of climate finance. This paper draws upon 17 semi-structured and unstructured interviews conducted in Vietnam, supplemented by document analysis, to investigate how cities deviate from their formal authority in the climate finance policy process. From the vantage point of legislation and policy, net authority shifts to the cities are limited because the central government still exercises power over the cities in direct and indirect ways. Between 2014 and 2017, it provided Da Nang and HCMC with greater authority over climate finance through the Law on Public Investment (2014) as well as Special Economic Zone policies. Nevertheless, it remains distrustful of local governments and actively interferes with their policies in politically sensitive areas, such as taxation and local level projects with national implications. In addition, the Vietnamese government forced the two cities to transfer a greater amount of their tax revenues to the state. It can thus be observed that decentralization and recentralization are occurring simultaneously. From the vantage point of project implementation, Da Nang and HCMC appear to have more autonomy than cities of similar administrative status. This is attributed to their above-average institutional capacity, which allows them to circumvent central government regulations. For example, the two cities claim authority over central government activities like interjurisdictional infrastructure projects. These claims are based on new interpretations of legal and policy documents, which are often so fragmented and contradictory that it is unclear who bears responsibility. In addition, Da Nang and HCMC try to reduce their reliance on central government financing by engaging in blended finance, a process which involves using limited public funds to attract additional private investments. Lastly, the two cities can – under certain circumstances – also undermine central regulations. Based on these observations, the paper concludes that formal authority arrangements are a poor indicator of the actual distribution of authority. It suggests that greater emphasis should be put on the role of capacity in understanding shifts in authority. These findings help to better explain the role that cities play in urban climate governance, especially in countries with a heavily centralized governance structure.

The Use of Serious Gaming in Global Climate Negotiations

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If countries fail to combat global warming, it is likely that dangerous tipping points of the climate system will be triggered this century. Because the likelihood of passing climate tipping points increases with global temperature rise and the impacts on human well-being might be catastrophic and irreversible, strong climate mitigation action is urgently required. However, climate tipping points are not sufficiently addressed among climate negotiators and are often not incorporated in belief systems of the participants of UNFCCC negotiations. Moreover, much is unknown about the way climate negotiators might perceive the risks associated with climate tipping points (i.e. risk perception) and the extent to which they feel capable of influencing the likelihood of triggering tipping points (i.e. perceived efficacy). Psychological research suggests that risk perception and perceived efficacy are important psychological factors underlying climate change action. Therefore, it is crucial to understand the perception of risks and efficacy regarding climate tipping points among climate negotiators and how this might be influenced, which is yet unknown. This paper reports on research in the Gaming Climate Futures project, where a role-playing simulation game has been developed in which climate negotiators explore the relationship between global temperature goals and climate tipping points and imagine climate futures following a collective decision-making process. By studying cognitive changes among UNFCCC participants, the effectiveness of serious gaming as science-policy interaction was investigated. Knowledge, beliefs and perceptions regarding climate tipping points were studied among climate negotiators and other professionals that are actively working on climate change. We discuss results on the perception of efficacy (or agency) and its relationship with risk perception in relation to climate tipping points. This way, we aim to offer insights into factors underlying the exercise of agency in global climate governance, while offering evidence for the potential of using simulation gaming as a tool for experimentation and imagination in global climate governance contexts. Our research aims to contribute to the sixth stream of the Earth System Governance Conference Theoretical and Methodological Foundations of Earth System Governance, while also offering insights for the second conference stream; Agency in Earth System Governance. Finally, the research presented in this paper seeks to contribute to the Earth System Governance Task Force on Anticipatory Governance.

From Citizen Participation to Government Participation: An exploration of the roles of local governments in community initiatives for climate change adaptation in the Netherlands"

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Citizen coproduction for climate change action is on the political agendas of many European countries. Citizens are viewed as empowered actors with resources with which they can contribute to the resilience of their communities to climate change. This increased responsibilisation of citizens has implications for the roles of governments. The degree of government involvement does not necessarily decline, but government roles may need to shift: from a regulating and steering government towards a more collaborative and responsive government that enables and facilitates community initiatives that are self-governed by citizens. However, we lack a conceptual understanding of such new government roles, as well as empirical insights into how local governments participate in citizens' initiatives, and how they take up such new roles. In this paper a 'ladder of government participation' is introduced, which is used to explore the roles of local governments in citizens´ initiatives for climate change adaptation in the Netherlands. The study was informed by a two-year period of participatory observation of a network platform of local government practitioners. The results show that local governments are slowly but gradually shifting towards more networking, stimulating and facilitating roles. Key concerns of local practitioners are (1) a lack of flexibility and support of their own municipal organisation to facilitate citizens' initiatives, (2) uncertainty about the continuity of citizens´ initiatives over time, and (3) a potential increase of inequity among citizen groups from facilitating citizens´ initiatives, since they tend to be over-represented in better-off neighborhoods.

Collaborative Learning for Flood Risk Management: Sustainable Urban Drainage Systems as a Policy Innovation

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Collaborative learning approaches have gained currency in the past few decades as a policy process for dealing with complex and dynamic socio-ecological systems. As governance systems become multi-level and encompass multiple stakeholders, the need for coordination, learning and adaptation becomes essential. However, despite much literature on collaborative learning, empirical research is inconclusive with regard to conditions that enable or hinder collaborative learning in the context of flood risk management. In this article we address this knowledge gap by examining the emergence and implementation of sustainable drainage systems (SuDS) as part of the Leicester City Council's effort to manage surface water flooding. Implementation of SuDS requires collaborative learning due to the fragmented and multi-level structure of flood governance in the UK, putting a partnership approach at the centre of management. Furthermore, the devolution of responsibilities to local authorities and weak statutory requirements for SuDS make collaborative learning essential for change. We are interested in the *what*, the *how* and the *why* of collaborative learning in Leicester around SuDS with a particular focus on what brings about the shift from individual to collective learning. The article is based on an extensive review of academic and policy literature, 18 interviews with multiple stakeholders in Leicester, and ethnographic observations at Leicester City Council. As a contribution to understanding collaborate learning in flood risk management context, we have found that the leadership and policy entrepreneurs are essential in shifting individual learning to collective one. Our analysis indicates that skilled intermediaries with a vision of change may break path-dependencies of a system through pursuing collaborative learning.

How Transdisciplinary Research can Benefit Sustainability Governance: Evidence from a Case Survey of 70 completed Research Projects

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While transdisciplinary research (TDR) is often touted as ideal or even necessary to ef-fectively address and even solve local to global sustainability problems, the empirical evidence that would support this claim is still weak and fragmented. Key elements of TDR include collaboration across scientific disciplines, a focus on real-world problems and the involvement of actors from government, administration, business and/or civil society in the research process. Whereas sustainability-oriented research projects have often been evaluated individually, no comparative study on the actually employed re-search modes and the scholarly as well as societal outcomes of a larger number of re-search projects is available to date. This paper presents results from a larger comparative study of 70 completed sustaina-bility-related research projects, which has been conducted as part of the research pro-ject 'MONA' (Modes of sustainability-related research and their impact on scientific and societal project outcomes). MONA is providing the to date most comprehensive compar-ative analysis of completed sustainability-related research projects, studying research modes, their outputs, impacts and outcomes. All analyzed projects were funded between 2000 and 2012 by the German Federal Ministry of Education and Research (BMBF) (funding lines 'Research for Sustainable Development' and 'Social-Ecological Research') and by the German Research Foundation (DFG) (individual projects and those in coordi-nated programs). This large-N comparison using the case-survey method is supplement-ed by a small-N in-depth case analysis of a subsample of six research projects. Our results indicate that - depending on its form and intensity - practitioner involve-ment indeed impacts positively on the societal outcomes of sustainability-related re-search projects. However, we find a great variation of individual pathways between re-search mode and outcomes. We elaborate on the roles of societal actors and combina-tions of actors from different societal sectors involved in transdisciplinary research and the interactions and forms of collaboration between scholars and actors from outside academia, as well as power delegation within these research settings. Furthermore, we identified and structured

various kinds of societal impacts of these research projects in different strength and on different levels. Finally, we describe relationships between actor involvement, interactions and societal impacts in the 70 studied research projects. Our results illustrate the multiple paths through which transdisciplinary research as a collaborative effort of science and other societal sectors is already contributing to sus-tainability governance on various levels.

Post-agreement Negotiations in Global Climate Politics

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While the big annual climate summits garner most scholarly and public attention, the phase that follows any international agreement is equally important. The institutions and processes implementing those agreements are more than mere technicalities. General goals might have been decided at the global summits, but the highly consequential intricacies of distributional mechanisms are often discussed only at the post-agreement level. As a result, post-agreement climate negotiations in areas such as finance or deforestation tend to be just as politically charged as their high-level counterparts. At the same time, however, the rules of the game are somewhat different. Post-agreement negotiations take place under different circumstances, considering for example the credible high-level commitment or the more technical subject matter. This renders bargaining using many conventional tactics, such as threat of withdrawal, ineffective as those tactics would lack the necessary credibility. The question then becomes if and how power dynamics present at the global level are reproduced or shifted under these new circumstances. In turn, the answer to this question has crucial implications for agency, as parties' structural assets come into play in different ways at the various levels of multilateral climate diplomacy. Does the post-agreement stage open new corridors for influence, or is it mainly an extension of global power politics? If it is the former, post-agreement negotiations could give developing countries a relative advantage and ultimately provide one answer to the structuralist paradox, i.e. the of question of how structurally weaker actors can successfully negotiate with stronger ones. If it is the latter, the question becomes through what trajectories structural power is translated into the post-agreement context. Drawing on seminal work from the last ten years as well as own research, the paper aims to synthesise an understanding of post-agreement negotiations with regard to the rules of the game, the role of structural power, and agency in international climate politics.

Actor's Strategies on Marine and Coastal Governance in Brazil

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Given the complexity of multilevel dynamics in ocean governance regimes, transformations to sustainability in marine and coastal zone territories require polycentric policy strategies, to effectively engage different social actors and varying levels of government in dealing with wicked issues through novel partnerships. This paper will provide insights on innovative actor strategies needed to improve marine and coastal governability in Brazil. The Brazilian Coastal Zone comprises a range of more than 8,600 km coastline facing the South Atlantic Ocean and with the expansion of the Economic and Exclusive Zone can reach 4.5 million km2. Current research shows the country's ocean policies faces an array of political-institutional problems, such as the fragmentation and sectorial policies and the lack and insufficiency of norms and effective instruments for the compatibility of productive activities with marine conservation. We will focus on past evolution of state and non-state actors strategies in the Coastal Management Integration Group (GIGERCO, acronym in Portuguese), a problem-solving forum created in 1996 to promote the coordination of federal actions in the coastal zone. This is the highest-level stance of civil society participation in marine policy affairs and also includes representations of ministries, governmental regulatory agencies, public companies, Brazilian Association of State Environmental Entities, National Association of Municipal Entities of the Environment, representatives of coastal states, universities and Public Prosecution Office. Actor dynamics at GIGERCO are framed and guided by the Federal Action Plan for the Coastal Zone, its main governing instrument, which is currently running in its fourth edition from

2017-2019, and it is part of the National Management Plan for the Costal Zone. Through an evaluation of these plans combined with participatory observation research (years 2017-2018), the question of how different actors exercise agency in marine and coastal governance, and how this is contributing to advance governance in Brazil will be discussed in relation to the Sustainable Development Goal No 14 framework and thus connecting to ongoing knowledge-exchange lead by the Earth System Governance Task Force on Oceans.

Designing Highly Renewable and Socio-environmentally Accepted Energy Systems

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The mitigation of climate change can be addressed by a large scale integration of renewable energy sources. The UK's power system produces roughly a quarter of the country's CO2 emissions and so its decarbonisation is essential in achieving the long term emission reduction goal enshrined in the Climate Change Act 2008. Furthermore, the sector has some of the most cost effective mitigation options currently available across the energy system. Of these, onshore wind is one of the most developed in the UK, with levelised costs of electricity rapidly approach parity with natural gas fired power stations. However, in the UK rising local opposition towards wind and solar PV projects in combination with unfavourable policy development has led to a considerable drop in wind energy projects being permitted. Energy system models have been used for over a decade to explore decarbonisation pathways. However, as critised by several authors those models which are used for planning and policy making do not consider social and environmental acceptance. As a result they may suggest systems designs which are socio-environmentally unacceptable and fail to capture the potential of possible amelioration options (i.e. community ownership). As first step to close this gap we use two approaches: First, we perform a literature review to define social and environmental scenarios of land availability. We use those scenarios in a high spatial and temporal resolution electricity model (highRES) to design future renewable focused power systems. This allows us to determine the cost and system design implications of socio-environmental acceptance. Secondly, we conduct and trial a participative modelling workshop with key stakeholders (e.g. planning office, nature conservation groups, wind farm developers). The aim is to elicit and refine socio-environmental barriers to wind energy and possible amelioration options, with a particular focus on quantifying and synthesizing data that are mainly qualitative to begin with. Here, we present insights and suggest ways forward based on those two different approaches. Overall, we conclude that there is an enormous need to include views of all stakeholders from lay people to environmental NGOs into energy modelling and as a result the political discourse. Otherwise, we may fail reaching national and global emission reduction targets.

Transformative Politics for Sustainability: Conceptual Tensions, Practical Synergies and Complementarity at the LUCID Research School

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Increasing awareness of the severity of global environmental degradation and the persistence of extreme social inequalities has led to widespread calls for social transformation for sustainability. But perspectives on what transformation means and how it is best achieved differ considerably. Various approaches to social transformation can be distinguished by the extent to which they emphasize structure or agency, which creates theoretical and practical tensions between diverse strategies. While difference in practical strategies and conceptual starting points can be viewed as conflictual, in this article we argue that it is more fruitful to view these strategies as existing in a relationship of complementarity rather than simply being at odds. Complementarity denotes a relation between mutually exclusive descriptions predicated upon theoretically incommensurable abstractions. By reviewing a selection of critical scholarly work produced by the LUCID research school, we aim to demonstrate both the strengths and limitations of different conceptualizations of transformation and their related political strategies. From this, we highlight how collective agency

can act as a conduit connecting structure and agency in transformational politics for sustainability. We begin by briefly reviewing three distinct approaches to instigating social transformation for sustainability, namely socio-technical sustainability transitions, grassroots initiatives, and discursive contestation. We then draw on contributions from the LUCID research school which have critically engaged with these approaches to transformation, highlighting where these theoretical approaches are found wanting and how they relate with other approaches to transformation. From this, we discuss how oppositional conceptual tensions between seemingly incompatible approaches can be understood as dialectically related, and that this understanding more adequately reflects actual human conditions. We conclude by suggesting a complementarity perspective on problem understanding and solution development provides the most promising avenue for engaging in the politics of sustainability, as it emphasizes collaboration over competition among sustainability advocates.

Philanthropic Foundations and Environmental Governance: A Research Agenda

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Social scientists understand philanthropic foundations as important actors in global politics and policy-making. Grant-making can be seen as an act of governance that sets and advances agendas in the public sphere through the redistribution of resources. Through grant-making activities supporting specific projects, governments, and non-governmental organizations, philanthropic foundations influence governance by fostering consensus and shaping understanding around particular agendas. While there is growing attention to philanthropic foundations in other sectors, there is relatively little empirical research on the role of foundations in environmental governance. In this paper we first illustrate the scope and breadth of philanthropic influence on environmental governance with a global review of their engagement in one particular sector: marine conservation governance. To do so, we engage available data on marine conservation funding to describe: the level of funding, number of organizations, and geographical and topical foci of foundations funding work in marine conservation governance. Next, we engage this descriptive analysis and review existing literature to identify key questions for a theoretical and applied research agenda the role of foundations in environmental governance generally. We argue this is an important topic for future research on agency in earth system governance and that increased understanding of philanthropic interventions in environmental governance through empirical research is necessary to inform the design of more effective, equitable, and enduring interventions in complex governance systems.

The Role of Private Sector Regenerative Agriculture Certifications in Earth System Governance

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Since the U.S. President pulled out of the Paris Accord, others – such as governors, cities and private food companies -- have emerged as new actors vowing to maintain the Paris accord numbers. Michael Bloomberg, former New York City mayor, launched an effort towards the Paris goals that includes thirty mayors, three governors, over eighty university presidents and one hundred businesses. As various non-state actors mobilize against climate change, as a trained agricultural economist and food law professor, my focus is on efforts that aim to reduce *agriculture's contribution* to climate change.

The food industry has a unique role to play in earth system governance in that the food industry can focus on emissions while also focusing on sequestration. Much of my prior work focused on certification programs to ensure food safety (ex. GFSI and Global Gap) and to promote sustainable farming practices (USDA Organic). As I turn to investigating new efforts to mitigate climate change, my goal is to focus on food industry brands (consumer product good 'CPG' companies) that are working with farmers and supply chains. One effort is the 'Climate Collaborative', a collaboration of 75 manufacturers, retailers, distributors and others whose mission is to work together "to catalyze bold action, amplify the voice of business and promote sound policy to reverse climate change." Another effort is the recent push by the

food industry to develop certifications and guidelines for regenerative agriculture. The Regenerative Organic Certification, for example, has emerged as a holistic agriculture certification encompassing pasture-based animal welfare, fairness for farmers and workers, and robust requirements for soil health and land management -- going beyond U.S. standards for organic certification. These private sector certifications have the potential to help farmers (and their supply chains) to meet sustainability and climate change commitments for increasing biodiversity, building soil, and sequestering carbon. Already, several companies (ex. DanoneWave, Patagonia Provisions and Maple Hill Creamery and Justin's Nut Butter) are developing a pilot to test various certiication systems. Food giants General Mills, Costco and Whole Foods Market have also launched a number of agriculture-forward initiatives like adopting biodynamic farming. My goal is to investigate the development of these and other private sector initiatives, to differentiate these new certifications with already existing programs in the U.S. and elsewhere, and to assess their role in earth system governance.

Accountability, Legitimacy and Democracy in Earth System Governance

The Double-edged Sword of Legality: Looking on Global Initiatives for Legal Timber Trade from a Local Perspective

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Recent state policies of the United States, the EU, and Australia to eliminate illegal timber from global supply chains are considered as some of the promising global forest policies to reduce deforestation. These initiatives represent a new generation of global governance approaches that combine better control with initiatives for local development. Particularly, the EU driven Forest Law Enforcement, Governance and Trade Voluntary Partnerships Agreements (FLEGT-VPA) is expected to actively integrate all segments of society for the development of the forestry sector. Accordingly, it is expected that global initiatives for legal timber trade stimulate the participation of local forest users in national forest policies while providing important direct and indirect benefits to them. By looking on the cases of Honduras, the Democratic Republic of the Congo, and Laos, this study critically reflects whether and to what degree these initiatives meet these expectations. More particularly, the study analysis the effects on the participation of local forest users in forest governance, and possible benefits from reduced illegal logging and enhanced opportunities for local forest management. The analysis shows that global initiatives for legal timber trade may stimulate national processes for improved forest governance principally based on command-and-control approaches, but that local forest users rarely benefit. Their voices are widely ignored in the national debate. Instead, the newly established bureaucracies add an additional barrier to local forest users to participate in attractive export markets while parallel, the improved enforcement of regulations affect the possibility to participate in informal markets. Latter seriously affect the livelihood of forest communities.

Mapping Transnational Environmental Rights for Democratic Earth System Governance

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Environmental rights are a subset of human rights, which have multiple characteristics and vary across any number of continua. The two established models or accounts of human rights are the declaratory model and the adjudicatory model. If we shift are focus from human rights per se to human rights narratives, two characteristics emerge that are particularly important: the level of abstraction and the degree of reflexivity (descriptive-cognitive-behavioral). Human rights narratives can be mapped onto the conceptual spaces defined by a typology incorporating all of these characteristics. In order to arrive at a more complete understanding of environmental rights as a subset of human rights, we develop this normative-analytical framework and map environmental rights onto it. We analyze both existing theoretical treatments of environmental rights and the real-world establishment of substantive and procedural environmental rights with respect to improved accountability, legitimacy, and democracy in earth system governance. We identify the further theoretical and empirical research needed to determine, first, the degree of international support for environmental rights, second, to assess the authenticity of any congruence between elite and popular opinion, and third, to anticipate how environmental rights narratives might be received by various existing legal traditions.

Assessing the Effectiveness of Water Policy and Governance in Brazil: The Water Governance Observatory as a Collaborative and Independent Platform

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The existence (and appropriate functioning) of arrangements aimed at ensuring the shared and sustainable management of water resources is directly associated with better protection of freshwater ecosystems. In this context, the report outlines the process of building a national and independent water governance observatory in Brazil (the 'Water Governance Observatory'), an evidence-based, participatory platform for continuous, independent assessment of the effectiveness of water policy and governance in Brazil. Considering that all the authors are directly involved in the process, representing institutions that have supported the OGA since its inception, the methodological approach can be characterized as "*Participant Observation*". A national Water Governance Observatory was first thought of in 2004, under the leadership of WWF-Brazil, which conducted studies and technical meetings, included a short publication evaluating the 'pros and cons, and 'achievements and challenges' from the first eight years of the policy. This report also identified and discussed a series of 32 potential indicators. In 2012, after a period of dormancy, it was decided that this issue should be tackled again as there was little sign from the federal or state governments of progress with the National Water Resources Management System (SINGREH). In a partnership with Fundação Getúlio Vargas a study was conducted applying their systematic approach and associated indicators to evaluate SINGREH. This took one year, including extensive background research, stakeholder interviews and the convening of two expert workshops. It resulted in a 2014 report: *Governance of Water Resources – Proposal of indicators to monitor implementation*. As a consequence of this process, by November 2015 the concept of an observatory had generated great interest throughout the country, with over 50 key institutions engaged in the observatory. By the end of 2017 more than 80 institutions were already engaged in the observatory, including federal and state water basin committees and forum. Brazil has made remarkable progress in water resource management, based on a decentralized, participatory and integrated system. However, multi-level governance is particularly critical in a federation, and rooted in a recent history of participatory democracy (OCDE 2015). Therefore, despite the progress achieved, the management of SINGREH still needs to be consolidated in order for it to be effective (WWF, 2016). We defend that the 'Water Governance Observatory' can be an important tool to provide the transparency required to enable Brazil to move towards responsible management and guarantee sustainable access to water for its citizens, economic activities and for natural ecosystems.

Global Politics and the Anthropocene: Present Narratives, Future Visions

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The Anthropocene has become a powerful concept in and around Earth System Governance. Mapping the term's use in scholarly debates as well as among practitioners, this article explores the different narratives and visions of the future that are explicitly or implicitly attached to the Anthropocene. Since the concept does not only describe global environmental problems but also frames potential solutions, shedding light on the Anthropocene's underlying narratives allows responding to questions of accountability and legitimacy in Earth System Governance. The idea that human activity has become a dominant geological force on earth has not only entered the academic realm but is also becoming more and more established in political debates. While referring to the concept of the Anthropocene holds clear opportunities to highlight massive environmental change caused by humans, the underlying narratives attached to the term also limit our ability to envision potential solutions and formulate calls to action. This article, therefore, asks how the idea of the Anthropocene is framed and contextualized in academic and policy-related debates. A discourse analysis is conducted in three consecutive steps: First, the broader academic discourse around the contested nature of the Anthropocene is analyzed (1), before scholarly debates more closely related to Earth System Governance are investigated (2). Finally, policy documents, statements, and reports published by international environmental

organizations are considered, in particular under the umbrella of the United Nations (3). Such an approach allows identifying and comparing the visions of the future attached to the Anthropocene in all three realms. The analytical framework of socio-technical imaginaries (widely used in science and technology studies) provides a robust foundation to extract these visions and link them to their broader political meaning. As a result, dystopian as well as utopian visions, ideas of techno-determinism and eco-modernism, universalistic imaginaries and critical accounts are identified, which all predetermine certain pathways to the future. The vagueness of the Anthropocene leaves room for co-optation; scientific debates around its starting date are attached to political agendas, vested interests, and power relations. The article points out how engaging with criticism from geologists, sociologists, and environmental historians can contribute to debates around legitimacy and accountability in Earth System Governance. Because the Anthropocene concept is deeply intertwined with very different belief systems, ideologies and epistemologies, this article underlines the need for a more reflexive understanding of the Anthropocene and its underlying narratives.

The Role of National Politicians in Earth System Governance: Evidence from a Study of Members of the UK Parliament

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The scientific case for Earth System Governance may be made, but how does this fit with a politician's mandate as a democratically elected representative? What role do national politicians think they can and should play in the governance of earth systems? This paper tests these questions empirically, using data from a study of UK politicians. A mixed-method study of Members of the UK Parliament (MPs), including corpus analysis of political speeches, a focus group of civil society advocates, and interviews with 24 MPs, investigated how politicians understand and respond to climate change. Climate change provides a test for the Earth System Governance concept, because a global goal to limit climate change has been agreed through the 2015 Paris Agreement. Yet while the Agreement sets a clear goal, the means to achieve it remain firmly at the level of the nation-state, with each country assuming responsibility for its own national plan. Thus national administrations, run by elected politicians, have a crucial role to play. Evidence from this study shows that, while many politicians have an understanding of the challenges posed by climate change and wider changes to earth systems, few have yet been able to operationalise this understanding into meaningful responses at the national level. The study highlights three main reasons for this. First, the literal and metaphorical scale of challenges at the earth system level conflict with the procedures and preoccupations of daily politics. Second, politicians consider the climate issue in the context of their professional identity and the cultural norms of their workplace, and report that climate action does not 'fit' with these norms. Third, UK politicians feel very little pressure from their electors to act on climate change, and have to work to build a democratic case for climate action. The paper concludes with recommendations for both research and practice. In terms of research, there is a need for a more fine-grained, contextual understanding of the interplay between global goals and national political systems. In terms of practice, politicians, working with other stakeholders, need support in order to articulate the scale and significance of earth system challenges, and craft responses which build democratic support for further action.

Legitimacy and Justice in the Face of a Resilient and Unsustainable Socioeconomic Context

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This paper takes as its starting point that the struggle for environmental justice occues within socioeconomic contexts characterized by resilient unsustainability. It then argues that, besides hindering the sustainability transition, the resilience of the socioeconomic unsustainability is effectively pitting against each other claims to justice, on the one hand, and democratic legitimacy, on the other. To make my argument I investigate the People's Climate March that took place in Washington DC and across hundreds of cities in the US and abroad in April 2017 to protest against the environmental policies of the Trump administration. This case-study is particularly interesting to observe how

sustainability transition advocates *make sense* of and try to *react* to a clear manifestation of the 'resilience of socioeconomic unsustainability'. I explore these issues by drawing from recent scholarship on knowledge repertoires in social movements and from qualitative evidence from fieldwork and desktop research. I observe three features. First, although there are many new and concerning challenges posed by it, activists tend to understand the Trump administration as yet another manifestation of the resilience of the socioeconomic unsustainability. Secondly, and relatedly, in the face of the enhanced challenges posed by the current US administration, the People's Climate March is understood as part of a broader effort towards coalition building across different activists groups and to reach out to larger segments of the population. Finally, whilst it is possible that enhanced interaction across groups might lead to the adoption of new strategies of action, a rethinking of their political strategies seemed to rank low in the agenda of actors involved in the People's Climate March. In the second part of the paper I interpret these findings in light of a growing tension between justice and democratic legitimacy. In particular, I argue that the People's Climate March speaks to a wider trend, documented also by recent studies, whereby an ever expanding set of claims to justice related to sustainability transition seems to find little or no answer within the remit of contemporary democratic practices.

Participatory Forest Management in Kerala, India and the Lessons Learned for Effective Earth System Governance in the Anthropocene

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Earth System Governance is definitely a complex and challenging issue. There are many players and several interests to protect either for economic or other reasons. This paper is based on a study conducted by the authors as part of a consultancy to improve functioning of Participatory Forest Management Institutions (PFMIs) in Kerala, India during 2015-17. The objectives of the consultancy included among several others, to evaluate the present level of Institutional strength of PFMIs, namely Vana Samrakshana Samithies (VSS),Eco-Development Committees (EDCs) and Forest Development Agencies (FDAs) in Kerala, and assessing training needs of the members of VSSs,EDCs and Forest Personnel in charge of VSS,EDC and FDA. Participatory Forest Management beacme operational in India in1990 to democratize forest protection and to give a role to the tribal and local communities in forest protection and improving their livelihood. In Kerala, one of the southern states in India, this programme started only in 1998 due to procedural and operational delays. As part of the study we carried out a "SWOT Analysis", received feedback from the Coordinators and Senior Officials using semi-structured questionnaires, conducted Focus Group Discussions(FDGs), Situational Analysis(SA) and one to one interaction to understand the ground realities.During the course of the study we met more than 500 people at various levels of the PFMI heirarchy. We employed the "5 C Framework"(Physical, Financial, Ecological, Human and Natural gains) to gauge success/ failure of PFM and its governance. The study revealed the basic issues in governance and help frame future course of action. We found that inspite of lot of rhetoric on accountability,legitimacy and democratic practices in the functioning of PFMIs, the ground realities were quite different.The reasons were heavy bureaucratic heirarchy without any inbuilt democratic practices,lack of proper and timely two way flow of information and no genuine efforts for empowering people at the ground level to carry forward this great mission and policy paralysis.This can be overcome by introducing inbuilt intreim participatory evaluation mechanisms, social audit and use of Information and Communication Technology (ICT). There is an urgent need to develop and incorporate a *Listening Earth Democracy (LED)* into People's Democray (PD) for earth system governance. In this paper we will discuss in detail the problems, processes, outcomes and future possibilities for effective governance of earth system in the Anthropocene.

Chile's Move to Modern Environmental Governance: How New Institutions Stopped the Pascua-Lama Mining Project

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This paper examines the intersection of domestic, regional and international institutions that forced the Chilean government to adopt the three (P10) procedural environmental rights, to stop a controversial gold mining project, and ultimately become a leader in promoting modern environmental governance in the Latin American and Caribbean region, starting in 2012.[1] I argue that the procedural environmental rights embodied in Principle 10 of the 1992 Rio Declaration (the three pillars of environmental democracy), provide the clearest guide to government transparency, participation, and justice/accountability in environmental governance. Yet these rights are unlikely to be adopted and implemented in many nations, e.g. Latin American nations, without outside pressure from especially regional and international governmental organizations. I begin with Chile's desire to join the OECD (which happened in 2010) and how that organization, along with the Inter-American Court of Human Rights were key in promoting the country's environmental governance reforms. The country created a Freedom of Information Act in 2008, (the global norm for government transparency) as required by the OECD but also resulting from a 2006 decision by the Inter-American Court of Human Rights. Another OECD requirement was to create a modern Environmental Ministry, completed in 2010, which among other duties, oversees public participation in Environmental Impact Assessments Finally, in 2012, the Chilean legislature authorized three specialized environmental courts to provide accountability. The story then hones in on the "politics of anti-extractivism" by analzing the struggle against the Barrick Gold/Pascua-Lama mining project in the high Andes of Northern Chile, a project ultimately defeated in 2016. This was a remarkable victory in a country guided by a neoliberal economic ideology, an economy long based on extractivism, and with a centuries-long history of human rights abuses against indigenous people. The main opponents of the mining project were environmental activists along with the indigenous Diaguita communities that would be most affected by the proposal to mine gold under the region's glaciers. Here the key question is,"what was the relative importance of the newly-created domestic environmental institutions versus the Diaguita's use of the International Labor Organization's Convention 169, which Chile adopted in 2009, in halting the project?"

Governance Transformations to Reverse the Resource Curse? The Extractive Industries Transparency Initiative in Myanmar

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Many resource-rich countries face the paradoxical situation that their wealth in natural resources coincides with low economic and human development rates. In assessing ways to reverse this so-called resource curse, academics and practitioners turn their hopes to institutional quality. Yet whether and how governance transformations help reverse the resource curse remains poorly understood, especially so at the sub-national level, where the effects of the resource curse are most acutely experienced. This article addresses this knowledge gap by providing empirical and theoretical insights from a case study on the effects of the Extractive Industries Transparency Initiative (EITI) in two regions in Myanmar. We analyse to what extent and how the EITI triggers governance transformations through changes in participation, transparency and accountability. Based on more than eighty semi-structured interviews with civil society, the private sector and government officials, we show that the increased transparency and participation triggered by the EITI results in unforeseen transformations that go beyond the official EITI process. While the EITI report itself is not heavily used by civil society organisations (CSOs), the EITI process has improved relations between state and non-state actors and triggered CSOs to gather data and organise themselves both around and beyond EITI-related issues. This created new forms of in- and exclusion. Although the EITI opens up avenues for CSOs to demand accountability, the extent to which CSOs are able to evoke action from extractive industry actors remains limited. The conclusion recommends taking account of spin-off effects and dynamic inter-linkages between governance transformations in efforts to (analyse how to) reverse the resource curse through institutional quality.

The Effectiveness of Global Extractive Governance: An Analysis of Extractive Industries Transparency Initiative (EITI) as a Global Transparency Norm Entrepreneur

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Since 2002, the Extractive Industries Transparency Initiative (EITI) has played a significant role in the development and diffusion of a transparency norm that leads to socially and environmentally responsible behaviors of extractive industries by requiring the disclosure of information on all payments and revenues. The EITI is a new hybrid form of transnational organization where both public and private actors participate in steering extractive governance at the global level. Despite the increasing presence of the new hybrid governance networks in resource-rich countries, there is a lack of studies to answer how to design such initiatives to effectively take advantage of the public-private authority. This research gap relies on the lack of interdisciplinary conversation between the scholars of International Relations (IR) and Public Administration (PA). While IR scholars relatively disregard management perspectives to look at hybrid initiatives, PA scholars have not much focused on transnational administrative cases. For that reason, this research aims to figure out under what conditions EITI works more effectively, by connecting the broad global governance debates of IR to the management frameworks of PA. Applying Ansell and Gash's (2008) model of "collaborative governance network," this study explores what institutional and political conditions facilitate the effectiveness of EITI. As a single case study using a process-tracing method, this research analyzes the official documents published by EITI from 2002 to 2017. The primary research result shows that the following factors stimulate the effectiveness of EITI: first, the high level of interdependence among stakeholders; second, adequate institutional settings including several internal transparency mechanisms and consensus rule; third, diverse communication channels to build mutual trust among members; fourth, the strong leadership of main public actors such as the EITI Secretariat, international development agencies, and the UK government. These findings have several implications for understanding newly emerging public-private hybrid governance initiatives at the global level. First, public actors should take primary leadership to orchestrate the behaviors and interests of private actors to strengthen public values in global extractive governance mechanisms. Second, the institutionalized coordination competence of the Secretariat to improve communication among members is significant for effective governance. Third, the organizational transparency of global governance initiatives is vital because it crucially increases the legitimacy of governance mechanisms. It shows how recently growing global hybrid governance initiatives as norm entrepreneurs can evolve in a more accountable way so that they can contribute to facilitating socially and environmentally sustainable natural resource extraction.

Processes of Change and Destabilisation in Resource Frontiers: the Making of Uganda's Oil Assemblage

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The commodities super-cycle of the 2000s spurred record greenfield foreign direct investment into sub-Saharan Africa, particularly in the areas of mining and petroleum projects. However, the 2014 oil price collapse has significantly affected exploration and development of new energy and non-energy minerals in sub-Saharan Africa. This expansion and contraction of capitalism provides an ideal lens through which to explore the assemblage dynamics of oil exploration in a new resource frontier, Uganda's Albertine Graben. We define the oil assemblage within this paper as the socio-material landscape of the Albertine Graben, i.e. the hybridity of the "matters, knowledges, infrastructures, and experiences" that make Uganda's oil-bearing region (Richardson and Weszkalnys 2014: 8). While commercial quantities of oil were discovered in 2006, a complex assemblage of oil's materialities has emerged in Uganda over the last decade. We trace processes of territorialisation as conflicts over spatial control, authority and governance unfold in this frontier space (Rasmussen and Lund 2018). Our empirical findings are based on a long term research project (since 2009) which explores the changing social relations and perceptions of oil development in Uganda's Albertine Graben. Of particular interest here is how struggles over accountability and legitimacy challenge new property regimes, new forms of authority and new institutional orders. The stability and permanence of oil assemblages in frontier spaces can

be exaggerated (Haarstad and Wanvik 2016). The socio-material landscape in the Albertine Graben is not a singular, coherent system. It is subject to significant change over time as tensions and contradictions lead to processes of deterritorialisation (Bakker and Bridge 2006). We explore how emerging forms of agency may lead to processes of change and destabilization in the making Uganda's oil assemblage.

Improving Accountability on Forest Management, Democratisation of Technologies toward Shared Cultural Values on Ecological Heritage

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Rain forest influences the provision of global public goods such as biodiversity and food security. In the last decades, national and international courts in Latin America have taken their citizens' environmental claims seriously and have recognized them not only in relation to rights, but as damages against humanity. Although, in many countries in this region environmental conflicts have increased significantly, the effectivity of this judgments remains lower. In most of the cases, accountability efforts on environmental justice have focused on understanding the complex impacts of large extractive projects, exploring accountability as related to violation of specific rights, as well as failures of the procedures of distribution and recognition of local peoples' values. A widening gap on the research on accountability is related to the democratisation of technologies, which enhances the effect of compartmentalisation of policies. Currently the most frequent source of environmental conflicts in the region is the overlapping of decisions between different policy sectors. This paper illustrates this through the case study of the demand for granting of mining titles in the protected area of Yaigojé Apaporis Natural Park, Colombia. The National Ministry of Energy granted mining titles for gold extraction (2012). The Constitutional Court ordered their immediately suspension considering that they would have caused the sedimentation of the river, contamination of the water, thereby endangering 21 surrounding indigenous communities and threating their ecological and cultural heritage (CC Judgment T-384 A of 2014). In November 2017 the owner of this mining concession appealed, asking US $ 16,500 millions from the Colombian State, arguing the legitimate expectation this concession.

Using Yaigojé Apaporis Natural Park as a case study, this paper sheds light on how a more accountable democratisation of technologies can facilitate the global challenge of sharing values about maintaining ecosystem services brought by the traditional ecological knowledge. Democratisation of technologies in forest management could reinforce equitable land rights decisions and transform cultural preferences on access and allocation for Forest Landscape Restauration (FLP). By doing so, this proposal first maps worldwide similar conflicts. Second, it characterizes a number of current initiatives, which have spread more accountable technological tools in local communities avoiding deforestation and forest degradation in forest. Third, it concludes by showing how democratisation of technologies represents a lever toward the accountable practices on cultural and ecological heritage protection in FLP.

Populism or Petrostate? The Afterlives of Ecuador's Yasuní-ITT Initiative

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In 2007, the Government of Ecuador announced the Yasuní-ITT Initiative: a proposal to forego exploiting 20 percent of its oil reserves located in the Yasuní National Park-- home to one of Earth's most biodiverse places, and several indigenous groups living in voluntary isolation. In exchange, Ecuador asked the international community for $3.6 billion, roughly half the revenue it would have earned through oil extraction. Five years later Ecuador received less than 10 percent of the required pledges, and the initiative was cancelled. Many accounts emphasize then President Rafael Correa's perceived untrustworthiness as key in explaining the initiative's failure. This article instead examines the role of entrenched institutions of the petrostate, emphasizing how the initiative defied expectations by offering a post-extractivist path for Ecuador. Despite its failure, this path continues to orient debates on development and extractivism, forming 'afterlives' of a call to mitigate climate change by leaving oil in the ground.

Blooming Landscapes? Utopian Thinking in the Anthropocene.

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Paradoxically, as the Anthropocene adds just another layer to the strata of geological time, connecting our planet to a distant past where human beings did not ever exist and reminding us that we are first and foremost earthly creatures who depend on the habitability of their environment, our relationship with the future has subtly changed. On the one hand, deep future is increasingly relevant in arguments about the need to act politically in order to adapt to a climatically disturbed planet: the medium-term predictions made by early environmentalism look now inescapably naive. On the other, though, the advent of the Anthropocene seems to have changed the dynamics of utopian thinking in environmental political thought. Whereas those who cling to an alarming account of the Anthropocene can just offer a renewed version of the austere ecotopia envisioned by early environmentalism, arguing as ever that only a modest utopia organized around frugality can avoid the dystopia of planetary collapse, so-called ecomodernists have taken the opportunity provided by the new geological age in order to give shape to a different kind of utopia -namely, one that makes use of the very human institutions and values that have produced the Anthropocene in the first place. A clever use of technology is thus presented as the key to a socioecological future that does not break up with the present but just improves it dramatically, turning utopia into a continuation of the present rather than a radical departure from it. What does this say about the operation of the Anthropocene in the social imagination? Is it an exercise in realism or a defeat for those alternative politics that contest the way in which modernity is framed? Moreover, is such a techno-managed planet really an utopia? Or can it be reframed as a dystopia that calls for political resistance and the opening up of conceptual space in the socioecological debate? Is there a way for creating alternative futures that go beyond the dilemma between a rational turbomodernity and a romantic leap into the past? How can new voices be added that help to pluralize the makings of the future in the transition from the Holocene to the Anthropocene? This paper will argue that utopia retains a key role for anticipatory politics, on condition that it is exerted realistically and presented as an attainable goal that speaks a language of hope rather than despair.

Communication and Rhetoric in the Irish Citizens' Assembly on Climate Change

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Environmental governance has taken a “deliberative turn” that aims for greater levels of citizen inclusion and a sincere exchange of views. Deliberation serves not only to enhance democracy and legitimacy, but can also result in improved policies through the prioritisation of the commons over self-interest, providing alternative perspectives and potential solutions, and facilitating greater coherence and consensus across highly complex issue areas. Questions of communication and rhetoric lie at the heart of deliberative processes the ways in which the groups of citizens participating in mini-publics communicate with each other has been the subject of considerable academic attention. Another source of communication can be found in the information that is provided to participants, often in the form of presentations from expert speakers. Since this forms the basis of participants’ deliberations it would seem to be an important element, however it has received surprisingly little attention. This paper aims to bridge this gap through an analysis of expert speaker communication at the Irish Citizens’ Assembly on Climate Change that took place between September and November 2017. Do expert speakers exert differing levels of influence over participants’ deliberations and decision-making through their use of communication and rhetoric? Climate change communication is a fast-growing field, and this paper applies the criteria outlined in the recently published 2018 guidelines for IPCC authors as a basis for evaluating effective communication. Definitively establishing a causal link between effective communication and the outcome of the Citizens’ Assembly is beyond the scope of this paper. Rather, through a three-stage analysis it takes tentative steps to further our understanding of the effects of climate change communication and rhetoric on engagement and decision-making in a deliberative context. First, the criteria set out in the guidelines for IPCC authors are systematically applied to the expert presentations at the Irish Citizens’ Assembly using discourse and video analysis. Second, a combination of video analysis of participants’ reactions and interviews with selected participants probe the

impacts of effective communication on participants' engagement. Finally, the recommendations reached by the Assembly and forwarded to the Irish government are compared to the ideas and proposals raised by different expert speakers. The hypothesis proposed is that more effective communication by expert speakers will produce greater engagement amongst participants, and is therefore more likely to play a salient role in their deliberations and be reflected to a greater extent in their recommendations than non-effective communication.

Ecological Democracy in Africa: Comparing Kenya, Uganda and Tanzania

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The tension between democracy and environmentalism in sub-Saharan African countries is intensifying. There are four dominant reasons for this. First, following the 1992 Earth Summit, several countries launched ambitious initiatives to respond to environmental concerns, including establishing substantive rights to a healthy environment in their constitutions. Yet, today, many regimes are less democratic or exhibit more repressive tendencies than in this early period. Second, multilateral and bilateral banks used to play dominant and influential roles in guiding African national policymaking, reform, capacity and institution building. Today, however, several countries avoid or refuse to work with these institutions, instead relying on support from countries like China, which have fewer procedural requirements or expectations. Third, while African countries have actively participated in international environmental forums, international norms relating to environmentalism and democracy are inconsistent with domestic practices or are undermined by the complexity of domestic policy processes. And, fourth, as countries resist international democratic norms, domestic civil society has increased its capacity, challenging governments in formal and informal settings, thus intensifying domestic tension. In sum, the optimism that emerged in the early 1990s for African ecological democracy at the national scale is being challenged by dramatic changes in domestic political relations. This paper examines these changes by comparing and contrasting three countries in East Africa: Kenya, Uganda and Tanzania. The paper traces the differences in support and resistance to environmentalism in each country from the 1990s onwards. It theorizes and contrasts how colonial experiences with land and natural resources, environmental civil society activism, and multilateral relations have interacted to influence the character of environmental democracy in each country. It argues that a dominant factor explaining the character of environmental democracy is each country's experience with civil society protest and activism. In Kenya, claims about environmental and land rights were central to independence struggles and to democratization in the early 2000s. In contrast, civil society activism in Uganda and Tanzania in the early 2000s was weak and has only intensified in recent years. Each country is confronting similarly complex ecological risks and shifts in international political economic relations. But the Kenyan state's early and sustained engagement with a mature, active and prominent environmental civil society has meant that it has developed more robust environmental democratic practices than the other two states. This paper is informed by over 15 years of field work in the region, focused on energy, climate, food, agriculture and forestry.

Democratizing or Delegitimizing Earth System Governance? 'Scapegoating' and 'Tribalizing' as Mechanisms of Power in Uganda's Fish and Land Governance

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When and why do people perceive rules governing access to and distribution of natural resources as legitimate? In reaction to previously failed state-centered as well as market-oriented environmental policies, the 1990s witnessed the global spread of decentralized and community-based approaches emphasizing the importance of democratic mechanisms for perceptions of legitimacy. This, in turn, was thought to increase the sustainable and equitable management of the Earth system. This paper seeks to contribute to a growing body of literature addressing the role of perceived legitimacy in democratic processes of Earth system governance. I use Uganda – a state that underwent one of the most far-reaching local government programs in the world – as an exemplifying case to illustrate how states'

decentralization and democratization efforts can produce unintended consequences in regard to its population's perceived legitimacy of rules governing fish and land resources. Drawing on seven months of critical ethnographic field research in Uganda, I show that decentralizing and democratizing governance in the country created a fragmented landscape of institutions, functions and responsibilities, which allowed for two mechanisms of discursive power, namely 'scapegoating' and 'tribalizing', to take hold. By allowing actors to shift responsibilities from one governance level to another ('scapegoating') and by opening a constitutive space for politicized ethnic identities ('tribalizing'), these discursive mechanisms shape perceptions of when and why fisheries and land governance rules are perceived as legitimate or not. I find that in the case of Uganda, decentralizing and democratizing environmental governance resulted in an institutional landscape, in which these discursive mechanisms are hurting rather than contributing to the sustainable and equitable management of the country's Earth system.

The Coming of an Authoritarian State: Fisheries Governance and Elite Power Grabbing in Uganda

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A few months before Uganda's 2016 presidential elections, the country's incumbent government issued an executive order to dissolve the community-based Beach Management Units, which were – up to that point – the local and democratic governance bodies responsible for the management of the country's decentralized fishing activities. The official narrative cited rampant corruption and the exploitation of Uganda's valuable fishing resources as justification for the suspension of these local governance structures. However, a popular counter-narrative - told in carrying whispers at local fishing landing sites around Lake Victoria - painted the order as President Museveni's attempt to gain votes during a tough presidential campaign. In February 2016, he won the country's national elections, marking his 30th year in power and the beginning of his fifth consecutive term in office. By analyzing socio-political narratives around fisheries governance, a year before and after the election, this article seeks to illustrate how recent policy changes in Uganda's fisheries governance sectors can be interpreted as efforts by the government in Kampala to secure the ruling elite's state power through more and more authoritarian means. Drawing on seven months of ethnographic research on fisheries management in the country and critical studies at the nexus of coloniality, capitalism and nature, I suggest that legacies of colonialism as well as three decades of global neo-liberalism created a permissive environment that allows the ruling elite to justify the use of more authoritarian tools of governance under the disguise of a political discourse of environmental sustainability and peace and security.

Ecological Democracy in Theory and Practice: Progress, Barriers and new Frontiers

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The role of democracy in the face of global environmental degradation continues to face intense scholarly and public debate. Conceptually, ecological or green democracy saw important theoretical advances in the 1980s and 1990s, not least with pioneering work by John Dryzek, Robyn Eckersley, Robert Goodin and others. Over the past decade, the literature has arguably seen fewer major developments than related areas of global and deliberative democratic theory (or indeed the burgeoning literature on environmental and ecological justice). While this may point to the success of earlier work in clarifying the conceptual foundations of ecological democracy, it raises the question of whether existing theories remain well-suited to changing contemporary circumstances. Not least, the increasingly widespread notion that humanity has entered the Anthropocene epoch—marked by humanity's pervasive impact on ecosystems worldwide—poses the question of whether the concept and practice of ecological democracy needs to be recast in light of conditions that may not have been foreshadowed fully in earlier theorizing. This includes thinking of ecological democracy on a planetary scale. Prospects for realising ecological democracy also face renewed practical challenges. Recent decades have seen important advances in implementing democratic innovations for environmental protection, particularly with the diffusion of substantive and procedural environmental rights in national constitutions and

international treaties such as the Aarhus Convention, and extensive stakeholder participation in multilateral environmental treaty bodies. The spread of social media has opened up new ways for environmental movements to emerge, but disenchantment with political institutions is widespread. Well-organised counter-movements—such as climate sceptics aiming to undermine action on climate change—have strengthened the hand of vested interests opposed to stronger regulation. In these conditions it is timely to take stock of how scholarship on ecological democracy has evolved and to chart new directions for research and practice. This paper synthesises findings from (i) a literature review of four decades of research on ecological democracy and (ii) two special issues on ecological democracy co-edited by the authors of this paper. We identify four main areas of recent theoretical progress: exploring the implications of the Anthropocene for democracy, representing non-human interests, democratising Earth system governance, and new varieties of ecologically oriented social movements, including those associated with sustainable materialism and fossil fuel divestment. However, in other ways theorising on ecological democracy has failed to keep pace with recent institutional innovations; addressing this shortcoming remains a major task for future work in this area.

Does the Blue Economy have a Social License to Operate?

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The Blue Economy is an ocean based economic growth model designed to ensure sustainable use of the marine environment. It includes 'traditional' offshore activities (e.g. oil and gas development, shipping, fisheries) and emerging industries such as deep sea mining and renewable energy. The social acceptability of ocean based industries, sometimes known as 'social license to operate' (SLO), will be important to securing the future potential of a Blue Economy. Whilst maintaining a SLO is a challenge that is experienced differentially across various sectors, the loss of SLO in one sector may impact the level of societal trust in the broader concept of a Blue Economy and lead to concerns about 'blue-washing'. Drawing on interviews, a cross-sectoral survey and an interactive workshop with the ocean business community we explore different components of SLO within the Blue Economy. In particular, this paper will focus on questions of *who* grants a SLO, *what* kind of sustainability concerns are impacting a SLO and *how* sectors are working to obtain, or maintain, a SLO. By comparing the responses of individual sectors to these three critical questions, we identify three distinct 'layers' at which SLO operates, which are distinguished by the degree to which the core values of stakeholders and industry align. At the first level, where values are shared, SLO issues can be remedied relatively easily through technical or technological responses or Corporate Social Responsibility activities. At the second level, some differences may exist between sustainability values and interests, but in many cases these are reconcilable. SLO concerns may be addressed through compensation or other mechanisms such as benefit sharing and community engagement. At the third level, more fundamental differences between the values and beliefs of stakeholders and industry may make SLO issues irresolvable. In these instances questions of legitimacy fall to the political realm where decision makers are asked to mediate between conflicting values. These 'layers' of SLO problematizes the interaction between sectoral SLO and the SLO of the Blue Economy. They highlight SLO as not only a question of dialogue between companies and stakeholders, but also as a political issue that requires broader societal engagement. Therefore, while the concept of the Blue Economy currently appears to be well received across multiple stakeholders and sectors, social and political engagement with questions on the values which underpin this concept will be crucial to determining whether the Blue Economy has a SLO.

What Role for Private Actors in Climate Governance? A Host Country Perspective from Uganda

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Article 6 of the Paris Agreement provides the bases for a new market mechanism for the mitigation of greenhouse gas emissions similar to the Clean Development Mechanism (CDM). This could strengthen the active role of non-state

actors in the implementation of climate action such as project developers and voluntary standards like the Gold Standard, the Verified Carbon Standard and audit bodies. The certification schemes are very active in the voluntary carbon market but also play a complementary role in the Clean Development Mechanism. At a time when carbon offsetting was highly controversial, the Gold Standard has increased its credibility by promising more inclusive stakeholder consultations, 'real' emission reductions and mandatory sustainable development benefits. Nonetheless, NGOs still detect implementation problems, with prominent cases from Uganda showing that despite certification, land right conflicts were insufficiently addressed and human rights violated. As a consequence, social movements, bloggers and researchers have questioned voluntary certification as a solution to conflictive and non-transparent carbon market activities. Private actors and market-based climate governance remain contested. Therefore, it is important to better understand on what bases their legitimacy rests and how they are perceived in host countries like Uganda. Building on the concept of legitimation communities (Bernstein 2011), we examine the socially constructed legitimation process of private actors within the country. Argumentative discourse analysis (Hajer 1995) is used to trace storylines, narratives and related practices. Sociological legitimation is here understood as a dynamic process which includes discursive struggles during the implementation of climate action. Specifically, we will investigate how monitoring and certification actors justify their own role through language and related social practices in Uganda. Moreover, we will identify relevant legitimation communities in Uganda that are involved or affected by the implementation of carbon market projects including state actors, civil society organisations, development agencies, researchers and affected communities. We ask how private monitoring and certification actors justify their role and how are they perceived in Uganda by analysing shared and contrasting storylines. The paper builds on data collected during a research stay in Uganda, which comprise 20 semi-structured qualitative expert interviews with (1) monitoring and certification actors operating in Uganda as well as (2) Ugandan actors involved in the implementation of carbon market projects and (3) participant observation during project visits. The analysis will contribute to a more comprehensive picture and shed light onto the Ugandan perspective on certification and private climate action.

Whose Voices Are Heard and Why? Advocacy Coalitions in the European Union LULUCF Negotiations

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In the EU climate debate, forests feature strongly both as a carbon sink essential to achieving climate mitigation targets and as one of the core resources of the economic development strategy – so-called bioeconomy. These visions, while sharing similar long-term mitigation ambitions, bring forward highly opposing stakes in forest-related policy issues at the EU since the forest-based bioeconomy foresees reductions in forest carbon sinks in the short-term. The recent negotiations on integrating the greenhouse gas (GHG) emissions from land-use, land-use change and forestry (LULUCF) into the EU 2030 Climate and Energy Framework provided the policy arena for these partly conflicting interests. The initial EU Commission's proposal intended to harmonize, simplify and upgrade existing methodologies in accounting GHG emissions from agriculture and forestry. However, the proposal became highly political, as it would have hampered supply of increasing demands for forest-based biofuels and the investments in the emerging sector. Actors and coalitions in the LULUCF policy arena sought to influence policy outputs to realize their interests and views on how carbon accounting should take place through both formal and informal negotiations and lobbying. This paper aims to gain insights on the key stances and power relations within the EU LULUCF policy arena, through answering the questions: who are the actors involved; what positions do they advocate within the LULUCF policy arena; and how powerful are the different actors and actor coalitions putting forward their positions? This will help to illuminate possible outcomes of LULUCF negotiation in terms of climate mitigation targets. We apply the advocacy-coalition framework and investigate actor's policy beliefs, reputational power and policy networks based on an online survey and a network survey. We set the boundaries of the policy network based on a series of expert interviews, as well as an initial analysis of the EU Transparency Register (TR), where all organizations, interested in access to the EU institutions, are encouraged to register. The initial analysis of the EU TR revealed 206 organizations, expressing interests in forest

and forest-related policies. The generated data will provide empirical insights into representation of organized interests in the EU LULUCF policy arena and will allow for a discussion of potential implications of these for the Paris agreement.

Can We Govern Geoengineering Research? Political Perspectives from the Global Climate Society

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Is it feasible to regulate research on large-scale interventions into the Earth's ecological system, in the name of combating climate change? Many scientists involved in the geoengineering debate argue that some form of public governance is necessary to ensure safe and ethical research, and to enable enough scientific progress to know the benefits and side-effects that geoengineering technologies would bring. This article discusses geoengineering research from the perspective of practitioners involved in the design and negotiation of climate policies. It argues that the long-term experiences and social networks that shape the international network of climate policy professionals calls for more research into the sociological aspects of geoengineering governance. This stands in contrast to much of the existing literature, which tends to discuss rational-choice informed scenarios of bargaining, coalition building and rogue actors. Based on interviews with key informants that participate in the multilateral process on climate change and that are familiar with the idea of geoengineering, I discuss the issues that policy makers associate with geoengineering, and the diplomatic difficulties that negotiators would face in bringing the governance of geoengineering research to a global agenda. A key insight here is that scale and jurisdiction of the intended technology matter greatly for the perceived need to govern research internationally. Early international oversight is considered necessary to ensure wide-spread involvement in the design and understanding of approaches that would be deployed in the global commons. Yet, the continued association with wanting to avoid mitigation responsibilities makes it costly for industrialized countries to raise the topic, while developing countries face lack of capacity and trust in western technologies. The article then discusses pathways through which governance for research on geoengineering in the global commons might be brought to the global agenda despite the discussed difficulties.

Warming Up or Cooling Down for Geothermal Energy: Public Accountability for Emerging Energy Technologies

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In a transition to sustainable energy many participatory methods are proposed to better include the knowledge and concerns of citizens and other stakeholders. These participatory methods can be considered institutional designs for improving public accountability as they provide 'the opportunity of citizens to critically monitor and debate proceedings of (political) decision-making'. The challenge in these types of processes is to create a process of learning that connects lay, experiential and expert knowledge. Through coproduction, often in the form of stakeholder-dialogues these interactions between science, technology and society may facilitate researchers and participants from industry, government, non-profit organizations to align norms, values, different interpretations with technological knowing and developments. However, strategic use and 'scientization' often impede the democratic quality of these participatory methods when put in practice. The extent to which citizens and others can critically monitor energy transitions through participatory methods is shaped by the problem definition and processual boundaries applied in specific cases. As such, these forms of public accountability are shaped by the issue-framing and procedures of governing actors. We empirically develop this argument through the case of geothermal energy in the Netherlands. Based on interviews with stakeholders about their perspectives on geothermal energy and the kind of participatory process they feel are relevant, we show that issue-framings of governing actors, including the industry, intersect with their ideas about desired participatory processes. We identify four clusters of participatory processes based on two axes: (1) location specific versus generic geothermal energy development; (2) issues concerning the development versus necessity of

geothermal energy in energy mix. We found that industrial actors and investors prefer to organize location-specific dialogues and communicate risks and safety; governmental actors and citizens groups want to be involved in more general dialogues about the need for geothermal energy in the energy mix. Based on these findings, we reflect on the potential of participatory methods as an institutional design for improved public accountability of emerging energy technologies.

Travelling Images of Shale Gas and Geothermal Energy: Citizen Detectives and Public Accountability

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The governance of the extractive sectors, such as energy, is populated with examples of civil society engagement pro and against sustainable and non-sustainable energy sources. In this paper we build on the idea of an 'ocular democracy' in which the democratic value of candor (sincerity) is almost extorted by the 'eyes of the people' and can no longer be ignored. We look at the potential of 'citizen detectives' to contribute to the public accountability in governance of this sector. On one hand governing actors need to provide visual evidence to support their decisions and 'give account', on the other hand citizen detectives produce visuals to hold governing actors accountable. Our question is: What is represented in these visuals used by accountors and accountees? In an online search, we gathered images on shale gas and geothermal energy that were presented on websites and in social media (facebook) by both citizen detectives and governing actors from the Netherlands and the United Kingdom. We analysed those using visual analysis techniques. This exploratory study of visual framings about shale gas and geothermal energy demonstrates that 'citizen detectives' reveal unknown or repressed information to critically assess the normative and technical framings by dominant discourse coalitions. They do so by producing referential, informational images; and condensational, emotion stirring images. While the referential visuals seem to represent new (interpretations of) information; the condensation visuals represent (conflicting) concerns actors have. The referential visuals are most of all produced to give account for governing actions – or are produced to hold governors and businesses accountable for their actions. The condensation visuals are most of all used to mobilize other citizens and create a counter discourse –and work as the eye of the public that watches governing actors. Through the visuals, the meaning of energy extraction and its relation to a transition to sustainable energy is politicized, negotiated and adapted in order to challenge governing actors, including business, not to engage in a Race To the Bottom (RTB) process with regards to sustainable energy.

Democracy Is in the Air? The Democratic Quality of Discourses on the Governance of Stratospheric Sulphur Injection

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There is a burgeoning literature on what is increasingly referred to as "geoengineering": the purposeful alteration of planetary systems to mitigate (the impacts of) climate change. One technology often proposed is the large-scale injection of sulphur into the stratosphere, which would partially block off sunlight and hence temporarily cool the planet. Apart from environmental questions related to geoengineering proposals, the potential to govern the global application of such technologies is entirely unknown. The focus of this paper is if stratospheric sulphur injection governance would be organised in a manner that fulfils basic standards of democracy. Given that stratospheric sulphur injection governance is not yet formalised or institutionalised, we relied in our analysis on discursive institutionalism, an approach that is highly useful in the ex-ante evaluation of governance and the explanation of the creation and change of institutions by the power of discourse. We identified the emerging governance system for stratospheric sulphur injection by means of a critical discourse analysis drawing on recent papers, reports, conference proceedings and news articles in which governance of stratospheric sulphur injection is directly discussed. Our research evidenced an emerging dominant discourse that views the governance of stratospheric sulphur injection twofold. First, regarding governance for *research* on stratospheric sulphur injection, this dominant discourse argues that governments should

not necessarily be included but that transparent communication to global society is indispensable. Second, regarding the *deployment* of stratospheric sulphur injection, this discourse argues that such deployment should be governed by state bodies as part of existing political regimes in order to place deployment within the existing system of international law. To analyse the democratic quality of this governance system as manifested in the dominant discourse, we drew on an analytical framework that addresses (1) participation, (2) democratic control and (3) discursive quality. Our analysis revealed that (1) the discourse poorly addresses participation by concentrating participation in developed countries and the epistemic community and much less so in developing countries and cultural or religious communities. (2) As for democratic control, the discourse scores low for accountability because it lacks discussion of control mechanisms at a global level, but it scores high for transparency because it discusses elaborate ways of sharing information. (3) Concerning discursive quality, we found some discursive balance in the dominant discourse, as both advocates and critics are heard, and also elements of deliberativeness, as the discourse considers argumentation and validation essential for governing stratospheric sulphur injection.

Global Renewable Energy Governance Reconsidered: Strengthening Legitimacy and Effectiveness

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Efforts to meet climate targets and tackle energy challenges have proliferated significantly. Over a hundred global institutions aim to address climate change and energy simultaneously, ranging from international organizations and transnational initiatives, to private arrangements and multi-stakeholder partnerships. Apart from the conflicts or synergies within this institutional patchwork, new research questions arise related to the implications of this institutional complexity for effectiveness and legitimacy. How do institutional linkages affect the effectiveness and legitimacy of individual institutions and how can effectiveness and legitimacy be strengthened in the institutionally complex nexus of global climate and energy governance? This paper aims to address these questions for the renewable energy subdomain, which captures the largest share of institutions within the climate and energy governance structure. The research is based on questionnaires and semi-structured interviews with climate and energy experts. By placing the focus on the mandates of the individual institutions and their linkages with other institutions, this paper argues that legitimacy and effectiveness can be assessed through a number of different perspectives. The paper further proposes a set of opportunities to enhance the effectiveness and legitimacy of a subset of international organizations, including the IEA, IRENA and CEM, and multi-stakeholder partnerships, including REN21, REEEP and SE4ALL. This paper thereby provides insights on how to strengthen coherence, connectedness, effectiveness and legitimacy amongst institutions involved in global renewable energy governance. Moreover, the paper contributes in advancing knowledge on policy integration and governance interaction within the global climate and energy governance structure.

Politics of Experimentation and Learning: How Democratic is Polycentric Climate Governance?

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Experimentation is at the heart of the polycentric governance discourse in climate and environmental policy-making, but conceptually experimentation is only weakly developed in the respective literature. There is a general expectation that it enhances innovation and learning for the common good. We argue that this rests on naïve assumptions about experiments working either as neutral tools for testing a pre-existing objective reality (in positivist terms), or as free and equal processes of collectively constructing realities (in pragmatist terms). We here see a dangerous myopia with regard to how conflict and asymmetric power relations play out in the course of *doing experiments*. To overcome this we systematically discuss the politics of experimentation. We conceptually reconstruct the experimental processes for moments of decision at which learning is directed and shaped for specific interests, and we illustrate them with results of empirical studies into innovation in governance. Our conclusion calls for more vigilant research into how experiments

are actually done, suggests that constitutional aspects of experimental governance need to be publicly discussed, and emphasizes that nothing less is at stake here than the future of democracy.

Political Representation of Future Generations in Climate Policy

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Political representation in democratic systems most commonly describes the notion of elected officials representing their constituents in political processes: political representation is the process of making citizens' voices and interests present in the policymaking process (Pitkin, 1967). When it comes to climate policy, developing 'just' policy requires considering the interests of those affected by the decision (or lack of decision) at hand. With the effects of climate change expected to be felt far into the future, it is not only current voters that are affected by policy (in)action, but children, the unborn and far distant future generations. Yet, what does it mean to make the interests of future generations present in climate policymaking? Can such representation lead to 'just' climate policy in democratic systems? In this paper, I analyse the potential of the notion of political representation of future generations for just responses to the climate problem. I examine how the notion of political representation has been stretched to accommodate the reality of complex, diverse democratic governance in contemporary times, and I assess whether the concept is adaptable and meaningful enough to bridge gaps towards just and fair climate policy. I combine the theorising work with an analysis of attempts by different democratic systems to account for the interests of future generations in policy making (through appointed representatives or other means), and I assess the value-added of such measures for just policymaking. I conclude by highlighting the potential of political representation in climate policymaking, while underlining the limits of the concept for achieving climate justice across generations. This paper contributes to the 'accountability, legitimacy and democracy' stream of the conference, by highlighting democratic responses to the challenge of intergenerational justice in climate policymaking.

Regulating Climate Change: Assessing and Explaining the Legitimacy of Transnational Governance Initiatives

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Climate change is regulated by an increasingly variegated set of actors and initiatives. Launched by private actors and public actors other than central governments, transnational initiatives with a rule and standard setting function have received increasing attention by earth system governance scholars. While a large number of studies have focused on evaluating the effectiveness of these governance initiatives in fighting climate change, recent years have seen increasing attention to assessing their legitimacy. Exploring the legitimacy of initiatives that are regulatory in nature is of particular interest because their effects may reach well beyond their own members, and legitimacy demands are therefore high. Furthermore, since they include non-state actors, they possess a particular potential for broader stakeholder participation and accountability. This paper aims to provide a systematic and encompassing analysis of the legitimacy of transnational climate initiatives with a regulatory function in three main steps. First, drawing on conceptual literature on legitimacy in democratic governance in general and transnational climate governance in particular, we establish a set of indicators for assessing the legitimacy of transnational climate initiatives, with a focus on 'participation' and 'accountability' as two primary aspects. Second, we apply this set of indicators to 49 regulatory transnational climate initiatives which we compiled through a comprehensive review of existing databases on climate initiatives. The result is an account of the range of legitimacy scores of these regulatory initiatives. Third, we correlate the scores with key characteristics of the regulatory initiatives, such as the types of actors involved (private, public, public-private) and the primary type of regulatory activity (standard setting, certification). We find that significant variation in the level of participation and accountability exists within the realm of regulatory transnational climate initiatives. In particular, initiatives in which public actors are involved and that aim at setting standards for carbon

management and disclosure display relatively high levels of participation and accountability. In contrast, regulatory initiatives formed by private actors only and aimed at certification are characterized by lower levels of the chosen legitimacy indicators. Overall, our analysis sheds light on the legitimacy of an important segment of transnational climate initiatives (regulatory ones), illustrates that there is significant variation, and makes a start in identifying factors that can help us account for this variation. It thereby also enables us to identify more clearly particularly significant legitimacy gaps in transnational climate governance.

The Influence of Democratic Quality on Reactions to Climate Change: A Comparative Study of Climate Policies in Established Democracies

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To understand the interlinkages between the earth system and democracy is of crucial importance for academia and practical politics. To address this topic, this study analyses how democratic quality influences the climate performance of established democracies. Two analyses distinguish between established democracies based on their democratic quality and detect internal mechanisms to understand their different reactions to climate change. The findings demonstrate that increased democratic quality generally positively influences climate performance. The positive influence of democratic quality, evaluated by empirical translations of control, equality and freedom, can be observed in terms of output (policy targets etc.) and, with certain limitations, with respect to outcomes (GHG emissions development). The research results are robust with detailed mechanisms verifying statistical trends. A concept of democratic efficacy explains these findings more generally by theorizing that a democracy's ability to produce desired and intended climate performances raises with increasing levels of democratic quality. Empirical analysis is conducted by applying an explanatory mixed methods design. Firstly, panel regressions deliver trends on the influence of democratic quality, as measured by the Democracy Barometer, and on climate performance, as measured by the Climate Change Performance Index. Secondly, a case study of Canada's Kyoto Protocol process from 1995 to 2012 is undertaken, providing detailed insights into mechanisms of democratic quality and climate performance. These findings are important for academia as well as for political practice. The main research implications are twofold: Firstly, more attention has to be paid to the different democratic qualities of established democracies and the influence these differences have. Secondly, the concept of democratic efficacy outlined here has the potential to be advanced to an encompassing middle range theory, which can provide an explanatory link between democratic quality and climate performance as well as performance in other policy fields relevant for the earth system. The fundamental practical implication is as simple as it is complex: overcome democratic shortcomings and thus democratize democracies to make them more efficacious.

Transparency, Accountability and (dis)Empowerment in Sustainability Governance

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In what ways does transparency, understood as information disclosure, empower those seeking accountability for actions causing significant environmental harm? It has become a maxim of "governance by disclosure" that transparency facilitates empowerment, as applied to multiple scales and contexts of sustainability governance. Viewing transparency as a necessary condition of accountability carries transformative assumptions – that those negatively affected have the capability to make a meaningful political claim for answerability and redress. Whether these claims are relayed directly to those held responsible or communicated to a governing authority, the expectation is that information disclosure assists in the political mobilisation of affected publics, leaving scholarship to examine the institutional logics impeding or promoting accountability in relevant issue areas for sustainability. However, largely unexamined are the different ways which the procedural power-effects attributed to the disclosure of sustainability

information connect to accountability claim-making. Using Lukes' (2005) multi-dimensional theory of power, this article interrogates the accountability impacts of disclosure-based forms of sustainability governance.

Performing Accountability: State-to-State Account-giving Within Multilateral Climate Governance

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Securing state-to-state accountability is a key challenge for multilateral climate governance. The two component elements of accountability—*answerability* and *enforceability*—are inherently difficult to secure in a global governance context where national sovereignty concerns reign supreme. This is evident from contested negotiations within the United Nations Framework Convention on Climate Change (UNFCCC) over (being answerable for) ambitious and fair burden sharing with regard to climate action. The enforceability component of accountability is largely out of reach in this global context, particularly in the currently decentralized era of nationally-determined, non-mandatory climate actions. Yet what about answerability? Is state-to-state answerability (account-giving to each other, about what is being done nationally) easier to secure? Who is answerable, for what, and to what end? This is the central question addressed in this paper. We do so by examining how existing UNFCCC account-giving arrangements are operating, and to what effect. These manifest here as 'monitoring, reporting and verification' (MRV) systems to document, report on, and verify climate actions of countries. Our paper explores how the international 'verification' element of these MRV systems is operating. In line with the principle of 'common but differentiated responsibilities', current UNFCCC MRV systems call for distinct processes and obligations for reporting and international verification for developed versus developing countries. While developed countries are subject to more stringent obligations with regard to scope and timing of reporting, developing countries have more leeway. Verification processes for both groups of countries entail a public question-and-answer session wherein countries report to, and question, each other on, inter alia, sector-specific greenhouse gas emissions, and climate policies and actions taken. These processes have begun to operate in the last 5 years. Developing country international verification processes, referred to as "Facilitative Sharing of Views" are the most recent, with almost no existing academic analyses of these yet available. We analyse four FSV sessions that have taken place to date. With support of Atlas software, we code and categorize these question-answer sessions, in order to assess who asks questions to whom, and what countries seek to hold each other answerable for. Ultimately, we are interested in whether and why these processes matter, for securing ambitious and fair collective climate action. The Paris Agreement will build on these existing MRV processes, hence scrutiny into they work yields insights into the transformative power of 'performing accountability' in this manner, within this contested global governance context.

Accountability and Policy Integration for the Sustainable Development Goals: Friend or Foe?

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The 17 Sustainable Development Goals (SDGs) and the full Agenda 2030 in which they are embedded are aspirational and intended to be both transformational and integrative in a number of ways. They are expected to support the integration of policies from issue areas often operating as separate silos particularly when these can create synergistic effects. The SDGs are also accompanied by an emerging system for follow-up and review centered on a long list of indicators that are intended to enable countries to be accountable towards their citizens. There is, however, in the accountability literature indications that some accountability mechanisms can be counterproductive for integrative policies. This paper is centered around the question whether a strong accountability regime is compatible with a high degree of policy integration both conceptually and in the context of the SDGs. We approach this question through looking both at the literature on (environmental) policy integration and mainstreaming, and the accountability literature. Combining these two literatures enables us to provide an analytical framework for evaluating the potential of the emerging accountability regime for the SDGs to enhance more integrated policy making and action both at

national and global level. We conclude that there are little or no strong hierarchcial elements of accountility relationships in this regime – unless countries enact that within their administrations or donor institutions impose conditions for that purpose towards their clients. This is probably good news for more integrative policies – but only if it is accompanied by a strong sense of shared responsibility among actors and also includes information on the types of behavioural efforts that support integration. We can see a risk in relying in evaluation deliberations too narrowly on quantitative indicators of outcomes particularly if these indicators are not reflecting integrative aspects. This will be particularly damaging in national accountability mechanisms that may have sanction possibilities. Here the course of action that various accountees take can play an important role; if they have deeper understanding of the underlying interlinkages among the goals and targets, and based on this, engage in accountability mechanisms, this would be valuable. The focus on learning which has become central to the follow-up and review design is certainly an opportunity for strengthening integration – but there are many questions on if and how it can do so, questions that the research community should engage with at an early stage.

Interpreting the Concept of Sustainable Development: The Case of Agricultural Land Use in Uruguay

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The absence of more specific guidelines have been both a success and a weakness of the concept of sustainable development. This has facilitated the support of a large number and variety of actors, but also led to criticism that the concept risks becoming meaningless. Similarly, the potential of the SDGs for transformation depends on how these are interpreted and implemented in particular contexts. Key questions are therefore what is meant by "sustainable development" and who gets to define this? This paper examines the various and partly conflicting interpretations of the concept in relation to agricultural land use in Uruguay. Since the turn of the century there have been major changes in agricultural land use in Uruguay and the Southern Cone region as a whole. During the 2000s high global prices and the introduction of new technological packages have led to an exponential increase in the production of genetically-modified soybean destined for export. The economic growth associated with this has underpinned successful social programmes, but the expansion of agribusiness has also led to the displacement of family farming. Moreover, the increased production has led to concerns over impacts on human health due to the extensive use of chemicals as well as biodiversity loss, water pollution and desertification. Agricultural land use in Uruguay is therefore linked to a complex combination of economic, social and environmental considerations and not surprisingly priorities and approaches to these differ. The paper juxtaposes two central approaches; agroecology, an approach promoted by some civil society organisations; and sustainable intensification, an approach put forward by parts of the government with support of the FAO. These two approaches entail different interpretations of all three dimensions of the concept of sustainable development and they can be regarded as two points of a spectrum. This framework helps to position the variety of different interpretations of sustainable development in agricultural land use in Uruguay and the various organisations promoting them. Making these different approaches explicit and examining to what extent they conflict is an important element for the legitimacy of both, agricultural land use policies and the concept of sustainable development.

The Palm Oil Policy Regime Complex: Challenges for Smallholders and Local Governance

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The policy and practice around sustainability in the palm oil sector is characterized by emerging institutional arrangements involving public and private sector actors—mainly palm oil companies, processors and traders—and civil society organizations, from the global to the subnational levels. State regulations involve contradictory interventions to stimulate oil palm expansion while controlling for their negative social and environmental impacts. Major palm oil corporate groups, continue expanding supply, but have made commitments to zero deforestation—in the form of

pledges to No Deforestation, No Peat, and No Exploitation. These commitments to sustainability are placing pressure on upstream suppliers, including smallholders who have to comply with shifting regulatory frameworks while simultaneously adapt their practices to the requirements of private sustainability standards. Main palm oil companies' initiatives have to do with improving the environmental performance of their operations—mainly through traceability and risk management—to source only from suppliers that comply with adopted standards that reduce risks on forest conversion. In addition, companies have also to adapt their operations to new regulations such as those constraining expansion on peatlands. Yet, a major challenge is how to ensure compliance with commitments, while at the same time securing the provision of supply from third-party suppliers and independent smallholders that comply with similar environmental standards. This is challenging when dealing with independent smallholders. For example, in Indonesia, the main palm oil's country supplier, independent smallholders often obtain lower yields, face constraints to adopt improved practices due to lack of access to inputs and operational capital and have not formal legal access to their lands, which limits them to benefit from public incentives.

Enhancing the environmental performance of the palm oil sector, therefore, risks excluding smallholders if legal and economic barriers are not adequately resolved, but mainly if appropriate conditions for upgrading smallholders' farming systems are not in place. This, however, requires of approaches that do not only look at improving the performance of the value chains, but look at the structural conditions that limit making progress to sustainability in the producing landscapes, such as those related to territorial planning, tenure security, improvement of public services, and mechanisms for conflict resolution, among others. This paper, based on interviews to key informants, literature review, and discussions with key stakeholders characterizes the shifting palm oil policy regime complex, and identify the main challenges in linking local governance with the demands from smallholder palm oil growers.

Procedural Justice in Climate Change Negotiations: Respect and Due Hearing

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International negotiations in summits with almost global state participation have become a critical forum for transnational environmental governance, yet the results delivered are mixed and often disappointing. Existing research has highlighted the link between procedural justice and the outcomes of such negotiations. Specifically, when a just process is followed that is both transparent and inclusive, it improves both the quantity and the quality of agreements reached. Procedural justice is therefore more than a normative imperative: it is a practical requirement for international cooperation. This paper argues that there is more to procedural justice than a transparent and inclusive process. Whilst procedural justice demands a legitimate process, it also concerns a process that treats both countries and the individuals who represent them with respect and ensures a due hearing to all concerned. Having a seat is not sufficient if one's voice is not heard or is disregarded. These social-psychological elements have been identified as facilitating bilateral and interpersonal negotiations, yet their significance on the international level have been overlooked, often in favour of structural or power-based explanations. This paper does not seek to discount such variables, but rather makes the case for a broader perspective that views climate negotiators not only as political agents defending national interests, but as individuals subject to human psychology. When these individuals (and the countries they represent) perceive they have been treated with respect and that their views have been heard, this increases their willingness to agree irrespective of the substance of the agreement. In the context of climate negotiations, in which each country wields a veto power on the final agreement, this can play a significant role is determining the success or failure of negotiations. The negotiations that led to the adoption of the Paris Agreement on Climate Change are analysed as a successful case in which the French hosts oversaw a process that was respectful of all and gave all countries a voice. Evidence from 28 in-depth expert interviews reveals the effect this had upon delegates' perceptions and attitudes, and how this in turn was crucial during the final days and hours of the summit to ensure a successful conclusion to the negotiations.

Global Democracy-Deficit in the Age of Anthropocene: Pros and Cons of Institutionalizing an Elected Global Parliament

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In this "age of anthropocene," human development activities are adversely affecting the dynamics and processes of global environmental and biogeochemical cycles. The projected rise of anthropogenic Green House Gas (GHG) emissions in the global atmosphere, increasing loss of biodiversity against background historical rates, and abrupt shifts in the Phosphorus and Nitrogen cycles are some of the most challenging planetary scale problems that require planetary scale legal and governance response. Lack of global environmental governance could lead to highly adverse impacts on vulnerable populations and ecosystems in both developed and developing countries. Yet, the current international organizations, in particular the United Nations (UN) system, have failed to effectively govern adverse human activities that interfere with planetary scale environmental processes. A fragmented response in the form of voluntary commitments in the 2015 Paris Agreement for mitigating GHGs or half-hearted implementation pledges for Sustainable Development Goals (SDGs) do not provide adequate hope to sustain essential environmental processes for future generations. Many proponents of earth system governance and global climate governance have argued for the need to set up an elected global parliament, which could reduce the global democracy-deficit and potentially enhance accountability for complex multi-generational and planetary scale public policy problems such as climate change mitigation and adaptation, biodiversity loss, food security, environmental refugees, bioterrorism, cyber-security and other such trans-boundary problems. This paper analyzes the arguments for and against an elected global parliament that have been raised in the current literature and expert interviews. Implications for institutionalizing accountability in global governance regimes to resolve trans-boundary problems are drawn.

Fossil Fuel Developmentalism and Climate Justice: Insights from Australia's Coal Frontier

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Normative arguments are becoming increasingly prominent in justifying fossil fuel developmentalism in the context of climate change, where previously proponents relied almost exclusively on economic arguments (Collier and Venables, 2014). In part, this is due to the falling cost of alternative energy sources such as solar and wind, but it also reflects an acknowledgement from the fossil fuel industry that it was losing the discursive war over the legitimacy of fossil fuels to a well-organised coalition of environmental and social justice actors who were effectively mobilizing normative arguments centred on historic injustice, current inequality, and intergenerational justice to argue for keeping fossil fuels in the ground (Knights and Hood, 2009; e.g. Bruno *et al.*, 1999; CorpWatch *et al.*, 2002; Hepburn *et al.*, 2011). Despite the contention that normative arguments lead to paralysis in the international climate negotiations (Gardiner and Weisbach, 2016), if anything their influence on the political economy of fossil fuel production and consumption is only growing. This paper examines how normative arguments figure in the narratives which have been mobilised both for and against coal, focussing on a group of export-oriented mega-coal mines slated for development in the Galilee Basin, a large undeveloped coal basin in central western Queensland, of which the Indian-owned Carmichael Coal Mine has been the highest profile project. Debates about Carmichael focus attention on the fact that both India (now the world's second largest consumer of coal) and Australia (the world's largest exporter) are seeking to legitimise ongoing coal developmentalism in normative terms, despite the fact that this developmentalism threatens the achievability of the SDGs and indeed the Paris Climate Agreement aspiration of limiting global warming to 2degC (Amos and Swann, 2015). This raises critical questions about how discursive politics shape the meaning of climate justice, and the implications of how climate justice is understood for both humanity and the planet.

The Role of Cities in Combating Climate Change and the Depletion of Resources – Conceptual Framework of an Accountability Analysis

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Urban infrastructures and lifestyles are responsible for significant shares of global greenhouse gas emissions and resource consumption. According to recent studies, approximately 75% of global energy and material flows are consumed in cities. With a growing urban population these shares will even rise. The crucial role of cities for global sustainability is increasingly recognized by states and fully embraced in key documents of the global governance agenda such as the 2030 Agenda for Sustainable Development and the Habitat III New Urban Agenda. With the Marrakech Partnership, Parties to the Paris Agreement even further integrate cities and other non-state actors into the international climate regime. In addition to these international political mandates adopted by states, cities themselves are increasingly engaging in international networks and developing voluntary pledges to reduce greenhouse gas emissions and work towards greater urban sustainability. However, despite this international political activity, empirical research in the field of urban action on climate mitigation has shown that even those cities, which have adopted GHG emission reduction targets, did not put in place a strategic governance mechanism to ensure that the targets are met. Thus, if cities are to become a reliable contributor in polycentric climate change mitigation and resource protection architectures it is crucial to establish and strengthen mechanisms for the accountable governance of urban carbon and material flows. The paper addresses this accountability challenge and builds on interim results of my interdisciplinary post doc research ("Urban Footprints – Towards Greater Accountability in the Governance of Cities' Carbon and Material Flows", a five-year research project at HafenCity University Hamburg funded by a Freigeist-Fellowship of the Volkswagen Foundation). Drawing on political mandates such as SDG 16, scientific literature – especially in the field of political sciences – as well as arrangements under the international climate regime, the paper presents a conceptual framework of an accountability analysis with four key pillars: responsibility, transparency, assessment, and participation. By way of example, the analytical framework is applied to three case studies: Lagos (Nigeria), New York (U.S.), and São Paulo (Brazil). More specifically, the accountability analysis will scrutinize three different perspectives – the internal climate and resource action planning of a city, the vertical (city – national – supranational relation) as well as the horizontal perspective (e.g. city networks). In all three dimensions the analysis identifies accountability chains, their instrumental and institutional design as well as respective gaps and critically reflects upon the status quo.

Institutional Diverseness in Forest Conservation: A Prospective Look into the Indian Protected Areas

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Over the past few decades biodiversity has become the issue of global concern for its rapid reduction worldwide. There has been a growing realization that the conventional '*Gun and Guard*' method of conservation is no more effective in dealing with the socio-ecological complexity of biodiversity conservation. Handling these challenges require an integrated approach that recognizes the interconnectedness of social and ecological systems and multi-stakeholder decision making. Recently, developing countries have adopted both community based participatory policy as well as co-management approach for sustainable management of natural resources. The major questions in this context arise as what kind of institutional framework is essential for the effective management of protected area resources in a biodiversity rich developing country? Are there clear differences between the co-management vis-à-vis self-initiated community conservation approaches? And what factors can explain these differential outcomes? In order to comprehensively investigate the possible factors responsible for effective management of natural resources, the present paper focuses on the complex interactions of local communities with the PA, keeping the geographical scale of the study as the Similipal Tiger Reserve (STR) in the Indian state of Odisha where forests are degrading at an alarming rate. The objective of this study is to identify and analyze the type of institutions functioning inside the tiger reserve and examine the institutional factors responsible for differential conservation outcomes. The study uses both qualitative and quantitative data collected from 240 households across 20 villages located in and around the STR.

Qualitative measures include case study approach, focus group discussion and transact walk method. The result shows that self-initiated local institutions have performed well as compared to government initiated institutions in terms of effective control over resource use and management. Where local NGOs are actively associated with communities in the conservation of forest resources, the local institutions are found to be effective. In general, local institutions are lacking adequate financial incentives that can further motivate for better conservation and use of resources in the STR. The study argues that payment for environmental services (PES) and sharing of revenue from eco-tourism can provide direct financial incentive to local communities and hence can promote sustainable use and management of PA resources. Further, in order to reduce trust deficit that exist between fringe villages and the forest department, more usufruct and ownership rights over resource must be transferred to local people, which in turn may enhance better conservation outcome.

Allocation, Access and Equity in Earth System Governance

What About Gender in Climate Change? Twelve Feminist Lessons from Development

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Adaptation and mitigation are two key responses to climate change. In the global South, they prompt many questions: what is the direction and degree of change needed; how can new climate change policies be aligned with existing development initiatives; and how are core social relations such as gender understood and prioritized in relation to technical, and other, solutions? In search of synergies between adaptation, development, and mitigation, this article asks a pertinent question *for* sub-Saharan small-scale agriculture in particular: what can adaptation and mitigation learn from development debates on social goal setting; institutional change; and gender equality? From the perspective of sustainability science and feminist literature, three main findings emerge. First, as regards social goal setting; adaptation and mitigation should, like development, support the escape out of poverty, ill-health, and food-insecurity. Second, as regards institutions, adaptation and mitigation should address how gender regulates access to, use of, and control over resources in terms of labor, land, and strategic decision-making power. Third, as regards gender equality, adaptation and mitigation should learn from how development in theory and practice has addressed gender, women, nature, and the environment. At its core, the analysis contributes twelve salient themes that can significantly inform adaptation and mitigation in research, policy, and practice, thus serving as inspiration for a critical debate on much needed synergetic trajectories.

Planetary Justice and the Ocean and Climate Regimes

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The atmosphere and oceans are by far the largest and most complex parts of the global commons. Oceans cover 70% of the planet's surface and contain about 97% of the planet's surface water. Global atmospheric change caused by carbon emissions is changing global climatic futures. Preambles of international agreements explain the contexts and purposes of the agreements and reveal their philosophical and moral motivations. Our climate and ocean regimes are good forums to study examine planetary justice in extensive environmental realms. How does international law apply justice to these planetary spaces? This paper examines the planetary justice references in the preambles of the three global environmental agreements that are widest in geographical scope: the United Nations Framework Convention on Climate Change, the United Nations Convention on the Law of the Sea and the International Convention for the Prevention of Pollution from Ships (MARPOL) as modified by the Protocol of 1978. The novelty and value of this paper is twofold. First, it creates a framework to assess planetary justice in international environmental law. Second, it reveals that generally the Preambles noted above give scant attention to environmental justice. It gives empirical weight to the argument of Gonzales and many in the environmental justice movement, that when the economic, political and social context in which the treaties were made not acknowledged, it is likely that justice is also ignored. The paper first analyses the core principles of justice of Plato, i.e. to give to each his due. Then it outlines the types of justice (distributive, procedural corrective and social) and the principles of environmental justice used by of the original architects of the environmental justice movement (universal, fundamental, disadvantaged are favoured, ill intent is unnecessary and corrective justice is always embedded). It uses these three sets of elements to present a framework of the elements that can be used as a lens to assess whether the preambles of international environmental treaties are rooted in environmental justice. The paper seeks to determine how are each of the elements of the framework embedded in the Preambles' stated philosophical and moral motivations. For example, how are agency, right-holders

and objective rights treated with in the Preambles? Although this study is limited to a part of the ocean and climate regime, similar weaknesses are at the base of global environmental governance more generally. There is scope to broaden this study to other areas of planetary justice.

Actors, Frames and Contexts in Fossil Fuel Subsidy Reform: The Case of Trinidad and Tobago

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Small island states tend to frame global climate change action in terms of climate justice and environmental stewardship. In fossil-fuel-producing developing states, debates about fossil fuel subsidies also include redistributive justice frames, for instance that the population has a normative right to cheap energy. The question is: how are these contradictory frames reflected in countries that are simultaneously small island developing states and fossil fuel producers, and do other frames also feature in their debate on fossil fuel subsidy reform? This chapter examines how fossil fuel subsidies and their reform have been addressed in Trinidad and Tobago, a petroleum producer and small island developing state (SIDS). It puts forward an analytical framework of actors, frames and contexts that have been central to the global and local subsidy reform debate. The chapter uses this framework to understand the particular context of a small island state that is heavily dependent on hydrocarbon exports for its socio-economic development and that has had entrenched producer and consumer subsidies (in the electricity and transport sectors) since the 1970s. The chapter illustrates how different actors use different frames (environmental stewardship, economic prudence, climate and energy justice) in the subsidy reform debate, and how historical and economic contexts are relevant to the reform process. To some extent, the frames used in the Trinidad and Tobago debate mirrored the (sometimes conflicting) frames found in the fossil fuel subsidy reform literature. Subsidies run counter to good economic policy or subsidies are needed for economic development. Subsidies allow for redistributive energy justice or subsidies are an ineffectual tool of redistributive energy justice. Subsidies run counter to climate justice – or climate justice explains their persistence in countries with minimal emissions, and subsidies thus detract from environmental stewardship. The chapter explained that even with the same actors and the existence of similar frames, policy changed in the last decade, largely because of changed global economic contexts. The case is a sobering example of how global frames are applied at local scales and of how local contexts, economic and historical realities, and actors articulate these frames to shape domestic fuel subsidy policy.

Privileged Coal: The Politics of Subsidies for Coal Production in Colombia

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Fossil fuel subsidies have been identified as a significant barrier to sustainability transitions. However, reforming fossil fuel subsidies is extremely difficult, even in contexts where they are clearly identified and deemed as inefficient and/or costly. As a result, more attention needs to be paid to the politics of the introduction, maintenance and removal of fossil fuel subsidies. This paper explores the political dynamics behind the existence of subsidies that support large-scale coal extraction in the Colombian context. Coal production, together with oil, gas and other minerals extraction, is often presented as one of the key sectors driving economic growth and development in Colombia. However, the country has seen an extensive debate about the adequacy of the institutional framework governing the production of coal and other minerals, including regarding the special benefits and support provided to this sector by the government. The paper reviews the socio-economic importance and challenges associated with coal production in Colombia and categorises key subsidies to coal extraction. Using a political economy lens, we then explore how discursive, instrumental and institutional forms of power have been used by different actors to establish, maintain and remove these subsidies. Three case studies — the Plan Vallejo, a special income tax deduction for investment in real productive fixed assets, and a royalty rebate — are analysed in detail.

Our study illustrates the diversity of subsidies that are provided to fossil fuel production and unpacks the interests and events shaping their creation and maintenance. It provides insights into the varied and innovative discursive strategies used by producers and governments to justify the existence of fiscal incentives. It also suggests that a powerful actor coalition exists in Colombia beyond the coal sector itself, including not only other minerals producers but also the national government and, in some cases, other export sectors. Finally, the Colombian case highlights issues of democratic legitimacy and accountability in the establishment of subsidies.

Pathways for Addressing Fossil Fuel Subsidies through the International Climate Regime

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The adverse environmental, economic and social implications of the sizable subsidies handed out by governments for the production and consumption of fossil fuels are increasingly clear. These implications are particularly significant for the challenge of addressing climate change. By promoting the extraction and use of fossil fuels, subsidies exacerbate the climate problem. Against this background, it is perhaps striking that the international climate regime put in place by the United Nations Framework Convention on Climate Change (UNFCCC) hardly addresses fossil fuel subsidies. This is in part due to the mitigation architecture of the global climate regime: the climate treaties do not specify which policies and measures countries are required to implement to reduce greenhouse gas emissions, leaving each country free to choose how to mitigate climate change. However, the lack of substantive obligations related to fossil fuel subsidies – or, conversely, measures to reform or remove them – also reflects broader concerns about the governance of this sensitive issue area of energy policy. This paper explores how the global climate regime established by the UNFCCC has governed, and could govern, fossil fuel subsidies. It reviews the literature documenting the relationship between fossil fuel subsidy (reform) and climate change (mitigation), which reveals not only that there is increasing evidence of the impacts of fossil fuel subsidies on greenhouse gas emissions, but also that efforts to reform subsidies can yield climate change mitigation benefits. The paper then moves on to discuss how parties to the UNFCCC have by and large sought to avoid addressing fossil fuel subsidies directly, notwithstanding efforts by some parties. The chapter then moves on to discuss five possible pathways in which the UNFCCC can exert influence on fossil fuel subsidy reform at the national level in the future. The first pathway highlights reputational cost of cooperation in the context of voluntary commitments to subsidy reform made by UNFCCC parties, notably in their nationally determined contributions (NDCs). A second pathway emphasises transparency and information linked to both NDCs and UNFCCC reporting mechanisms. The third focuses on the possibility of building incentive structures through international, private and domestic finance. A fourth pathway underscores the possible role of the UNFCCC in amplifying an emerging norm on fossil fuel subsidy reform. And finally, the UNFCCC could also influence subsidy reform by providing a framework for learning and building institutional capacity.

Legal Frameworks and Corporate Strategies for Bioprospecting and Bio-innovation in Polar Regions

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Bioprospecting and bio-innovation have the potential to create high value products in pharmaceutical, cosmetics, food and other life science-based industries. The marine genetic resources of the Arctic and Antarctic Oceans are becoming increasingly interesting to commercial users in the private sector. Bioprospecting in the high seas is cost-intensive and it is dominated by multinational companies from a few developed nations. As a result, at the heart of an ongoing international debate is an equity question, partly invoking the Common Heritage of Mankind (CHM) debate of the early 1980s. The question is whether benefits from exploiting these resources should be shared by the entire international community or only by the States or individual corporations with the capacity to exploit them. The sustainable and equitable use of genetic resources in the Arctic and the Antarctic is affected by legal conditions for access and rights to

use this material. The aim of this project is to contribute new knowledge on how the law as a tool can contribute to sustainable resource management, while also spurring research and development. We analyse the current legal situation at the three levels of law (international, regional and domestic); then explore the consequences for patenting and academic publication and third, examine corporate strategies of bioprospecting actors.

Using Indigenous Knowledge to Protect the Environment, and to Respond to Climate Change in Nigeria/Africa

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As we adopt the new Sustainable Development Goals in Africa, indigenous knowledge may prove to be "the single largest knowledge resource not yet mobilized in the development enterprise". Africa contributes least to but suffers the most from the disastrous consequences of climate change. How can the continent cope with the worsening threats of flooding, droughts and other emergencies that result from extreme weather conditions? For a long time African customs and traditions were misperceived as irrational and incompatible with the conventional strategies of development. But the current global economic and environmental crises have exposed flaws in the Western model for development and for the mitigation and adaptation to climate change. Marshall Sahlins has rightly emphasized the need for all peoples 'to indigenize the forces of global modernity and turn them to their own ends" as the real impact of globalization depends largely on the responses developed at the local level. This paper considers how indigenous knowledge and practice can be used to protect the environment, and support climate adaptation in Africa. Although poverty may sometimes force people to use resources unsustainably, most traditional African societies have deeply entrenched ideas about environmental protection and sustainability because their livelihood depends largely on the land and on the stability of the ecosystem. They believe that land and other forms of nature are sacred, and are held in trust by the present day users on behalf of dead ancestors and future generations. Chief Nana Ofori Atta of Ghana once told a colonial official that "land belongs to a large family of which many are dead, a few are living, and countless hosts are yet unborn". The paper presents the indigenous knowledge movement as an appropriate way to respond to climate change and to other global and external impacts. While Africa stands to gain form global science and international best practices, indigenous knowledge offers a model for rethinking and redirecting the development process, and for enlisting positive traditional values and institutions in a way that enables and empowers local actors to take part in their own development. Development agents, researchers and donors, who often assume a knowledge or capacity vacuum in Africa, should instead try to tap into the vital resource of indigenous knowledge for locally appropriate ways of forecasting weather systems, traditional techniques of soil management, pest and disease control, adopting suitable crop and animal varieties, and so on.

The Political Economy of Incumbency: Fossil Fuel Subsidies in Global and Historical Context

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This paper situates the contemporary policy and academic debate about the politics of fossil fuel subsidies and their reform within a wider historical and material context. Fossil fuel subsidy reform represents a prerequisite for any serious attempt to dismantle the fossil fuel economy and accelerate what is being referred to openly as an 'energy revolution' or more specifically as a 'clean energy revolution'. Yet it is ultimately just one of a series of political moves and interventions in a hotly contested political terrain over energy futures; a space dominated by some of the most powerful governments and corporations in the world, but increasingly also occupied by new social movements. Understanding this terrain and locating fossil fuel subsidy reform's place in the broader politics of decarbonisation helps provide a clearer sense of the challenges that face reform initiatives. It can also highlight where such initiatives might thrive and ride on the back of other waves of reform eroding the bedrock of fossil fuel power that has held such sway over the global economy over the last century. This requires an understanding of the politics and political

economy of energy transitions, because fossil fuel subsidy reform is seen as a key lever to accelerate a transition to a low-carbon economy. But reforms to subsidy regimes also touch upon the deeper politics of transformations to sustainability, since energy use is so closely tied to all other aspects of sustainability such as food, water, housing and transportation. This has been brought to the fore by the 2015 Sustainable Development Goals, which demand simultaneous action on land, food, agriculture, water and energy – domains where questions of access, security and sustainability give rise to political trade-offs among competing demands and pathways. Because of these connections, the decisions on which forms of energy production and consumption are supported and subsidised, or transitioned away from, have wide-reaching and highly uneven implications for the economy and society as a whole. It is, therefore, unsurprising that the politics of fossil fuel subsidy reform serve as a lightning rod for the expression of a wide range of social concerns and economic interests.

Spotting the Climate Finance Free Riders

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Because many nations had little impact on the problem, face greater risks and lack the resources to confront them effectively, international climate finance is at the core of any effective and equitable responses to the global problem of climate change. Reaching the 2°C or 1.5°C targets demands aggressive mitigation efforts in rich countries and even stronger actions in emerging and developing nations. These are places where the financial resources available to slash fast-growing emissions are most constrained and where the costs to adapt to climate change will likely amount to billions of dollars annually for decades to come. Ambitious participation by all nations in global agreements requires broadly-held perceptions of equitable action by co-participants. Strong commitments to help developing countries address climate change are therefore fundamental to keeping global temperatures below 2°C or 1.5°C. Financial promises have been repeatedly made in joint declarations by developed countries – such as the US$100 billion mobilisation goal by 2020 stated in Copenhagen in 2009 and confirmed several times since then. However, no formula for sharing this burden has ever been formally decided. This lack of burden sharing arrangements presents the real danger of free-riding, eventually risking missing climate finance pledges, and impeding mitigation and adaptation action in developing countries. This article quantifies the scale of current free-riding behaviours of developed countries in climate finance provision by comparing the most recent available climate finance data with a range of indicators of equitable approaches to solving the climate problem. Assessing the scale of free-riding of some countries appears to be very sensitive to the choice of indicators, but some countries appear as free-riders under all indicators we considered. Taking into account the climate finance reported by developed countries over the period 2011-2014, we found that Japan has provided an average surplus, while the United States, Australia, Canada and Greece appear as significant free-riders. We conclude by examining how a more transparent accounting system for international climate finance is absolutely fundamental for an external review process to assess conformity of climate finance contributions against equity criteria. This is particularly important because the Paris Agreement strongly relies on civil society and peer-pressure to drive ambition on climate finance.

Designing a Global Mechanism for Intergovernmental Biodiversity Financing

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In order to safeguard human survival on the planet through conservation and sustainable use of biological diversity, the Convention on Biological Diversity (CBD) aims at institutionalizing benefit sharing and appropriate funding mechanisms. While the convention recognizes national sovereignty as a governing principle, it also affirms that the conservation of biodiversity is a “common concern of humankind”. However, most of the 20 associated Aichi target indicators show some but insufficient progress to reach the targets by 2020. One of the main causes of insufficient progress is

inadequate financing. Most conservation spending in developed countries comes from domestic sources while developing countries mainly rely on inter- and transnational biodiversity financing. The lack of overall progress towards the Aichi targets thus calls for additional action and innovative financial mechanisms. Regarding financial instruments, access and benefit sharing (ABS) mechanisms have been specified in the Nagoya Protocol. Article 10 of the Nagoya Protocol states that a global multilateral ABS mechanism shall be considered by the parties 'to support the conservation of biological diversity'. These mechanisms are meant to facilitate 'fair and equitable sharing of benefits' that originate from the utilization of genetic resources and 'appropriate funding'. The ABS mechanisms are therefore expected to create economic incentives for biodiversity conservation but no direct (financial) obligations arise from the formulation of the article and a corresponding mechanism design has not yet been developed. In this paper we develop and assess three design options for a global scale financial mechanism to support biodiversity conservation through intergovernmental transfers. We called the design options: ecocentric, socio-ecological and anthropocentric. We analyze the corresponding incentives to reach the Aichi target of terrestrial protected area coverage by 2020 for each design option. Results show that the socio-ecological policy design provides the strongest incentives for states with the largest distance to the Aichi target. The proposed mechanism is thus well aligned with the current regime complex for biodiversity protection. As such it fills a gap on how intergovernmental ABS mechanisms can be implemented and provides an innovative contribution to the current debates. We would expect that our mechanism design proposal serves as a starting point for a more specific science-policy dialogue on benefit and burden sharing of biodiversity conservation among the CBD, the Intergovernmental Platform on Biodiversity and Ecosystem Services, and the broader community.

Including Persons with Disabilities in Earth System Governance

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Because they face disparate access to education, employment, healthcare, transportation, and basic goods and services, persons with disabilities have been and are likely to be disproportionately affected by the health and social impacts of environmental degradation. However, the recognition and protection of disability rights in the context of environmental governance has attracted little attention from policy-makers, activists, and scholars. Despite the importance of addressing the particular challenges faced by disabled persons, they remain largely invisible in planning and programs for responding to environmental hazards and natural disasters. The needs and perspectives of persons with disabilities have also tended to be excluded from efforts to promote sustainability in affluent societies, including, for instance, in the development of mass transit, energy efficiency measures, or ecological homes. The resulting inaccessibility of these measures have undercut their effectiveness and exacerbated social inequities. This paper aims to fill this critical gap in scholarly knowledge and policy thinking by developing a disability rights approach to earth system governance. Enshrined in the UN Convention on the Rights of Persons with Disabilities, a disability rights approach conceives of disability as resulting not from the impairments of individuals, but from the way societies are organized. It moreover emphasizes that persons with disabilities are entitled to legal protection against discrimination as well as to measures that can achieve substantive equality with non-disabled persons. This paper will proceed in three parts. First, it will present key perspectives and issues in the field of disability studies and how they intersect with the key debates in the field of environmental governance. Second, it will review a growing literature in disability studies that explores whether and to what extent efforts to address environmental issues and problems have included persons with disabilities, considered their perspectives, and met their needs. Third, it will outline how a disability rights approach might be integrated into earth system governance. In doing so, it will consider whether and how transitions to a low-carbon and climate resilient world can fully respect the rights of persons with disabilities, promote participation and accessibility, eliminate discrimination, and address the physical, economic, institutional, and social barriers that hinder the full enjoyment of rights by disabled persons. Ultimately, this paper seeks to generate new knowledge regarding the opportunities and challenges of recognizing and protecting disability rights in earth system governance and the ways that this may strengthen the effectiveness and equity of environmental policies and institutions.

Gender in Development Discourses of Civil Society Organizations Engaged in Mekong Hydropower Development Deliberations

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Gender in development discourses matter because they are used to justify interventions or opposition to projects and policies; they may also influence perceptions, practices, or key decisions. Four discursive threads are globally prominent: livelihoods and poverty; natural resources and the environment; rights-based; and, managerial. In the specific case of large-scale hydropower development, Civil Society Organizations (CSOs) have been vocal in raising awareness about the adverse impacts on the environment, local livelihoods, and vulnerable groups, including women. CSOs depend on discursive legitimacy for influence. This study examines how CSOs engaging in hydropower debates in the Mekong Region frame and use gender in development discourses, and their implications for the empowerment of women and men. This is done through examining in detail the content of documents (n=263) authored by CSOs, media reports on their activities, interview transcripts (n=32), and images (n=409) for how they represent gender. The findings underline differences in framing and strategies of CSOs with different orientations towards development, gender, and the environment, as well as positions with respect to the state and dam-affected communities. The way men and women are represented in images, for example, differs by CSO orientation. Feminist CSOs depict women actively interacting with other men and women more than other CSO types; knowledge-based and communitarian CSOs were more likely to show women in passive than active roles. Images used by feminist and communitarian CSOs were more likely to show women expressing stronger emotional states than environmentalist or knowledge-based CSOs. As might be expected CSOs with different orientations were more or less likely to use particular gender in development discourses. Thus, rights-based discourses are most common for feminist CSOs, whereas managerial discourses often come from knowledge-based organizations. All emerging discourses have merits and limitations, for example: managerial discourses depoliticize struggles to control resources and distribution of benefits, making it more likely that existing power relations go unchallenged; rights-based arguments are often hard to translate into practices on the ground. CSOs engaged with hydropower development in the Mekong Region, by talking about gender and dam-affected peoples in certain ways, help normalize ideas about the roles of women and men. These findings are of practical value to reflexive CSOs, as they show ways language and framings may enhance or inadvertently work against efforts to empower women and men.

An Equitable Regime? How the UNFCCC Paris Agreement and its NDCs Innovate the Differentiation of Countries' Responsibilities to Address Climate Change

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One of the biggest challenges of the UN climate regime is the differentiation of countries' responsibilities in addressing the common problem of climate change. After years of stagnation in the negotiations, where countries held on to the rigid dichotomous differentiation between industrialised and developing countries, the Paris Agreement made great progress in moving beyond this dichotomy. We argue that this was possible because of the Paris Agreement's 'subtle differentiation' towards specific subsets of countries (e.g. Least Developed Countries) on certain issues (e.g. adaptation and finance) and procedures (e.g. timelines and reporting). This paper analyses whether subtle differentiation is mirrored by the self-differentiation countries undertook during the bottom-up formulation of their 'Nationally Determined Contributions' (NDCs). For that purpose, we analysed all 165 NDCs. These climate action plans were key to reaching the Paris Agreement and will be instrumental in implementing it. We demonstrate that subtle differentiation is indeed mirrored by self-differentiation in the fields of mitigation and adaptation, demonstrating the strength of the Paris Agreement. However, on finance, technology transfer and capacity building, Least Developed Countries and Small Island Developing States in particular often make their NDC conditional upon receiving finance, whereas developed

countries do not describe their provision of means of implementation. Here, the Paris Agreement's subtle differentiation is not mirrored by self-differentiation in NDCs. This is likely to become a major issue for the UN climate regime in the lead up to 2020 when countries have to submit their second and more ambitious NDC.

What Do We Mean When We Talk About Justice? An Analysis of the Narratives of Planetary Justice Used in Environmental Governance Research

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The study of planetary justice is an emerging research field that explores questions of justice on a planetary scale, particularly in the context of the profound environmental changes and challenges our earth system is now facing. The connection between environmental conditions, human well-being and justice and equity has been established over the past decades both through academic research as well as advocacy and campaigning. However, despite the growing attention and priority of this concept, divergences exist between what is meant by 'justice' by different actors in every arena, including academia. This article explores what concepts of justice are present in the academic discourses on planetary justice, how this has changed over time, and what are the patterns or contradictions. It uses a new research framework developed by Biermann and Kalfagianni (forthcoming) for analyzing planetary justice, and contributes to this emerging research agenda by exploring what concepts, principles and mechanisms of justice emerge from the academic discourses. The paper uses a discourse analysis method to analyse over 100 articles from four key journals (Global Environmental Change, Global Environmental Politics, Ecological Economics, and over ten years to understand the changing narrative over recent years. Initial conclusions find that empirical applications of concepts of justice have changed over the past years, while the number of articles present have not consistently increased or decreased over time. In addition, conclusions can be draw about what concepts of justice are underpinning the philosophical foundation, the subjects and the mechanisms or application of the concept of justice can be found in recent research.

Justice vs. Equity in Global Environmental Governance

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The issues of ‘justice’ and ‘equity’ have been high on the global political agenda for sustainable development since the 1992 ‘Earth Summit’. Both concepts find their roots in the wake of criticism of mainstream environmentalism, but emerge through distinctively different socio-political processes. The terms now appear in numerous texts, agreements and policy documents, and have largely been studied by different scholars. The rationale behind their use, however, has received little attention so far. This paper compares the use of justice and equity for a number of selected key policy documents (Aichi targets, CBD Strategic Plan, UNFCCC Paris Agreements, etc.) and related declarations made in their wake, using both content/discourse analysis and semi-directed interviews with key stakeholders. It asks why ‘equity’ appears to have become the preferred term in official environmental treaties and declarations, whereas the use of ‘environmental justice’ has surged in the academic literature and with grassroots movements. The paper shows that, despite the proliferation of equity-related rhetoric in global environmental governance, a ‘justice gap’ clearly persists. The environmental justice issues which motivate the claims of the poor and cultural minorities and inspire growing social movements appear strikingly dissimilar to the forms of equity promoted as part of the strategies and programs adopted to implement global environmental and developmental goals. We maintain that differences between environmental justice and equity are therefore not simply questions of semantics or philosophy but must be viewed as political processes with profound impacts for the nature, impacts and success of development and environmental policies. We contend that the justice gap persists not simply due to deficiencies in implementation of equity as an international policy objective, but due to the negotiation of equity and/or justice-related norms between various actors in a range of forums at various scales.

The Political Economy of Ecosystem Services in Argentina: Actors, Agendas, and Interests

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Latin America has been at the forefront of efforts to value nature and incentivise conservation, beginning with early experiments in "payment for ecosystem services" in Costa Rica, as well as REDD+ projects throughout the region, and most recently the Yasuni oil initiative in Ecuador. In contrast to the innovation and experimentation by its regional neighbours, Argentina stands out as a country that has resisted the concept of ecosystem services. While parts of the Argentine academic and civil society communities have engaged with this concept, it has failed to find political traction. The case of Argentina is important because it reveals limitations of the concept of ecosystem services, and the challenges of reconciling nature´s value with commodity-centric economic development models. Argentina is the second largest country in Latin America, with a high level of biodiversity. Industrial agriculture drives deforestation, which in turn degrades the environment and threatens the cultures and livelihoods of indigenous people and traditional small-scale farmers. It is precisely the type of context where advances in ecological governance are essential. In this paper we analyse the diffusion of the ecosystem services concept from the international to the local sphere, and examine why it has failed to institutionalise. We draw on elite and expert interviews, and fieldwork in three sites reflecting important economic activities: mining, forestry, and agriculture. Our analysis reveals three pillars of resistance, which impede the institutionalization of this concept in Argentina. One pillar of resistance emerges from the agricultural sector, which is threatened by environmental exercises that question the rationality of intensive commodity production. A second pillar of resistance arises from the complexity of the ecosystem services concept; this complexity is scientifically justified but does not translate easily into the political realm. A third source of resistance emerges from the historical marginalisation of environmental issues in Argentina. We reflect on the implications of this case for wider efforts to promote sustainable development through the valuation of nature.

The Practices of Multilateral Climate Governance: Blunting the Politically Contested Edge of Equity?

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Equity remains a deeply contested concept in multilateral climate politics, with academic debate and geopolitical conflict alike focusing on diverse ways of conceptualizing the principle of "common but differentiated responsibilities and respective capabilities" (CBDR-RC) of industrialized and developing countries in combating climate change. Much scholarly debate has focused over the years on parsing out distinct meanings and typologies of justice/equity or advancing specific normative ideals that *could or should* underpin the pursuit and realization of climate justice and equity. Our interest here is rather on scrutinizing *equity-in-practice*, i.e. how equity is being *operationalized within the evolving practices* of multilateral climate governance. Specifically, our analysis traces how the two component elements of equity embodied in the CBDR-RC principle ('common but differentiated responsibilities' and 'respective capabilities') are being operationalized within the obligations and institutional arrangements relating to specific pillars of multilateral climate governance, including mitigation, adaptation, and transparency. We are interested in how 'responsibility' and 'capabilities' are being operationalized over time, and on how, if at all, they are related to each other. Based on our analysis, we argue that the focus of equity within multilateral climate governance is shifting away from the "responsibility" component of CBDR-RC to the "capabilities" component (with capabilities reduced to a narrower notion of capacity building). As one illustration, the Paris Agreement's call for an enhanced transparency framework applicable to all reflects a shift away from a focus on the differentiated 'responsibility' component of CBDR-RC to a focus almost exclusively on the capabilities component. Much attention is now devoted to negotiating and operationalizing the notion of "flexibility" as the remaining linchpin of differentiation but *flexibility based on differing capacities* to participate in an enhanced transparency framework applicable to all. As such, equity-in-practice is increasingly coming to be equated with redressing differing capabilities (and more narrowly) capacities rather than with multilateral engagement with the notion of historical responsibilities, with such a shift discernible not only within the transparency

pillar but also within mitigation and adaptation. As such, we argue that the *politically contested edge of equity is being blunted* in practice within multilateral climate governance. We conclude with discussing the implications of such a shift, including for UN-led multilateralism to (still) deliver on climate justice and equity as a central tenet in the pursuit of sustainable development.

Planetary Justice: What Can We Learn from Ethics and Political Philosophy?

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Within the Earth System Governance scholarly community, the idea of planetary justice is mainly discussed by scholars specialised in non-normative work. This has consequences for the kind of questions that are asked, and also, possibly at a more implicit level, of what the legitimate tasks and boundaries of scholarship are. However, if one looks at the question of planetary justice from the disciplines of ethics and political and environmental philosophy, a whole different set of questions pops up, as well as answers to the questions which contributions scholars could make in the further development of the field of planetary justice. This paper will analyse and clarify how normative disciplines and non-normative disciplines differ in how they approach 'planetary justice', and provide a taxonomy of different types of questions one could address in this field. The second part of the paper draws on the philosophical literatures on theories of distributive justice, climate justice, and environmental ethics, to distill what the earth system governance agenda on planetary justice could use from those literatures. The presented analysis will primarily draw on the (dominant) 'analytical' literatures on distributive justice, climate justice and environmental ethics, but will also draw on "non-western" philosophies who are providing important correctives to some blind spots and biases in the dominent western/analytical tradition.

Transnational Adaptation Governance: Designing an Institutional Setting to Deal with Climate Change Impacts Across Borders

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Adaptation is a social process and cross-scale linkages are commonly seen as important in social processes. Yet the dynamic nature of linkages between levels of governance in adaptation is not well understood. This paper will analyse inter-relationships between existing and new public and private actors in the context of transnational adaptation governance. Transnational adaptation initiatives and partnerships are emerging and non-state actors are increasingly governing adaption to climate change impacts across borders and at the global level. Adaptation is being governed across borders in multiple socio-economic sectors, including water, agriculture, insurance, bio-diversity, disaster risk reduction and at multiple levels. A recent study found that, transnational adaptation initiatives do, however, not target environmental or sustainability indicators directly but often focus on softer governance functions, such as capacity building and information sharing. Given that the initiatives are often relatively small in scale and reach, their main impact may be found in how they contribute to these broad processes of transformation rather than their individual effects. This paper will build on these findings and explore the emergence of an institutional setting where adaptation is governed transnationally across several issue areas. More specifically, through institutional diagnostics, it sets out to investigate how problem formulation, politics, actors and practices are characterising the governance of adaptation across different socio-economic sectors. The scope of the paper focuses on three broad areas: supply chains, insurance and adaptation technologies. The comparative analysis will focus on the socio-economic and political interests that shape the rationale for the emergence of new actors in adaptation governance. The goal is to identify features or elements in these three issue areas that are best suited to address specific situations calling for the development of governance systems. The objective of the paper is to work out the contents of governance systems needed to solve the

problem of adapting to impacts of climate change across borders. The paper argues that more attention should be given to these transnational processes as it is becoming increasingly evident that climate impacts are borderless.

Planetary Just Transitions? Towards a Systematic Analysis

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In response to the multiple environmental crises confronting our world a wide variety of actors – from environmentalists to militaries – call for planetary green/sustainability transitions. A common thread running through many of these proposals is the downgrading of social and ecological justice, often in the name of urgency and effectiveness. Throughout all proposals, however, run preferences about justice, manifested in who, what and how needs to be prioritized during these green transitions. The concept of Just Transition emerged in recognition that green transitions must also be just. Over the three decades since its inception in the USA and Canada it has now become a global and thus increasingly contested global narrative. The purpose of our contribution is to provide an analytical scheme that will allow us to interpret, compare and evaluate different JT proposals and narratives. In the first part we will outline the genealogy and what we consider to be the general parameters of Just Transitions. In the second part we clarify the two dimensions of our analytical scheme. The first dimension differentiates approaches to justice and injustice on the basis of social and environmental standing (depth). We will argue here that ecological approaches to justice move us in the right direction, provided that we are aware of their variability. The second dimension focuses on the scale and scope of justice (breadth). We suggest that, in the relative absence of authoritative global governance, we need to pay closer attention to the central role of policy or governance chains (not the same as networks or diffusion) that are at the heart of global, uneven and combined, integration. These two dimensions are brought together on the hypothesis that practices of justice at one scale may, in fact, produce injustice at another scale. An important challenge for planetary justice, therefore, is the crafting of policies that lead to upward rather than downward harmonization (upgrading). In the third part we will illustrate our analytical scheme by briefly applying it to two general approaches to JT – one from the world of global labour (International Trade Union Confederation and ILO) and the other from the world of the global environmental movement (Friends of the Earth and Greenpeace).

Governance in Telecoupled Land Systems: the Case of Thilawa Special Economic Zone, Myanmar

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The emerging lens of telecoupled social-ecological systems offers new opportunities for social scientists to refine the analysis of interdependencies among actors in networks that cross established boundaries of social-ecological systems (e.g. interregional commodity trade and investment flows). Changing interdependencies among local and distant actors give rise to changing governance needs and entice novel governance responses in an increasingly networked world. However, debates about networked or polycentric governance and telecoupled land systems remain largely disconnected despite a need to understand performance and change of governance in telecoupled systems. As a consequence, it remains unclear what kind of governance responses are suited to address what kind of sustainability problems in telecoupled systems. This paper is guided by two objectives. Methodologically and theoretically, it shows opportunities and challenges of using the networks of action situations (NAS) approach rooted in institutional analysis to investigate governance in telecoupled systems. Empirically, the paper presents a case study that analyzes the polycentric governance in a telecoupled system in Myanmar. It assesses how governance interactions triggered telecoupled sustainability problems manifested as adverse livelihood and environmental outcomes in concrete places. Further, it locates the action situations, in which actors transformed some of those sustainability problems. We chose the Thilawa Special Economic Zone in Myanmar as a representative case for this purpose. Data were collected in three field missions between 2016 and 2018. We analyse the data by process tracing and qualitative content analysis.

Tentative results show that, first, the NAS approach is a suitable methodological tool to identify networked spaces of decision-making in telecoupled systems and their critical roles in shaping sustainability outcomes. However, we need to advance common standards in the scientific community for drawing analytical boundaries of action situations and the linkages in between them. Second, problems of livelihoods and resource access in the early phase of the Special Economic Zone can be attributed to a lack of linkages between distant action situations and local social-ecological contexts. Subsequently, community resistance in local and distant action situations lead to the creation of new governance spaces, which contributed to transform some of those sustainability problems. We conclude with discussing conditions under which polycentric governance systems actually do and do not support the sustainability of telecoupled social-ecological systems.

The Role of Equity in a Green Keynesianism

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Green Keynesianism emerged as a popular discourse following the Global Financial Crisis (GFC). The basic premise of Green Keynesianism is that government intervention in the economy through public policies is required to achieve full employment and environmental sustainability. The existing literature on Green Keynesianism largely consists of: broad evaluations of government spending post-GFC; assessments of individual green fiscal stimulus measures (e.g. calculating the greenhouse gas emission reductions achieved by a particular program); and critiques of Green Keynesianism, typically focused on the unsustainability of economic growth. Some authors have responded to the growth critique by arguing that the Green Keynesian project should be seen as transitional. In other words, while public investment may stimulate growth in the short term, it does not have to be a long-term goal. This paper argues that one key element missing from debates about Green Keynesianism is equity. It suggests that proponents of Green Keynesianism should embrace the notion of a Just Transition, which links ecological sustainability with issues of work, and social justice. At the core of the concept is the notion of equity: no individual or community should bear a disproportionate burden of the costs associated with shifting to a more environmentally sustainable economy. Instead, the costs should be fairly distributed across society. A Green and Just Keynesian Transition recognises the needs of both current and future generations for safe, secure and satisfying jobs and the central role that government must play in the process.

Reconceptualizing Planetary Equity through the ILO's Just Transition Agenda

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Planetary justice through just allocation of benefits and harms to stakeholders is at the heart of global environmental governance. One significant move taken by the International Labour Organization (ILO) is the adoption of the Just Transition Agenda in 2015. Its significance lies in the fact that it forms part of a greater strategy by the ILO to embed values of justice and equity within its environmental framework that includes the Sustainable Development Agenda (1988) and the Green Jobs Agenda (2008). The Just Transition Agenda promises to do so through the protection of vulnerable workers affected by a transition from a brown to a green economy. The future prescribed by a just transition is marked by better allocation of harms and benefits to all stakeholders including labor, the planet and society. The other significance of the Just Transition agenda is the projection of values and influence of the ILO onto global environmental governance. Problematic to this influence are the contestations surrounding the conceptions of what is ‘just’ in a just transition. These contestations are evident in ILO negotiations prior to the adoption of the Just Transition Agenda in 2015. What were the arguments raised by the proponents and opposition groups when invoking the term? Did their arguments and claims focus on economic, environmental, socio-political priorities or a combination of these? This research basically asks: How was the ILO’s approach to a just transition or planetary justice shaped given its tripartite nature and internal/external contestations and influences? To understand the political processes involved and

the narrative behind the production and use of the term, analysis of the ILO documents from the ILO Office, the Governing Body and the International Labour Conference is being undertaken. To corroborate the findings from these documents, interviews with ILO officials are scheduled to take place in the near future.

Thinking through the Planetary

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In this paper, our aim—as an historian working with a political scientist— is to both attempt to think through the short history of the planetary as an idea, and to contemplate the significance of thinking through the idea of the planetary. We can find the adjective *planetary* in institutional use since at least the mid-twentieth century as a means of designating a specific political perspective on the global challenges of inequality, the environment, and even conflict resolution. More recently, *planetary* has begun to enter scholarly and political discourses in the context of growing awareness of the transformations of life support systems, as a conceptual tool to imagine subsequent challenges and appropriate ways to (re)act. In these contexts, the adjective *planetary* implicitly or explicitly stands in line with the adjective *global* and is intended to go beyond the imaginary worlds that the latter adjective has allowed us to think in, and of. In the first quarter of the twenty-first century, the adjective *planetary* serves a similar purpose to the adjective *global* at the beginning of the 1990s, that is, to open the way for an intellectual paradigm shift. As we will discuss, the planetary has had a life in other *international* and *global* contexts, even though, at this time, its appearance is meant to signify a more substantial shift, as a way of thinking that takes us beyond the *international*, and the *global*. What difference does thinking through the *planetary*, rather than the *international* or *global,* make? This paper approaches this question through an original contribution to a historical genealogy of the idea *planetary,* and reflecting on the premise that a paradigm shift to 'planetary thinking' is essential for developing theories and practices of justice and designing governance institutions that are adequate for human existence within 'planetary boundaries'. It investigates where such a paradigm shift might be occurring, with what possibilities, for what kind of (human) future. It does this by providing a genealogy of the webs of meanings associated with the adjective *planetary* as it has been used in political and scholarly discourses over the past 70 years.

Hidden Figures in Transnational Environmental Governance and the Micro-politics of Brazil's Green Economy: The Soy Moratorium

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Between 2005 and 2014, deforestation in the Brazilian Amazon declined by 70%, decreasing the country's contributions to global greenhouse gas emissions from 6.2% to 2.9% for the 2004-2012 period. While no doubt encouraging, this trend is not assured and all the factors responsible for this reduction have yet to be scrutinized. Besides state-led policies, market-based solutions have also taken place. These have become prominent modes of environmental action within the so-called "green economy." At a micro-level, capital, and civil society have sought to increase eco-efficiencies through transnational environmental initiatives such as strategic partnerships and supply-chain management. While helping economies, industries, and corporations to internalize environmental concerns, these initiatives are not socially, politically, or environmentally neutral, but reflect broader asymmetries of power within the hegemonic sustainable development project. Accordingly, this paper analyzes the micro-politics of Brazil's green economy within the context of global awareness against deforestation and growing demand for commodities like soy and beef, as well as plans for infrastructure development in the Amazon. It focuses specifically on the implementation of the Soy Moratorium in which participating buyers committed not to buy from farmers who grew soy on land cleared after 26 July 2006. This agreement was the result of a Greenpeace consumer pressure and naming and shaming campaign against the Brazilian Amazon soy industry, and joins farmers, the soy industry, NGOs and the government. In 2008, it was renewed with the support of Brazil's national government and, until May 2016 it was renewed annually. Since then, it is valid for an

indeterminate period. We analyze the Soy Moratorium as an instance of transnational environmental governance, specifically, non-state market-driven governance. We aim at identifying the main actors and institutional arrangements that were set, but also the conflicts and socio-environmental impacts. Through a literature review, analysis of documents and interviews with key actors, we make descriptive inferences to show that while this initiative produced environmental goods, it overlooked other impacts, and empowered certain voices in their design and implementation. Thus, we analyze what this case says about the "hidden figures" of global environmental politics - the actors, institutions, solutions, and socio-environmental costs that are concealed from view, or marginalized altogether, in the struggles for a more sustainable world. We argue that local case analysis can provide fruitful insights into the "contested terrain" of global environmental governance.

The Politics of Payments for Environmental Services: Who benefits? Who loses? A Case Study from Vietnam

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Payments for Ecosystem Services (PES) has emerged as a prominent policy over the past decade with the push for market-based instrument in expectation that ecosystem loss can be addressed effectively and efficiently. The core idea of PES is that land users can be encouraged to adopt environmentally-sound land use practices that secure ecosystem conservation and/or restoration through direct economic incentives from ES beneficiaries. PES schemes are considered to be novel institutional arrangements that compensate producers of positive externalities. Most studies on the effectiveness of PES have focused on assessing the local environmental and social outcomes, and the evidence demonstrate mixed impacts. However, the essential questions of how PES decision making is made, how power structures shape and are shaped by PES, and who actually benefits or loses from PES deserve equal attention. We argue that there is still only superficial understanding of the roles of culture, agency and power relations in the shaping of PES institutions and their outcomes. We use a political ecology lens to examine the underlying politics of the Payment for Forest Ecosystem Services (PFES) policy instrument in Vietnam. In particular, we looked at the process of institutional design, the changing power structures over time, the selective enforcement of laws, and how benefits and responsibilities are being transferred and shifted along the different components and levels of PFES. Our findings suggest that PFES is a "political program" that is designed, framed and aligned with the interests of the State to advance their own goals and reinforce power structures over forests and land. Although the formal target beneficiaries of PFES are the 25 million forest dependent people in Vietnam, the larger proportion of PFES benefits mainly go to the state agencies. However, there are also divergent interests and beliefs for PFES and in this political-institutional process, PFES has enabled a new space for, and the agency to struggle over rights and benefits.

Rethinking Justice in Global Biodiversity Governance: Signs, Constraints and Opportunities

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In order to transform global biodiversity governance, multilateral institutions need to develop a capability to rethink what core values - such as justice, conservation and sustainable development – mean for their policies and practices under a rapidly changing Earth system. But how well equipped is the UN Convention on Biological Diversity (CBD) to cultivate such a capability? While existing research and policy debate on the CBD has addressed aspects of justice for Indigenous peoples and local communities or for the global South (particularly in relation to equitable access and benefit-sharing), very little has explored broader dimensions of biodiversity justice, including the ramifications of biodiversity loss for global justice, and justice as it relates to non-humans, including animals and ecosystems.

I begin by setting out an analytical framework that differentiates three key discourses - justice, equity and rights – drawing on research on environmental justice and international environmental law. I then compare the prevalence of these three discourses across the CBD and the United Nations Framework Convention on Climate Change, based on documentary analysis of recent Conferences of the Parties to each convention. I find that explicit references to equity and rights in the CBD are far more common than references to justice in the CBD, and to all three discourses in the UNFCCC. Appeals to justice in the CBD are quite limited when compared with appeals to justice in the UNFCCC. I then present findings from interviews with CBD stakeholders to explain what constrains the CBD's ability to rethink norms of justice. Key explanations include: the lack of explicit references to justice in the text of the CBD; the presence of competing discourses such as economic valuation of ecosystem services, which may sit uneasily with the idea of allocation according to principles of justice; and limited representation in negotiations of those most vulnerable to injustice.

Equity in the Utilization of Transboundary Marine Living Resources: An International Legal Review

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Transboundary fisheries are facing multiple serious problems. Very important among these is the problem of overfishing, resulting in the decline and eventually the disappearance of fish stocks. This problem has multiple complex causes among which, ineffective and arguably inequitable transboundary management regimes and in particular allocation decisions. This crisis touches upon the entire international community. However, the consequences of declining fisheries resources will, in all probability, be more severe for developing coastal states and small islands developing states (SIDS) do to their vulnerable international position and direct dependence on the resource for their livelihood and food-security. This crisis requires a fair distribution of a desperately needed conservation-burden among states, and take into account their different international positions, interests and responsibilities. In particular, decisions on allocation, which are responsible for distribution of burdens and benefits among participants of the fisheries, should be reviewed from the perspective of equity. Therefore, it is relevant to consider whether equity, as a legal concept, is part of the law that governs the utilization of transboudary marine living resources, as a mean to guide the allocation of both benefits and burdens of transboundary fisheries. Further elaboration of the concept of equity, as part of the legal framework for allocating the conservation burden among states, could be significant for obtaining conservation and sustainably in managing fisheries resources. Therefore, it is worthy to subject this framework to further investigation. Accordingly, this paper analyses the concept of equity in international law, and its existing/non-existing role in the legal framework for the utilization of transboundary living marine resources. Equity, in this context, will be most probably understood as a form of distributive justice, balancing the rights and interests of coastal developing states and SIDS versus distant water fishing nations (DWFNs). Attention will be paid to the role of equity in international law, in particular, its emergence and function as distributive justice. The legal framework of the utilization of transboundary marine living resources, starting with the Law of the Sea Convention (UNCLOS), and whether equity, as distributive justice, is part, and influential, within this framework. This study is meant to serve as a basis for following articles which can further discuss the elaboration of a normative framework of equity for decisions on the allocation of transboundary fisheries.

What Future for Primates? Conservation Struggles and Multi-level Governance for REDD+ in Cross River State, Nigeria

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In December 2015, the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) in Paris highlighted once more that reducing deforestation and forest degradation is of global importance. Forests and forest fauna are increasingly under threat worldwide in many places, due to increasing exploitation of

forest resources, habitat loss and overhunting. Human activities directly affecting forests have received growing attention at the UNFCCC, particularly in terms of deforestation (e.g. clear cutting) and degradation (e.g., selective logging). However, with defaunation, a third "de", has to a great extent been overlooked. Human-induced faunal loss does not only reduce tree species diversity, but also significantly erodes key ecosystem services and functions and further disadvantages local communities. In this article we analyze these adverse impacts, and the associated multi-level governance gaps, through a case study of Nigeria's Cross River State and make suggestions for more encompassing conservation approaches that take defaunation into account. To this end, we analyze the interplay between current forest governance in Cross River State, the roadmap towards REDD+, biodiversity conservation and local hunting of wildlife. Methodologically we use Ostrom's social-ecological systems framework and apply a mixed-methods approach. We show how the current foci and gaps of international and domestic forest governance not only fail to address fauna loss in the state and the local community forest we studied, but also how they affect allocation and access of environmental benefits and burdens on the ground. Based on our analysis, we develop recommendations on how an equitable and locally appropriate distribution of the costs of forest conservation and the benefits from collectively owned forest resources could look like – both in Cross River State and beyond.

The Use and Implications of Justice framings in the Political Activities of Decentralized Renewable Energy Producers

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Community and co-operative decentralized renewable energy (DRE) producers are often promoted as key players in justice-oriented energy transitions. This is because DRE movements are assumed to increase local capacity, strengthen communities, and more equitably distribute resources, opportunities, and political power. As their market shares increase, DRE producers are becoming increasingly effective political actors. The traditional political privilege enjoyed by incumbent industries is indeed challenged by DRE actors as they gain capacity, and shift control over jobs, economic growth and energy supplies. DRE actors pursue policy outcomes that have a diverse range of justice dimensions (e.g., inclusion in energy policy decisions, redistribution of profits). However, there is limited empirical evidence regarding the presence and success of specific justice framings in formal energy transition policy contests, and the consequences of this for transition outcomes. This paper makes use of data and findings from 3 qualitative cases that were used to collect data on how and why DRE transitions are shifting political power relations, and the consequences of those shifts for political systems and outcomes (electricity policy in Canada; the Netherlands; the U.K.). This larger project uses a framework based on theories of power, institutions and transitions. In the paper presented here, I analyse interview, document, and policy process data from this larger project to determine the extent to which formal participants in energy policy arenas make use of procedural, recognitional, and distributive justice frames in their political arguments. Findings indicate that DRE interests focus on procedural and distributive justice arguments, while incumbent energy interests heavily emphasize only distributive justice outcomes. I have further integrated these findings with results from the larger project on the dominant energy-related political discourses employed by policy makers. This generates insight into the types of justice framings that dominate energy policy decisions in the target cases, and the extent to which different justice framings are reflected in government policy positions and decisions. The paper provides important empirical grounding for scholars and practitioners seeking to advance justice outcomes through energy transitions. Practically, the findings reveal the effectiveness of using specific framings to advance energy democracy through formal political activities in current political contexts. Thematically, the paper addresses earth system governance themes of Agency, but provides its primary contributions to the theme of Allocation, Access and Equity.

The Mathematics of Sustainable Development: Analysing the Cross-scale and Telecoupling Effects of China's Reforestation Program on Climate Change and Biodiversity

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Sustainable development goals have been identified and defined at a global scale, and are expected to be scaled to sub-global, national levels for their implementation. We investigate how sub-global implementation of sustainability policies – here reforestation programs in China implemented since the 1980s – contribute to achieving global goals of sustainability. Using a telecoupling approach, we first quantify economic, land use and land use change impacts on countries that have significantly increased their exports of agricultural and forestry goods to China since the reforestation programs started. We then use a qualitative approach to describe the deeply intertwined social, political, economic and ecological impacts of these programs within exporting countries. Next, we relate these cross-sectoral impacts to targets of the Sustainable Development Goals and evaluate how they influence each other – highlighting trade-offs and synergies between targets. Finally, we place these international SDG impacts back into the context of China's advances towards achieving SDG 15 – Life on land. Our findings support the saying that 'the whole is more than the sum of the parts'. Indeed, to understand global effects of achieving goals nationally, we cannot simply add-up national achievements on individual targets. We highlight that irrespective of a country's global importance in terms of its economy, land cover and population size, it could still theoretically achieve many national targets without bringing global sustainability any closer to global goals. Importantly, we illustrate context-specific interdependencies and tensions between SDG targets that are invisible at the global scale but may be of high importance to implementing effective sustainable development policies. In this way, we conclude that dividing-down global quotas and sustainability targets does not inform on how to implement or achieve sustainable outcomes at sub-global scales.

Governance for Future Generations: A Global Review of National Institutional Mechanisms to Protect the Interests of Future Generations

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Intergenerational equity, as a concept, is widely evoked in policy discourses on earth system governance. It is frequently mentioned in debates that range from climate governance to broader notions of sustainable development, and found in key texts from the United Nations Charter to the Brundtland Report to the Paris Agreement. Intergenerational equity is also widely seen as a key concept in the ethical discourse about climate change. And yet, very little research has taken place so far to understand how this concept is being implemented in political practice, and with what effects. Did countries follow these lofty discourses on intergenerational equity by actually creating institutional mechanisms at national level specifically designed to protect future generations? This is the key question that has motivated this research. Our paper presents the findings of a global study on the institutionalisation of notions of intergenerational equity in national political systems. Our research covers the political systems of all member states of the United Nations. It uses a unique analytical framework to first categorise examples of national governance mechanisms for the implementation of intergenerational equity with relation to climate change, and then analyse their effectiveness, focussing on four core mechanisms: the institutionalisation of ombudspersons and of special committees or councils for future generations; the inclusion of the protection of future generations in national constitutions; the protection of future generations through court decisions; and the use of youth representation mechanisms as proxy's for future generations. Overall, our global mapping of institutional mechanisms to protect the interests of future generations revealed 167 mechanisms across 134 countries. Based on this mapping, we analysed the effects of these 167 mechanisms, with a focus on the most long-lived, stable, and influential mechanisms. Overall, our analysis presents a new picture of the global progress of operationalization and implementation of intergenerational equity; offers important recommendations for improving the effectiveness of governance mechanisms to implement this concept; and lays the foundation upon which a new field of research could emerge.

Towards a theory on Access and Allocation in Earth System Governance

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This paper synthesizes the analysis in the previous papers, the answers to the research questions and the lessons learnt in access and allocation literature. It aims to develop a comprehensive theory on access and allocation. It argues that (a) there is clear evidence that inequality exacerbates environmental degradation. There is evidence that multi-dimensional inequality plays a key role in supporting unsustainable production, distribution and consumption patterns, leading to unsustainable lifestyles for some and unsustainable aspirations for others; that multi-dimensional inequality leads to reduced access to some basic services, land, water, and natural resources which exacerbates poverty, reduces adaptive capacity and endangers human health; that multi-dimensional inequality leads to marginalized people being forced into marginal habitats (e.g. migration to remote and peripheral areas, coastal lands, higher up the mountains, and peri urban areas), marginal and unhealthy labour situations (e.g. garbage separation, ship-breaking industry with impacts on coastal areas), making inappropriate choices (e.g. collecting wood for charcoal) and using inappropriate technologies (e.g. in fishing) which may also exacerbate human vulnerability and environmental health; and that multi-dimensional inequality exacerbates demographic trends (e.g. countries with high Gini coefficients have high population growth). (b) It argues that environmental degradation has impacts that affect both access and allocation of resources. Environmental pollution, loss of biodiversity and climate change distributes risks inequitably in terms of social, spatial and temporal aspects (e.g. climate change affects small island states, poorer countries, and poorer people generally; air pollution affects poor men in Britain; indoor air pollution affects women in poor countries). From an ecocentric perspective, cumulative human behavior is leading to the 6th extinction event, where the rights of nature and ecosystems are grossly ignored. (c) Policy failure on the environment may be related to the inability to account for equity. Policy approaches and implicit decisions ('non-decisions') are not neutral and can themselves have intended and unintended inequitable and environment unfriendly consequences.

Technology Adoption and the Provision of Shared Infrastructure in Irrigation Systems with Storage

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The world is filled with cases of complex systems in which resources are actively shared, managed, and used to support livelihoods of rural populations. Examples of such systems include irrigated agriculture, community forestry, and coastal fisheries. Many challenging problems we face in modern societies concern the provision of shared, physical infrastructures. Provision decisions may include participation in construction and maintenance of shared infrastructure (e.g., cleaning irrigation canals), reforestation, and use of nets with larger mesh to protect of fish populations. Often, provision decisions of individuals depend on the quality of cooperation in appropriation of the shared resource; and the quality of cooperation in appropriation of the resource depends on the level of provision in the SES. The link between the provision and appropriation often results in social dilemmas; situations in which each individual receives a higher payoff for a socially defecting choice (e.g. not cleaning irrigation canals) than for a socially cooperative choice, but all individuals are better off if everyone cooperates than if they all defect. Designing institutions for the provision of shared infrastructure in SESs is, therefore, a serious endeavor. However, how different types of production technologies affect feedbacks among resource systems, institutions, and human behavior are poorly understood. Tanks (or surface reservoirs), a type of production technology, were the single largest source of irrigation in South India in early 1970s. But, many tanks are now physically in serious disrepair (e.g. silted) and the social institutions managing the tank systems have collapsed. One factor which degraded the performance of tank systems is the privatization of access to water resources through well and pump-set irrigation. This raises serious equity concerns for farmers who do not have access to private wells. We develop a formal model to capture strategic interactions in provisioning shared infrastructure over time that focuses on tank irrigation systems in South India. The model examines how tank-users and private well-owners interact and co-evolve at the community level. We focus specifically on farmers' incentives to move from a public non-scalable production technology (tank) to a private scalable production technology (groundwater well). Understanding this shift in asset portfolio of resource users is important for understanding what kind of institutional rules will enhance the robustness of the social-ecological systems in a self-organized way.

Are Transnational Multi-stakeholder Initiatives Furthering Global Goals? Effectiveness and Equity in Governance by Goals

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Sustainability governance has lately seen two major trends. First, sustainable development is increasingly governed through international goal setting (Kanie and Biermann 2017), wherein a clear direction is set but how to meet the goals and targets are not prescribed. Second, sustainability governance is increasingly transnationalised, as the number and types actors implementing decisions diversify. Governments and international organizations increasingly recognize the (potential) contributions of non-state actors; not only by setting up registration platforms, but also by explicitly referring to them in political outcomes. SDG-17 is exclusively dedicated to partnerships as a means of implementing all the other goals, whereas the Paris Accord welcomes *'all non-Party stakeholders [including] civil society, the private sector, financial institutions, cities and other sub-national authorities'* (Art 134). The converging and related trends of 'governance by goals' and transnationalisation across global sustainability governance raises methodological and empirical questions. On the one hand, the goals need to be achieved, on the other hand, only some of these goals are related to justice, equity, and allocation issues. It is therefore necessary to juxtapose the foci of transnational initiatives that are registered by the UN in terms of what they want to achieve. Accordingly, this paper addresses the question 'are transnational initiatives effective and/or equitable in the context of governance by goals?' It suggests and applies a measure to assess output performance across large sets of transnational initiatives in sustainability and climate governance and compares these with the equity and allocation related goals. Effectiveness has always been central to environmental governance scholarship. However, contrary to formal international regimes transnational initiatives are characterized by voluntariness, which effectively rules out compliance as a measure. Using the Function-Output-Fit (FOF) framework (also see Pattberg et al 2012; Chan et al 2015, 2016; UNFCCC 2017) the paper aims to address this critical lacuna in literature. FOF entails an assessment of the consistency between outputs and functional goals, where 'outputs' are observable, tangible, and attributable products (Young 2011). This allows for comparing the actual outputs of initiatives that focus specifically on equity and allocation with the outputs of initiatives with no such goal. To conclude, I discuss FOF as a method in governance studies, particularly in the assessment of effects of transnationalization in the context of governance by goals.

Access and Allocation in Global Biodiversity Governance

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Concerns over access and allocation are at the core of struggles and conflicts brought about by the often ineluctable trade-offs related to the conservation of global biodiversity. These issues have gained importance since the 1980s, with the emergence of the 'sustainable use' paradigm and so-called 'rights-based conservation approaches' at local, national and international levels. Access and benefit-sharing mechanisms, integrated conservation and development projects, payments for ecosystem services, or community conservation programs have all tried balancing environmental objectives with concerns for the allocation of natural resources and associated rights within society, and for access to basic human needs. Yet, whilst global conservation goals have adopted increasing social dimensions, the conservation sector comprises states, donors and NGOs with control over considerable resources employing well-established practices and narratives, which may conceivably obstruct transformations and local aspirations in practice. Inconsistencies and tensions between governance systems across different scales raise additional challenges for ensuring that access and allocation is both equitable and effective. This paper reviews the literature on access and allocation in global biodiversity governance, produced between 2008 and 2018 through the Earth System Governance Project and elsewhere. It does so by addressing the following research questions: how have the concepts of access and allocation been conceptualized and defined in the earth system governance literature? How are these concepts related

to broader concerns for justice and equity, including gender justice, in the context of multi-scale biodiversity governance? Through which governance and institutional mechanisms have issues of access and allocation been most successfully addressed, and what opportunities and barriers exist to their diffusion? And what evidence exists on the links between access and allocation, and the effectiveness of governance in meeting conservation goals? By drawing on the trends and evidence from the literature, the paper considers the lessons for the next generation of earth system governance scholars and draws out some key policy implications to be included in the debates on the post-2020 Strategic Plan for Biodiversity.

Epistemological Underpinnings of Access and Allocation at Multiple Levels of Governance

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The epistemological roots of access and allocation lie in substantive and procedural notions of justice. The literature on these subjects is disparate and spread through multiple disciplinary fields and levels of governance and raise a range of different issues. This paper addresses the question: What does a decadal review of the relevant literature tell us about how to conceptualize and define access and allocation, what norms and principles underlie access and allocation and what public, private or hybrid instruments implement or influence access and allocation, whether and under what circumstances these principles can be reconciled with notions of governance effectiveness, and how do power, knowledge, and scale affect access and allocation? Furthermore, the paper explores how institutional architecture at multiple levels of governance shapes access and allocation either deliberately or implicitly, or as an unintended consequence of well-meaning policy? The paper draws out key trends and lessons from the literature, as well as highlights the key areas for further research and development.

Toward A Systemic Approach to Climate Adaptation Finance – Exploring the Role of Transboundary Climate Impacts and Climate-Induced Agricultural Risk Flows

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Climate adaptation finance is a critical piece of the climate policy architecture, particularly for developing countries who are highly vulnerable to direct climate risks. Yet, there is increasing recognition among the policy community that some climate risks are transboundary, and flow from one location to another, with some countries unwittingly "exporting" climate risks abroad, and others "importing" those risks. Using international flows of key agricultural commodities as a case study, this paper seeks to explore the implications of transboundary climate risks for the provision and allocation of climate adaptation finance. We develop a novel dataset of "agricultural risk flows," in order to motivate a thought experiment surrounding transboundary adaptation finance. Results suggest that effective risk reduction could be feasibly supported by channeling additional adaptation finance to either risk exporters or risk importers. Additionally, while several key exporters are indeed introducing climate risk to the global agricultural system, others may be well-positioned to reduce risk under warmer climatic conditions, related to anticipated growth in crop yields. Many risk-reducing nations, however, are also incumbent agricultural producers (e.g. China, Argentina, Russia), raising concerns about the geopolitical implications of directing adaptation finance to those places. One innovative solution to this dilemma might be directing adaptation finance toward "systemic" actors, who operate on a transboundary scale with the intention of building global resilience. Shifting to a systemic approach to climate adaptation finance such as this may require engaging with age-old questions regarding the purpose of climate finance, as well as developing new adaptation governance mechanisms that reach across borders.

Climate Mitigation: Energy, Negative Greenhouse Gases, and Forests

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Reducing greenhouse gas (GHGs) emissions raises many access and allocation issues. The access elements include the right to (sustainable) development and access to clean energy (particularly for the 2 billion people who continue to live without electricity), amongst others. The allocation issues include the distribution of benefits and burdens related to clean energy technologies (e.g. biofuel production), costs and royalties, as well as transport costs, taxes, subsidies and interest rates. Multi-level governance mechanisms and policies can change the underlying costs and risks. The Climate Regime has recently adopted bottom-up voluntary GHG reduction commitments in a "broad but shallow" policy architecture. Development pathways for many developing countries will be constrained by national level GHG emission reduction commitments. The weaker "ambition" in reducing global GHGs in the Paris agreement is inconsistent with the stated goal of keeping global temperature increase below 2°C from pre-industrial levels, which emphasizes the role of "negative" GHG reductions. The literature on these subjects is disparate and spread through multiple disciplinary fields and levels of governance. This paper addresses: What does a decadal review of the relevant literature tell us about how to conceptualize and define access and allocation in the area of climate change mitigation governance? The paper draws out key trends and lessons from the literature to conclude that negative emission technologies are not a substitute for substantial cuts in emissions, but they are expected to play an important role in climate stabilisation by compensating for the remaining emissions. The cheapest and least risky approaches in the short to medium term are forestation and soil carbon enhancement. It shows how efficiency and equity are de facto elaborated in the climate, energy and forest governance regimes and what still needs to be achieved to be consistent with sustainable, inclusive and low carbon development pathways.

Re-imagining DPSIR from an Equity and Inclusive Development Perspective

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The Drivers-Pressure-State-Impact-Response model has been used for decades by environmental agencies to assess environmental challenges and policy responses. However, in doing so, social justice or equity issues tend to come as an after-thought, while there is some evidence that environmental challenges and policy responses are not equity neutral. Hence, this paper addresses the question: How can the DPSIR model be reimagined to take into account an ecological justice and inclusive development perspective? How can such information be graphically conveyed to demonstrate the need for an equity perspective? This paper makes an argument for including the equity and inclusive development perspective. It applies this approach to biodiversity, air, fresh water, oceans and land and shows how significant it can be in some cases. It concludes that although one cannot categorically argue that both development and environmental policies that ignore the equity component are likely to fail in protecting the environment, it can demonstrate that such policies may further aggravate inequality and lead to exclusive development.

The Governance of Water Insecurities

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Achieving water sustainability world-wide raises many issues in relation to access and allocation. These include issues of access to water and sanitation services (e.g. human rights regimes), hydro power and benefit sharing, the increasing privatization of water, the role of public private partnerships and foreign aid, growing multilevel hydro hegemony on freshwater in the developing world, and climate proofing water initiatives, etc. The access elements include the role of people as citizens versus customers, and the delinking of water and sanitation services; the allocation issues include the

management of water by government, the market, or people, or a hybrid, principles for the equitable and efficient distribution of water resources for multiple and often competing uses, and dealing with the plural legal systems. People's access to drinking water and sanitation is geographically and temporally immediate and in close proximity. However, community, regional, national and international governance has profound implications for people's access and distributive issues. This paper addresses the question: What does a decadal review of the relevant literature tell us about how to conceptualize and define access and allocation in the area of water and sanitation governance? The paper draws out key trends and lessons from the literature to conclude that water insecurity is often a failure of governance, rules incoherence, and particularly legal pluralism (mainly at the local level) at the local, and perhaps even regional, national, and international level. Addressing water sustainability therefore increasingly requires a comprehensive consideration of the different principles, instruments and norms that operate within water governance institutions in order to address rules incoherence and promote mutual support for sustainable water governance. This will also entail a consideration of water access and allocation issues together with related issues like sanitation, development, climate change, energy and food, across multiple levels of governance.

Exploring Integrated Technological Infrastructure Systems and Indigenous Traditional Ecological Knowledge Toward Innovation on Forest Governance

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Large technological and scientific infrastructure programs, as NEON (National Ecological Observatory Network) in the USA, or ICOS (Integrated Carbon Observatory System) in Europe, monitor ecosystem functions and services using a holistic approach. They use technology not only to detect the main disturbances of ecosystems but also to provide a more efficient management of resources. These programs integrate observations of the atmosphere, ecosystems and oceanic greenhouse gases through different technologies such as: satellite remote sensing, remote detection by air, field sampling, and other instruments in situ. This integrated data is useful for research, policy making and the general public information at a scale that was not available to previous generations. These systems allow to contrast information about a given territory facilitating the planning and management of resources. Technologically advanced systems allow today to recognize places around the world, in which traditional systems of resource management are still in force. Remote sensing has confirmed that indigenous territories encompass up to 22 percent of the world's land surface and they coincide that indigenous communities hold 80 percent of the planet biodiversity worldwide. A widening gap on research on this field has to do with the possibility of exploring ways to articulate this technological systems, with the Traditional Ecological Knowledge (TEK) of indigenous people to overcome forest degradation and deforestation. In the literature for environmental conflicts, technologies have often been identified as the mean for large extractive projects and thus the source of different Antropocene damages. This paper illustrates the case study carried out by RFUS Project, a participatory research, in La Sierra del Divisor, Peru. This project focuses on the increasing implementation of effective policies in the Amazonian biome, using geo-positioning equipment and other ICTs. In October of 2017, the communities of Saposoa and Patria Nueva, refrain from registering new deforestation alerts in their forests to regaining control of their territories; they came to agreements with the settlers, expelling those who did not respect forest communal rules. The Peruvian State has recognized their work as pioneers on national forest safeguard, granting a program of incentives on conservation during 2018. The Earth Governance System may explore the possibility of democratization of technologies in communities with significant TEK worldwide, particularly in forest ecosystems. This paper concludes identifying ways to optimize integrated systems and TEK for forest governance oriented towards Forest Land Restauration.

Not Out of the Blue: Ethics to intersect Civic Participation and Formal Guidance

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Ethical frameworks, civic participation and formalised guidance are societal features of socio-environmental processes [*]. They are essential for the governability of the human niche building. This essay looks into how these features intersect for small-scale fisheries and seabed mining. Small-scale fisheries are artisanal socio-economic systems with participatory structures, which are threatened by industrial fisheries. Seabed mining is an emerging industrial activity, which will operate remotely controlled technologies in a harsh environment that is difficult to monitor. Under such circumstances, best (terrestrial) mining practices would apply civic participation ('social license to operate'). The techno-commercial operations, the embedding into global supply-chains and the multi-level regulation/management make 'blue economy' a 'wicked game'. Hence, a research question 'what is the function of ethics for its governability? This essay presents, first the commonalities of the 'Voluntary Guidelines for Sustainable Small-Scale Fisheries' (SSF-guidelines) and 'geoethical thinking' (Geoethics). These two approaches stem from two habitually not related communities. The SSF-guidelines propose how to govern a strained multi-actor societal-environmental system. The concept of Geoethics has emerged amongst geoscientists to understand the societal implications of contemporary geoscience professions. When comparing, both approaches offer an actor-centric ethic to further a path-/context-dependent development that respects interests of all actors. This essay presents, second a critical ethical dimension of the United Nations Convention on the Law of the Sea (UNCLOS), the promotion of the 'common heritage of mankind'. Hence, UNCLOS calls on actors to operate at a higher level of 'ethical adequacy' (Kohlberg's model). When applied it requires to establish forms of multi-level governance, to use reliable scientific knowledge among other sources of knowledge (also related to technologies), and to find compromises for ethical dilemmas. Dilemmas include the civic support for public development programs, to know, document and maintain the wealth of all life forms and the systems that sustain them, to use renewable natural resources sustainably, to appropriate respectfully non-renewable natural resources, and to minimize the footprint of technologies operated by ethically responsible professionals. Drawing on these examples we argue that multi-actor/level policy-making would benefit from ethically-based meta-orders to enhance civic participation, to guide actors (from various communities and governance structures), and to ensure legitimacy and enforceability.

Access sand Allocation for Food Security and Land

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Achieving food security and sustainability world-wide raises a number of issues in relation to access and allocation. These include issues of access to food, markets and revenues in an increasingly vertically integrated production system, land grabbing, the privatization of seeds, land use change, adaptation, to changes in climate, plastics in the ocean, fisheries, Arctic, etc. The literature on these subjects is disparate and spread through multiple disciplinary fields and levels of governance and raise a range of different issues. This paper addresses the question: What does a decadal review of the relevant literature tell us about how to conceptualize and define access and allocation in the area of food governance, what norms and principles underlie access and allocation and what public, private or hybrid instruments implement or influence access and allocation in food governance, whether and under what circumstances these principles can be reconciled with governance effectiveness, and how does power, knowledge, and scale affect access and allocation? Furthermore, how does institutional architecture at multiple levels of governance shape access and allocation either deliberately or implicitly or even as an unintended consequence of well-meaning policy? The paper draws out key trends and lessons from the literature to conclude that food security and access to land is essential towards the realisation of the sustainable development goals.

Governance of Ecosystem Services: the Challenge of Stakeholders' Preferences

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Governance of ecosystem services is a topic requiring deeper understanding of how to integrate this approach into all levels of environmental governance. This field of research and practice is related to natural, social and policy sciences, where the natural systems meet socio-ecological systems. Resource governance institutions determine the patterns of access to and allocation of ecosystem services. The challenge, however, for the governance of such complex relations increases when the view of different stakeholders has to be included in the decisions as different institutions with different stakeholders participate in this process. Interrelations of multiple institutions working at and across different scales and levels in resource governance, complicate patterns of access and allocation of ecosystem services. Such governance complexity is addressed in this study and different preferences for different management alternatives is identified. This research presents the analyses of the preferences of different stakeholders regarding the identified ecosystem services in the case study area. Empirical data will be collected through the questionnaire and photo-elicitation survey from different stakeholders participating in the resource governance in Vilnius city. The preferences should be taken into account during the decision making process, but different knowledge and priorities might mean conflicts hindering the effective governance. A policy development of ecosystem services require not only steering through the complex issues in ecological processes, but also addressing the diversity of potential human needs, choices and decisions of multiple stakeholders. It is necessary to understand both the conflicts and synergies regarding the preferences of resource access and allocation. Thus, the study contributes to the existing ecosystem services governance literature by presenting an empirical data for better understanding of the complexity of governance in the context of the stakeholders' preferences.

Conservation Before Use: Common Ownership as a Constraint against Degrading the Environmental Commons

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Although all human beings require minimal access to environmental resources, current resource use is both highly unequal and highly unsustainable. Human activities consume the equivalent of 1.7 planets worth of renewable resources and ecological services, with wealthy countries consuming the lion's share. Nonetheless, it is unclear which principles of distribution ought to govern entitlements to environmental resources, or how to balance the basic needs of individuals with collective interests in sustainability. In this paper, I develop an account of resource justice based upon common ownership of the earth. On my view, common ownership ensures a minimum provision of resources necessary to meet basic human needs. From this perspective, current overuse amounts to intergenerational resource robbery, and ought to be constrained as a matter of urgency. As a normative claim, common ownership is prior to entitlements based upon just appropriation, and forms a check upon legitimate resource use within territorial boundaries or property holdings. This proposal draws upon the recent theories of Mancilla (2016) and especially Risse (2012), but departs from both in ceasing to think of common ownership in terms of use rights and corresponding immunities. On my view, this overlooks the impact of human actions upon the provision of environmental resources available for use. In terms of the famous analogy of seats at the theatre, we are thus already assuming there will always be enough seats for all. But from an earth system perspective, current use has already crossed several planetary boundaries. The theatre is manifestly not large enough, and cannot continue to be used in the same way. Thus, I argue that common ownership recognises two claims: firstly a prior constraint against dangerous patterns of overuse and degradation; and second, an individual right to needs-based resource use.

Prospects for Accountability: Gender, Rights, and Justice in Global Food Governance

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The reformed UN Committee for World Food Security (CFS) has quickly become the central decision-making body for global food policymaking. As a result of pressure from various actors – most importantly, civil society organizations – the CFS recently concluded discussions on the promotion of gender equality in their future work. Interestingly, a key recommendation accepted by the CFS in October 2017 was to remind member states of their obligations under the Convention on the Elimination of Discrimination against Women (CEDAW), emphasizing the rights of rural women as described in General Recommendation 34. Importantly, this General Recommendation focuses not just on the need for states to pay attention to rural women, but also to understand the impacts of climate change, land and soil degradation, pesticides and agro-chemicals, extractive industries, monocultures, bio-piracy, and loss of biodiversity on rural women. The civil society turn to promote and protect women's rights within the CFS highlights a critical link between governance architectures within the United Nations system. This prompts key questions to consider the effectiveness of CEDAW as a tool for accountability and the prospects for promoting both more equitable *and* sustainable environmental governance. By reviewing the successes and shortcomings of CEDAW as a global policy instrument, this paper highlights the possible advantages of redirecting environmental advocacy towards the human rights instruments that already exist and explores the various environmental and resource-based dimensions of CEDAW, General Recommendation 34.

Sustainable Energy for All? An Examination of Climate Finance Decisions through the Green Climate Fund

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Access to energy lays the foundations of modern life and is necessary to escape poverty. Yet, in 2014, 1.06 billion people – or approximately 15% of the global population – still lacked access to energy sources. Eighty percent of the global population without access to energy is concentrated in 20 countries (high-impact countries), mostly in Sub-Saharan Africa or South Asia. Due to the small amount of carbon dioxide mitigation potential in these countries, a tradeoff between financing of energy access and mitigation projects is seen. In order to close the energy gap by 2030, an estimated $45 billion must be spent annually, which is not currently being met. In 2015, total global finance to energy development projects amounted to $20 billion, and less than 20% of that went to projects in high-impact countries. Moreover, between 2011 and 2015, less than 10 percent of funding to support energy access went to Sub-Saharan Africa, where electrification needs are greatest. These high-impact countries are among the least developed nations in the world and the most vulnerable to the effects of climate change, perpetuating climate injustices. The finance incongruences in the energy development space are not well researched and further data compilation and analysis is needed to fully understand the tensions underlying this issue. This paper contributes to discovering these disparities by investigating the funding behaviors of the Green Climate Fund (GCF) regarding energy projects. The GCF, becoming fully operational in 2015, is the newest financial mechanism under the United Nations Framework Convention on Climate Change (UNFCCC), and already the largest multilateral climate fund in the world. As such, it is in a unique position to fill funding gaps and change paradigms. Energy development is essential to modern life, therefore concerns of equitable and just distribution of financial resources for energy access projects must be better understood. Through document analysis and targeted interviews, this paper discerns at what stage and according to what rational projects are being accepted, rejected or requiring additional revision. Moreover, the paper considers how the four major cross-cutting themes of Earth Systems Governance research, including power, norms, knowledge and scale (Biermann et al. 2010), may impact funding rationales. By better understanding where the disconnects are between the requirements and priorities of funding institutions and those in need of assistance, progress can be made toward closing the energy gap and achieving more just and equitable dispersion of climate finance.

Food Security and Access to Land

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Achieving food security and sustainability world-wide raises a number of issues in relation to access and allocation. These include issues of access to food, markets and revenues in an increasingly vertically integrated production system, land grabbing, the privatization of seeds, land use change, adaptation, to changes in climate, plastics in the ocean, fisheries, Arctic, and so forth. Elements of access and allocation are various and complex, encompassing spatial, temporal, ecological and socio-economic dimensions coupled with challenges of service delivery, local retail presence and the need of adjusting life-styles. The literature on these subjects is disparate and spread through multiple disciplinary fields and levels of governance and raise a range of different issues. This paper addresses the question: What does a decadal review of the relevant literature tell us about how to conceptualize and define access and allocation in the area of food governance, what norms and principles underlie access and allocation and what public, private or hybrid instruments implement or influence access and allocation in food governance, whether and under what circumstances these principles can be reconciled with governance effectiveness, and how does power, knowledge, and scale affect access and allocation? Furthermore, how does the institutional architecture at multiple levels of governance shape access and allocation either deliberately or implicitly or even as an unintended consequence of well-meaning policy? The paper draws out key trends and lessons from the literature to conclude that food security is not only about the global production level, but is a multifaceted issue including access to land, water, money and health. Further, for both the global South and North, the promotion of local agriculture appears as the most effective way to improve access to and allocation of food, complemented by a more profound consideration of the market sector and increased government incentives for investment in small scale farmers.

Energy Justice in a Post-Extractivist World: Development Possibilities for South Africa in a Transition to a Low Carbon System

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With the current imperatives of climate change and growing global inequality, our heavy reliance on the extraction and consumption of natural resources is unsustainable, especially non-renewable fossil fuels. Many countries of the Global South have built their economies on energy-consuming extraction and export of natural resources and despite decades of such trade, are trapped in a “resource curse”. The need to reduce carbon emissions through a transition to a sustainable energy system may offer such countries an opportunity to re-consider their development pathways. Critical to this transition however is the need to consider questions of justice to ensure that new initiatives do no embed old power asymmetries. This paper presents an investigation of the principles of democratic, just and sustainable forms of energy production, and how these can be introduced in mapping out a post-extractivist pathway for the case of South Africa. Policy and institutional analysis using deliberative policy analysis is applied to examine the strategies for energy, sustainability and resource trade and their implications for energy justice. The research also examines the Million Climate Jobs and WoMin initiatives to understand civil society responses. The research suggests that the government-led transition to a low carbon energy system is perpetuating energy injustices but that NGOs and civil society are introducing innovative alternatives for South Africa's development pathway.

Adaptiveness, Resilience and Transformation of Earth System Governance

Urban visions as (contested) Imaginaries on Sustainability and Welfare

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In this paper, we aim to analyse how cities envision their future as a place of good living providing welfare within planetary boundaries. Recently cities have grown in importance and are often seen as sites for addressing new societal challenges and as sites for developing societal solutions. Many cities face the twin challenge of providing inhabitants with material and social welfare while striving to build a sound and sustainable urban environment. Scholarly debates on urbanization and urban governance stress how urban visions play an important part of city politics, urban planning and local governance. Visionary imaginaries are means to collectively entangle with and envision the future city and urban communities. In urban governance, such visions play a key role in imagining the future to be or that we desire and, thus, for constituting urban identities. Urban visions are however political acts as they are produced by present actors, with particular interests and agendas in relation to ideological positions. As an act of political storytelling, urban visions thus hold both transformative and performative power in the sense of shaping imaginaries of future city developments and the efforts addressed to transform urban environments. Urban visions might furthermore motivate initiatives and activities among public and civil actors to experiment with new ways of organizing public concerns and to practice alternative ways of living, thus striving to provide 'real utopias' (Olin Wright) of sustainable welfare. This paper seeks to contribute to debates and research on urban utopias and visionaries by comparing how three Swedish cities (Stockholm, Gothenburg, Malmö) develop urban visions on how to build a city that provides their inhabitants with social welfare *and* a sustainable urban environment to live in. Drawing on document studies, interviews and observations for these cases, we study how the three cities discursively construct and invest in the future of their cities and its inhabitants across a potential ideological divide between developing a city that is sustainable and provides social welfare for all.

A District Level Climate Change Vulnerability Index for Flood Risks – Concept, Implementation and Results for the City of Kiel

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As adaptation actions by cities and communities in the face of climate change are becoming increasingly important, innovative and practicable approaches for early identification and estimation of vulnerabilities on the local scale are crucial. Thereby it has to be taken into account that possible adaptation measures can vary from place to place due to the geographical location, city structure, responsible institutions, number of inhabitants and the state of economic development. Therefore, successful adaptation has to be individually and specifically.For cities, especially the exposure to flooding is high because of their spatial concentration of assets, people and economic activities. Within our paper, we focus on the effects of climate change regarding two flood types: storm surges and urban flooding after heavy rain events. Thereby, a vulnerability index has been developed that conceptually comprises of exposure, sensitivity (ability to evacuate and financial losses) and coping capacity. This index has been applied to thirty municipal districts in the state capital of Kiel in northernmost Germany regarding their specific vulnerability. For the present case, a coastal flood level of 3.5m above mean sea level was considered as one climate change impact in order to examine how and to what

extent people and goods are exposed. This scenario corresponds to the highest water level within the city of Kiel's flood risk map. With respect to urban flooding, also the degree of surface sealing was taken into account. Regarding the sensitivity, the capacity for population evacuation as well as financial damage caused by the events in question were analyzed, whereby possible financial damage was taken into consideration for both the general population and businesses. The coping capacity was analyzed to discern the available resources to reduce possible impacts, whereby state transfer payments have been taken into account, such as benefits within the German social system depending on financial needs. Our approach differs from previous vulnerability assessments carried out at the city and/or municipal district level mainly due to the exclusive use of public and freely available data as well as the use of a ratio calculation for the relative comparison of districts. As a result, our study provides detailed insights into climate change related risks, in order to identify the most vulnerable districts in a city, and highlights the reasons for their vulnerability. Furthermore, limitations of the approach as well as additional need for research are outlined.

Business Strategies and Climate Change: Prototype Development and Testing of a User Specific Climate Service Product for Companies

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Companies are increasingly concerned with current and future climate change risks and opportunities that have the potential to generate a substantial change in their business operations, revenue and/or expenditure. Against this background, the paper presents and discusses the methodology and results from the joint activity „Business Strategies and Climate Change". Based on the practical requirement to develop a novel approach to increase awareness for companies to adapt to climate change, a questionnaire has been co-developed as a novel „Company Analysis Tool", which considers the influence of climate change on key business indicators and planning strategies. Thereby the three complementary areas „Value Chain", „Value Levers" and „Value Drivers" are the main areas of investigation. The structure of the novel approach is orientated along the main organizational areas of companies: i) management and leadership, ii) market, iii) finances, iv) infrastructure, v) production and logistics and vi) employees. Each of the six main organizational areas is divided into different company-relevant subtopics, whereby each subtopics is translated into specific questions. In total, the „Company Analysis Tool" includes 55 questions regarding 36 subtopics. Additionally a first implementation and testing of the „Company Analysis Tool" has been carried out based on 35 interviews with the top-level management involved. Thereby the main objective was to raise awareness for climate change and the need for adaptation measures. The paper presents and discusses the methodology, practical implementation, results and lessons learned as part of this prototype development and testing of a user specific climate service product for companies. Main results of the project has been to learn about the crucial importance of closely integrating companies in the development of a climate service product at an early stage and at eye level, to systematically integrate the adaptation to climate change into business strategies. Besides awareness raising and a company-specific analysis, also the detailed examination of climate change opportunities and risks have been of great interest and importance for the participating companies. Therefore our approach in general – but mainly the „Company Analysis Tool" with a clear focus on companies specific challenges in different sectors – proved to be a useful climate service product, with results of high relevance for adaptation practice and business.

Coastal Community Resilience: A Comparative Case Study of Barriers and Opportunities for Sustainable Governance in the United States

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The ability of communities to navigate barriers while capitalizing on opportunities to enhance resilience to social, political, economic, and/or environmental change and disturbances is increasingly important. The adaptive responses of communities to gradual processes of change or more immediate shocks and disturbances are affected by their

adaptive capacity (control of or access to material and non-material resources and services) and ability to collectively act for the common good. Adaptive responses and the consequences for community resilience are also shaped by multiple linkages across scales (temporal, geographic, jurisdictional, or analytic) and levels (hierarchical relationship of authority) of governance systems. I use a community-based, case study approach to produce practical knowledge and contribute to theory development about the cross-scalar and multi-level opportunities and barriers to sustainable governance of local livelihoods in the context of disturbances and change. I will present a comparison of two cases as examples of variation in community resilience outcomes. Two Rivers, North Carolina represents a case of collective action failure, which resulted in decreased community resilience; Delcambre, Louisiana is a successful case of collective action that resulted in increased local resilience. Together, these cases demonstrate how community adaptation and resilience are shaped by differential adaptive capacities within and across communities, the structure of natural resource/environmental and economic governance systems, and broader processes of development and change. However, much more work is needed to understand the congruence between resilience and sustainability.

Synthesizing and Identifying Emerging Issues in Adaptiveness Research within the Earth System Governance Framework (2007-2017)

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The Earth System Governance Project lists “adaptiveness” as one of its core research themes. The term has been introduced as an “umbrella term for a set of related concepts—vulnerability, resilience, adaptation, robustness, adaptive capacity, social learning and so on—to describe changes made by social groups in response to, or in anticipation of, challenges created through environmental change”. The Science Plan formulates related questions: How can earth system governance conceptually and practically respond to the inherent uncertainties in human and natural systems? How can stability to ensure long-term governance solutions be combined with flexibility to react quickly to new findings and developments? What are the politics and conflictive dimensions of adaptiveness? Which governance processes foster it? What attributes of governance systems enhance capacities to adapt? How, when and why does adaptiveness influence earth system governance on different levels? Over the period of the past 10 years, significant progress has been made in the research on governance processes of adaptiveness and in answering these questions. In particular in the field of climate change adaptation significant conceptual and empirical work has been conducted on international, national-level and countless local and community-based activities. It is the goal of this paper to identify central strands of this research on adaptiveness including cross-cutting issues within the Earth System Governance community and to bring together essential findings. On this basis, the paper seeks to develop ideas for future research agendas and implementation needs in the field of adaptiveness. The paper will be based on a literature review of the relevant contributions in the past 10 years as well as on a data collection within the adaptiveness community in the context of the Earth System Governance Project including the specific contributions to the harvesting initiative.

Framing Urban Resilience: Different Perspectives on Resilient Cities and Their Impact on Adaptation Governance

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Cities worldwide face numerous complex and interacting challenges, such as climate change, increasing populations, resource use, various socio-economic problems. Many cities strive to become more resilient to the shocks and stresses that are related to these, and the notion of urban resilience has become highly popular in both research and practice over the past years. Pinpointing what urban resilience actually means, has proven difficult however. The concept is inherently rather malleable. This helps it function as a boundary object, bringing many parties to the table, but it also

means that people have different ideas on what it means. For instance: what does resilience-building contribute to, what are the problems, causes and solutions, and what trade-offs, side-effects and other normative choices are acceptable? These different ways of 'framing' urban resilience are hidden in the positive, but sometimes fairly vague, language used to promote it. I will explore different ways of framing urban resilience based on examples from the urban resilience literature and examples of how cities in practice try to shape resilience plans and policies. Two important frames of urban resilience include the 'system resilience' frame, which focuses on maintaining urban functions and processes, and the 'community resilience' frame, which emphasises urban life, and community capacity & self-sufficiency. Other important (contrasting) frames include 'static resilience', dealing with quick return to equilibrium, and 'dynamic resilience', dealing with adaptability and co-evolving with trends. Different framings of urban resilience can result in a 'dialogue of the deaf' (people may seem to agree, but really mean something completely different) among stakeholders in discussions on practical adaptation measures. They also have strong implications for the governance of adaptation. For instance: who should have a say in determining the policy options, who takes the lead, what values are taken on board, what knowledge and decision-making tools and approaches are useful and legitimate, and what kind of processes should be adopted to design, implement and evaluate adaptation? Urban actors should reflect on how they frame resilience and what the implications and trade-offs of that framing are.

Urban Rivers Governance: M3K Movement to Increase the Adaptive Capacity of the Poor in Yogyakarta City

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This paper explains how the urban rivers as an earth system are governed towards climate adaptation using case study of Yogyakarta's three main urban rivers: Winogo, Code and Gadjahwong. There is three land statuses of the riverside in Yogyakarta city: 1) government owned, 2) Sultan's ground, and 3) private owned. This created difficulties for the city planning since most of the poor reside in that area since long time ago and they have their legal statuses, although the riverside area is prone to disasters (flood and landslide) and diseases outbreak (malaria, cholera and dysentery). Local government approaches the community and provides support system through community engagement. This scheme generates innovation breakthrough. The communities became more aware to the misused of rivers. They are actively participated in discussion forum to increase the awareness of the rivers utilization, and initiated the M3K movement, which stands for: *Madep* (to face), *Munggah* (to go up), and *Mundur* (to back away) from the *Kali* (the river). The process of this river governance went both ways: bottom-up and top-down. This in-depth case study research is a part of the researcher's PhD trajectory, uses empirical exploratory approach with purposive sampling derived from a list of related participants: local government officers, city leaders, NGO person, local academia, and riverside communities. The primary data is collected using interview with snowball sampling, while secondary data is collected from policies and reports to understand the context of problems and setting of multi-stakeholders' collaboration. This collaborative action in the M3K movement, although not yet been enacted in a policy, resulted in the significance of better city planning and environmental protection. Logically, it can reduce the heat island effect in the city, consequently reducing the impact of climate change. Furthermore, it also reduces the vulnerability of the poor to disaster, while also increases their adaptive capacity. Using Yogyakarta as Indonesian case study, this paper contributes to the knowledge of adaptation strategies in developing countries.

Governing Sustainability Transformations through Strategies of Small Wins: The Case of Circular Economy

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This paper aims to explore the governance and politics of transformations towards sustainability by applying the perspective of 'transformative change through accumulating small wins'. This perspective is rooted in theories on sensemaking, continuous organizational change, and incrementalism. It challenges two dominant assumptions of transformational change: the feasibility of changes that are at the same time in-depth, large-scale and quick; and the assumption that incremental change is necessarily slow and can only result in superficial changes. Small wins are characterized by concrete outcomes of moderate importance, in-depth changes at a local level, and contributions to a transformative agenda. They differ from quick wins or low hanging fruit, which are first-order changes where people take fast and easy steps to solve simple issues and gain easy victories. The fact that changes are relatively small does not mean that they are trivial in the long term Indeed, they can amplify and cumulate into transformative change through non-linear mechanisms such as energizing, robustness, logic of attraction, bandwagon effect etc. The perspective of small wins is in particular promising for transformations towards sustainability, because it allows governance actors to embrace ambiguity, uncertainty, and interconnectedness; to welcome new understandings rather than protecting existing routines; and to cherish emerging change rather than discarding them. Moreover, because small wins are less threatening they can be made much faster in politically sensitive environments. We use the small wins perspective to analyse the Dutch Transition Program Circular Economy. This program departs from a very ambitious transformation agenda: 100 % circular economy in 2050 and 50 % circular economy in 2030. Our analysis shows the emergence of abundant small wins. However the potential of these small wins is underestimated and it proves to be challenging to activate the right propelling mechanisms so as to accumulate these small wins into transformative change. As a consequence not all results feed back into the governance process where they in turn could activate new small wins. The small wins perspective intuitively makes sense to the involved governance actors but is also criticized by referring to curing of symptoms, attacking a problem on too low a level, or the risk that it becomes more difficult to finally attack the really big problems with big solutions. It also clashes with the rather unrealistic expectations and related monitoring methods to govern transitions rapidly, radically and linearly.

Towards Design Principles for Enhancing Urban Flood Resilience: A Comparative Study on Required Governance Conditions in 18 European Areas

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Urban areas face increasing flood risks due to climate change and ongoing urbanization. In order to enhance the resilience of these areas different types of Flood Risk Management Strategies (FRMSs) can be implemented. Not only the urban, but also other levels of governance are involved in this. By comparing their flood risks governance practices and results urban areas may learn from each other. The C40 mayors for instance try to do so as does the European Union. Key question in the debates is what governance conditions are needed to enhance urban flood resilience. These conditions must enable urban systems to resist flood risks, to absorb and recover from flood risks and to learn and innovate in order to be better prepared for dealing with future floods This paper advances this debate by specifying design principles governing actors must follow to successfully enhance urban flood resilience. These principles are based on an extensive review of literature on resilience and on a comparative analysis of 18 in-depth case studies conducted in Belgium, England, France, Poland, The Netherlands and Sweden. The latter have conducted in the context of the EU-funded STARFLOOD-project. In order to allow us to make theoretical generalizations we have chosen for case study areas that differ in flood proneness as well as economic and institutional background. We compare what conditions are present in the cases and discuss whether "the" good practice case exist or not. The latter doesn't seem to be the case. Our case comparison however does allow us to refine the conditions we found in literature. The principles found will be contrasted with existing water governance principles like the Dublin principles and the more recently developed OECD Water Governance principles. The design principles we have found could be used as a starting point in societal debates about a for further enhancement of urban flood risk governance. The latter however also asks for additional principles as inputs since resilience should not be addressed without taking equity and efficiency issues into account.

Narratives of Change for a Resilient Future City

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Climate change impacts cities through changes in the likelihood and magnitude of extreme weather (shocks) and more subtle long term pressures (trends). Many cities are developing climate change adaptation plans. Adaptation measures impact not only the way the city looks and functions, but also people's daily lives. In order to find support and enable collaboration with and among actors and residents, adaptation measures should be rooted in people's hopes, fears and aspirations towards a desired future for the city. In this paper, we explore the use of 'narratives of change' as a tool to elicit perceptions of past, present and future weather and climate (and changes in these), and how that relates to people's values and goals, as well as possible strategies to foster climate resilience. Narratives are stories around perceived realities and futures that people can describe, and they mediate various understandings of them. They unfold around events and include key actors, relationships, values and ambitions, located in time and space, and are therefore both backward looking (explanatory) and future-oriented (aspiratory). They let people make sense of the world they live in and organise their experiences and foster interaction among individuals through shared experiences. Consequently, they turn 'matters of fact', such as scientific observations and projections, into 'matters of concern' by connecting changes to local individual and collective memories and by incorporating them into the local societal realities. As such, narratives become central for the quest of resilience-building and future-proofing a city by displaying desires of what ought to be achieved: what should be kept (made resilient), and what should be changed (made adaptable or actively transformed)? We conducted a narrative analysis on climate adaptation planning in the city of Dordrecht, the Netherlands. This historical port city is surrounded by rivers on all sides, close to the sea, and vulnerable to numerous climate-related changes, as well as socio-economic challenges. The city is in an active process of adaptation, and we collaborated with them to explore the options for building urban climate resilience. We assessed organisational (public) and individual (personal) narratives of change among public and private actors and citizens, based on narrative interviews, historical interviews, document analysis, photo documentation, and site visits. We will discuss the implications of these local narratives of change for building adaptability and resilience, and for the governance of this adaptation process.

Urban Flood Resilience, a Discursive-Institutional Analysis of Planning Practices in Milan

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Flood risk is increasing all over the globe due to urbanization and the effects of climate change. Both water managers and urban planners are called to enhance urban flood resilience. The concept of resilience is commonly used in policy discourses or academic debates about a wide range of disciplines. According to the literature, three dominant discourses of resilience can be identified: engineering, ecological, and socio-ecological resilience. Because each discourse defines resilience in a different way, and prescribes different substantive and governance strategies to enhance urban flood resilience, the concept of resilience is interpreted differently by the parties involved in urban flood risk management. In this research, we will employ a case study strategy to demonstrate how a discursive-institutional analysis of practices of urban flood risk management may enhance our understanding of the complexities of realizing urban flood resilience in practice. Our case is the Lambro river basin within the metropolitan area of Milan, which is characterized by an increasing urban sprawl and recurring flash floods. Our analysis is informed by the "politicized Institutional Analysis and Development framework". Drawing on Ostrom's "Institutional Analysis and Development (IAD) framework", Clement added two external variables: the politico-economic context and the discourses. The extended framework is used to investigate which discourses of resilience are dominant, and how they are translated into institutions (rules-in-use) and outcomes (i.e. building restrictions, room for the river, flood defense systems). We have coded relevant policy documents from the river basin district authority Po, the metropolitan area of Milan, and the city of Milan, and have conducted a series of in-depth interviews with policy-makers and project managers involved

in flood risk management of the river Lambro. Our analysis reveals that the discourse of engineering resilience is dominant in Milan flood risk management, but the discourses of ecological and socio-ecological resilience are becoming more prominent in the discussions, and are also partly translated in institutions, such as land-use regulations. Poor implementation and enforcement of these regulations may explain why, in spite of ambitious plan to partly restore the natural water storage capacity of the river Lambro, floodplain occupancy continues.

The Operational Design of Climate Change Adaptive Capacity Assessments: Conceptual Approaches, Normative Choices and Policy Considerations

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Over the last decades, adaptive capacity took a greater place on the climate research agenda, enabling a greater input from social sciences and contributing to the inclusion of non-climatic dimensions as factors influencing the ability of human societies to adapt to climate change. However, there is no consensus on how to define adaptive capacity while existing definitions are consistently vague. This becomes a challenge when assessing the concept. Multiple qualitative, quantitative and participatory approaches have been designed to analyse adaptive capacity, each of them producing different results and recommendations. Considering the importance of climate change adaptive capacity on the policy agenda and on the development of adaptation strategies, crafting an operational design coherent with the policy objectives of the case at stake is crucial. The objectives of this paper are two-fold. First it aims at providing guidance in overcoming the challenges associated with operationalizing a concept that has been influenced by different theoretical backgrounds. In order to do so, four conceptual approaches of adaptive capacity, namely the IPCC, social ecological resilience, institutional and risk-hazard, are presented to illustrate this diversity of theoretical and operational perspectives. We make the assumption that the key in operationalising adaptive capacity is to consider its various conceptualizations as a rich source of knowledge rather than an obstacle. A set of questions linking the assessment with its specific policy objectives is provided to guide future operational framework designs. Second, taking the case of Canadian forest-dependent communities, the paper seeks to demonstrate how an operational definition and framework of climate change adaptive capacity that integrate multiple epistemic, spatial and temporal dimensions can be developed. While elaborating on this case, the importance of having a clear understanding of the factors and dynamics influencing climate change adaptive capacity, at multiple spatial and temporal scales, is underlined as an essential step in elaborating efficient climate change adaptation policies. Since we acknowledge that recognizing the normative choices made during the entire adaptive capacity assessment process, from the crafting of an operational definition to the selection of methods, is another vital step in matters involving governance and policy recommendations, the choices made for this specific case will also be highlighted. We believe that reflexivity and transparency not only contribute to enrich the literature on adaptive capacity assessments, but is also capital with respect to the development of a fruitful science-policy interface.

Adaptive Capacity in Polycentric Climate Governance: The Case of Multifunctional Water Use in Oberhasli, Switzerland

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Recent scholarship suggests that polycentric organization of climate governance enhances adaptive capacity in the face of climate change. However, accumulating evidence and theory shows that polycentric governance can limit, rather than enhance, adaptive capacity due to high transactions, problems of leakage, and power asymmetries. Thus, polycentricity may not be a sufficient condition for high adaptive capacity. In this paper, we suggest that we need to advance the theory of polycentric governance in two ways to resolve the puzzling effects of polycentricity on adaptive capacity. First, more analytical depth is needed on the evolving governance processes rather than polycentric governance structures. Second, a larger set of institutional attributes of governance systems needs to be taken into

account in order to explain varying levels of adaptive capacity in polycentric systems. Furthermore, the paper contributes to the advancement of polycentric climate governance theory by operationalizing polycentric governance with the approach of network of action situations. We examine these arguments using a case study research design for a case of polycentric climate change mitigation and adaptation in Switzerland. We selected the governance of multifunctional uses of water in Oberhasli in the Swiss Canton of Berne as a critical case in this regard. Data were collected through 22 semi-structured interviews between 2016 and 2018 and document analysis. Data were analysed through qualitative content analysis. The results show how framing power of actors and accumulating knowledge from polycentric experiments shape the evolution of polycentric governance systems over time in this case. The results further show how polycentric climate governance enhanced adaptive capacity at local scales whereas it reduced adaptive capacity at larger scales. Based on these results, we suggest that adaptive capacity at large is enhanced if the problem frames translate into decision-making centres with state and non-state actors on the scales that effectively match biophysical and political interdependencies among actors. By contrast, scale mismatches between dominant problem frames and actor interdependencies imply that polycentric organization of climate governance actually reduces adaptive capacity. The adaptive capacity of evolving polycentric climate governance seems to depend on processes rather than polycentric governance structures. We conclude with reflections how the 'network of action situations' approach can usefully advance analysis of evolving polycentric governance systems.

Room for Improvement: Promoting Compliance with Legal Obligations Through the Convention on Biological Diversity Conference of the Parties

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The CBD is looking towards its post 2020 strategic plan and it is timely to consider how the CBD COP can best play a part towards achieving effective governance. The theory of interactional law understands that the nature and internal legitimacy of legal norms is key to pulling states towards compliance as well as the use of compliance (or enforcement mechanisms) that are embedded in shared understandings. The CBD COP provides a perfect opportunity to enhance compliance with CBD obligations. This research uses socio-legal methods to consider how far the processes occurring at the CBD COP fulfil certain requirements of interactional law. It finds limitations to these processes and proposes how they could be strengthened. Using a thematic analysis of qualitative semi-structured interviews with CBD COP 13 delegates and observations from a mini event ethnography this research considers the balance of participants in the decision making process at CBD COP 13. It finds that some groups of actors are poorly represented including state actors from less developed countries, non-environmental sectors of governments and business actors. This provides evidence that the CBD COP decision making process does not include, 'participation of all relevant actors' in its decision making processes and does not fulfil this requirement for the interactional legal process. The CBD largely adopts a co-operative and problem solving approach to compliance through capacity building and other facilitative means. The CBD uses reporting mechanisms and a 'transparency for governance' approach. This has not had sufficient effect in relation to implementation and compliance with the Aichi biodiversity targets. 63-87% of parties are not on track to achieve any given Aichi target by 2020. This research proposes strengthening compliance in two ways. Firstly, through increasing the internal legitimacy of legal norms created at the CBD COP by ensuring all relevant actors are involved in and exposed to decision making processes at the CBD COP. Secondly, through the development of compliance mechanisms at the CBD COP that are embraced by the CBD community through processes of persuasion. These could include more transparent information in the form of detailed analyses highlighting those countries struggling to meet legal obligations under the CBD alongside the initiation of peer review mechanisms in cases where there is failure to comply. The CBD COP provides a legal arena in which these processes can be shaped and actors can be influenced to enhance compliance with legal obligations under the CBD.

Transforming Biodiversity Governance by Mainstreaming Animal Concerns

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Actors involved in biodiversity governance are increasingly aware of the relationships between biodiversity and other sectors and issues, and the mainstreaming of biodiversity concerns into sectors such as fisheries and forestry are at the center of many biodiversity debates. However, mainstreaming of other issues into biodiversity governance has received much less attention. We here contribute to the debate on transforming biodiversity governance by arguing for the mainstreaming of animal concerns into biodiversity governance. We do so by providing a state-of-the-art overview and analysis of global discussions and governance instruments on: a) animal health, welfare and rights, and their relevance for biodiversity governance, and b) rights-based approaches in biodiversity governance, such as ecosystem rights, and their relevance and lessons learned for mainstreaming animals concerns. Our analysis highlights a rich, centuries-old normative debate in the literature on the relationship between human and non-human animals, and animal and conservation issues. Most of the contributions are philosophical and legal in character, and have formed the basis of the current animal welfare and rights movements. Other discussions include a longstanding debate between environmental and animal ethicists on the priorities in conservation, the individual animal or species, with some making the case for more attention to animal welfare in conservation, promoting “compassionate conservation”. However, these debates have rarely reached political debates and practices in biodiversity governance. Exceptions include some developments on the rights of nature and ecosystems, and the concept of “one health”, in which animal, environmental, and human health are viewed as one. Crucial examples with practical implications can be found in New Zealand, Colombia and India, where ecosystems, including non-human species, are granted legally enforceable rights, usually involving a guardian making decisions for the benefit of the ecosystem. With this analysis, the paper brings together the more legal and philosophical literature on (among others) animal and ecosystem rights, and the IR literature on global environmental governance. We argue for the biodiversity governance system – from the global to the local level – to mainstream attention for the individual animal. This means reconsidering conventional anthropocentric perspectives in favor of more ecocentric approaches.

Transnational Adaptation: Drawing Lessons from the Economics of Mitigation

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We conceptualize transnational climate change adaptation in terms of the transnational spill-overs of local adaptation measures. Under such definition, transnational adaptation is shown to be analytically similar to the public good problems addressed in the economics literature on climate mitigation. Like climate mitigation, transnational adaptation is likely to show underprovision – which however can be amended with the “right” governance arrangements. The economic literature on climate mitigation provides insights on such arrangements, which we then explore for the case of governing transnational adaptation. Specifically, we tackle the question whether lessons from climate mitigation could be translated to transnational adaptation: what could be done in the case of transnational adaptation, knowing what we presently know about the similar problem of climate mitigation? We apply such reasoning to the problem of eutrophication in the Baltic Sea, highlighting the analytical similarity with mitigation, and subsequently translating mitigation findings to the specifics of the Baltic context. Focusing on coalition-building, side-payments, issue linkage and trade sanctions, the paper critically reviews the available governance architectures and policy instruments, shedding light on their capacity to deliver transnational adaptation at Baltic Sea and beyond.

Biodiversity Policy Integration in German Agricultural Landscapes

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Agricultural systems in Germany are facing the challenge of a growing and increasingly diversifying set of demands with the globally-developing bioeconomy. Beyond the production of food, one sees a growing demand for raw material, bio-

energy as well as tourism, all of which need to be integrated in the demands from agricultural landscapes, all of which challenge the objective of conserving biodiversity and ecosystem services. Furthermore, 69 hectares of land cover are daily sealed by construction projects across Germany (as of 2014 based on a moving four-year average, according to data from the statistical agency 2017). The UN's Sustainable Development Goals (SDGs) call for balancing the dimensions of sustainable development, such as economic growth (SDG8), life on land (SDG15) and health and well-being (SDG3). Likewise, the strategic plan of the Convention for Biological Diversity (CBD) calls for fading out political incentives harmful to biodiversity (target 3), and for ensuring biodiversity conservation on agricultural landscapes. While the German biodiversity strategy calls for stabilising biodiversity until 2020, current trends indicate ongoing decline. Transforming agricultural ecosystems into a sustainable state space requires drastic changes, facilitate by enabling and supporting policies. Political framework conditions and incentives are however not only provided by the environmental sectors, but by other policy fields, most of all the European Common Agricultural Policy (CAP). This article assesses Biodiversity Policy Integration (BPI) across political sectors relevant for regulating agricultural landscapes. Based on legal and strategic political documents as well as relevant secondary literature, we analyse BPI along the following criteria: inclusion, operationalization, coherence, capacity and weighting. We find that agricultural policies and impact assessments target biodiversity conservation, but fail to specify indicators and assess policy performance accordingly. While a wide set of policy instruments exists, weak coherence and policy design impede effective and efficient implementation. Weak institutional structure, bureaucratic hurdles and a low flexibility to allow context-specific bottom-up integration further hampers efficient implementation. Missing linkages of political processes and policy implementation enabling a systemic perspective on agricultural landscapes, the lack of science policy processes to facilitate the best possible uptake of existing knowledge as well as strong influence of lobby groups water down the weight given to biodiversity targets during both policy negotiation and implementation.

Reconceptualising Access to Reshape International and National Biodiversity Laws

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There is a tendency to consolidate access and benefit sharing (ABS) into a unified concept and not to focus on the role that 'access' on its own plays in a broader context of the governance of genetic resources. To the extent that scholars have considered the meaning of access, it is usually assumed that access is merely the physical performative act of providing and obtaining genetic resources for some kind of benefit sharing between resource providers and resource users. In this paper, I move beyond this way of thinking about access, seeking instead to explore the meaning of access in a broader historical and emerging context of the governance of genetic resources. In so doing, I investigate three questions: (1) how did access emerge as a concern?; (2) how has access been perceived by relevant international agreements?; and, (3) why and how should we reconceptualise access in a broader context of the governance of genetic resources? I argue that there is a need to de-link access and benefit sharing, and in particular, address the question: are users of genetic resources obligated to share the benefits from accessing genetic resources? I also argue that access is a mechanism of benefit sharing in the context of the Convention on Biological Diversity, the Nagoya Protocol and the Plant Treaty and that such conceptualisations of access have often been ignored in academic discourses. Concluding that there is a need to revisit the traditional conceptualisation of access over 'tangible resources' in the light of the new technologies and knowledge systems that lead to the access and use of 'intangible resources' such as digital genetic sequence data, the paper finally calls upon the international community to address the inconsistent approaches that countries have adopted while defining 'access' in their domestic laws. The reconceptualisation of access, I argue, is needed if the goal is to make bilateral and multilateral mechanisms of access more robust and effective.

Tracking Progress on the Intractable: Linking Key Dimensions of Adaptation Success with Strategies to Overcome Adaptation Finance Challenges

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Finding funding and financing to plan and implement climate change adaptation is persistently one of the most difficult barriers that local communities must overcome to increase their preparedness and resilience in the face of climate change. The prominence of this barrier holds in both developing and developed countries. This paper will link the results of two studies to answer the question *whether there are common patterns to the strategies local communities use to overcome this fundamental barrier*. The first study established a framework for how to think and track adaptation success. The second study identified 15 archetypal adaptation finance challenges that local communities in California, USA, face repeatedly as they attempt to advance their adaptation efforts. In this paper, I will introduce both, but focus on the strategies stakeholders/study participants in the second study offered to overcome the identified adaptation finance challenges through the lens of the adaptation success framework. That framework – itself a stakeholder-driven product that allows one to assess adaptation progress and success – features six principal and evolving dimensions: (1) process, (2) decision-making, (3) actions, (4) outcomes, (5) capacities, and (6) barriers overcome. The results suggest that adaptation success will depend in significant measure on the willingness of local and higher levels of government to address several classes of governance challenges: (a) current and historical *legacies of inadequate governance* (e.g., systematic discrimination of low-income communities, local government dependence on sources of income that pose conflicts of interest with adaptation), (b) historical legacies of *once-adequate, but no longer suitable governance* (e.g., restrictions on the ability to raise taxes, governance silos), and (c) *new governance arrangements and philosophies* (e.g., openness to innovation, new scales of governance, new governance partnerships).

Archetypical Opportunities for Water Governance Adaptation to Climate Change

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In the face of a rapidly changing and increasingly unpredictable climate, the adaptiveness of water governance systems has become a global necessity. Under the header of “barriers to adaptation”, a large body of scholarly work has exhaustively shown the many challenges practitioners and decision-makers are confronted with while trying to achieve such adaptiveness. Comparatively less attention has been devoted to those conditions favourable to adaptiveness at the nexus between water governance and climate change: in other words, little is known about the “opportunities” for climate adaptation. Confronted with the ubiquitous character of barriers to adaptation, one is led to believe that opportunities constitute rare occurrences. Truth is that very little effort has been undertaken so far to characterise those situations where opportunities to climate adaptation arise. The present contribution constitutes a first attempt in that direction. Relying on a meta-analysis of 26 case studies on adaptation in water governance, it characterises situations in which barriers to adaptation are overcome, and governance architectures in place show adaptiveness. The analysis specifically searches for configurations of attributes of the governance system in place that, in combination with the specificities of the resource system at stake, are systematically linked with particular opportunities for climate adaptation. Through an “archetype analysis” – a procedure that systematically searches for attribute configurations – the article identifies six such archetypical situations. Surprisingly, none of the identified archetypes is inherently rare or is characterised by attributes that occur seldom. To the contrary, all archetypes represent typical settings in river basin management. With all due caution, our findings seem to raise a few important questions for the way adaptiveness in the face of a changing climate has so far been thought of. First, if opportunities emerge in patterns, they may be product of underlying, but currently poorly understood mechanisms – the “opportunities” label may thus be a misnomer. Second, if specific circumstances are regularly linked to particular opportunities, policy instruments could be devised that leverage and stabilise such pattern, making sure that opportunities are seized and adaptiveness is achieved. Implications for institutional design and broader governance architecture questions ensue.

How Do We Know It Works, and Could It Work Elsewhere? An Empirical Exploration on What Is Considered Transferable Across Cases

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Global change phenomena encompass numerous and interconnected processes in human-environment systems (e.g. land use, biodiversity, climate change, globalisation and migration). While many of these processes interlink at global scales, their impacts manifest differently across locales and regions, given context-specific and diverse natural and social factors. Consequently, research that responds to these impacts, i.e. generate 'transformation' knowledge on policy or other options, combines diverse scientific disciplines and inputs from practice and broader society. However, a core issue is whether one can infer that knowledge produced in a particular social and regional context is also applicable in another context, and if so how or under which epistemic criteria. Transferability of knowledge across cases is a critical issue for the overall quality of this research and consequently how these are viewed as evidence in assessments for action, given that inference on the application of knowledge for another case is often done on implicit assumptions. Yet, a systematic discussion of transferability across cases is missing. A proposal to conceptualize transferability of knowledge across cases as arguments by analogy, was recently presented as a contribution to advance this debate. Arguments by analogy imply explicit considerations on whether the cases in question are sufficiently similar in relevant aspects while not dissimilar in other additional relevant aspects. This approach calls for explicit material considerations that are needed to learn about which aspects of cases are indeed relevant. Moreover, formal considerations on how to weigh relevant similarities and dissimilarities of the cases are also needed. In this presentation, I highlight empirical results on research currently undertaken on the questions of what and how knowledge is considered transferable from one case to another, focusing on the epistemic criteria that apply in this judgement. This presentation therefore corresponds to the panel's question that asks: *For what contextual and normative conditions are the considered strategies successful, and under what conditions are they not?* The foreseen contribution of this presentation is an empirically based representation on how knowledge about a problem in a specific case applies to another case, as a fundamental step for scaling up global change strategies such as climate change adaptation. This in turns contributes to a deepened understanding and critical reflection on the concept of archetypes in sustainability research, as envisaged for this panel, particularly on key processes of social-ecological interaction between knowledge producers that play a role on how knowledge is valued as transferable.

Governance of Sustainability Problems through Transdisciplinary Research: Archetypical Pathways to Impact in Agricultural Systems

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Transdisciplinary approaches are often praised for being effective when addressing sustainability problems that involve a substantial amount of complexity, uncertainty, and conflicting values. The adaptive and integrative character of transdisciplinary approaches aims at engaging various scientific and non-scientific actors in collective knowledge production processes and is recommended for addressing sustainability problems. In recent years, transdisciplinary approaches and methods proliferated to address collective action problems located within and spanning across policy fields from local to international levels. However, it is still rather unclear why and under what conditions specific transdisciplinary approaches are effective for advancing sustainable development while others are not. Hence, generally applicable guidelines for contextually tailored transdisciplinary approaches and methods are difficult to make. This paper addresses this knowledge gap in two steps. First, the paper introduces a diagnostic framework that structures the multiple links between goals for sustainability impacts, transdisciplinary methods and approaches, specific context conditions, and sustainability outcomes in a generic way. The framework can be applied for various sustainability problems. In a second step, the framework is used to map archetypical pathways to impact for different

transdisciplinary approaches. The aim is to recognise salient patterns and mechanisms for supporting sustainable development through transdisciplinary approaches. To this end, we conduct a meta-analysis of 29 transdisciplinary case studies in different agricultural settings through systematic case selection, coding and formal concept analysis. The findings of this paper point to the importance of co-design and co-production in research processes that aim at sustainability transformations. The degree of stakeholder interaction varies depending on the complexity of the sustainability goal in question and the interactions are generally strongest in the research phase when new knowledge is produced. Furthermore, the findings illustrate the importance of creating responsibility and ownership for the sustainability outcome among involved actors and they support the understanding of complex relations in transdisciplinary projects and build a useful base for further analysis.

Archetypical Strategies for Safeguarding Community Access to Land and Natural Resources in the Global Land Rush

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Large-scale land acquisitions (LSLAs) have become a cornerstone of transformations of Earth System Governance over the past decade. Political strategies for climate change mitigation and adaptation, energy transitions, and food security, which form an important part of contemporary Earth System Governance, are among the major drivers of this global land rush. Previous research has documented widespread adverse impacts of LSLAs, for example through loss of access to land, environmental degradation, and increased conflict. Adverse impacts are frequently rooted in governance failures that give rise to processes of elite capture, enclosure and marginalization. These impacts and processes around LSLAs have nurtured critical narratives of 'land grabs', 'water grabs', 'green grabs', and 'commons grabbing'. While these narratives point to key challenges for sustainability at local to global scales, they fail to capture the diversity of transformation processes that actually occur in target regions of LSLA. A rapidly increasing body of case studies provides evidence on strategies to safeguard or even enhance access to land and natural resources for prior land-users in LSLA target regions. However, the diversity of recent, highly contextualized findings from case studies has not been systematically synthesized yet. As a consequence, it remains largely unclear under what conditions and why some strategies (e.g. community-based collective action) safeguard or enhance resource access in some LSLA contexts, while they fail in others. This paper utilizes the archetype approach to identify recurrent patterns of successful strategies for safeguarding and enhancing access to land and natural resources in LSLA contexts. Methodologically, the paper is based on a meta-analysis of evidence from 35 systematically selected case studies of LSLAs in Africa, Southeast Asia, Southern America and Eastern Europe. Conceptually, it is based on Ribot and Peluso's theory of access. The results show that community-based collective action and household-level livelihood adaptations are the most frequently identified strategies for safeguarding resource access in LSLA contexts. The archetypes show that community-based collective action is most likely to be effective in contexts characterized by strong, accountable and vocal community leaders, legal and political support through external advocacy groups, and like-minded departments within the state. However, contexts with pronounced asymmetries of agency and representation within affected communities were more prone to elite capture and marginalization rather than protected resource access. We conclude that 'land grabs' are not unavoidable, but specific strategies work only in specific contexts. Archetype analysis can help diagnosing what particular strategies match particular social-ecological contexts.

Do Climate Risk Perceptions Induce Behavioural Change and Policy Action? Machine Learning the Feedback Effects from Perceived Risks to Mitigation of Climate Change

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Global climate change is projected to have a variety of local to regional scale impacts on human societies and ecosystems. The severity of these impacts (risk magnitude) depends upon the extent to which humans at the global scale mitigate Green House Gas (GHG) emissions through switching their fossil fuel-intensive behaviors to green behaviors, as well as adapting to adverse impacts of climatic change at local scales. While a flurry of studies and Integrated Assessment Models (IAMs) have independently investigated the impacts of switching mitigation behaviors or adaptation in response to different climate scenarios, little is understood about the feedback effect of how human risk perceptions of climate change could contribute to switching human behaviors from fossil-fuel intensive pathways to climate-friendly behaviors. Standard Global Climate Models assume a disconnect between risk/adaptation and mitigation behaviors. IAMs typically ignore human risk perceptions and focus on economic dynamics to predict the effect of adaption on mitigation behaviors (if at all). This study utilizes a suite of machine learning algorithms, both supervised and unsupervised, to explore how shifts in human risk perceptions, cognition, affect/emotion, trust of scientists and past experience can influence the adoption of green behaviors and induce support for mitigation to climate change at the policy level. The study uses mixed-pool "Climate Change in the American Mind" dataset collected between 2008 and 2014 (N=13,400) and apply three supervised (e.g., structural equation model) and three unsupervised (e.g. maximum spanning tree) machine learning algorithms on the data set to predict the adoption of green behaviors and policy action. Further, the study replicates this analytical approach on a large sample of Eurobarometer dataset for 2000-2017 (N=150,605). Best fitting algorithms and models are identified through k-fold model validation approach by splitting the datasets in multiple folds of test and training samples. The implications of the best fitting algorithms for understanding the implicit processes by which people may translate climate risk perceptions into behavioral change and support for public policies aimed at mitigation to global climate change will be presented.

Systematic Learning in Water Governance: Insights from Five Adaptive Management Projects for Water Quality Innovation.

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Adaptive management proliferated in recent years as a policy approach for dealing with uncertainty regarding the effects of governance interventions through systematic learning. In adaptive management, learning takes place through a cyclical approach of experimentation and (possible) adjustment. While researchers have examined its application to a wide range of environmental management challenges, few empirical studies exist that cover complete adaptive management cycles. The fact that the concept has partly been used in a very broad sense limits our ability to diagnose the performance of adaptive management projects and related learning. This article reports on a comparative empirical study regarding the potential of adaptive management for successful experimentation, learning and environmental improvements. We analyse five small-scale projects of German water management that tested innovative actions for water quality enhancement. We trace processes as well as learning outcomes to identify factors affecting different types of learning and a successful delivery of a project throughout a management cycle. Our findings point to a key difference between two kinds of uncertainties in the studied adaptive management processes: on the one hand the uncertainty whether and how ecological measures will be effective in improving water quality ('ecological uncertainty') and on the other hand uncertainty regarding whether and how the chosen management process will allow for the actual implementation of measures ('social uncertainty'). This is because experimentation in water governance in a real-world context implies potential pitfalls for the ecological and social system affected. We find that those management teams performed better who addressed both kinds of uncertainty. Factors for dealing with 'social' uncertainties were usually rather different than the ones affecting uncertainties linked to the results in the rivers. For successful project delivery, however, the addressing of social uncertainties was decisive and appeared to foster learning by stakeholders and policy actors. On a conceptual level, our findings allow for a more clear-cut differentiation of factors that literature suggest for successful adaptive management such as participation, since we link them to social and ecological uncertainties within every phase of the feedback cycle. These nuanced findings have wider implications for systemic governance approaches, as both kinds of uncertainty are always present in social-ecological systems.

Sustainability Meets Ecological Reflexivity: Virtues for Future-oriented Governance in the Anthropocene

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In the unstable conditions of the Anthropocene, political institutions need to cultivate what Dryzek (2016) calls the virtue of "ecological reflexivity", which involves "listening more effectively to an active Earth system, capacity to reconsider core values […] in this light, and ability to seek, receive and respond to early warnings about potential ecological state shifts". Ecological reflexivity has a close affinity with notions of foresight, anticipation and futures thinking. However, there remains a need to understand better how ecological reflexivity could be cultivated in practice. In this paper we show how the core value of sustainability can be rethought in ecologically reflexive terms. Drawing on theories of ecological democracy and sustainability science, we identify five key characteristics of such an account: sustainability needs to be open, ecologically grounded, dynamic, far-sighted and integrated with other societal values. Each of these characteristics can be at times mutually reinforcing and at other times in tension, not least because far-sighted governance that seeks to remain ecologically grounded (in the sense of maintaining the ecological preconditions for wellbeing) may raise trade-offs with maintaining an open view of multiple conceptions of sustainability (some of which may fail to accord with evolving understandings of the Earth system). At the same time, a far-sighted conception of sustainability must remain attuned to the historical path dependencies that render it so hard for institutions that evolved in the Holocene to recognize their ecological impacts. We then turn to a case study of one of the largest recent global efforts to advance sustainability: the UN Sustainable Development Goals (SDGs) adopted in 2015. We draw on documentary analysis of the 2030 Agenda and the extensive consultation process leading up to the SDGs to investigate whether they show signs of reflexive sustainability. Our answer is that they do so to a limited degree, but many opportunities to go further were lost. The 2030 end date for the SDGs extends well beyond the time horizons of short-term electoral cycles, though far short of addressing future generations in the plural. To that extent, the SDGs entail a degree of longer-term thinking than in conventional policy-making. Nevertheless, key aspects of the consultation process emphasized short-term priorities at the expense of longer-term collective interests. We conclude by outlining ways in which subsequent processes of citizen engagement on sustainability could engender a more robust orientation towards deliberative foresight.

The Two Faces of Securitization in Risk Governance: A Study of Climate Change Adaptation in Nigeria

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In this paper, securitization is defined as framing climate change as a security threat to heighten awareness of such issues and to demand urgent action. The concept is recognized as a political tool in climate change adaptation literature. However, existing research, offers limited explanation of how securitization influences the risk governance practices of government institutions and consequences for adaptation in practice. In climate change adaptation, the role of risk governance is critical. Not only do institutions influence how individuals and communities are affected by climate impacts, they also take part in shaping the ability of communities to respond to climate impacts and pursue adaptation practices. Among other, security framings of climate change adaptation impact participation in risk assessment and risk management including the access of different communities to institutionally allocated resources. It is therefore central to explore how framing climate change adaptation as a security issue impacts participation among the different risk governance institutions engaged in climate change adaptation. In this paper, securitization of climate change adaptation and influences on risk governance is discussed in the context of Nigeria. This is a country expected to be among the worst affected by climate change. An in-depth qualitative study was conducted in eight local government areas, two states and at federal government level. The study found that securitization of climate change adaptation has both negative and positive impacts on the policies and practices of climate change adaptation in Nigeria. Securitization has highlighted that climate change adaptation is a complex non-traditional issue that is not easily contained within

local boundaries. Adaptation measure carried out in one locality could have consequences for another and participation across local areas and states was positive. However, in some cases climate change adaptation was securitized by government stakeholders in order to attract urgent attention and to push for an increase in financial aid. These initiatives boosted integration attempts at policy level and created demands for accountability in government sectors. However, this accountability was characterized by paperwork rather than describing actual adaptive activities. Overall, the study findings indicate that the results of securitization at government level has done little to impact the lives of vulnerable communities and groups and was even found to deflect responsibility for government inaction in relation to other risks. This paper therefore cautions for securitization of climate change adaptation.

Scrutinizing European Union Policy Debates on Tackling 'Embodied Deforestation': A New Emerging Paradigm in Multilevel Forest Governance?

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This paper scrutinizes the transformative potential of a newly emerging paradigm within European Union governance arrangements to address tropical forest and associated biodiversity loss: that of 'embodied deforestation'. To date, EU policy-making on combating tropical forest loss has mirrored the fragmented range of approaches taken at global level, as an example of multilevel networked governance in which many actors shape policy, in addition to the state. At the EU level, such actors represent a range of different interests, from biodiversity conservation to forest peoples' rights to agribusiness companies. More recently, policy discussions with these stakeholders has turned to reducing the impacts of EU consumption of agricultural commodities associated with the loss of tropical forest ecosystems, so-called EU 'embodied' or 'imported deforestation'. While this is a potentially transformative new policy paradigm, it is not yet clear whether it represents a real shift towards tackling the international consumption-related drivers of tropical forest degradation and deforestation. Through a combination of analysis of policy documents and semi-structured interviews with stakeholders involved in current EU external forest policy discussions, we take a multilevel networked governance approach to analysing whether this newly emerging policy paradigm represents a shift in responsibility for tackling international deforestation drivers from developing to developed countries, and whether it signals the presence of a more integrated approach. We find that despite the high political support within the EU for addressing the environmental impacts of resource consumption, a gap remains in terms of specific policy measures to reduce the impacts of EU consumption relating to tropical forests. This notwithstanding, many stakeholders are supportive of new EU policy measures that attempt to tackle EU consumption impacts linked to deforestation, rather than just supporting developing countries to take action, as has been the focus of EU policy to date. This suggests that a move towards a more integrated approach to combating tropical forest and associated biodiversity loss is possible. However, as long as actual EU legislative proposals to tackle drivers relating to global consumption are lacking, EU discussions on addressing consumption impacts are unlikely to signify major change for tropical forest biodiversity. The transformative potential of the newly emerging paradigm of "embodied deforestation", particularly for reducing fragmentation and promoting synergies across governance arrangements relating to tropical forest biodiversity, thus remains currently more of a promise than a translation into policy.

What Have Been the Practical Effects of the Aichi Targets on the Ground? Insights From Five National Case Studies and Recommendations for CBD COP15

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The Convention on Biological Diversity's (CBD) has adopted a 2011-2020 Strategic Plan in 2010, which contains twenty ambitious targets to halt biodiversity loss worldwide (so-called Aichi targets). However, alarming news on the rates and magnitude of biodiversity loss, both on land and at sea, keep appearing almost weekly, in the scientific literature and the general media. In such a context, the international governance of biodiversity could be easily dismissed as totally

ineffective. However, such a view would neglect the fact that not achieving a given target does not necessarily mean that setting the target had no practical effects on biodiversity action. Targets and goals can be used by actors for mobilizing and agenda-setting, for justifying their action, to raise additional funds, to improve knowledge and notoriety of a question, or even to allow name-and-shame. In order to inform discussions on CBD's next Strategic Plan, to be adopted at its COP15 (Beijing, 2020), such practical uses and effects of the Aichi targets must be further documented. This paper will present the results of five national case studies (China, France, Germany, Mexico, South Africa). Based on interviews with state and non-state actors (academia, NGOs, private sector) in each country, we will propose insights on i) what effects the Aichi targets have (not) had on the ground in each country, ii) what this teaches us about the links between international and national levels of biodiversity governance, and iii) what expectations different types of actors have for the future of the CBD. Based on a cross-country analysis, this will enable us to make some first recommendations for the decisions to be taken at COP15.

Governing Urban Sustainability: The Transformational Potential of Small Businesses and Pathways for Building Adaptiveness and Resilience of City-regions

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Businesses occupy a central position in research and policy debates on sustainability governance. Related research emphasizes the influence of the private sector in policy processes, the opportunity to advance sustainability through public-private partnerships, and the potential of firms to pioneer innovation - or displays them as laggards with limited incentives to accelerate transformations. However, little attention has been devoted to systematically understand the adaptive capacity of this group of non-state actors and their transformational potential to collective shape the resilience of city-regions. In this article, we scrutinize the role of small firms in governance processes and the pathways through which this actor contributes to sustainability transformations. We provide a more nuanced understanding of the mechanisms through which small businesses contribute to adaptiveness and resilience of cities and regions. Building on evidence from a large-*n* survey of over 1,600 small- and medium-sized enterprises (SMEs) in Canada and complementary insights from 80 in-depth interviews in Vancouver and Toronto, we examine the potential of SMEs to accelerate sustainability transformations in urban spaces. Our findings point to the need to view businesses not only as economic players and technology innovators, but as social actors that are embedded in social structures and influence their socio-environmental surroundings. Based on this re-conceptualization, we differentiate between governance *within* businesses (such as changing processes of manufacturing, employment arrangements, revenue structure, etc.) and governance *led by* businesses that shape configurations on a city-level (such as disrupting economic sectors, changing conventional practices, influencing agenda-setting, etc.). We develop a conceptual framework that integrates these two perspectives and explore urban transformation pathways. We demonstrate that businesses are able to build adaptive capacity and collectively shape the resilience of city-regions through transformations of internal operations (e.g. alterations of workplace environments, employee and client habits, business structure, etc.) and diffusion of capacities and practices required to implement sustainability on a systems level (e.g. habits and values in the local community, physical structures, policy environments, etc.). Small businesses can perform a diversity of roles as agents of change, which can be accelerated through partnerships between firms, government and civil society. We conclude with suggestions for new avenues of research and policy-making that may more effectively harness the transformational potential of small- and medium-sized enterprises.

Overcoming the Process-structure Divide in Conceptions of Social-Ecological Transformation: Assessing the Transformative Character and Impact of Change Processes

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A fundamental transformation towards sustainability in face of complex social-ecological challenges needs to initiate a deep change of those incumbent system structures that support unsustainable trajectories, while at the same time encouraging a diversity of alternative practices on the ground to account for diverse contexts, democratic concerns and uncertainties. A review of diverse transformation approaches, including the fields of Development Resilience, Critical Theory and Sustainability Transitions, shows that these do not (sufficiently) link processes of change at the micro level to deep leverages of change in the wider system structures. Further, most approaches lack evaluation principles that help to capture the transformative potential or impact of ongoing change processes. Addressing this research gap, we develop a conceptual framework that connects the macro and the micro level and helps to bridge process-oriented and structural approaches to transformation. It particularly draws on transformation conceptions building on Political Ecology and Social-Ecological Resilience. The framework combines an analytically sound approach, providing a basic understanding of the social-ecological system structures and functioning, with a normative frame that sets the space for legitimate sustainability goals of earth system governance. At the macro level, the objectives of inter and intragenerational justice need to be pursued by challenging the central paradigms that constitute unsustainable trajectories. To make the framework concrete and applicable in practice, we propose process-oriented evaluation principles for the micro and meso level that reflect these normative objectives and help to measure the transformative character and transformative impact of processes of change. The application of the framework and its principles is illustrated taking the example of organic breeding as an actor network attempting to challenge the current agricultural system. The framework can potentially provide guidance both to initiatives in increasing their transformative impact and to politicians in designing favorable frame conditions in support of a social-ecological transformation.

Self-organizing Transformations: A Social-ecological Network Reaction to an Oil Spill in Babitonga Bay, Santa Catarina

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In the Anthropocene, social-ecological systems (SES) are prone to face interlinked crises such as ecosystem degradation, pollution and sudden shifts in political or economic structures and processes. A thorough analysis of complex SES relations and associated environmental governance regimes is needed for the development of strategies to cope with such challenges and effectively using crisis as opportunity to leverage transformations to sustainability. One important knowledge need relates to the way actors that share challenges or resources link to each other. Social network analysis (SNA) is a well–known tool to investigate links between actors, but how those links change in response to sudden shocks (crises and opportunities), the dynamics they underlie, and how these dynamics influence environmental governance and management outcomes has been rarely examined so far. Social ecological network analysis (SENA), an evolving tool for SES analysis has its roots in SNA. In this paper SEN dynamics in the aftermath of an oil spill (2008) in Babitonga Bay (Santa Catarina state, Brazil), and subsequent opportunities and transformative actions taken are described. The company that caused the accident was fined over the harm it had done to the aquatic ecosystem of the bay and bordering coastline. Novel institutions were crafted to foster sustainability projects (n>5) in six coastal cities following a public call process and implementation-phase oversighted by the Federal Public Ministry and Federal Court of Justice. We report on the outcomes by one of such projects, Babitonga Ativa (www.babitongaativa.com), which deliberately acted as a network facilitator organization and, according to our current hypothesis, has been able to tip the governing system from a largely fragmented towards a hazy-to-transparent (release to reorganization to exploitation) regime according to transformative agency theory. This project ran from 2015 until 2018 and facilitated the emergence of a social movement of stakeholders. One major project outcome was the self-organization and lively endurance in the operation of a novel collaborative problem-solving platform (Pro-Babitonga Group). Here we discuss in which way certain network changes led or will likely lead to specific governance and management outcomes. We conclude with some reflections about the social energy, which fueled a joint

momentum in Babitonga Bay, since arguably this was and is a crucial driver of the implementation, investigation and development of the social ecological network and the local environmental governance.

Deconstructing the CAP: Global Versus Grassroots Influences on Urban Climate Adaptation

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Research on climate change-related disasters shows that social resilience tends to be directly related to the strength of community ties. Moreover, disasters often catalyze intense forms of community mobilization. Given the increasing prevalence of climate-related stresses in cities, there is a pressing need to understand what mechanisms help promote community self-organization, and how such forms of autonomy may be both shored up and scaled up by civil society organizations, municipal governments, international organizations, etc. An important dimension of the role communities play in climate adaptation is the way they respond to disasters. The increasing loss and damage resulting from disasters related to climate change are affecting vulnerable communities worldwide. In response to these experiences, grassroots' reaction to them are flourishing around the world. Some of the most well-known examples of these responses are the 2016 Occupy Sandy movement in New York City and the 1996 flood of Rio de Janeiro. On the other hand, Climate Action Plans of cities are organized around the ideas of climate adaptation, augmenting resilience, and recognizing potential vulnerabilities. This paper aims to answer how such plans are drawn up, and whether they are influenced by global scale developments or local, grassroots narratives about loss and damage, adaptation, resilience and so forth. To do this, I examine the climate action plans published by local actors and civil society organizations in five cities (New York, Istanbul, Napoli, Rio de Janeiro, and Stockholm) and compare them to two sets of narratives: The first set comprises of the local, grassroots narratives that emerged and/or were articulated following climate-related disasters in these cities. The second set of narratives are global in scale and are represented by the formulations in the IPCC's fifth Assessment Report (AR5) published in 2014. The findings help identify the influence of local and global narratives in urban Climate Action Plans, specifying the common points and hegemonic struggles between levels of governance.

Governance and Global Environmental Change in Conflict-affected Countries of Central Africa

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African populations are expected to be more vulnerable to global environmental change as a result of a higher than the global average degree of change, high levels of dependence on natural resources, and a low degree of adaptive capacity. In many countries, vulnerability and adaptation to climate change is affected by deficits of governance in such areas as government effectiveness, accountability, transparency, citizen engagement, social inclusion, and the rule of law. In some countries, political instability and violence threaten the peace and security of the population making them more vulnerable to climate hazards and constraining the development of long-term adaptive capacity. Despite the context of poor governance and political instability of some countries, international institutions are investing in initiatives to address climate change challenges. Central Africa contains the Congo Basin, the second largest rainforest in the world, and has become a main focus for international REDD+ initiatives (Reducing emissions from deforestation and forest degradation in developing countries). With a history of poor governance and conflict in some countries, it is not surprising that governance has been identified as one of the challenges in REDD+ implementation. According to some, REDD+ is functioning as a form of governance, due to its specific framing of climate change and its legitimization of specific tools, actors and approaches. Others have suggested that REDD+ can contribute to addressing issues of weak governance and help countries to adapt. Content analysis of documents from four REDD+ initiatives in two conflict-affected countries of the region, Central African Republic and the Democratic Republic of Congo, sought to understand how such initiatives could contribute to addressing the governance challenges. In particular, an emphasis was placed on how conflict is being integrated into the discourse on REDD+ and its implications. Results showed that while

governance reform was a key part of REDD+, discussion of how political instability might impact REDD+ outcomes was limited. Concrete approaches to address the reality of civil conflict were not evident. Since REDD+, peace-building and development initiatives are often funded by the same institutions, it is important to begin a dialogue as to how they can be more intentional in harmonizing approaches in conflict-affected, forest-rich countries in the region. Finding synergies has the potential to address governance deficits, foster resilience, and improve overall outcomes for the local people, and the global climate.

The Roles of Social Innovation and Community Science in Enhancing Earth System Governance and the Implementation of Intended National Determined Contributions (INDCs)

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In order for the global aspirations for development and social justice to be achieved as envisioned in the Sustainable Development Goals (SDGs), global policymakers need to develop new innovative strategies and mechanisms for improving climate change governance and earth system governance. This follows that regardless of various national and international environmental laws and climate change treaties and programmes such as the United Nations Framework Convention on Climate Change (UNFCCC), global policy makers have failed to put in place a framework capable of reaching any of the goals in the Paris Agreement and the global goal to limit temperature increase to 2°C. It is with these reasons in mind that bottom-up approaches for economic development and climate change governance have been suggested as strategies and alternative mechanisms that can lead to sustainable development and improved earth system governance. Social innovations are new solutions (products, services, models, markets, processes, etc.) that simultaneously meet a social need (more effectively than existing solutions) and lead to new or improved capabilities and relationships, and better use of assets and resources. Arguably, social innovation can facilitate bottom-up approaches for promoting sustainable development and improved earth system governance. Consequently, this paper sought to determine how social innovation can be used to create bottom-up approaches to facilitate sustainable development by complementing global architectures for improving climate change governance and improving earth system governance. The methodology used included analyses of case studies, project reports, policy reviews, policy briefs, and academic literature reviews on social innovation and environmental governance. The investigation discovered that most studies on climate change impacts in Africa are commonly performed at large spatial scales hence the generalised and broad conclusions generated do not always encompass the varied climate change impacts and challenges at local level and community level. The paper therefore concluded that enhanced climate change resilience and improved environmental governance in Africa may be improved by utilising climate finance modalities to promote community science/citizen science as a means to enable communities to collect climatic and non-climatic data on climate impacts and build the capacities of communities on the governance of resources.

Lock-ins in Climate Adaptation Governance: Conceptual and Empirical Approaches

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Building on the growing body of literature on barriers to adaptation to climate change, this paper focusses on 'lock-ins' as a particular conceptual approach to understanding path dependencies and rigidities in policy processes with a particular relevance to the field. The central research questions are, first, how can lock-ins be conceptualised, what indicators might identify them, and how can they be detected and described? Second, we seek to understand the emergence of lock-ins affecting climate adaptation policies by reference to central mechanisms originating from: (i) knowledge, discourses and expertise; (ii) physical infrastructures, (iii) institutions and past policy tools; and (iv) actors and their respective mental frames. Third, in cases where they are considered harmful, how can lock-ins be overcome or abated? It is the central thrust of this paper to advance an in-depth and conceptually rich explanatory approach to

climate adaptation governance and its obstacles. Empirical material from the Netherlands, Germany and the UK, including evidence from pre-existing studies, will support the argumentation. For example, in the Netherlands Lake IJsselmeer plays a pivotal role in water management, serving as a storage reservoir in the summers, from which perspective the water level should arguably be raised. However, the lake's intensive recreation sector relies on an extensive (harbour) infrastructure that only functions well with current water levels. These infrastructural and institutional factors, among others, make it hard to change management of the lake, and yet some small changes have recently become visible. In the case of urban heatwaves in the UK, the health care sector demonstrated significant failures to adapt to present-day vulnerabilities. These led to pressures for change, and the development of the Heatwave Plan for England, providing guidance to health practitioners and the public to protect vulnerable people. Despite these responses, serious recognition of the need to adapt the built environment including planning and architectural practice is lacking. No institutional solutions such as governmental plans are in place to adapt the present-day built environment. Along the North Sea coast under the expectation of a future sea level rise, higher hydrodynamic impacts may result in the loss of salt marshes in front of the dykes which could lead to further loss of unique Wadden Sea fauna and flora. Transformative ecosystems-based adaptation responses could avoid these impacts, but as of yet few actors or policy action in terms of ecosystems-based adaptation address these issues.

Climate Financing Needs in the Land Sector under the Paris Agreement: An Assessment of Developing Country Perspectives

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This paper explores the transformative potential of climate finance as a crucial ingredient in country efforts to shift away from unsustainable land use patterns in the context of the 2015 Paris Agreement on climate change. Specifically, we explore developing country assessments of the nature and scope of climate financing needs in the land use, land-use change and forestry sectors (LULUCF), as expressed in 40 Nationally Determined Contributions (NDCs). We synthesize the information that countries provide on targets and activities planned for forestry sectors, as well as cost estimates for mitigation versus adaptation-related forest-sector activities. While 39 of 40 countries reviewed provide detail on targets and activities they plan for the forestry sector, only 14 of the 40 countries reviewed provide clear cost estimates, and of those, mitigation cost estimates total US$ 20.6 billion, while the adaptation cost estimates total US$ 10.5 billion (mostly from the present to 2030). Importantly, the majority of adaptation and mitigation ambition is conditional on sources of international climate finance. None of the countries reviewed note the importance either of domestic or international fiscal policy reform of existing flows of finance to agricultural commodity production or other financing schemes that affect the direct and underlying drivers of land use conversion, as a means to promote their NDC goals. Following this meta-analysis of developing country perspectives captured in NDCs, the paper briefly assesses the state-of-play regarding climate financing for land use in two important forest-rich countries, Brazil and Indonesia. We examine whether these countries have relied on domestic finance to achieve land-sector climate mitigation goals, and if fiscal reform has been pursued. We conclude by drawing out implications of our analysis for continued debates over sources, quantities and flows of finance (international, domestic or private) to support the Paris Agreement's climate objectives, and the extent to which climate finance can realize its transformative potential.

Policy Design to Support Collective Action and Adaptive Governance: Examples from Community-Based Forest Restoration Approaches in the United States

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Research is needed to understand the policy contexts that support the tenets of adaptive governance, including collective learning, collective action, and multi-scale approaches that support local participation and network building.

Recently, scholars have proposed legal-administrative characteristics that may support adaptive governance. These include, among other things, participatory decision-making, well-defined boundaries, and statutes with defined periods of commitment, evaluation, and legal sunset. Examples of policies that have these characteristics are sparse, particularly in the United States; leaner yet is the literature exploring the implementation of such policies, their effects on governance institutions, or how existing institutions shape differential implementation. We evaluated two policies that were designed to support community-based approaches to forest and watershed restoration. These policies were intended to build cross-boundary, public-private partnerships, promote prioritization and integration of resource management, and encourage planning at larger scales. Through 140 interviews and a survey of over 400 individuals we assessed the perceived benefits of these policies, factors that supported project success, and variables that presented major challenges. We found that focused, multi-year funding investments encouraged collective action to a greater extent than traditional policy approaches and supported collective learning. Creative funding structures allowed for investments in typically underfunded activities. We also saw evidence of the emergence of networked governance structures to promote collective learning across multiple individual projects, leading to greater adaptive governance institutions more broadly in forest management, moving us beyond the era of place-based collaboration. The changing nature of governance raises a suite of new questions in US forest management, particularly around power structures, measurement of long-term success, and economic challenges that are becoming apparent as significant barriers to restoration. We will explore what is known about policy design to support adaptive governance, discuss the findings of our work, and expand our discussion to situate our research within the international discussion on adaptive governance strategies.

Explaining Institutional Change? Testing Theoretical Propositions through a Global Survey of Cities and Climate Change

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The unfolding impacts of global climate change compel governance systems across all scales to be adaptive and even to transform in response to shifting boundary conditions and evolving societal expectations. Institutions are central to this challenge, yet we still have a vastly under-developed knowledge of exactly how and why institutions change, and with what consequences. Developing suitable theoretical explanations of institutional change that go beyond traditional notions of stability or radical change is at the forefront of environmental governance research, and political science more broadly. Comparative empirical analysis of institutional change across diverse global environmental governance contexts remains a particularly pressing need. This paper focuses on applying and testing prominent theoretical propositions about processes of institutional change, through a large original global dataset of institutional innovation in 96 cities across the globe. This dataset was developed through a global primary survey of climate change adaptation in cities. The survey design was explicitly theory-formed to provide a basis for testing propositions about institutional change. It targeted cities that are potential innovators in adapting and transforming urban governance systems under climate change, stratified across continents (i.e. Africa=18, Asia=21, Europe=26, Latin America=13, North America=12, Oceania=6). Individual respondents (n=319) were key experts from multiple sectors (government, research, industry, civil society) and scales (within and beyond the city territory), to capture information about the complex, cross-sectoral and cross-scale nature of urban governance systems. Several types of institutional innovation were detected, regarding policy and legal frameworks (65% of cities), organizational setups (67% of cities), and coordination arrangements (77% of cities). The main processes of change appear to be 'layering' of new arrangements onto existing arrangements, and 'conversion' of existing arrangements to meet new objectives (cf. radical reforms). Endogenous drivers (e.g. problem pressure, change agent activity) appear to be important explanatory factors, but exogenous drivers (e.g. actors/arrangements at higher levels, experience of crisis) are too. This highlights a key need to further develop current conceptual models of institutional change, which often focus on either endogenous or exogenous drivers of change, from a broader multi-scale temporal perspective. Overall, this paper has relevance to earth system governance scholars interested in the interplay between architecture, agency, and adaptiveness. It contributes to several pressing questions for new directions in earth system governance research regarding: 1) approaches to conceptualizing institutional

change, 2) attributes and processes in governance systems that enhance capacities to adapt or transform, and 3) the politics of adaptiveness and transformations.

The Social Dimension of Ecosystem–Based Adaptation to Climate Change in Colombia

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Ecosystem-based adaptation (EbA) is "adaptation powered by nature", where the goal is to boost the resilience of natural ecosystems and the services and species that support them, so that they and the communities that depend on them are prepared for the impacts of climate change. EbA approaches can be very diverse and include mangrove restoration to buffer against storm surges; watershed management to protect against droughts and floods; rangeland management to prevent desertification; and sustainable management of fisheries and forests to ensure food security. Adaptation has become an increasingly important part of the international climate policy agenda. However, there is still a lack of adaptation finance targeted to biodiversity and ecosystem services as adaptation planning and funding is mainly focused on traditional or hard adaptation options (e.g. infrastructure). Besides its adaptation benefits, it is assumed that EbA comes along with important social co-benefits (e.g., empowerment, capacity-building). However, so far no studies have been undertaken that evaluate EbA measures from a social point of view. This paper aims to address the identified research gap by investigating the generation of social benefits and potential social costs in the context of selected EbA projects on water management and costal adaptation in Colombia. Moreover, we also aim at exploring the distribution of these social benefits and costs and the factors contributing to the distribution. Conceptually, we use several ecosystem services frameworks developed by scholars (e.g. Fischer et al. 2014) and EbA methodologies developed by funding and implementing agencies (e.g. FEBA 2017), we further incorporate other elements to make it more fit to analyzed realities in the global south. The analysis shows how EbA measures have the potential to support a. peasant and local knowledge (exchange) and livelihoods, b. gender equality, c. intra and inter-social collective action, d. the revitalization of cooperation networks, e. environmental awareness raising, f. creates social recognition for environmental leaders, g. creates spaces (physical and intellectual) for community to come together, g. supports provisioning (e.g. water) and regulating (e.g. local climate regulation) ecosystem services. Nevertheless, there are two things that need to be considered: On the one hand, most of these social benefits only occur during projects implementation phase. On the other hand, and given the small scale of the projects, the degree of adaptation of the involved communities is still unclear.

Exploring the Performative Power of Pathways in Evidence-based Policy-making: The Role of Negative Emissions Technologies in the Climate Regime

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This paper examines challenges which may arise from basing policy-making on future pathways with reference to Negative Emissions Technologies (NETs) in the context of Post-Paris climate regime. This Post-Paris constellation includes at least two, mutually reinforcing challenges: firstly, science is not only asked to simply assess scientific facts about the causes of global warming (attribution), and assessing its impacts (detection). Instead, science is also expected to project and evaluate the performance of policies in the future. By providing future pathways, expert bodies such as the Intergovernmental Panel on Climate Change (IPCC) also offer sites where climate futures are imagined and transformed into actionable collective future and thus contribute to shape political choices in the present. Secondly, the paper explores what role is attributed to emerging technologies such as NETs in scientific projections of climate futures. The particular challenge of projecting NETs is that these technologies are *speculative* in the sense that most of their proposals only exist within the parameters of Integrated Assessment Models (IAM) used by the IPCC but are not yet available at the extent calculated by IAMs. Based on the concept of 'imagined futures' (Beckert 2016), the paper

explore how NETs work as 'fictional expectations' and shared imaginaries which enable actors to make decisions in situations of extreme uncertainty and political contestation independently of whether the promises of the technologies at their core are actually fulfilled. The role of pathways based on speculative technologies in climate politics is rarely understood. This paper also takes into account the political context and the growing demand for pathways from this side. It therefore asks how and for what reason expert bodies are asked to provide scientific evidence for political decisions and expertise has become a major source of political legitimation. The growing political demand for legitimation by experts for making and justifying political choices raises novel challenges for science and expert bodies, potentially undermining of their integrity and trust in the long-term. The paper concludes by addressing democratic implications of climate politics based on future, technology-based pathways such as the diagnosed lack of democratic scrutiny (Stilgoe, 2017) and the loss of political accountability (Geden & Löschel, 2017).

Institutions and Trade-offs between Climate-Resilience and Livelihood-Vulnerability in Socio-Hydrological Systems

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Bangladesh is ground zero for climate change. It is ranked as the most vulnerable nation in the world by the Global Climate Risk Index. Among other things, the country is vulnerable to land subsidence and sea-level rise (i.e. flooding). This is exacerbated by demographic trends (for the provision of sustainable livelihoods). In order to tackle such problems, about 140 polders have been constructed across the coastal belt of Bangladesh. A polder is a socio-hydrological system consisting of a piece of land surrounded by embankments. The polders of Bangladesh seek to offer food and flood security for about 35 million people spread across about 47,000 sq. km. However, there is no theoretical clarity about the conditions under which socio-hydrological systems in general (and Bangladesh polders in particular) result in decreased vulnerability for the constituent social system. Theoretical light also needs to be shed on the conditions which increase the adaptability and resilience of such systems. Our study seeks to better understand such conditions by asking the question: How do institutions moderate the trade-off between climate-resilience and livelihood-vulnerability for communities associated with hydraulic technologies such as the polders of Bangladesh? These questions are answered by operationalizing the Sustainable Livelihood Framework. This framework is based on the assumption that resource endowments affect livelihoods depending on the context. Institutions (local, regional and global) moderate this relationship. The vulnerability of communities to shocks and their resilience to stresses further influences the relationship. Drawing on such ideas, a 2-stage hypothesis guides this effort: a) Under different contextual settings, different combinations of livelihood resource endowments, lead to different combinations of livelihood strategies; b) These combinations of livelihood strategies, lead to trade-offs between livelihood outcomes after being moderated by different institutional settings. The methodological approach used to the test this hypothesis is a 2-stage linear regression analysis conducted on a dataset of about 140 polders using data collected from 280 structured interviews, secondary research and GIS analysis. Preliminary research suggests that institutional misfit, after controlling for vulnerability to hazards, leads to conflict over resource use. Such conflicts influence the trade-off between climate resilience and livelihood security for communities associated with polders. In other words, preliminary research appears to suggest that the construction of polders is not a panacea for climate change adaptability. Polders are useful but only under certain conditions, such as when local communities redesign the hydraulic systems to fit local institutional and hydraulic boundaries.

Political Things and Governance Objects: Future-Making and the Transformation of Earth System Governance in the Anthropocene

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The transformation of Earth System Governance in the age of the Anthropocene has resurged the interest in the ways in which futures are anticipated and inscribed into specific objects for the future such as climate foresight processes. For instance, the IPCC started to create "pathways" which are used as benchmarks against which extant policies can be measured and evaluated. This paper advances current scholarship on future making by introducing an object-centered theory as developed in Science and Technology Studies and International Relations. My core argument is that objects for the future are either sites wherein the politics of anticipating the future can be analyzed; or, equally important, they are functional instruments that allow building and creating features. In other words, I suggest to differentiate between those objects which are open-ended, contested, highly political and directed to what we do not know for sure (political things), and those objects which are already known and functional (governance objects). In distinguishing between both functions of objects for the future, we are able to explain how actors engage in transformative practices: Only if actors manage to black-box some objects as governance objects, they are able to determine the space for creativity and change and thus work collectively on political things. The paper illustrates the implications of such a theory with reference to the changing role of science institutions for sustainability. Science institutions such as the IPCC, the IPBES or Future Earth started to provide both conventional assessments (governance objects) as well as new forms of knowledge such as pathways or learning platforms (political things) which increasingly create room for experimentation. The object-centered theory suggested here explains how the interplay of both objects can function as an engine for making futures.

Plastic and Politics: A Review

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There is considerable controversy surrounding plastics. It is both a quintessential material that acts as an 'infrastructure' of modern societies, and it is emerging as one of the defining global environmental problems of our time. Concerns over plastic problems and how to govern them have received increasing attention in recent years. Several national governments have begun targeting specific plastic objects, e.g. plastic carrier bags, plastic bottles, and microbeads. There is also a growing academic literature that seek to highlight, understand and provide solutions to the multitude problems of plastic. However, the literature on the politics of plastics is scattered and exists as subgenres or pockets within different debates about plastics. While scholars who focuses on marine pollution talks about political solutions in one way, those that investigate sustainable solutions to plastic often have quite different perspectives. Using the Web of Science database, we study how plastic politics is represented in the literature using three different lenses. First, we study plastic politics along the plastic value chain analysing the literature focusing on production, consumption, waste management, and pollution. Second, we study the literature on plastic politics around key plastic objects, which have been the focus of public policies, e.g. plastic carriers bags, bottles, microbeads, and textile. Third, we study plastic politics at different governmental levels, examining literature on plastics at the local, national, intergovernmental level. We find that there is a lack of literature that demarcates plastic politics in a comprehensive way, where the plastic system as such is analysed. We conclude by presenting our views on key characteristics of plastic politics and argue that it in many ways is a different type of environmental problem.

Conflicting Narratives on Sustainable Plastics: Critical Analysis of the EU Plastic Strategy

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Few would disagree that we need to ameliorate the multiple problems of plastic and begin transitioning towards a sustainable plastic system. However, what sustainable plastics is and how get there is much more controversial. This is becoming increasingly evident, since the EU Commission launched its "A European Strategy for Plastics in a Circular Economy" in 2018. Using a combination of sociology of expectations and policy narrative analysis, we analyse five key narratives that present different pathways to sustainable plastics: *bioplastics, biodegradable plastics, recycling, fewer*

types of plastics and *less plastics.* We also identify key actors that adhere to these narratives within discussions at an EU level. Each narrative present different perspectives on what the key problems and solutions are in relation to sustainable plastics. We identify the synergies and trade-offs between these narratives and argue that the policy process needs to reflect on these trade-offs to a larger extent. We also find that the recycling narrative has become a dominant narrative within the EU discussion and highlight how this presents certain opportunities, but ultimate neglects others. We conclude by discussing the complexities in governing this transition at the EU level and how plastic governance much like its material characteristics cuts across and is influenced by a number of other political domains. A key challenge for the EU Plastic Strategy, and indeed for governing a sustainable transition of the plastic system more generally, lies is orchestrating the complexity of the plastic system and further integrating the different stages of the value chain.

Fossil Fabric: Decarbonisation and the Politics of Textile Transitions

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The Paris Agreement states that countries will aim to “undertake rapid reductions” to achieve zero net greenhouse gas emissions in the second half of this century. As the scope of action for responding to climate change expands beyond the energy sector to the materials through which the economy is made – such as steel, paper, plastic, meat and milk – the question of how to achieve decarbonisation must also shift. This paper examines the decarbonisation of the textile industry and the politics of its potential transitions. It engages the problem of how plastics form the “fossil fabric” of modern life and the challenges of untangling society from petrocarbons. For the textile industry, “decarbonisation” is as much about material substitution as it is about reducing carbon dioxide emissions. Actors including manufacturers and retailers, consumer groups, social movements, and non-governmental organizations have proposed a range of initiatives aimed at reshaping the existing configuration of production, consumption, and waste of petroleum-based clothing. Achieving a significant reduction in the use of petrocarbons in clothing and textiles is, however, regarded as challenging due to the lack of easily substitutable low-carbon technologies, the nature of the modern clothing market, the complexity of the industry’s product chains, and the material qualities of fabrics that come into intimate contact with human bodies. Drawing on case studies of specific initiatives within the clothing industry, this paper reflects on the varieties, indeterminacies, and contradictions at work in the transformation of the textiles economy and their implications for decarbonising other emissions intensive industries.

Oceans of Plastic: A New Challenge for Global Environmental Governance

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In the last 20 years, the discovery of several ocean 'garbage patches' in international waters has revealed a major endpoint of the global plastic production and consumption chain. These great patches, or ‘trash gyres,’ mostly plastic, are a quintessential externality: hidden from sight, harmful in a diffuse and difficult-to-quantity way, and existing beyond national jurisdiction. This paper describes the features of ocean garbage patches, including where they exist, what they are made of, and what questions remain about them. Through surveying the patches’ effect on ocean ecosystems, the paper identifies interests and stakes of the international community in characterizing the problem and formulating solutions. I focus especially on impacts on global fisheries and the provision of 'ecosystem services.' I argue existing global environmental governance frameworks are inadequate to address the problem of a plastic-filled ocean, and consider remediation possibilities. This paper connects the ocean garbage patch phenomenon to two larger narratives. First, it fills out our understanding of the chain of production-consumption-degeneration of global plastics. Second, it contributes to ideas about the inadequacy of a state-centric perspective for redressing global environmental challenges, by demonstrating how the framework of 'national interest' fails to prompt concern or action regarding this planetary-scale problem.

Exploring the Microplastics-Biodiversity-Climate-Health Governance Nexus

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As it has become a new yet permament toxic element of the anthropocentric environment, plastic marine debris (including macro, micro, and nano plastics) has assumed and contributed to an alarming level of threat concern for planetary boundaries. However, a systems approach demands that we recognize how this physical threat is now part of other large-scale biosphere challenges, especially the biodiversity, climate, and human health nexus. We can draw lines of influence amongst these biosecurity threats in environmental science, epidemiology, disaster reduction, and other disciplines; but global governance studies need to add the micro plastic crisis to the equation as well. This can be reflected in amendments and additional protocols to extant governance mechanisms and internataional conventions, but also in a changed mind-set that is more accommodative of adaptive, large-scale systems thinking. The paper will describe the microplastics-biodiversity-climate-health nexus from a systems perspective and discuss points of commonality and synergy in governance/adaptation approaches. It will argue that it is at best incomplete and at worst negligent to ignore these ongoing connections when trying to solve the "plastic problem": for that problem has now become intertwined with the biodiversity crisis, the climate change dilemma, and the human health challenges of this century.

Evolution of the International Regulatory Regime and 'Ecosystem' of the International Carbon Market Mechanisms Since the Late 1990s

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A structured review of the existing literature on changes in international market mechanisms for greenhouse gas (GHG) emissions reductions and related regulatory systems is undertaken, including over 200 peer-reviewed articles and 50 articles from "grey literature" coming from highly-reputed sources. The key objective is to distil the key lessons for the design of the market mechanisms under the Paris Agreement. A key aspect of the review is the identification of distinct periods with specific challenges faced by markets and regulatory systems. The first period from 1997 until 2005 is characterized by the introduction of market mechanisms as a climate change mitigation tool. The operationalization of market mechanisms required the establishment of officially approved baseline and monitoring methodologies and piloting activities in different sectors. The nascent carbon market was characterized by the lack of demand from the private sector making the initial participation of the public sector crucial. Between 2005 and 2010, the carbon markets entered a phase characterized by great expansion. This period saw significant changes in markets and regulatory frameworks as the EU ETS became operational and was linked to the Kyoto mechanisms. This link created a large source of demand for carbon credits from the private sector adding to the demand from governments, e.g. in Japan. During this "gold rush" period criticism emerged with regards to the uneven distribution of projects and limited participation of poorer countries, as well as issues related to environmental integrity. The next period is characterized by a sudden fall in carbon prices between 2011 and 2013 and the resulting decline in the development of new carbon projects. This market crisis occurred due to changes in both domestic and international regulatory regimes. At the domestic level, the issuance of carbon credits started reaching quantitative limits on the use of offsets in the EU ETS effectively eliminating the largest source of demand. At the international level, the failure of the Copenhagen conference and uncertainty surrounding the second Kyoto Commitment Period resulted in the drying up of demand from governments. The post-Paris period is characterized by significant changes in the international climate regime. Unlike the Kyoto Protocol the Paris Agreement adopted in 2015 involves global participation in mitigation, which will increase complexity. New market mechanisms will therefore face both old challenges – supply-demand balance, environmental integrity, transaction costs – and new ones – interactions with other policies and national targets, sectoral baselines, enhancing the sustainable development contribution, etc.

Envisioning New Modes of Governance for a Blockchain-enabled Energy Market Transformation in the Netherlands

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Blockchain technology, among the many technologies which comprise the Fourth Industrial Revolution, presents novel governance challenges. As of spring 2018, blockchain-enabled energy trading was in an experimental phase, without any commercialised products rolled out on the Dutch market. Private consultancies, energy suppliers, and the European Union have invested in technical proof-of-concepts, which have demonstrated promise for wider-scale implementation. Concurrently, the question of governance has repeatedly been raised without adequate cross-actor discussion to provide clear, actionable visions set for future transformation. This research explored how governance arrangements and actor networks within this sociotechnical system can be reconfigured over the first half of the 21st century to facilitate a sustainable transformation towards a blockchain-enabled peer-to-peer energy market in The Netherlands. It additionally prescribed actions that societal, technological, and governmental players can take in order to achieve that target. The research consisted of literature review, interviews with stakeholders and experts, culminating in participatory scenario design and roadmapping workshops. Interviews were conducted with domain experts and actors currently in or seeking to participate in the Dutch peer-to-peer energy market. Scenarios were designed, ranked, back-cast, crash-tested, and discussed over the course of several participatory workshops. Finally, an implementation and roadmapping workshop was held, in which an optimal scenario was selected, avoidable governance pitfalls were discussed, and each actor planned out specific actions and organisational changes to make over the 2018-2050 period to realise the agreed-upon future vision. It is our hope that the research findings will help bridge the gap between invention and innovation, and promote orchestration in future governance. Our results enrich the robustness of contemporary knowledge on the arrangement and planning for transformative governance structures which can promote opportunities for sustainable development provided by novel technologies such as blockchain. Practical insights are provided to stakeholders in other countries, who may be considering how to approach the governance of blockchain-enabled peer-to-peer energy markets. This research contributes to the conference themes of 'Adaptiveness, Resilience, and the Transformation of Earth System Governance' through its focus on transformation pathways, and of 'Architectures of Earth System Governance' due to our focus on new modes of governance required to support the development of an emergent technological niche. Our use of the futures methodology is based on work by the Task Force on Anticipatory Governance, and our theoretical focus on the governance of new technological developments is based on the body of Strategic Niche Management research.

Between Governance and Transformations: Insights from a Meta-analysis of 180 Case Studies

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The actual and necessary emergence of societal transformations to deal with sustainability challenges is discussed in different bodies of literature, including transition theory, social-ecological systems, and policy innovation. While recent papers have made laudable efforts to draw some syntheses about governance of or for societal transformations, a significant conceptual and empirical knowledge gap persists. Empirical studies are fragmented and limited in scope, particularly in terms of the modes of governance that are presupposed or advocated to steer societal transformations. Hence, we lack a systematic overview of the modes of governance that are applied in practice and what they produce in terms of societal transformations. In view of this knowledge gap, this research presents a systematic literature review that aims to document empirical case studies of the governance of societal transformations. We developed an analytical framework for conceptualizing both governance modes (including centralized, decentralized, public-private, interactive and self-governance) and other key elements of societal transformations (including system model, form and temporal range, seat of causality and outcome of the transformation). This analytical framework was used to

systematically code over 180 empirical case studies of transformation to sustainability of a range of systems and in different geographical contexts. This research is unique in the way that it reveals the interdependences between modes of governance and pathways of transformation to develop a robust and holistic understanding of how societal transformations are governed and how governance might change in the process.

Towards Sustainable Peace? The Social-ecological Dimensions of Post-conflict Governance in Aceh, Indonesia

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This paper advances a new conceptual framework for the analysis of "sustainable peace" that expands traditional concepts by a novel socio-ecological dimension. This new conceptual framework has become necessary given the novel challenges of the Anthropocene that require a conceptual framework fostering at the same time peace, equity and justice for human and for nature. The definition of sustainable peace in our framework combines the absence of violence (including direct, structural and cultural violence) against all human basic needs and ecological needs, and the presence of positive quality (that is, direct, structural and cultural peace) to human and nature – a positive quality that may heal the impacts of past violence and prevent the future emergence of violence. In constructing this definition, this paper develops a novel definition of violence; reformulates existing typologies of violence and of the cycle of violence; and devises a time dimension of violence within an ecocentric approach. The socio-ecological dimension in this framework will enrich the concept of peace as it has initially been developed by Galtung, encompassing the notion of negative peace but expanding it to human and nature, and the positive peace in the form of positive quality: direct peace (cooperation); structural peace (equity, equality and justice); and cultural peace (dialogue and co-learning). This novel framework is expected to generate new insights into the conditions under which sustainable peace can be advanced, and how sustainable peace can be measured. The second part of this paper employs this conceptual framework to the case of Indonesia, and here in particular to post-conflict governance in the region of Aceh, which has been affected for long by violence against both people and nature.

Techno-optimism and Farmers' Attitudes toward Climate Change Adaptation

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In industrialized societies, techno-optimism is a belief that human ingenuity, through improved science and technology, will ultimately provide remedies to most current and future threats to human well-being, such as diseases, climate change, and poverty. Here we examine: (1) whether techno-optimism is found among Midwestern corn and soybean farmers and (2) how this confidence in human ingenuity influences their support for climate change adaptation. By examining a survey of nearly 5000 conventional farmers in the Midwestern U.S., we found that greater techno-optimism can reduce farmers' support for climate change adaptation and increase their propensity to express a preference to delay adaptation-related actions. Techno-optimism can be an ideological force that may hinder farmers from engaging in climate change adaptation, even when they perceive that the risks associated with climate change are serious. This study makes several contributions to our understanding of farmers and climate change adaptation: First, to the literature on environmental sociology, specifically to its understanding of human exemptionalism in conventional agriculture. Second, to natural hazard research by highlighting that actors may think of 'experts' in terms of abstract entities and not solely in terms of actual authorities, such as disaster relief and rehabilitation agencies. Third, to the literature on farmers' decision-making in uncertainty, specifically, as it relates to their willingness to support adaptation to climate change.

Who Speaks for the Future? Political Representation in the Anthropocene

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In the Anthropocene, political representation of affected constituencies stretches over large time scales into the future. Speaking for future people has thus become a common claim in sustainability politics. Although institutional designs of such representative bodies for future people are already invented and experimented with, the underlying power struggles over the making and defining of the future remain a gap in current research. In the Sustainable Development Goals (SDGs) process, politicians or NGO-campaigners make representative claims about specific constituencies on a global scale and thereby construct constituencies, for example as “the indigenous people”, “the younger generation”, “the future people”. A myriad of representative claims from different actors are made between cities, on protest events or the international negotiation fora of the UN. Thus, political representations are bound to concrete local contexts and at the same time, relations between representatives and constituencies are often stretched over different times, geographical distances or beyond different species. Political representation can then lead to the construction of distant and isolated entities, such as the far away “global poor” or the distant “future people”. In drawing on arguments on Othering-mechanisms, this paper explains the mechanisms of representing future people as distant and isolated “others”. As such, this paper inquires how political representations within the SDG framework shift, when the places of representation change. It does make a difference, if representative claims are articulated in the UN headquarters of New York, or in a local NGO office in the Philippines or in the mayor’s office of the city of Baltimore. In analyzing the case of the city of Baltimore, which has become “one of three US cities to pilot implementation” of the SDGs, this paper reconstructs the translation and reconfiguration of the SDGs between the UN level and the city level. This case is specifically interesting as it shows the shifting and reinterpretation of global and abstract sustainable futures into very concrete and relational representations of futures. In sum, this paper argues that political representation of future people needs to be reconceptualized in a relational and pluralized way in order to avoid pushing future people into the positions of distant others.

Neoliberalism and the Uncertain Future of Funding International Agreements: A Review of 26 Agreements on Climate, Environment and Development

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Since World War II, developed countries provide public finance to support developing countries to implement international agreement in the fields of environment, climate and development. In the UN climate regime, private finance (since 2009) and support by emerging economies (since 2015) are now included as additional sources of finance. Intergovernmental regimes around international agreements are rarely constructed on a blank slate. This paper therefore examines 26 post-World War II international agreements on development, environment and climate change on similarities and patterns in the way their implementation is financed. Our research demonstrates that financial support for the implementation of international agreements, and the motivations to provide it, have changed dramatically. Three broad phases can be defined based on the 26 agreements we analysed: 1) Traditional donor countries assist developing countries with public finance (roughly until the 1990s); 2) traditional donor countries have the responsibility to support developing countries, but all countries accept ‘common goals’ and address these through public-private partnerships (from the 1990s until the present); and 3) implementation of international agreements is voluntary but universal; private (co)financing of the implementation of international agreements is the new norm. This third phase started with the UNFCCC Copenhagen Accord (2009), but can be witnessed as well, among others, in the Agenda 2030 (SDGs) and the Sendai Framework for Disaster Risk Reduction. These three phases sometimes overlap, and they develop neither in linear nor identical ways. We discuss three potential and interrelated explanations for the shift from public to private financing for the implementation of international agreements. First, the rise in belief in neoliberalism, in particular by developed countries. Second, the relative economic decline of the Global North and the changing world order. A third explanation is public evasion by developed countries. Finally, we ask whether a fourth

phase, of universalized expectations of nations, and reliance on massive private funding, with only marginal public pledges - and some made by developing nations- is to be expected.

Assessing the Influence of Natural Hazards on National Disaster Risk Reduction

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Natural hazards continue to cause significant harm to societies worldwide but are also potential drivers of positive change in social, economic, and political orders. However, if learning and reform is to engender positive change in the wake of disruptive hazards a number of inhibiting factors, such as institutional barriers, self-defensive measures, and blame-shifting, must be surmounted. Actual empirical evidence about the transformative potential of natural hazards is rather meager, and consequently there is an urgent need for systematic research. We assess whether and how natural hazards influence national-level capacity for disaster risk reduction. Using data on natural hazards from the Emergency Events Database (EM-DAT) and national progress reports on the implementation of the Hyogo Framework for Action (HFA) we conduct a global and longitudinal assessment of how hazard exposure shapes national disaster risk reduction capacity. Our study examines association between hazard attributes (type, frequency, magnitude) and changes in areas of disaster risk reduction (institutional frameworks, monitoring, education, risk assessment, and preparedness), controlling for lagged effects and relevant regime type variables. Besides filling an important empirical void, the study's findings will be situated in relation to interdisciplinary scholarly debates about the societal impacts of natural hazards and how best to make vulnerable communities more resilient.

Governing Transnational Climate Risk: Sweden's Trade-related Climate Risk Profile

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Sweden is a small, highly connected, trade-dependent country. Relative to other countries in Europe and globally, its vulnerability to direct climate change impacts occurring inside its borders is low. For these two reasons, Sweden's toughest adaptation challenges may well result from climate change impacts in other countries upon which Swedish society is dependent or to which it is otherwise linked. But how can countries assess their exposure to climate risk that originates beyond their borders? The aim of this paper is to develop an analytical framework and methodology to assess such risk exposure and present preliminary results for Sweden, as a basis for understanding governance and policy options. Assessing country level exposure to these so-called transnational climate risks is not a trivial undertaking given high levels of complexity and uncertainty. *Complexity* refers to the challenge of untangling the web of Sweden's global connections, including multi-tiered supply chains and the high level of "embedded risk" inherent in products that are manufactured in multiple countries before being consumed in, or indeed exported from Sweden. *Uncertainty* refers to the potential effects of climate change on transnational links and flows, as well as potential future changes to the spatial distribution of Sweden's links and flows, as a result of dynamic processes within and beyond Sweden's borders. This paper will propose an analytical framework that distinguishes different types of risk over distinct spatial and temporal scales. This typology will then be used to identify suitable quantitative indicators by combining existing data with new data platforms (e.g. trase.earth) and new modelling techniques (e.g. IOTA), and where possible by combining these with data on climate change risk for specific countries and commodities. The paper will reflect on the relevance and usability of such indicator-based assessment for risk governance by national and private actors in Sweden, and highlight key policy options.

Conceptualizing 'Anticipation' as a Normative Ideal of Climate Governance

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Anticipation is increasingly central to contemporary environmental governance debates on climate change. It is largely agreed that climate change requires long-term thinking coupled with new forms of decision making that build resilience to future large-scale, uncertain and rapid changes at a global scale. Anticipatory practices are thus coming to the forefront of political, organizational, citizens' society and humanitarian relief. Research into anticipation, however, has not kept up with public demand for insights into these anticipatory practices, their risks and uses. Where research exists, it is deeply fragmented. There exist gaps in our knowledge such as how do anticipatory regimes produce climate governance? Who is telling the story of the future? Are these normative predominantly? And what tools and techniques are being used to govern future narratives about climate change? The objective of this paper is to explore anticipation as a normative framing of climate governance, which furthers our understanding of anticipatory governance in relation to adaptation and the future. Here, we consider that anticipatory governance is adaptive governance under noteworthy or disruptive, transformative future change. We review the development of the concept anticipation to date in scholarships in social science as a reaction to rationalist and linear accounts of policymaking, such as: 1) policy and planning studies; 2) post-positivist policy studies; 3) political science literature on defense studies and presidential decision-making; 4) post-normal science and STS studies and 5) reflexive governance for sustainability, and examine how these relate to the notion of long-term, futures-informed anticipatory governance. The paper concludes with some critical reflections on how these approaches or framings are new and relevant to climate change resilience and adaptation debates.

Policy Transformation Analysis: Comparative Case Study of Water Management in South Korea and Germany

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Climate change results in more frequent extreme precipitation as well as prolonged drought in a number of countries including South Korea and Germany. Nevertheless, their water management policies have shown substantial difference. The Korean government initiated its 'Four Rivers Project' in 2009 as part of a 'Green New Deal' policy and the main activities of the project consisted of building 16 weirs and dredging sediments. Meanwhile, the German government has turned their way from technical solutions to nature-based solutions. In the Climate Change Adaptation Strategy, The German government puts emphasis on re-naturing rivers as a way to reduce flood risks. It raises questions such as: why has Germany changed their approach to water management? More generally, why do Korea and Germany pursue adaptation policies for water management in different ways while the expected effect of climate change is similar? This study analyzes the aforementioned cases with institutional and discursive frameworks. Formal and informal institutional settings such as rules and the interaction patterns of different actors can be 'sticky' in the governmental policy process at every stage from policy making to implementation (historical institutionalism developed by Hall, Pierson, Skocpol, etc.). At the same time, climate change raises the question of the role of discourse in the policy process. This is partly because the limitation of our scientific knowledge about the climate system gives discourses and frames bigger roles in the decision making process. The actors involved in climate change adaptation policies try to use powerful narratives and symbols to gain political support (e.g. Hajer, Fischer, Dryzek, etc). This study is an ongoing PhD research project based on most similar case comparative study. Qualitative approach is taken for the analysis. 45 semi-structured interviews have been conducted in Korea and Germany since February 2017. The current conclusion based on the analysis of the interviews is that both institutions and discourses affect the policy process. Particularly, policy transformation in German water management occurred when the raised environmental awareness met shocking events such as floods or chemical accidents in the rivers. In other words, it can be concluded that when a specific societal discourse meets a critical (external) event which gives the discourse a momentum, policy change can be possible.

Transforming Institutions in Transitional societies of rural India

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Efforts to combat climate variability, pollution and adapt to its effects is the major challenge human race is facing this century.Risk induced by these environmental changes in grain production is well understood.Yet the cooperative initiatives by small and marginal farmer households to address the associated risk, use of new technology from developing countries are under-represented in environmental negotiations. The objective of this study is to understand the formal and informal institutions followed by small-medium farming communities to address climate based production risk along Vembanad wetland, a Ramsar site along the Southern Indian peninsular. The study use three cases to illustrated and compared on how the paddy-shrimp rotational farming communities (less than 2Ha land)adapt to changing salinity levels in the estuary by bringing institutional transformations.The first case study shows how agrarian farmers negotiated with local panchayats for deconstructing the water barrier for best use of water quality for shrimp farming ,the second case study shows how rotation rice –shrimp farmers form groups to raise their concerns on constructions along wetlands which impact their crop production in scenarios of unpredictable sea surges, while the third case study points out how farmers moved legally for their right to good quality water.The cases are studied using unstructured questionnaires and focus group discussions. The results show that though the market could give signals on crop production, in the transitional societies it's the institutional initiatives linking multiple institutional players helped the farmers to adapt to changing climate scenarios.

Citizen Participation in the Energy Transition: What Role for the European Union?

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In 2008, the European Commission launched the first edition of the Covenant of Mayors for Climate and Energy, which calls civil society and other stakeholders to become "*active players in the energy transition […] by getting involved in community action".* More recently, in 2016, the European Commission recognized the role of community-based energy projects in proposed legislative measures that are part of the Clean Energy Package, for the first time. I argue that this shows a shift from the Commission in the wording of legislative measures and non-legislative measures. Indeed, it now looks at European people as actors of the energy transition and not solely as energy consumers. This paper develops a policy analysis that explains this shift and shed light on the source of these new energy policy elements. New insights into the intention of the Commission behind its recognition of community based energy projects and its willingness to develop bottom-up tools to foster the energy transition are being presented. Furthermore, by looking at the actors involved in the policy formulation phase of those two EU legislative and non-legislative measures, this analysis helps both to pinpoint the emerging actors of the current and upcoming energy system governance and to evaluate their influence on these measures. In terms of methodology, I draw on the Paul Sabatier Advocacy Coalition Framework to distinguish two coalition of energy transition actors, a cooperative value-driven coalition and an incumbent operator value-driven coalition. This framework helps to understand the cohesion and the influence that exist within and between these coalitions. I draw on Ecological Economics to spotlight the deep core values and beliefs that motivate the positions and advocacy strategies of both coalitions. Ultimately, thanks to its temporal approach, this paper helps understanding that politics of adaptiveness and transformations of earth system governance evolve over time, as the context changes. This also helps to understand the resilience of the current earth system governance.

Theoretical and Methodological Foundations of Earth System Governance

Social Process Obfuscation and the Anthroponomy Criterion

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If Earth system governance is to be morally and politically acceptable, its core concepts, values, and goals -such as sustainable development- must satisfy the *anthroponomy criterion*. They must be consistent with *the collective self-regulation of humankind* as a whole. Otherwise, they advance moral injustice and political oppression over people. A basic condition of not violating this criterion is for governance practices, structures, institutions and language to not impose a way of life on people that they do not conceivably recognize (Coulthard). Imposing a way of life in language, for instance, commits an epistemic injustice that takes the form of an injustice of misrecognition. It forms epistemic silencing (Dotson), disrespect of the social meaning of people (Honneth's third form of misrecognition), and contributes strongly to exclusion from the "division of the sensible" (Rancière). It is therefore necessary that any Earth system governance practice, structure, institution or discourse does not impose a way of life on people by way of how it speaks about things. Among the numerous implications of this conclusion, one is that the language of Earth system governance must itself be processually constructed through anthroponomic practices in an "open-consolidation process" (Dotson). To illustrate the injustice of not doing this, I focus in this paper on one kind of linguistic operation that commits an epistemic and misrecognitional injustice against people in violation of the anthroponomy criterion: what I call "social process obfuscation" (or "SPŌ"). The case in point is standard technical discourse around the Anthropocene. According to standard science, the Anthropocene is caused by "humankind," "*homo sapiens*," or "humans." This usage, in turn, forms a core social process obfuscation of Earth system governance discourse. It attributes to all human beings, irrespective of the social processes in which they recognize themselves and their traditions, causality for our perilous geological era. The social processes of, e.g., the Onondaga Nation, are thereby saddled with the social practices of, e.g., fossil fuel intensive, generationally short-sighted, industrial capitalism. This is an epistemic and misrecognitional injustice (Whyte). The language around the Anthropocene thus currently obfuscates social processes when it implies a retrospective causal claim. Only if it instead indicates a prospective constructive norm might it avoid this problem. But then the anthroponomy criterion would need to be applied to it and an open consolidation process (cf. Stevenson/ Dryzek) begun. Thus self-identifying social processes, Earth system governance would avoid injustice and improve the accuracy of its work.

Scientific Uncertainty and Decision-making on Tuna Regional Fisheries Management Organizations

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This study asks two related questions about the influence of scientific uncertainty on environmental policy decisions, drawing specifically on evidence from regional high seas tuna management. First, whereas previous research assesses whether or not scientific uncertainty impacts policy choices, we suggest that the answer depends on the situation facing policy makers. Therefore, we ask *under what conditions does scientific uncertainty lead policy-makers to reject or adhere to scientific advice*? Second, the level of scientific knowledge and uncertainty itself varies over time and across species assessments. This research therefore considers *under what conditions does knowledge produced for the policy-makers become more and less uncertain*? Previous studies examined how high or low uncertainty (dichotomous measure) affected international negotiations, but this study assesses how different *levels and types* of uncertainty

(categorical and continuous measures) impact regime actions. Comparable measures of uncertainty can be difficult to identify, so we develop measures that allow for normalization across policy areas. In addition to refining measurement of scientific uncertainty and policy response, the study considers factors that condition this relationship. In particular, it tests hypotheses about the interaction between uncertain knowledge and institutional design, scientific community, stock characteristics, and political strategies. In order to test these hypotheses, we have collected an original dataset that catalogs every annual stock assessment and resulting policy recommendation by scientists under the tuna regional fisheries management organizations (tRFMOs), as well as Commission management choices. A pilot analysis of Atlantic stocks shows that: 1) on average, reported uncertainty has declined over time for the managed stocks (likely indicating improved scientific information); 2) uncertainty is not correlated with likelihood of scientists making a recommendation to act, but does affect the type of management recommendation; 3) for low-priced stocks, increasing uncertainty surprisingly correlates with more adherence to scientific advice, but total uncertainty is correlated with less adherence; in contrast, for higher-priced stocks, the reverse is true. The conference paper will expand the analysis to include the other four tRFMOs, allowing us to also assess whether results are impacted by institutional design, treaty membership, or characteristics of the research community.

Humans and Socio-cosmological Implications in the Anthropocene

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The rise of the Anthropocene forces Earth System Governance scholars to reconsider the bedrock assumptions and traditional levels of analysis in political systems. State borders will not confine the Anthropocene's accelerating dynamism; this will affect all of humanity, with varied scale and specific consequences. Despite a lack of total consensus among geoscientists that the Anthropocene fully constitutes a geological epoch, the concept is embraced in interdisciplinary, and especially, global environmental governance contexts. A philosophical divide emerges between those who actively engage the Anthropocene as a means to address and refine human-nature relations and those who believe that the blanket term Anthropocene masks complexities of social dynamics. Temporal scaling and emphasis on processes define this divide: the former position deals in geological epochs and planetary processes while the latter is concerned with human history and social processes. Both positions offer important understandings of the political implications resulting from this new age with unknown climatic behaviors and mass biodiversity loss, but they imply fundamentally different perspectives on humans in the cosmos and, thus, offer conflicting positions on how politics should confront the Anthropocene. Engaging these two camps, I outline three implications for political processes discussed in literature on the Anthropocene: 1) institutional changes; 2) re-evaluation of human-nature relations; and 3) the role of science. I argue that as global governance scholars acknowledge the Anthropocene we must lead progressive discussions on entangled humanism and the fundamental nature of human-beings in the cosmos. The Anthropocene is an opportunity for Earth System Governance to adapt and include more profound socio-cosmological frameworks that challenge traditional notions of levels of analysis.

Transformative Food System Governance in South Africa and India: Preliminary Findings and Methodological Innovations in the Transdisciplinary Research Project SHEFS

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Governance of the food system is an integral component of Earth system governance. All nine of the planetary boundaries that monitor the risk of human activity on the Earth System, can be linked to the production and consumption of food. Currently, the world's food system is meeting neither global food and nutrition security nor environmental sustainability targets. Transformative change is required to improve the food system, where societal, environmental and economic needs are equally valued at all levels of governance. Identifying the nature of transformative change is a challenge. Novel, transdisciplinary and participatory research can provide insights on what

change is required and how to overcome the constraints of current political architectures. Taking the two cases of India and South Africa, the SHEFS (Sustainable and Healthy Food Systems) project aims to provide policy makers with novel, interdisciplinary evidence to achieve future food systems policies that deliver nutritious and healthy foods in an environmentally sustainable and socially equitable manner. Existing research, policy and community networks in India and South Africa will be involved in trialling innovative methods to envision a more desirable future food system, as well as to identify food system leverage points and opportunities for governance innovation: where changes in policies and governance could have the desired transformative effect on the food system. These methods range from spatially mapping policies and governance structures on to the food system and the Sustainable Development Goals; applying system approaches to explore the policy trade-offs and key actor influences in the food system (e.g., social network analysis, tracer analysis); and using innovative participatory methods (new futuring methods, Transformation labs) to provide a space to identify and experiment with potentially transformative policies that might be able to overcome the challenges and barriers of achieving a sustainable and healthy food system. In this paper we will elaborate on the innovative methods that will be employed in the project to engage more meaningfully with transformative food system governance and provide some preliminary insights. By experimenting with and extending these new research methods, SHEFS hopes to contribute not only to improving food governance in South Africa and India, but to provide insights for better governance of the world's food systems across multiple levels and jurisdictions and to elaborate new tools and methods for improved co-production of knowledge between researchers and other stakeholders.

Deep Time Organizations – Learning Longevity from History

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The notion of the Anthropocene has brought the temporal dimension of earth system governance to the forefront, with new emphasis on which central planetary processes with tremendous potential societal impacts evolve over time periods of hundreds of years. Despite this temporal interdependence of current actions and future impacts, however, almost all political institutions lack a clearly defined deep-time perspective. Many are shaped by political election cycles that focus on merely 4-5 years. A "deep-time" perspective in both political theory and political practice is lacking. This is the rationale for this paper, which analyzes and compares existing experiences from what we call "deep time organizations", that is, organizations that have proven empirically to have survived hundreds, and some cases, even thousands of years. To understand how such "deep time organizations" that outlived multiple generations have become institutionalized, our paper explores historical examples of organizations of great longevity. We identify in several issue areas the respectively oldest organizations in that field, such as the world's oldest banks (e.g. Sveriges Riksbank); the world's oldest universities (e.g., University of Al Quaraouiyine); or the world's oldest dynasties (the Imperial House of Japan). While these deep-time organizations are not directly related to sustainability and earth system governance, we identified in our research broader characteristics of "institutional longevity" that may be transferable to modern institutions for deep-time planetary stewardship. Our research is based on detailed coding protocol that identifies characteristics of longevity. First, we analyze whether and how organizations of great longevity have built up traditions of reaching out to, and interacting with, their surrounding societal environment over time. We found this indicator to range between continuums of secrecy to a variety of transparent interaction modes. Secondly, we investigate the internal structure of these organizations of longevity, and identify a diversity of organizational forms between strong hierarchies and wider networks. Thirdly, we found that each of the organizations that we analyzed delivers something to specific societal actors, including material as well as non-material issues and different ways of distribution. Based on insights on these three indicators we distill the main reasons for the longevity of the investigated organizations, which we reformulate, in our conclusion, to more generic hypotheses about the establishment of durable "deep time organizations", which might be of use for the novel purposes of planetary stewardship and earth system governance.

Jettisoning Environmental Law: The Case for Earth System Law in the Anthropocene

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The future configuration of the Earth System is now a key matter of geopolitics, and of how the world is known, reorganized and rebuilt in the struggles for economic and political mastery and human survival in rapidly changing socio-ecological conditions (Dalby, 2015: 34). Because law will continue to play a crucial part in this endeavour, it requires little arguing in support of rethinking the trite juridical constructs that we have designed and relied on for decades to mediate the human-environment interface. Of all these, environmental law is the most prominent, but there is now sufficient evidence that it has failed at all regulatory levels, from the local to the global, to help effectively maintaining Earth system integrity. The failures and deficiencies of environmental law are explicated by the Anthropocene's human-induced signatures which loosely characterize them as being: anthropocentric and supportive of neoliberal economic development; incompatible with Earth system complexities; unresponsive to Earth system changes; inflexible and not sufficiently reflexive; and state-centered which preserves sovereignty and shuts out alternative modes of inclusive ecological care. These factors are all apparent in environmental law and they legitimise and reinforce the type of human behaviour that is causing the Anthropocene, while allowing environmental destruction, growing inter and intra-species hierarchies, human rights abuses, and socio-ecological injustices. Considering the foregoing, there is evidently a critical need to revisit, and ultimately to reimagine, the traditional foundations, design, scope, ontology and objectives of environmental law in a way that would render it more suitable to respond to Earth system demands and complexities and to the socio-ecological crisis of the Anthropocene. As one of the first analytical contributions to the work of the newly established Earth System Governance Task Force on Earth System Law, this paper proposes a new body of law to replace environmental law. It sets out in broad terms to make a case for the development of Earth system law, while it also endeavours to illuminate the broad conceptual and normative contours of this new body of law. It does so by: 1) briefly motivating why environmental law has become obsolete; 2) identifying and elaborating the core demands, and thus considerations for reform, that the Earth system perspective present in the context of the Anthropocene for law; 3) and proposing short, medium and long-term strategies that should collectively lead to the eventual creation of a coherent body of Earth system law.

Reasoning Together about Global Environmental Issues: Addressing Epistemic and Ontological Pluralism through Deliberative Framing

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To realize the democratization of global environmental issues, the concept of public reason needs to be revisited and rendered contingent rather than universal. Without this theoretical intervention, formal public deliberation will court normative and epistemic closure due to tacit universalistic assumptions about reason and science. This closure violates the deliberative condition of legitimacy as universalistic claims constrain the fair exchange of divergent reasons across national and regional contexts, and across varied epistemic communities. The alternative is not 'anything goes' or reinforcing populist or denialist assumptions but supporting the institutional and cultural conditions that can render legitimate epistemic and ontological pluralism (ie. multiple ways of knowing multiple realities). Political theorists have long argued for the democratization of global environmental policy. Similarly, science and technology studies (STS) scholars argue for the need to democratize science. These rich conversations and recommendations have yet to inform on-the-ground practices of formal public deliberation at local, national, and global levels. Bridging the gap between theory and practice is a key challenge. We present practical ways to bring STS and deliberative systems insights together through deliberative framing. This approach to public deliberation acknowledges the importance of considering multiple policy frames before coming to collective decisions. We use deliberative framing as a bridging strategy to connect practitioner and scholarly communities, with a view to highlight the intimate relationship between framing (how we represent the world) and governance (how we respond collectively).

The Transformation Meme in Environmental Governance: An Institutional Disruptor

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Transformation is not a new word, yet its appropriation by environmental governance and global change scholars is a recent phenomenon. In 2011, the German Advisory Council on Global Change wrote that: 'The worldwide remodelling of economy and society towards sustainability will be a "Great Transformation", on the scale of the Neolithic and Industrial Revolutions". Three years later, the United Nations report (*The Road to Dignity by 2030*) that introduced the global Sustainable Development Goals (SDGs) referred to transformation 18 times, positioning it as the 'watchword' for the world. Today, transformation towards sustainability is a focus of major grant programs and networks under Future Earth and the topic of numerous conferences, papers and discussions. Transformation seems to be an idea, or meme, whose time has come. But why has the concept suddenly risen to prominence? What are the characteristics of the transformation meme that make it attractive to environmental governance researchers? And how does it relate to other prominent terms, such as transition? This paper examines the rise of the transformation meme and responds to the questions raised above. First, it positions transformation as a boundary concept. Transformation has meaning - it refers to a marked change in form, nature or appearance. Yet, much about this meaning is fluid and contested. What exactly needs to change? Why? And how? Researchers and practitioners from different disciplines and perspectives respond differently to these questions. The concept of transformation draws them into dialogue across boundaries, acting as a boundary concept. This boundary-crossing role is perhaps most evident in the successful series of biennial Transformations conferences that began in 2013 (https://transformations2019.org/). Second, the paper draws attention to the disruptive institutional work that global change scholars and activists do with the concept of transformation. It is not a neutral term, but one intended to draw attention to the breadth, depth and scale of changes needed to prosper within planetary boundaries. More radical than its sister term – transition – it critiques the status quo and bolsters a political project to achieve the vision represented by the SDGs. If the world takes the SDGs seriously, and fully intends to achieve them, they will indeed be transformative. Current rates of progress towards sustainability will not be enough. From this perspective, transformation is a meme that may become an integral part of a new disruptive storyline about the human relationship to the planet and a catalyst for new discourse coalitions to form.

Climate Engineering and the Sustainable Development Goals: Toward an Assessment Framework

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To date, discussion on climate engineering is hindered by the lack of a set of legitimate, communicable and operational assessment criteria. To address climate engineering adequately in context of earth system governance, a corresponding assessment framework would need to have sufficient political legitimacy, span across and integrate normative values and empirical parameters. The Sustainable Development Goals adopted in 2015 bring biophysical, social, economic and governance aspects together under the normative frame of a 2030 development agenda, and may offer a legitimate and practical context for assessment of climate engineering. For this, we first analyse the 169 SDG-targets regarding their applicability to potential climate engineering impacts, undertake interviews with policy practitioners in UN climate change negotiations and explore how current research on climate engineering aligns with – or falls short of – such an assessment framework. We identify knowledge-gaps in need of novel inter- and transdisciplinary research collaborations, the pursuit of which could render normative components on climate engineering impacts research more transparent and accountable, ultimately improving the basis of future decision-making in the spirit of earth system governance.

Exploring Connectedness to Co-produce Knowledge between Western and Indigenous Ontologies

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In the Antropocene, the co-production of knowledge between scientific and extra-scientific actors is required to support societal transformations towards sustainable futures. Open Science has delimited a third space of communication among local level narratives to co-produce knowledge, connecting them with national and global narratives. This paper sheds light on the concept of *Connectedness* to clarify the relationship between Western Scientific Knowledge Ontology and Indigenous Knowledge Ontology (IKO). This concept, in (IKO) represents the intrinsic interdependence of the larger whole and the place of humans in it, namely a plural interrelated existence for everyone and everything, even in the case of polarities. Here, we use it to explain that Scientific and Indigenous ontologies should not be expected to form a uniform whole. Rather, we should seek those pieces of knowledge and values that are shared between both ontologies. The specific case that this paper focussed on is rainforest governance. The rainforest is of key importance for the provision of global goods such as biodiversity and food security. However, national governments still pursue the maximisation of timber and mineral resources productivity, rather than investing in carbon neutral goods or in cultural ecological heritage. The circulation of knowledge across multiple levels of governance require new methodologies and new modes of governing resources. This paper first shows how shifting cultivation in agroforestry represents an empirical use of connectedness, showing how it can lead toward a collaborative perspective of values on human-nature relationship to solve contemporary problems related to forestry management. Agroforestry studies have recognized shifting cultivation (swidden) systems and plant gardens mimicking the diversity of the tropical forest as examples which help to solve deforestation. They describe how native farmers in multispecies systems optimize the use of soil nutrients by making appropriate changes in the crop mixture, according to height, length, and consequently, nutrient levels. These practices are common enough to be called principles, evidence of these systems is common in Asia, Africa and South America. Based on the combination of natural sciences and social sciences, this presentation shows then methodological input for Open Science incorporating *Connectedness*, to technology-based modelling programmes such as NEON (National Ecological Observatory Network) in the USA. Finally, it concludes by verifying the importance of Connectedness in these programmes and its political significance to transform current forest governance into more holistic Forest Landscape Restauration.

Tracking Integration of Climate Change Adaptation Globally

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Global environmental governance frameworks increasingly call for ‘global stocktake’ to track how governments, business and civil society organizations are taking action and transforming their practices to address the critical challenges the Anthropocene poses. How to track progress under the 2030 Agenda for Sustainable Development, the UNFCCC Paris Agreement and the Sendai framework for Disaster Risk Reduction, for example, has become an emerging field of research. One critical issue often reported is the challenge of tracking the process of integrating, synchronization and harmonizing global environmental objectives into specific country and sector specific contexts. Although much literature has described integration as a ‘holy grail’ for policy makers, we know very little about integration beyond single or small-n cases. This is partly because: a) vagueness of the concept of integration in scholarship; b) lack of coherent, consistent and comprehensive frameworks to assess integration; c) intensive data collection necessary for in-depth investigation of integration over time and across context; d) challenge of dealing with strongly varying contextual settings which hamper meaningful understanding of integration. In this article we develop a conceptual model and test its value to systematically track policy integration. The conceptual model makes use of four dimensions of policy integration: frames, subsystems, goals, instruments. We apply the conceptual model to the question of how countries across the globe are integrating climate change adaptation policies, strategies and actions in their existing sectoral policy subsystems. To test the framework we explore the value of supervised machine learning tools as new ways for tracking progress on integrating. Using data science methods we can parse through many text sources and identify patterns of how different policy sectors in a country frame adaptation in similar or different ways; to understand how the concept of adaptation has been diffused and integrated in existing policy sectors; and which policy instruments are proposed to integrate adaptation in each sector For the pilot, policy and legislative data from the United Kingdom will be used to see how the UK (globally seen as a forerunner country on adaptation) has integrated

climate change adaptation in their sectoral policy areas. Using the experiences of the pilot, we will reflect on the conceptual framework and the value of using machine learning tools to track adaptation policy integration globally.

Adapting to Climate Change is a Global Challenge

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Adaptation to climate change is typically perceived as a local and domestic responsibility. This has historically been reflected in the overwhelming majority of policy prescriptions that focus on adaptation at this level, both at the international climate change negotiations and in national policy. However, this has changed. Recent global and cross-border events – either as hurricanes causing enormous local damage whilst disrupting global supply-chains or as national populist movements shifting focus from multilateral arenas to bilateral approaches – demonstrate that this artificial perception no longer applies. In addition to the global temperature goal, the 2015 Paris Agreement on climate change introduced the global goal on adaptation: to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response. There are ongoing activities that discuss and propose indicators and metrics to track progress towards meeting the global goal on adaptation, and how conceptual, methodological and empirical challenges may be overcome. However, Parties to the Paris Agreement recognized also that “adaptation is a global challenge faced by all with local, subnational, national, regional and international dimensions”. Compared to the attention given to the global goal on adaptation, much less analysis has been conducted to understand exactly what makes adaptation a global challenge, and what implications this would have for research, policy and practice. Nevertheless, this new conceptualisation of adaptation is not sufficiently reflected in policy and is rarely being considered in adaptation planning today. Failing to apply a global lens in adaptation planning risks making local action ineffective and increases the risk of maladaptive practices and negative spill-over effects. In this paper, 46 researchers argue that efforts to achieve the global goal on adaptation and attempts to take stock of these efforts should start with an understanding of the global nature of the challenge.

The Potential of Models of Agency in Climate Change Adaptation

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Adaptation in Earth Systems Governance is a complex problem that depends upon perceptions and realities of impacts, adaptation options and capacities. Modelling can play an important role in understanding the processes and outcomes of adaptation, in projecting these into future scenarios, and in investigating interactive effects. However, a large body of local-scale evidence suggests that adaptation decisions are determined by individual, social and institutional behaviours that are embedded in specific socio-ecological systems, which may not be amenable to large-scale data-gathering or modelling. We review existing models of agency in adaptation to climate change in land-based sectors in order to assess the current state-of-the-art in model design, coverage and usage. We find that many characteristics of adaptation are currently under-represented or entirely absent from models of adaptation, with most models adopting a simplistic, top-down approach that fails to account for realistic forms of human behaviour. Processes such as diffusion, interaction, anticipation and learning are particularly under-represented, as are feedbacks between socio-ecological changes and land use decision-making. Using example applications of a cross-scale agent-based modelling framework, we identify a number of constraints on the ability of models to represent adaptation, but conclude that current practice lags well behind potential, and suggest a number of specific priorities for improvement.

Methodological Challenges in Applying an Earth System Governance Framework to the Study of Water Governance

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Water governance as a distinct field of research is relatively new and has a broad remit, encompassing political, social, economic and institutional dimensions. Consistent with its mixed provenance, water governance research often draws on the strengths of systems thinking as well as on actor-oriented approaches. Earth System Governance holds promise for structuring a multi-level analysis of water governance by bringing a planetary perspective to bear on questions about the wise use of water resources at the subnational level, which is often viewed as a local issue for municipal and provincial-level actors. While earth system governance scholarship initially focused on questions around the global multilateral architecture for decision-making and with understanding the role of different kinds of institutions and partnerships, some recent studies have engaged with earth system governance as a conceptual framework that can be applied in its entirety to structure research into the governance of shared natural resources at finer scales than the global, including in single-country case studies. This paper reflects on experiences from the application of earth system governance's '5 As' and four crosscutting issues as a conceptual framework for a pilot study of multi-level governance of water resources in Johor state, Malaysia. The pilot study was undertaken as the first step in a series of subnational studies that will investigate the mix of institutions and actors engaged in managing Johor's water resources at multiple levels, how decisions about water allocation are currently being made, and how actors at the subnational level can best prepare for a potentially water-scarce future. Governance as a phenomenon is not easily separated from its context, nor easily characterized as a set of exogenous variables that are directly comparable with each other; governance research therefore needs to define relevant units of analysis in messy and complex situations, and consider in what ways findings can shed light on comparable situations. The paper focuses on methodological considerations in applying earth system governance as a framework to structure the pilot study, and considers in what ways an earth system governance framework is helpful in defining areas or units for comparative analysis, discerning patterns of interaction, and understanding points of similarity and points of difference in various sectors of water resource use and local and municipal levels.

Integrating Science and Engineering with Earth System Governance: The Case of Mercury Pollution

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As governance evolves to address large-scale changes in the Earth System that are characteristic of the Anthropocene, our scientific knowledge of the structure and function of biogeophysical systems and their interactions with society are also advancing. Managing sustainability transformations increasingly requires detailed knowledge of the functioning of complex, coupled systems, which include not only governance systems but also environmental and technical components. This is an area where there is need for both more conceptual development and empirical analysis.

In this paper, we introduce a conceptual framework that captures the interactions among social, technical, and environmental sub-systems in ways that facilitate the development of governance solutions. To do this, we use a matrix-based approach that documents the interactions of components of these sub-systems, their character, and their physical and temporal scales. We link this approach to theories of resilience and planetary boundaries. The paper then illustrates the application and usefulness of the conceptual framework using a case study of mercury pollution. Mercury is a particularly relevant case to assess questions of how the scientific and technical understandings of complex environmental problems affect strategies for governance across spatial and temporal scales. Mercury has been regulated for decades by domestic authorities, but is more recently addressed by the Minamata Convention on Mercury, which entered into force in 2017 and takes a life-cycle approach to mercury management. More specifically, we focus on mercury emissions to the atmosphere from combustion sources (in particular, coal-fired power plants). In Asia, especially in China, high coal use and limited emission controls lead to the world's highest levels of mercury

emissions. Depending on the form that mercury is emitted, and control technologies applied, mercury can deposit to local ecosystems, or travel globally. Mercury also has a long lifetime in the environment, and the legacy of past and present emissions can continue to effect ecosystems for decades to centuries. We explore the fit between regulatory authorities at national and global scale with the spatial and temporal characteristics of mercury emission from combustion sources, and their coupled interactions. We find that current approaches to manage mercury reflect a framing of the problem that does not fully account for its environmental dynamics, and in particular, their interactions with technological approaches to manage it. We use this result to draw lessons about how to better incorporate systems-level insights into mercury governance.

A New Conceptual Framework for Analyzing the Effectiveness of Multilateral Environmental Agreements

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As the number of global and regional environmental agreements grow, international organizations, countries, and civil society groups continue to express concerns and frustrations about their often serious and lingering implementation gaps, as many convention objectives and obligations remain partially or wholly unfulfilled. In response, parties and treaty bodies have taken different legal, political, organizational, and financial measures to promote better implementation. There are, however, continuing analytical and political debates about how to appropriately examine and evaluate the effectiveness of multilateral environmental agreements (MEAs), as part of earth system stewardship. In the Anthropocene, such effectiveness evaluations can allow for both generating a more detailed understanding of whether or not progress is achieved, and identifying specific areas where greater implementation efforts are most needed. This paper advances the literature on, and analysis of, the effectiveness of MEAs. In response to the need for more theory development in support of more comprehensive effectiveness evaluations, the paper uses a systems-oriented approach to develop and apply a conceptual framework to formalize and advance the analysis of influences of human interventions in MEAs and the social-technical-environmental systems they attempt to influence. More specifically, the paper uses a matrix-based approach to effectiveness evaluations. Empirically, the paper focuses on the effectiveness evaluation of three agreements that address chemical substances: The 1995 Vienna Convention for the Protection of the Ozone Layer/1987 Montreal Protocol on Substances that Deplete the Ozone Layer and subsequent amendments and adjustments; the 2001 Stockholm Convention on Persistent Organic Pollutants; and the 2013 Minamata Convention on Mercury. The paper discusses how the conceptual framework based on a matrix approach can be used to diagnose important causal relationships and feedback loops between policy interventions and the multiple dimensions by which they might be evaluated. This provides a more nuanced and accurate way to draw lessons for governance across different environmental issue areas. The paper demonstrates that while the Minamata Convention, the Stockholm Convention, and the Montreal Protocol address a seemingly similar type of environmental issue of chemical pollution, the three agreements have important differences in problem structures that are coupled to the institutional forms that are designed to address their respective environmental problems, raising important issues of institutional fit. Finally, the paper draws lessons about the types of indicators that might be used to inform MEA effectiveness evaluation processes in practice.

Governing Marine Plastic Pollution: An Environmental Flows Perspective

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Marine plastic pollution is a new global environmental change issue that is increasingly subject to scholarly attention. The analysis of the flows of plastic from different origins and sources to different destinations in the marine environment (through material flow analysis) dominates current analysis of global plastic pollution. However, we argue

that a socio-material understanding of what and who shapes plastic flows holds considerable potential for solutions to the plastic crisis. To understand these flows and how they are (and can be) shaped, three socio-material dimensions or 'natures' of plastic are relevant. First, plastic is a ubiquitously and near-permanent type of pollution. Second, plastic is not homogenous, but consists of multiple types of polymers and additives. Third, plastic's material diversity is constituted by the relevance and multiple use in every-day life. These natures are crucial in how they enable and/or constrain its governance, yet have received virtually no attention in the current literature. Instead attention has focused narrowly on either international governance arrangements that rely on state treaties, national governance arrangements that rely on state interventions or corporate social responsibility. We argue that this debate would benefit from an environmental flows perspective that centres on the material and social dimensions that shape sustainable production and consumption, how these material and social dimensions change over space and time, and the implications such change has for synergistic public-private governance arrangements. Using the cases of PET drinking bottles and nylon fishing nets, we elaborate on how this environmental flows perspective opens up new insights on ubiquitous and multi-forms of environmental pollution.

Following the Mean Won't Do Any Good: For a Complex Systems Approach of Global Climate Governance

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The complexity concept has gradually become a buzzword in global governance studies. The increase in the number of populations of organisations and in the total number of actors participating in global politics has indeed led scholars to talk about a complexifying global governance system. This is particularly true in issues related to earth system governance, where the multiplication of non-state actors has triggered a variety of works focusing on their interdependence and impact on global environmental governance. However, complexity does not necessarily grow with the rise of interconnected elements in the system. Moreover, many seem to confuse complexity with complicatedness. We thus need to be more thorough in our use of the concept. This paper advocates for the application of complex systems approaches in the analysis of global climate governance. Several scholars have started to use them in related questions, whether to conceptualize experimental climate governance, the politics of decarbonization, or transnational climate governance. However, there have been few studies of the complex system of global climate governance. It is argued here that these are both relevant and useful. First, regarding the relevance, global climate governance has a multiplicity of interacting and interdependent elements. It is also nonlinear and hierarchical, because of its numerous levels going from the global to the micro creating the possibility of feedback and strange loops. Finally, it is open: its borders are porous and allow for interactions with actors coming from other systems. All of this makes the system unpredictable and complex. Second, regarding the usefulness, this perspective could bring new insights on the understanding of global climate governance. More specifically, by acknowledging the nonlinearity and unpredictability of the system, we could embrace the uncertainty of the world we live in and of our own findings. This could help us diverge from traditional but often failing goals such as prediction, and redefine our research strategies to make them more effective. Overall, this paper seeks to offer a new vision of global climate governance. It thus hopes to foster novel ideas on the ways to analyse and understand governance complex systems and contribute to the broader field of earth system governance.

Nature and Power Relations: The Multifaceted Conflict over Genetically Modified Maize Cultivation in Germany

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The issue of genetically-modified organisms (GMOs) strikingly illustrates conflictive nature and power relations. Those in favour of GMOs argue that they make agriculture more effective. Those against GMOs warn that they have

irreversible consequences for ecosystems. In Germany, farmers were allowed to grow the GM maize species 'MON810' from 2005 to 2008. When the Federal Ministry of Agriculture withdrew its temporary GM permit in spring 2009, this meant the early end of commercial GM crop cultivation in the country. However, the Ministry did not take a general decision against genetic engineering and agricultural biotechnology. Permits may well be issued for other GM crops in the future and new breeding techniques (NBTs) such as Genome Editing, trigger similar conflicts. Therefore, the aim of our paper is to learn from the case of MON810 in Germany. After describing the background, based on a document analysis and expert interviews, we develop a more theoretical understanding of this conflict by analysing it along three dimensions: First, the (re-) production of nature is an *object* of conflict, i.e. human living and human production always imply an interference with nature and GMOs are therefore an object of conflict. Second, changes in nature relations are an *effect* of conflicts. Only in the course of a conflict do people address the consequences of interventions in natural systems and nature relations. GMOs, for instance, are a case in point since they pose conflict-based changes in nature relations. Third, the production of nature is a *conflictive action*, because humans actively change and recreate nature. Here, we broaden conflict definitions by adding nature relations to social conflict definitions. Besides social interaction, for example between the agro-food industry and environmental activists, conflict actions also arise, for example, through DNA modification of (maize) plants, the cultivation and planting processes and even field occupancies and other acts of civil disobedience. The analysis of the multifaceted conflict over GM maize cultivation in Germany helps us to better understand the course of this conflict and, moreover, to forecast courses of environmental conflicts in more general terms. Conflicts over agricultural innovations, such as GMOs and NBTs are much more than conflicts over technologies. The study of nature and power relations not only offers new theoretical perspectives but also reveals prospects for conflict resolution.

Anthropocene Genealogies: Cold War Legacies in the Discourse on the Human Epoch

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The social sciences have recently discovered the Anthropocene - as a trope to rethink their disciplinary theoretical canon and to challenge their ways of knowing and engaging the world. In the existing social scientific literature, the dominant narrative of the Anthropocene as the latest geological epoch defined by the human impact on the planet is often uncritically adopted from the geosciences. Only recently, the social sciences have begun a more reflective dialogue on the epistemic roots and conceptual implications of the Anthropocene thesis. While the roots of the Anthropocene in Earth system science and geology have been discussed by authors such as Eva Lövbrand, Silke Beck or Johannes Stripple, earlier predecessors of the Anthropocene debate received far less attention. Based on a careful analysis of seminal texts, expert interviews, and archive materials, the paper sheds light on this historical prologue of contemporary Anthropocene discourse. On the one hand, the paper takes a close look at the Whole-Earth Movement around Stuart Brand's Whole-Earth Catalogue in 1960's California. As will be shown, the creative amalgation of cybernetics, environmental thinking, spirituality and technophilia at that time foreshadowed much of the current discourse on the Anthropocene. On the other hand, the paper traces visions of the planetary future in the work of Russian geoscientists, futurists and cosmists such as Nikolai Fedorov, Vladimir Vernadsky or Evgeni K. Fedorov. As will be shown, the fusion of geoscience with cosmist philosophy in the work of these Russian thinkers already covered many tropes of the present Anthropocene discourse, including visions of geoengineering the planet or the idea of the planet as a single living organism. The paper reveals how these early thinkers of the Anthropocene in the 20th century envisioned the future of the planet. In doing so, the paper seeks to further a critical reflection upon the current futurology of the Anthropocene, which often paints the future in quite dire terms.

Managing Networked Landscapes: Conservation in a Fragmented, Connected World

Managing networked landscapes: conservation in a fragmented, connected world

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Ecological fragmentation coupled with climate and land use changes pose a serious threat to species loss globally. Ecological fragmentation reduces connectivity between landscapes on which species thrive, while climatic and land use changes reduce species habitat. The ability of species to move between landscapes is a fundamental adaptive strategy and impacts their gene flow, foraging, and ability to avoid predators. However, the effect of connectivity on species coexistence is not certain because it may also have detrimental effects such as dispersal of pests and diseases among others. Ecological fragmentation often spans multiple political, social, and institutional jurisdictions, calling for collaborative management approaches at appropriate governance scales in such a complex adaptive system. While collaborations are important for managing fragmented landscapes, it is critical to understand how collaborations between different land managers are formed, how groups make decisions about collaborations, and how people share knowledge and learn in a decentralized rule-making environment. Research has highlighted the importance of social networks in sharing information about management strategies between land managers for more resilient outcomes. Two important learning mechanisms are 1) success bias, where individuals copy the strategies of other successful individuals in the network, and 2) conformist bias, in which individuals adopt the most common strategy within the population they are connected to, regardless of the actual success of the strategy. Several studies have examined information transmission across different types of networks and the robustness of such networks to social and ecological perturbations. However, the effect of networks on the social and ecological drivers of biodiversity conservation is poorly understood. We present an agent-based model that seeks to integrate the latest social science work on collaboration and learning with ecological studies in which we combine species interaction between three trophic levels (predator, prey, and vegetation) and their movement across different landscapes managed by different land managers. Landscape management is primarily done by altering landscape connectivity. The managers' adaptive decision-making process to alter landscape connectivity depends on the data about specific trophic level populations, a land manager's previous experience, and the strategies of other land managers in the network. This model is parameterized through real-world case studies and seeks to inform the decision-making process of practitioners in the field by exploring the ramification of different rules under a range of conditions.

The Anthropocene and the Geopolitical Imagination: Tracing Travelling Notion of Environmental Risk and Security

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The Anthropocene has arrived both as an epoch and discourse and prompted scholars of international relations to reconsider the meaning of security and geopolitics. In a time when the Earth is fundamentally reshaped by human activity, we have learned that neither security nor environment are concepts that can be interpreted or acted upon in traditional ways. In this debate, dystopian narratives of environmental danger and global insecurity are competing with more optimistic accounts of revitalised international collaboration. In this paper we critically examine how these scholarly debates travel and are taken up in the study of international statecraft and security. We do so by reviewing the expanding literature on the Anthropocene in security studies and by analysing reports and briefing papers produced by security think tanks, research institutes and policy centres. In our study we ask how the risks and security implications of the Anthropocene are imagined and acted upon in this literature. Who and what is deemed endangered in the Anthropocene; which geopolitical futures are seen as possible and likely; and which policy responses are advanced to address the resulting political challenges? By tracing how the Anthropocene debate is unfolding in security circles, we seek to understand the power of environmental ideas to organise, occupy and administer political space and hereby shape our common geopolitical futures.

When NGOs Run Online Campaigns on Environmental Issues: a Theory-based Critique Drawing on Habermas and Foucault

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The Australian (left-wing) non-governmental organization (NGO) GetUp! tried to stop the re-election of a selected number of racist and climate-sceptic Members of Parliament (MPs) using big data and social media, mostly Facebook. Is this a welcome success story of how interest groups use the digital age to their advantage? Or is it voter manipulation and a threat to liberal democracy? Different social milieus respond to different ways of being addressed. Research on product marketing and placement has built on these insights for a long time. Digitalisation is now offering tools that are able to target subjects even better – with success as the Australian case shows. While this is certainly effective, there are also problematic aspects of social media campaigning, which I will discuss drawing on political theory. For the proponents of liberal democracy like Habermas, it is problematic that many sub-publics are addressed in a specific way. This contributes to a growing polarization and fragmentation of society living in parallel universes. Habermasians would ask where the spaces are for deliberation of a 'general public' that could lead to a 'general will' or shared ideas about the common good. From a Foucaultian perspective, there is no such thing as a pre-existing 'free voter' who could be manipulated. Instead, voters are always already inscribed in certain dominant discourses and their social identity is shaped by these discourses. For Foucaultians, it is problematic that digital and social media show *personalized*campaign ads and search results, thereby reinforcing existing power relations and notions of who we already 'are'. Foucault's idea of emancipation was to resist who we are supposed to be. This of course requires a willingness to break out of the echo-chamber. Giving individuals access to *alternative* types of information, outside the range of who they are supposed to be, is an important precondition for running a campaign that has emancipatory qualities.

Examining the Factors Affecting the Variations in the Ability to Make Progress in Climate-Sensitive Land-Use Planning of Municipalities in Metro Manila, Philippines

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This research will generally examine the factors affecting the variations in the ability to make progress in climate-sensitive land-use planning (CSLUP) of municipalities in Metro Manila, Philippines within theory of Earth System Governance and the concept of institutional adaptive capacity (AC). Specifically, this research will be verifying the validity of the earth system governance-adaptive capacity framework—a conceptual framework modified by the lead author from Bierman et al. (2010) and Zollo et al. (2013)—that hypothesizes that: the differing abilities of municipalities to make progress easily or with difficulty in CSLUP is respectively determined by their inherent institutional AC conditions of architecture, agency, adaptiveness, accountability and legitimacy, and allocation and access. Accordingly, to test this hypothesis, this research will be doing a case study in Metro Manila, Philippines that will determine and explain the influence of 17 recurring institutional factors in the literature, which can either manifest as any one of the five institutional AC conditions that make it relatively easy or difficult for municipalities to be able to make their land-use plans into climate-sensitive land-use plans. The case study will particularly determine and explain the relative influence of these 17 institutional conditions in the municipalities through: (1) quantitative data analysis, which will employ binary logistic regression modeling on the numerical opinions (on each of the levels of the 17 institutional conditions) and the actual progress in CSLUP, indicated by targeted municipal officials in semi-close-ended surveys; and (2) qualitative data analysis, which will employ narrative analysis using ATLAS.ti on the verbal opinions and textual statements issued by targeted municipal officials and referred key informants in semi-structured interviews and documents. The results of this research are expected to find that municipalities with climate-sensitive land-use plans—in contrast to those without—are most likely to indicate the statistical significance of most—if not all of—the 17 institutional factors. Nevertheless, since the research is limited only to the 17 municipalities in Metro Manila, Philippines, it's anticipated that results will serve as illustrative—rather than representative—cases that will either validate or invalidate the earth system governance-adaptive capacity framework's hypothesis. These findings, to the authors' knowledge, will be useful to inform future research and policy reforms in CSLUP worldwide, as this research will be one of the first to deductively analyze institutional factors influencing the variations in the ability of institutions to make progress in the local governance of land-use for climate change adaptation in a developing country.

Obligation Based Governance Models: Opportunities for New Environmental Sustainability Goals

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This paper examines opportunities for obligation based governance models to progress environmental sustainability goals in international policy contexts. It seeks to shift debates and strategies in support of improved environmental outcomes and to elevate political recognition of sustainability. It draws upon Stern's (2009) optimism regarding progress and prosperity, Achterberg's (2001) explications of environmental justice and Hirschmann's (1992) insights into obligation as a neglected and potentially transformative concept. It argues that the concept of obligation can improve environmental sustainability by shifting discussions away from politically contextualised ethics debates towards considerations of human universalism. Doing so, would reduce obstacles arising from contests between rights and responsibilities and debates about the relative merits of hard and soft compliance instruments. It would also enable recognition that preferences between bottom up/grassroots/local initiatives and international leadership based approaches are important for program and project level decisions but are unlikely to establish new normative principles for sustainability. This paper also considers obligation as a source of new insights to overcome the circularity of ongoing debates concerning the relative merits of knowledge versus uncertainties as drivers of international environmental governance approaches; preferences between and opportunities for adaptation and mitigation strategies; and, the advantages of states-led or states-plus non-state actors approaches.

Opening up Anthropocene Futures: Integrating Pluralistic, Practice-based Bottom-up Pathways into Global Environmental Assessments

Mandy van den Ende

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Global analyses on the state of the environment used in policy making are provided by global environmental assessments like the Global Environmental Outlook (GEO) and the recently established Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Their assessments typically include 'outlook' sections, where scenarios form a set of possible futures that can inform policy. Usually these scenarios are based on global-level projections developed using quantitative models, providing limited room for including the diversity found in local and national contexts – both in terms of local or at least sub-global concerns, and in terms of potentially transformative practices that could contribute to desirable global futures. Without such bottom-up input, global futures run the risk of being too abstract to be useful to policy makers at other levels. This paper investigates how bottom-up scenario approaches can play a role in global environmental assessments in combination with global modelling. In a comparative study between GEO and IPBES, which are both innovating around this integration, the influence of 1) governance factors of scientific assessments and 2) methodological factors on the role of bottom-up scenario approaches is examined. With respect to the governance of global environmental assessments and how bottom-up scenario approaches are influenced by this governance, the research scope is focused on funding sources, expert nomination processes, and cross-scale representation. For the analysis of foresight methodology, the aim of the assessment, the number and connectedness of scales, and data sources are considered. Interviews are conducted with experts from GEO and IPBES. Preliminary findings on the effects of the governance factors indicate that, despite a perceived willingness to engage, internal dynamics within GEO and IPBES complicate the inclusion of bottom-up futures. In terms of methodology, these assessments are depending on the development of new approaches, since there is a lack of pre-existing methodology for the development of bottom-up futures. Our findings serve as a source of reflective information for GEO and IPBES by indicating possibilities to integrate the bottom-up approach and enabling co-learning, while providing a theoretical foundation for comparable assessments with similar aspirations. Our research contributes to the conference stream 'Theoretical and Methodological Foundations of Earth System Governance' because of its focus on global environmental assessments, as well as being relevant to the stream 'Architectures of Earth System Governance' given the role of global science governance. It aims to be a part of efforts under the Earth System Governance Task Force on Anticipatory Governance.

Diverse Understandings of Anticipatory Climate Governance: Theory and Practice

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This paper undertakes a critical social science review of how the notion of ex-ante or *anticipatory governance* is being understood and deployed by diverse social science research communities working in sustainability domain. In a period of accelerating earth system transformations and their potentially disruptive societal and distributional consequences, imagining and governing the future comes to the fore as a core challenge for sustainability research and practice. Numerous social science research communities deploy the notion of anticipatory governance, yet it is understood in very different ways, with diverse ontological, epistemological and normative starting points and research agendas. Most notably, these understandings vary in their conception of the future, including the extent to which the future is knowable and subject to steering, and how the future impacts on the present. This paper undertakes an extensive literature review in order to develop an in-depth understanding of different influential notions of anticipatory governance. We analyze how seven research communities engage with concept of anticipatory governance. These communities are: responsible research and innovation; sociology of the future; socio-ecological systems; public policy and planning; environmental governance; probabilistic foresight; and socio constructionist foresight. We analyze and compare understandings of anticipatory governance deployed within these seven communities across the following dimensions: (a) how the concept is defined; (b) underlying conceptions of the future (its knowability and manageability); (c) mechanisms and tools seen as key to knowing and steering the future; (d) actors seen as relevant; and (e) how conceptions of the future are understood to impact policy and governance choices in the present. Based on this comparative analysis, we identify overlaps, incompatibilities, complementarities and possibilities for integration between these diverse perspectives. Insights from this comparative analysis allow us to generate an analytical framework, which can be deployed in future research to compare the core characteristics, functioning and impacts of anticipatory climate governance *practices* in diverse contexts. This paper contributes to the conference stream 'theoretical and methodological foundations of Earth System Governance' and to extending the work of the Working Group on Anticipatory Governance, under the auspices of the Task Force on Conceptual Foundations of Earth System Governance.

New Pathways for Governing Urban Food System Transformations: a Pluralistic Practice-based Futures Approach Using Visioning, Back-casting and Serious Gaming

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This paper responds to the need for novel futures approaches to help new coalitions of societal actors create pathways to earth system transformations. One proposed way to do this is to combine and re-imagine existing innovative practices as 'seeds' for transformational futures. This paper aims to show how practice-based, pluralistic futures processes can be implemented in real-world governance contexts to complement existing, global-level earth system futures. We provide insights on the benefits of using multiple complementary futures methods, and on the value of combining 'seed' practices with new governance models. We focus on food systems transformations in urban contexts, using the concrete case study of Kyoto (Japan)'s food system to test the potential of this approach. Innovative combinations of methodologies (visioning, back-casting, digital and role-playing games) were used and assessed in order to create multiple ways for participants to experiment and engage with food system futures, enabling them to co-create diverse yet grounded future pathways. We analyzed process outcomes as well as participants' experiences of the process. Our results indicate that the complementary use of methods enabled different modes of engaging with the future, resulting in diverse imagined futures. The combination of Kyoto-based 'seed' initiatives with initiatives from elsewhere in the world and with a new food system governance model resulted in participants learning about new food system practices, extending their networks, and in broad support for actualizing a new food system governance model (a Food Policy Council). We conclude that multi-method futures methods that combine existing practices and new

modes of governance can lead to extended imaginaries about transformative pathways as well as to an increased likelihood of transformative changes in governance. These results are useful both within the domain of urban food system transformations as well as more broadly applicable in earth system transformation contexts. As a series of futures imagination and anticipation experiments involving relevant urban governance actors, this paper directly relates to the earth system governance conference stream 6 (Theoretical and Methodological Foundations of Earth System Governance**).**

What Constitutes Catastrophe? Thickening the Thin Concept of Global Catastrophic Risk

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Despite growing concern around tipping points or critical thresholds in the climate system, mainstream climate modeling remains largely concerned with gradual warming scenarios. However, the threat posed by abrupt or catastrophic climate change has been taken up by the emerging research program on "global catastrophic risk." This research program investigates the threat of catastrophic climate change alongside such risks as pandemics, asteroid impacts, and nuclear war. However, researchers disagree about how to properly define global catastrophic risk and have proposed several competing conceptualizations. More importantly, it is not entirely clear if -- beyond their enormous potential disutility -- there are sufficient similarities between different global catastrophic risks for interesting comparative anlaysis. In other words, the global catastrophic risk concept is rather thin. This paper systematically reviews the conceptual literature on global catastrophic risk, compiling all defintions and typologies proposed to date. While existing definitions are intentionally broad, this paper argues that tightening the rules for inclusion and exclusion is necessary to clarify the distinction between global catastrophic risks and lesser risks. Further, the conceptualization proposed here highlights the often overlooked temporal dimension of risk. A typology of global catastrophic risk is presented that considers both their intrinsic properties and governance characteristics, thereby "thickening" the concept. Then, several pathways for cross-risk comparative analysis are proposed with a focus on catastrophic climate change governance.

Toward Sustainable Transformations in a Complex World: Theory Building based on Meadows' Leverage Points and Williamson's Transaction Costs Economics

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The pressing environmental challenges that societies are facing today one way or another will require or impose transformations in the ways we govern and use available natural resources. Two underlying assumptions frame the theory building related to such transformations in this work. On the one hand, from a complex systems perspective, analysts note that the cause and effect processes are often counterintuitive that make many of the policies result in unintended rebound effects. On the other hand, larger system level shifts from traditional governance structures based on extractive logics to more sustainable ones often bear prohibitively high costs. Hence, efforts should be directed toward transformations where a relatively small or doable intervention is aligned with the intended system level change or can even trigger such change on its own. Here I propose to extend the analysis of transformation possibilities as suggested by Donella Meadows' *Leverage Points: Places to Intervene in a System* by integrating Oliver Williamson's framework for analysis of transaction costs. Twelve leverage points that Meadows suggests are grouped into four categories for intervention: parameters, feedbacks, design, and intent, in the growing order of their potential to influence the system. For example, Meadows argues that parameters such as tax and subsidies, although are important to achieve growth and solve capital-intensive environmental challenges, are limited in their potential to change behavior. In contrast, at the other end of the spectrum is intent with its highest potential to change the system from within. Interventions here mean the mindset or paradigm shift, as well as developing the ability to stay flexible for new challenges. However, Meadows concedes, the higher the leverage point, the more the system will resist changing it.

The arguments by Meadows are in line with the scholarship on multilevel governance and institutional path dependency (e.g. Ostrom 1990; North 1990), but coincides particularly well with Williamson's four levels of social analysis. For example, looking at institutional change, Williamson considers norms, values and beliefs as the highest level of institutions with pervasive long-term influence upon economies, which would correspond Meadows' "intent" category. What stands out in Williamson's analysis is the timespan and transaction costs he suggests that will be necessary for establishment of these institutions. Thus, combining the systems approach and transactions costs framework can take the concept of leverage points to the next level by providing more accurate insights on how transformations can be made more sustainable.

Addressing Scale Mismatches of Scenarios for Effective Sustainable Development Decision-Making

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During the 20th century the world experienced a 'great acceleration' sparked by global industrialization which has significantly transformed human lives, the Earth's surface, biodiversity, and biogeochemical cycles. Some of these changes have led to substantial gains in human wellbeing and economic development, while at the same time, there has been degradation of many ecosystems, growing risks of abrupt social-ecological changes and an increase in livelihood vulnerability. There is widespread agreement that the current trajectory cannot be sustained, h owever, how to create alternative social-ecological futures is not well articulated. Global Environmental Assessments (GEAs) distil, synthesize and interpret existing information in ways that are relevant to decision makers. They also play an instrumental role in catalysing cooperation and helping governments arrive at consensus when negotiating complex international deliberations (e.g., Paris Agreement, 2030 Agenda). Today, GEAs have become an important feature of the international policy landscape and the global architecture for sustainable development and thus play an important role in Earth System Governance. However, while GEAs often rely on global-scale quantitative scenarios to assess potential futures and navigate uncertainty, they struggle to integrate dynamics that bridge local, regional and global scales. As a result, while such scenarios present archetypal, globally unified futures, it is not always clear to decision-makers how national policies implement these pathways and support positive local initiatives. In many cases, it is not even clear how local initiatives themselves support or oppose desirable global trends. Addressing the challenge of developing multi-scale scenarios is critical because social, ecological and economic systems spread across local, national, regional and global scales. Furthermore, where development interventions need to happen at all levels, the environmental impacts of these interventions also have cross-scale repercussions. This paper outlines a way forward for developing bottom-up, multi-scale scenarios to strengthen GEAs, with due consideration to the cross-scale challenges for science and decision making. Taking our lead from one of the major GEAs—the UN Environment's Global Environment Outlook (GEO) process—we outline how to address shortcomings of the current global scenarios through coupling with local and regional decision makers' knowledge and needs. We posit that such a framework will guide the development of future assessments to be more effective in meeting the SDGs, as well as more long-term sustainable development across scales and as such could make a substantial contribution to earth system governance.

Changing the Rules: Game Co-Design as a Futures Method for Inquiry and Experimentation with Systems of Environmental Governance

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In this paper, I investigate game co-design as a novel, iterative and dynamic approach for the participatory imagining and experimentation with future systems of environmental governance. Games have a history in policy and planning that goes back almost as far as simulation modelling and future scenarios, and games share many of the analytical and/or experiential benefits of modelling and scenarios. What is unique about games in the context of environmental

governance is their focus on subjective actor perspectives, and on rule systems. These unique traits mean that game players can step into different roles and interact with others and the game, exploring the consequences of regulations and policies. However, when players can only play set roles within games pre-designed by experts, games have important limitations as a tool for investigating systems of governance. A finished game has a specific 'procedural rhetoric' – the game rules explain how the game designers have conceptualized the systems that the game seeks to represent and the players can only accept and act within this procedural rhetoric. By contrast, when game co-design, rather than game play alone, is used as a method for inquiry and experimentation between diverse actors, this can lead to a process of actively questioning how current systems of governance are conceptualized, and what future forms of governance may be possible. What are the rules, roles, responsibilities and relationships in the system that the game is representing? And what happens when game co-designers change these elements to represent a more desired future system of governance? In this paper, I describe the benefits of game co-design as a high-potential approach to the research and imagining of environmental governance - an approach that offers key opportunities of actor inclusion, reflexivity, and flexibility to engage with specific governance issues. Using several examples, I investigate the practical and conceptual challenges that such an approach entails. I argue that the problems of simplicity associated with the game metaphor can be overcome by widening our definition of 'games' and by valuing broken, incomplete, evolving games as useful for reflecting on systems and processes of governance. I offer specific guidelines for using game co-design for the purpose of investigating and re-designing systems of governance in multi-stakeholder processes. This paper contributes to the conference stream 'Theoretical and Methodological Foundations of Earth System Governance' as well as being part of efforts of the Earth System Governance Task Force on Anticipatory Governance.

Utilizing Local Initiatives and Bottom-up Scenarios to Enhance IAMs and Inform Policymakers

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Earth System Governance literature increasingly points towards the need for transformative change to avoid significant and irreversible planetary change. Certain theories of change argue that the first step in achieving any type of transformation is visioning the desired change. Normative global "top-down" scenarios and integrated assessment models explore quantitative changes needed to accomplish SDGs and MEAs, but lack concrete and actionable next steps for policymakers. Given this challenge, local initiatives and "bottom-up" scenarios offer much needed complementary knowledge to existing "top-down" work. They can ground top-down work in local realities, identify blind spots within IAMs, build buy-in and ownership, develop accountability, and help disseminate knowledge to stakeholders. This paper explores the potential methodologies and outcomes of connecting "bottom-up" with the "top-down," focusing on such work's uptake and use by policymakers. By using a participatory process to collect "seeds", defined as potentially transformative initiatives that have yet to be adopted at a large scale, a useful database of solutions is developed with an emphasis on enabling conditions and policies that decision-makers can pursue. These seeds are further developed into scenarios that allow for specific and positive visions of sustainable futures, to be used as images and narratives that can complement and guide quantitative goals. Finally, analysis of the seeds and seed-based scenarios is used to better inform top-down scenarios and models, and provide recommendations to policymakers. This research draws from the theoretical underpinnings of the Seeds of a Good Anthropocene project, which has developed the seeds framework and continues to explore innovative methods for seed analysis and scenario-development. As the first global attempt to connect similar bottom-up work with existing top-down modelling, this research also utilizes UNEP's upcoming GEO-6 as a case study. After building a method to collect and analyze seeds, create seeds-based scenarios, and integrate with "top-down" scenarios and models, the research will test the methodology from an urban perspective. This paper directly relates to the fifth (Adaptiveness, Resilience, and the Transformation) and sixth (Theoretical and Methodological Foundations) conference streams, specifically earth system governance transformations, the improvement of modelling and scenario work, and the use of imagination and anticipation. It presents and explores a novel method of thinking about how to navigate towards a more sustainable

Anthropocene, and hopes to identify ways to connect scientific models of the future with visible solutions to empower and inform policymakers.

Analysing the Politics of Foresight for Social-ecological Systems Governance

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This paper offers a critical social science perspective on the use of foresight for social-ecological systems (SES) governance. Our analysis addresses an important research gap. On the one hand, literature exists on the use of foresight for SES governance, and on the other, social science perspectives have been used to analyze foresight approaches in a more general sense. However, there is still a limited understanding of the politics of foresight in SES governance contexts. To this end, this paper presents a framework to analyze foresight processes aimed at improving SES governance, more specifically processes focused on improving national-level policies related to climate change, agriculture and other forms of land use, food security, and environments. To understand the impacts of foresight, this framework is comprised of criteria for good SES governance, which we define as governance contributing to SES resilience. We use an outcome-based definition of resilience: a system is resilient when it remains able to generate, or even improve certain outcomes, regardless of its internal organization. Beyond this basic definition, however, what resilience entails (what is the system, which shocks pose threats to the system, what are the system's outputs and for whom, etc.) should always result from a negotiated framing by key system actors. From this definition of SES resilience we derive a number of criteria for good SES governance, such as inclusiveness, adaptiveness, transparency, and social learning. We then define a number of potential ways in which foresight can impact these criteria. The paper illustrates the framework by applying it to a case study in Burkina Faso, focusing on the scenario-guided review of the National Rural Sector Plan. We conclude that when foresight processes are not explicitly designed with SES governance principles in mind, foresight can still contribute to SES governance in a number of ways, for example though scenarios that encourage certain options for climate adaptations or through stressing the importance of including multiple stakeholders in decision-making. However, there is a risk that only incremental improvements are made, neglecting long-term resilience. To be able to contribute to the resilience of key social-ecological systems, SES governance principles should guide the design of foresight-guided policy formulation processes. This paper contributes to two streams: *Theoretical and Methodological Foundations of Earth System Governance*; and *Adaptiveness, Resilience, and the Transformation of Earth System Governance*. In addition, it offers a contribution to the Earth System Governance Taskforce on Anticipatory Governance.

Governing SDG Implementation through Blockchain Technology: Limitations and Possibilities

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Distributed-ledger (or 'blockchain') technologies play a key role in shaping the future of public administration. This submission looks at the limitations and possibilities of such a future based on the assumption that governments in developed and developing countries are embracing these new technologies to advance the implementation of the Sustainable Development Goals (SDGs). We are taking a close look at areas of public administration and governance which will most likely see an adoption of distributed-ledger based systems over the next two decades, such as digital identity (SDG 16), innovative climate finance (SDG 13) and social service provision (SDGs 1, 2, 3). Based on empirical evidence from India and the Netherlands, we will first explore the impact of governance through blockchain technology on individual and collective privacy. While some hail blockchain as a potentially privacy-preserving technology through the empowerment of the individual and the weakening of intermediaries and centralized institutions, it deserves further consideration which potential risks an immutable distributed- ledger containing (sensitive) personal data might create. Even more so in cases where the access to the distributed-ledger is completely decentralized among its users, and openly accessible to the public. Furthermore, the ever-growing amount of immutable personal data raises the

question if privacy in the (virtual) public space will be possible at all. Considering the different areas of application in which governance using distributed ledgers might impact SDG implementation, we also ask if and to what extent blockchain technologies are able to alter existing modes of governance. Our findings suggest that emerging issues in areas such as data privacy, transparency and accountability will not be solved by the mere application of new technologies but require innovative governance arrangements that are centred on a number of key criteria, including well-selected implementation choices, clear ethics guidelines, and common monitoring and evaluation frameworks.

The Dominant Belief System on the Economy and the Environment in Canada: Evidence from Elite Perspectives Using Q Methodology

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Building upon a complex systems view of shared belief systems, this paper explores the dominant belief system among political-economic elite in Canadian politics of the economy and the environment. Its starting premise is that belief systems are not simply discourses, separate from society-nature relationships, but rather are deeply entwined in those relationships in a way that implies their subjective layering over time. This paper uses Q methodology to test this hypothesis by identifying the dominant belief system held among Canadian political-economic elite related to economy and environment at the national level. Q methodology is ideally suited to test this hypothesis because it enables researchers to identify and extract layers of shared meaning within and among groups of people. First, a concourse of statements capturing the range of perspectives on the economy and the environment is developed by reviewing political manifestos, policy statements and other publicly available documents. Next, this concourse is used to conduct Q-sorts with research participants to empirically identify the dominant belief system among Canadian political-economic elite. Semi-structured interviews were conducted during Q-sorts to identify the subtleties of participants' responses, including specific concepts, connections, valences, and ontological presuppositions. Factors are extracted from statistical analysis of Q-sorts, and were interpreted not as pertaining to separate discourses but as often overlapping layers of socially shared meaning. These results are used to evaluate the hypothesis of historical layering and interrogate what this means for society-nature relationships. This paper concludes by discussing the implications this layered view of belief systems has for how societies can affect systemic changes towards more ecological ways of living on the Earth.

Organising Policy-relevant Knowledge for Climate Action: Integrated Assessment Modelling, the IPCC, and the Emergence of a Collective Expertise on Socioeconomic Emission Scenarios

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The IPCC, in its regular assessment of climate change research, covers a wide range of sciences and expertise, with three Working Groups with different focus (physical basis, impacts and adaptation, mitigation). Whereas physical climate models relevant to Working Group I have received much attention, few studies have tried to unpack to plurality of scientific perspectives that make up climate change research, and the relationships among them. In particular, little is known about expertise on climate change adaptation and mitigation. We seek to analyse one increasingly influential source of expertise on mitigation that is within Working Group III of the IPCC: Integrated Assessment Models (IAMs), which were prominent within the AR5. We retrace how IAM research organised into a community around the production of socio-economic scenarios during the preparation of the IPCC AR5 (2005-2014). Our objective is to describe the co-emergence of a research community, its instruments, and its domain of applicability. We highlight the role of the IPCC process in the making of the IAM community, showing how IAM worked their way to an influent position, and analyse elements of the repertoire that served to organise collective work on scenarios in interaction with the IPCC and the European Union, and which now frames the community and its epistemic practices.

We conclude our analysis with some challenges the community is confronted to. The repertoire that was constituted to enable IAM research to meet demands from the IPCC and the EU seems to stimulate research and to give IAM teams "an innovation boost". The positioning of IAM research as policy-relevant also generates constraints and tensions, especially since policy framing and priorities evolve. For the IAM community, maintaining and reinforcing its current position implies adjusting to the dynamics of assessment and policies. In particular, since the 2015 Paris Agreement, international climate negotiations focus on bottom-up initiatives and national mitigation policies, rather than on global action. IAMs are being less suited for studies at the national scale, the IAM community seeks to assert its relevance in the face of competing expertise. In the context of EU funding, it is also expected to assess increasingly stringent climate objectives, such as the 1.5°C, and contributes to their institutionalisation even when models have to be pushed to their limits to achieve them.

Techniques of Futuring: The Search for Soft Spaces to Break out the Climate Deadlock

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It is widely acknowledged that overcoming the current planetary crisis warrants new ways of producing and integrating knowledge in in policy processes. The depth, width and urgency of issues likes climate change requires, it is argued, knowledge practices that not only explain change but that actively help to shape sustainable development. A key issue in this respect is the way in which specific epistemic practices like cost-benefit analysis and design thinking integrate ideas, feelings, analysis, and aspirations with building legitimacy and capacity for achieving change in practice together with diverse societal actors. Building on recent writings on transdisciplinary science, this paper calls for a better understanding of the actual acts through which the future becomes represented in social and material forms and how this affects the relation between public deliberation, exchange and social inclusion. It introduces and develops the concept of 'Techniques of Futuring' defined as practices bringing together actors around one or more imagined futures and through which actors come to share particular orientations for action. We theorize how how techniques of futuring may be understood as a particular take on or moment in transdisciplinary research, organized around the exploration of possible and desirable worlds. For organizing the exploration of futuring in a non-technocratic and deliberative fashion, we emphasize the need for moving beyond cognitive and routinized settings and to include more experiential forms of knowing. We argue that with careful created settings and the inclusion of arts and design, conditions may be created in which, techniques of futuring may help to constitute a 'soft space' for politics. In these soft spaces contested issues like climate change are not politicized but a more constructive dynamic is fostered around questions on the nature of the problem and what those involved could possibly desire and achieve together for the future.

Understanding the Evolution of Complexity Thinking in the Context of Earth System Governance

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The origins of Earth system science and governance can be traced back to the "ecological revolution" around 1970 when a broad awareness of the side-effects of mankind's economic activities took shape (Radkau 2014). The following two decades have been characterized mainly by political debates and the setup of inter- and transnational institutions and research communities that would help to structure these diagnoses and essentially normative questions. During the 1990s discourses of transformative research in the context of climate change and sustainability have emerged (i.e. co-creation or co-production of knowledge, transdisciplinarity, mode-2) and currently we observe that transformative research is entering a new phase, characterized by increased reflexivity as an essential element of complexity approaches in sustainability. In order to understand this epistemological development and to apply it to problems of Earth System Governance we build up a comprehensive corpus of the history of sustainability thinking, that captures the main lines of thought and the evolution of complexity thinking in this context from the beginnings around 1970 until today's sustainability sciences. Based on a literature review, we identify the most relevant dimensions of

sustainability thinking in a topic model and apply it to find corresponding literature. The main question guiding the construction of our corpus reads: *How can we identify and understand (system) boundaries in sustainability contexts?* The historical depth of the corpus allows a distant reading and provides the basis for critically conceptualizing boundaries and transitions in the evolution of sustainability. This helps to evaluate and understand contemporary sustainability sciences' being deeply embedded in complex dynamic human-nature systems including efforts to govern them.

Our historical extended take meets the challenge of modeling system boundaries in sustainability. We contribute to critical reflection, evaluation, and observation of complex dynamics in the contexts of sustainability calling for adequate practices and suitable models (Satanarachchi/Mino 2014). We apply modeling methods to corpus construction and analysis that are linked to current developments in computational history, discourse analysis, and transdisciplinary methodologies in the context of sustainability thinking. This mix of methods provides a degree of reflexivity especially helpful and demanded in *transdisciplinary* sustainability sciences and thus contributes to the modeling of complex dynamic sustainability contexts within human-nature systems.

In our presentation, we will introduce our corpus, discuss our methodology, and indicate potential next steps for applications.

Climate Engineering and Earth System Governance in the Anthropocene

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In recent years, Earth system governance researchers have systematically explored the intersection of theories of governance and Earth systems analysis. This has included diverse approaches to managing the global climate system and the challenges of anthropogenic climate change. One growing thread within the Earth system governance literature is the Anthropocene. If humans have indeed become such a dominant force on natural systems, then whether and how we govern Earth systems becomes even more salient. A secondary growing thread within the literature is emerging technologies, some of which have enabled (or would enable) humanity to reshape Earth systems, unintentionally or intentionally. Separate from this, other scholars have devoted increasing attention to the challenges posed by emerging climate engineering technologies. Climate engineering is a set of proposed deliberate large-scale technological interventions in either the global carbon cycle (so-called carbon dioxide removal or negative emissions) or the global energy balance (solar radiation management) to counteract climate change. Some proposed methods appear to be effective, affordable, and technologically feasible. If developed and used at scale, then these technologies would reshape our relationship with the natural world, perhaps signifying an acknowledgement or even an embrace of the Anthropocene. Given its global impacts, climate engineering would necessarily entail new modes of governance at all scales, including the global . Yet how to govern climate engineering remains uncertain and contested. These two streams of research overlap in multiple, important ways, yet exchanges between research communities have been limited. In this paper, we lay the foundation for a dialogue between the discourses of Earth system governance and of the governance of climate engineering. We begin by considering points of continuity and contrast to assess the degree of complementarity between these two literatures. We then examine enduring debates and knowledge gaps associated with each and consider the ways and extents to which these programs could be mutually supportive. Finally, we reflect on the practical implications of this relationship for the evolving politics of the global environment in the Anthropocene.

Policy Reports as Boundary Spanning Devices? A Story of Glossy Pictures, Fancy Logos, and the Science-policy Interface

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For many organizations that are active in the field of global environmental governance, publishing and disseminating policy reports is an activity they routinely engage in. It is such a common practice, that most organizational websites

feature a dedicated repository for these publications. With the notable exception of flagship publications such as the science assessments of the Intergovernmental Panel on Climate Change or, more recently, of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, there however has been limited scholarly attention for this types of document. This research gap is ever more surprising seeing that organizations such as the International Union for Conservation of Nature, the Food and Agriculture Organization of the United Nations, or the World Bank consider their reports to be 'authoritative publications', which are 'key to advance knowledge' and 'designed to contribute to the debate on the appropriate design of public policies'. With this background in mind, this paper examines policy reports from a science-policy perspective. Building on a systematic analysis of reports addressing blue carbon – a concept that refers to the climate change mitigation potential of vegetated coastal ecosystems – the paper reflects on the formal characteristics, making-of, and functions of policy reports. Among others things, it shows how policy reports reflect scientific knowledge, mimic academic practices, mobilize a wide range of experts and are geared towards decision makers and practitioners.