

IIED External Review

2017-2022

ADDENDUM

Landscape Analysis

July 2022



IIED 2017-2022 Review

Notes on IIED's landscape

About this document

This document responds to a set of questions in IIED External Review for the period 2017-2022 regarding IIED's positioning in the landscape of environment and development research-to-action. It provided background analysis supporting sections of the main review report on global shifts. The document was produced by Dr Louise Gallagher (primary author) and Dr Zenda Ofir. It has not been edited. Navigation aid (page numbers hyperlinked):

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Objectives

To feed the analysis on positioning of IIED in its next strategy period by mapping and analysing the operating landscape for the organisation in 2022.

This analysis has been conducted with the understanding that IIED is on the cutting edge of many trends in the sustainable development sector. The intention is to create a summary overview from which key shifts in the landscape that could be important for IIED can be identified and discussed in the main review report.

Definitions

‘Positioning ‘

‘Positioning’ in this analysis is defined in terms of ability to achieve stated goals relative to other actors in the same landscape. This ability is determined in part by value proposition, built on niche and brand fit for a changing market, competition based on performance of existing products and services including return on investment (in terms of stated desired outcomes achieved relative to investment by IIED and its funding partners).

Defining IIED’s landscape

IIED is fundamentally in the business of influencing towards just and equitable transitions and transformative change, seeking institutional innovation in policy environments for local-to-global sustainability governance towards outcomes that will address interlinked, dynamic global crises in climate, ecological and social systems that have regionally and locally-distinct manifestations and differentiated adaptive capacities. This is how this analysis defines the landscape and operating context for the organisation.

Definition of key terms

Transformative change: Transformative change is understood as intentional, game-changing shifts, or “fundamental, system-wide reorganizations across technological, economic, and social factors, including paradigms, goals, and values” (IPBES 2019: 14).

Policy (policy environments): The term can mean: a domain of interest; an intended outcome or proposal for action, an instrument by any policy actors; formal decisions taken by government, private sector or other policy actors or the process to take such decisions; government plans, programmes, legal frameworks or legislation.: The social, political, historical and economic factors determining much about policy strategy, decision making, choice, actors and their networks, implementation and performance. The policy environment is a polycentric and multi-level environment where state actors are just one policy actor. (Cairney, 2019).

Local-to-global sustainability governance: [Also termed environmental governance in the literature]: On-going processes across temporal, spatial and polycentric institutional scales between varied entities to shape and enact practices through which societies are governed to intentionally guide, steer, control, or manage sectors or facets of societies’ towards realising collective interest sustainability and resilience outcomes with multiple dimensions. Governments are no longer the only relevant actors as attaining these outcomes is currently understood as a shared responsibility of actors at multiple levels of state authorities, markets, civil society and citizens. (Cash et al., 2006; Ostrom, 2010; Lange et al., 2013; Heikkila, 2018).

Institutional innovation: “novel, useful and legitimate change that disrupts, to varying degrees, the cognitive, normative, or regulative mainstays of an organizational field”. Innovation practices are typically future-oriented, asking big questions and solving big problems by seeking disturbance of an established pathway. Innovation practices can seek either deliberate *incremental change* (improving upon how we are already attempting to achieve sustainability goals) or deliberate *radical change* – breaking with existing institutions, knowledge and technologies to create totally new pathways needed to steer away from critical planetary-system thresholds and open up new trajectories of sustainability. (Raffaelli and Glynn, 2015).

Adaptive capacity: a generic concept involves (1) capacity of a system, group of people, or individual to cope with environmental contingencies (to be able to maintain or even improve its condition in the face of changes in its environment(s)) and (2) capacity to improve its condition in relation to its environment(s), even if the latter does not change, or to extend the range of environments to which it is adapted. (Adapted from Gallopin, 2006:300).

Analysis approach

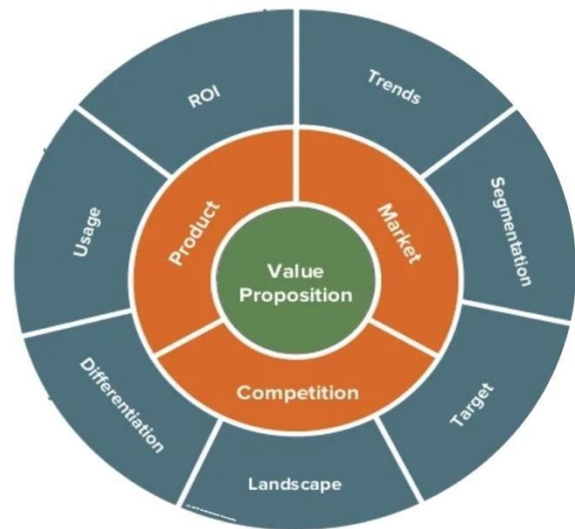
I define IIED's landscape as that of multi-level sustainability governance, with a focus on arenas, situations and patterns of interaction for research-to-action in sustainability praxis in the environment-development nexus.

This analysis is a rapid search and synthesis of current trends from leading sustainability thinkers and institutions about this landscape, as well as reflections from IIED staff and their partners.

A landscape like this is vast, yet the aim here is to provide a comprehensive mapping of major trends and issues for critical elements rather than in-depth analysis of each. Data used:

- IIED Peer discussions
- IIED Partners survey
- IIED Staff survey
- Academic and grey literature publications from leading institutions published 2020 onwards about key trends in sustainability priorities, governance and activities in research-to-action praxis.
- Public information available on other research-to-action organisations.

Note: I use the term **research-to-action** in this discussion to encapsulate a broader set of ideas about the relationships between science & research and change in the world. This term seems most relevant to IIED (from the peer discussion) given they discuss themselves as doing 'research' not 'science', and place a heavy emphasis on action-oriented outcomes. However, I draw from a wider reading from fields including policy sciences, science and technology studies, innovation studies, sustainability science, sustainability transitions, agenda-setting by global science and sustainability institutions when discussing evolution trends in this mode of engaging in sustainability governance.



Section 1: Some dynamics in IIED's landscape ¹

This section summarises three sets of dynamics: 1) global influencing the landscape of sustainable development in 2022, 2) sustainability landscape dynamics, as the primary landscape in which IIED operating and 3) research to policy and action theory and practices dynamics, covering IIED's major implementation field. The section is written as a horizon scan with hyperlinks linking to underlying sources. Readers who feel up to date on current affairs and latest trends in sustainability and research-to-action can jump ahead to the section 1 [conclusion](#) on what does engaging with the dynamics outlined imply and onwards to [Section 2](#): Exploring IIED's value add in these landscape dynamics.

1.1. Global dynamics influencing IIED's landscape in 2022

In 2022, we seem to be observing [climate change](#), [ecosystem degradation](#), [social inequity](#) trends – the fruits of the Great Acceleration – more clearly than ever before. As these play out in the context of the global COVID-19 pandemic, [intersecting effects are threatening](#) progress already made on human wellbeing in 50 decades of international development and environment interventions, as well as the 2030 Agenda for Sustainable Development. Ecosystem and social resilience were already compromised in many ways. Now, intersecting climate and biodiversity crises are making existing inequalities worse with increased unpredictability in access to water, energy and food, and exposures to disasters. Big global issues have differing impacts on nations depending upon the conditions in that nation. We are already potentially seeing some 'canaries in the mine'² as a unique combination of factors are triggering significant problems in some countries and regions in the past 12 months:

1. [Fragility in economic and social systems.](#)

- A. Our disrupted economic systems following the pandemic bounce-back: Asset class bubble, Venture Capital overload.
- B. Interlinked evidence crisis, ICT developments and media institution trends
- C. Social cohesion and solidarity failings: Reckoning with racial injustices in US, UK; COVID vaccine and mask politicization, mainly in US and EU media and societies; COVID vaccine distribution inequality; Housing crises in Germany, US, Ireland, parts of the UK.

2. [Climate crises.](#) [Climate change: Big increase in weather disasters over the past five decades](#) documented by the World Meteorological Organisation. We speak now about climate change impacts happening today, and not as something that may come to pass in the future:

- A. **Climate change physical risks and impacts** (changing monsoon/precipitation patterns, flooding, drought and high humidity heatwaves, sea level rise,) have been recognised as already present in **Asia** for many years. Extreme heatwaves in **India and Pakistan in March 2022** started the season. [By 2050, between 600 million and one billion people in Asia will be living in areas with a nonzero annual probability of lethal heat waves.](#) More than 9 million people have been marooned across **Bangladesh** and northeastern India, and at least 54 people have died, after [heavy monsoon rains](#). Severe storms and summer rains – the heaviest in 60 years in some places - in **China** have triggered [flooding in cities and mudslides in rural areas](#). **Africa's mountain glaciers are shrinking** faster than the global average. A drought in **Madagascar** caused a humanitarian crisis. The number of people affected by food insecurity rose by 40% in 2020 over with the previous year, in part impacted by a locust invasion in **East Africa**. This region also accounted for 12% of all new population displacements worldwide, with over 1.2 million new disaster-related displacements compared to 500,000 new conflict-related displacements. [Summary of a [2021 WEF review](#) of the State of Climate in Africa]. Devastating fires in the **Amazon**. Lakes disappearing in **Bolivia**. Water scarcity in **São Paulo**. Melting glaciers in **Patagonia**. [South America is already feeling the impacts of the climate crisis](#). **California** is experiencing a megadrought, the worst in centuries ([Williams et al., 2022](#)). "This drought will very likely persist through 2022, matching the

¹ Rather than include in-text citations, I refer the reader to the bibliography for this section at the end of this document.

² Some inspiration for this section was found [in this post](#).

duration of the late-1500s megadrought.” This part of the world has also experienced increasing regularity and intensity of wildfires. **Europe:** [flooding in Germany in July 2021](#) is juxtaposed with a [2021/22 winter drought](#) in Europe which is currently culminating in continent wide water availability concerns, leading to a variety of (potentially cascading) risks to drinking water access (Northern Italy), crop failures (France), nuclear station cooling (France), wildfires ([Spain, Germany](#)) and now [2022 summer heatwaves](#). The [Arctic is heating up seven times faster than the global average](#)

- B. **Political will is failing in some key governments.** Leading global governments around the world are starting to walk back climate commitments in the context of social and economic turmoil in mid-2022. [“The west is back-sliding on climate action”](#) (The Hindu, 26 July 2022).
3. **Food, energy and debt crises.** The war in Ukraine and sanctions on Russia are accelerating global energy transitions; this geopolitical situation is also bringing fuel and food security concerns to the forefront of international politics at a time of supply constraints, strong spending and fragile economic and social systems in many countries following COVID-19. A combination of food availability concerns, rising prices of fuel, food and debt repayment difficulties have been observed [in 2021 and 2022](#) in **Afghanistan, Argentina, Bangladesh, Burkina Faso, Cameroon, Haiti, Indonesia, Iran, Ivory Coast, Lebanon, Morocco, Mozambique, Pakistan, Peru, Senegal, Somalia, South Africa, Sri Lanka, Tunisia, Vietnam.** The [United Nations Crisis Response Group](#) shows 107 nations who are vulnerable to at least one of the three critical drivers of fuel, food or debt crises, with 69 ‘perfect storm’ countries with 1.2 billion people that are being hit by all three at the same time.
 4. **Globalisation and democracy crises - accelerated global governance system transformations on the horizon?** COVID hit a world already struggling in so many ways. In the midst of slipping economic balancing acts, now we have a war between two of the world’s biggest food, fertilizer and energy exporters. Doubts had already been raised about a key theory of change guiding international relations and governance since the post-World War 2 period that more trade integration and dialogue as the pathway to peace and cooperation. Longstanding debates in the EU in this regard have been dampened by the war in Ukraine – the benefits of being part of the EU collective have been reinforced amidst concerns about democracy of EU systems. There is a reckoning with [Ostpolitik](#) failures (The Guardian, 20 June 2022). Economists are debating whether recent supply chain turmoil and geopolitical conflicts will result in a reversal or reconfiguration of global production. WEF 2022 Global Risks Report captures many of related risks, and gives a timeframe for when the probability of becoming critical over the next 2, 5 and 10 years is significant. However, many organisations like and associated with the WEF have a stake in international systems of governance and trade, and do not give weight to de-globalisation concerns. For example, Lombard Odier talks about [globalisation evolving](#). Other voices suggest we have been on a de-globalisation trend for years (Witt, 2019).
 5. **2022 Energy supply crisis** and looming energy access competition, driven in part by an energy transition which is accelerating following the Russia invasion of Ukraine. Existing models and experiences for energy transitions are going to come under scrutiny in the coming years given climate and energy policy targets, the coming energy supply crunches, and access issues that are likely to be critical points in near future political decisions under current global dynamics. We will need to learn what is working and not working, and be ready to defend the concept while improving implementation of sustainability transitions.
 - A. **Europe and in China are two particularly interesting cases that illustrate this point.**
 - i. *The EU energy transition.* EU transition actions have been heralded as ahead of the curve. However, this transition has gaps. The European policy of exiting coal and nuclear has been quick in response to carbon emission targets and security concerns [following the 2011 Fukushima nuclear accident](#). But investment in renewables has been slower. Russian natural gas was supposed to be the bridge of the transition, but now sanctions against Russia, as well as larger realisations about the failures in the Russia-EU relationship, means this is no longer viable. In addition to energy system disruption, Europe is also dealing with drought conditions affecting water stocks in hydropower reservoirs [in Switzerland](#). This climatic situation also affects the remaining nuclear production too – In France, less than half of the nuclear reactors are active [given concerns about not having enough water for cooling in June 2022](#). Europe is facing a near term

future of less energy available than demand in the winter of 2022. Energy executives at a Reuters conference on 15 June urged [shorter-term solutions such as efficiency and conservation during the current fuel supply crunch](#) and IPCC 6th Assessment discusses sobriety for the first time.

- ii. *China's energy transition.* Sourcing natural gas from elsewhere would also place EU and China in competition, given the [latter's switch to natural gas](#) in many of its largest cities since 2017. This action, among others, has indicated China is the other major leader in implementing an energy transition. [China has announced several major renewable energy projects and is set to become the leader in renewable and clean energy by the end of the decade](#). The question is can this investment keep up with growing energy demand? Coal-based energy production is the backup plan strategy to meet supply shortfalls and this is threatening China's transition commitments.

- B. **Financing realities for energy transitions.** *New energy futures are not guaranteed.* IEA (2021): Even if spending on clean energy is set to rise in 2021 by around 7%, financial flows have grown more rapidly than actual capital expenditures. There is a shortage of high-quality clean energy projects. This is compounded by inadequate channels to guide available funds in the right direction and a lack of intermediaries capable of matching surplus capital with the sustainability needs of companies and consumers. [...] The USD 750 billion that is expected to be spent on clean energy technologies and efficiency worldwide in 2021 remains far below what is required in climate-driven scenarios.

1.2. Sustainability politics dynamics

Some key trends emerging in local-to-global sustainability governance landscape perhaps include:

1. **Continued evolutions in 'Environment' and 'Development' framings – Environment and Development' returns to 'Environment or Development'?** The argument that development without environmental sustainability is not sustainable development (Figure 1) is promoted by: i) influential concepts like the Great Acceleration (Anthropocene) (SRC and [International Geosphere-Biosphere Programme](#)), Planetary Boundaries ([SRC](#)) and Doughnut Economy ([Oxfam](#)), coupled with ii) years of advocacy by biodiversity conservation groups, natural capital and ecosystem services scientific developments; and iii) more palpable effects of climate change, natural disasters, increasing concerns over the biocapacity for food production etc. in the Global North. Given inequalities soaring under our current system, and also under many transition scenarios, there is scepticism for the triple-bottom line wins promised by the 'environment for development' and 'environment and development' paradigms (Chaigneau et al., 2022). There are trade-offs to be made – and significant justice and equity dimensions to be contended with. Who is going to win from sustainable development or sustainability transitions? Who is going to lose? Who will win and lose if we don't transition? What has what capacity to absorb which losses? Having a clear-eyed view of the answers to these questions is going to be needed. How can we maintain a focus on the foundational function of environmental sustainability while meeting social, basic needs may become more urgent under the current set of global crises? Are we already swinging back towards 'Environment for Development' type framings? It certainly seems to be coming into focus for international environmental governance actors recently at UNEA5.2) ([Strengthening Actions for Nature to Achieve the Sustainable Development Goals](#)), [Stockholm50+](#) (prosperity for all), [the UN Science-Policy-Business Forum on the environment](#) (nature positive transformations that deliver), among others.

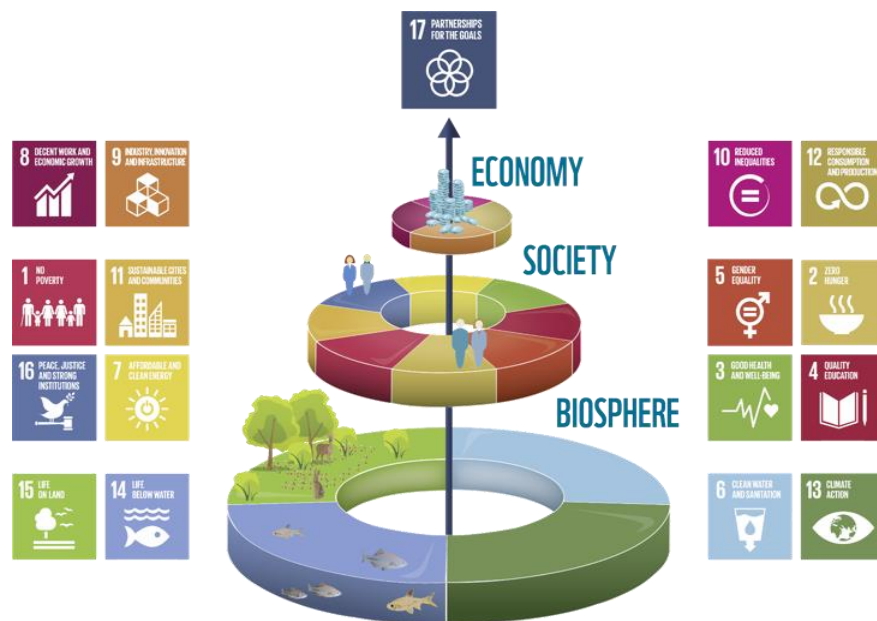


Figure 1 Ecological systems and fulfilling basic human needs through protecting human rights are both part of the foundations for well being for all life

2. Changing politics of local-to-global sustainability governance.

- A. **SDG weaknesses.** The power of these goals are not legal – they are not an instituted convention. The SDGs are providing a normative agenda-setting in the public square for sustainability, but “impact has been largely discursive: and structural institutional impact “remains rare”. (Biermann et al., 2022).
- B. **Just Transitions?** From [McKinsey](#), January 2022, under a net-zero attainment scenario: “we estimate that global spending on physical assets in the transition would amount to about \$275 trillion between 2021 and 2050, or about 7.5 percent of GDP annually on average.”[...]” The transition could lead to a reallocation of labour, with about 200 million direct and indirect jobs gained and 185 million lost by 2050—**shifts that are notable less for their size than for their concentrated, uneven, and re-allocative nature.**” Environmental and social justice, just transitions, political ecological concern have long featured in sustainability, but now they are gaining increasing dominance with growing intersectional and intergenerational considerations. Transforming our World: the 2030 Agenda for sustainable development 5 was produced over a 3-year process of consultation, summits and high-level political forums to define the post-2015 development agenda and map a pathway to the 'Future We Want'. Yet, the consultation input came largely from established, large groups defining the status quo of global sustainability. This will not be sufficient next time round. The ‘who’ really matters when considering distribution of risks, costs and benefits of the status quo and sustainability transitions. Significant participation from private sector, Global North countries and citizens is critical not only to action and evaluating impacts, but in asking who gets to decide what is sustainable, what is equitable, and what are the priorities for action. The notion of what is development, and who needs to develop in which ways is changing. Income-based as well as institution- and knowledge-based distinctions between Global South and North are less clearly demarcated than before – both as Global South capacity catches up and Global North societies face the impacts and consequences of the global crises they have mostly created. The concept of ‘development’ is moving beyond an older notion of developing capacities to get out of poverty traps to include the notion of repair and regeneration of natural systems, avoidance of further damage and a reimagining of human-nature relationships under a footprint of 10 billion people living well.

Developing countries and fossil fuel-producing regions would invest more in a transition relative to GDP.

Average annual share of GDP spent on physical assets for energy and land-use systems by region, 2020–50,¹ share of regional GDP

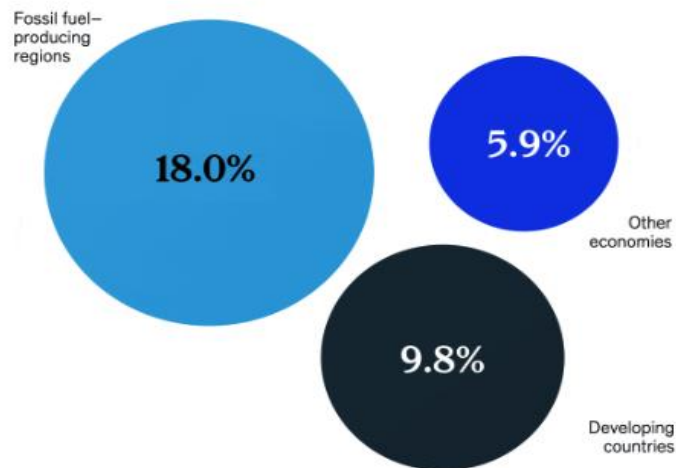


Figure 2 Who pays for realising the Net Zero 2050 Scenario? McKinsey, January 2022

- C. **Finance is the biggest issue for making transition and politics abound.** Achieving net-zero on a global scale is expected to cost around \$125 trillion in climate investment. One of the biggest differences between China and Europe's implementation of transitions is the level financing. China increased its overall energy transition investment by 60% from 2020 levels, further cementing its position as a global leader with investment totally 266B USD. European countries invested 219B USD. ([WEF, 15 Feb 2022](#)).
- i. **Sources of finance for sustainability actions are no longer public alone and the politics in the landscape are changing as a result.** Twenty-nine donor governments have finalized \$5.33 billion in pledges to the Global Environment Facility for the next four years, an increase of more than 30% from its last operating period. However, this surge is not anything approaching necessary levels. While development assistance (OECD DAC) flows held steady, with the situation of national debt in major donor countries ready to collide with rippling effects of COVID, and efforts required on burgeoning inflation, housing, energy and food security concerns at home, less aid spending in the Global South is expected in coming years (2021 giving was already below the UN target of 0.7%). Where funding does flow, it is expected to increasingly occur with a strategic interest lens and in context of established trends like regional forms of multilateralism, south-south cooperation, non-state actor growth (e.g. [Changing Landscape of Development Cooperation Amidst and Beyond COVID-19 in Asia](#)). Public sources of finance may yet pick up if we advance [income redistribution](#), as Thomas Piketty now [believes is urgent to do so](#). However, the [pushback and confusion](#) around policy effects of progressive taxation have dominated public discussion.
- ii. **Innovative development finance mechanisms are being piloted but are not ready to support scaled efforts.** These include i) green and social bonds, redirecting private sector flows through ii) ESG developments, including targets, metrics and reporting measures; and iii) blended finance/impact investment opportunities – **but these are not performing as intended, nor scaling as quickly as will be needed to finance an accelerated transition.** The increased digitalization of the finance sector is [a trend to watch](#) for the implications of getting money to where it needs to go – but it is not there yet.
- D. **Brewing backlashes?.** A mixture of desperation and scepticism when it comes to technical fixes to the complex problems we face (2020-2022 articles: [Knight Foundation](#), [New Republic](#), [Digital Rights Watch](#), [DataCeterDynamics](#), [Earth.org](#), [Stanford Social Innovation Review](#) – a [recent academic review](#) concludes “although strong forms of techno-optimism are not intellectually defensible, a modest, agency-based version of techno-optimism may be defensible”. Questioning of centralized governance systems in [India](#), politics of the centre and right [in Colombia and other Latin American countries](#); and of the centre, and left in the [US](#) and many European countries, and coalitions in Australia and Israel all

in the past two years. And with political action or lack thereof and a swell of decentralized actions by citizens and other actors. Failing belief in ESG following [one](#) scandal after [another](#), and [another, responsible business](#) and related [sustainability efforts](#), given many of these initiatives come from status quo powerbrokers and interests. Fatigue with dire predictions and [‘every unprecedented thing being blamed on climate change’](#) signals a new form of climate misinformation –about impacts and consequences Frustration with top-down “solutions” and approaches, including international diplomacy and Multilateral Environmental Agreements and related processes ([Do we really need more climate change COPs? Do we need the IPCC?](#)). It is how we get coordinated global action, except we don’t get it. [Some local and indigenous peoples’ reaction to regenerative agricultural strategies](#). [Youth movements and intergenerational injustice](#). Now with geopolitical fragmentation and some chasms forming, then the move to decentralised systems there is a need emerging for innovation in governance models.

3. **A growing pessimism about the concept of “sustainable development”?** Sustainable development, is considered an oxymoron by some in the biosciences and de-growth communities, and this is a refrain that is spreading in some key stakeholder circles. Resources are finite, and the current economic models of consumption and production only sustains itself through continuous growth is not realistic for 7bn people, and even less for 10bn expected by 2100. It is on this basis that de-growth theory and movements argue that sustainable development or green growth is not realistic for everybody and that privileged classes around the world must question what it means to live well under paradigms and inclusiveness, equity and justice. De-growth pleads for a more fulfilling life without the high levels of wasteful consumption observed in industrialised countries today while being sensitive to historical justice factors and unequal distribution of wealth. Decentralisation and reorganisation around local community is an important part of the pathway proposed. Importantly, technology is more often considered as one innovation among others of social, political and market innovation. Convincing practical answers to many critical questions have yet to be developed, but it is clear that this idea is having an influence.

1.3. Research-to-action dynamics in local-to-global sustainability governance³

Improving relationships between science & research, policy and practice has been described as one of the critical challenges for sustainable development by the UN, among others. Sustainability research aims to generate relevant problem solving strategies in full context of the complexity and uncertainty of natural systems and human and nonhuman values by 1) developing an understanding of the fundamental and complex interactions between nature and society; 2) designing policy and practice actions that will guide these interactions along sustainable trajectories; 3) and facilitate the social learning and innovation adoption for material and widespread institutional change, regime shifts and new pathways (as per the definition of sustainability science). While it seems intuitive that effective relationships between science, research and policy is a necessary part of effective sustainability governance, empirical success has been varied. Why? The legitimacy and credibility of traditional, western science and related authorities has been challenged in various ways over recent years. However, there are also deeper questions and many differing views about whether the heavy emphasis that is placed on evidence-based policy and action as a panacea. Further, some in the field are questioning if the very processes we go through to improve or support decision-making. Can research processes and outputs empower key actors to change practices, navigate uncertainties and envision a positive future in a rapidly changing geopolitical and physical world? Leading research-to-action scholarship and practice is evolving in 5 key areas to find the answer to this question:

1. **New practices of research-to-action are needed : good governance oriented, systems thinking, nexus analysis and addressing of knowledge inequalities**
 - A. **Connecting to governance.** Research-to-action processes are deliberately engaging with key barriers or providing necessary spaces, tools, information for (adapting Bennet and Satterfield, 2018’s framework) Adaptive governance; Anticipatory governance; Equitable governance; Responsive governance; and Collaborative governance : characterized by the pooling of knowledge and resources amongst a broadly inclusive set of actors with an interest in the problem at hand (e.g., citizen groups, policy makers, natural resource or other industries, Indigenous groups) ([Ansell & Gash, 2008](#)).

³ See Annex with bibliography of research-to-action literature at the end of this document. This bibliography was used to produce the thinking in this section and the majority of in-text citations eliminated for ease of reading.

- B. **Valuing multiple and varying perspectives in collaboratively defining challenges, goals, targets, actions and evaluation of outcomes in context.** The importance of who is involved and who is excluded and why is becoming critical to research-to-action. This paper's title gives a picture of a bubbling discussion of sustainability politics in research-to-action: *Making room and moving over: Knowledge co-production, Indigenous knowledge sovereignty and the politics of global environmental change decision-making.* (Latulippe & Klenk, 2020).
- A. **Interlinked, accelerating crises and the need for integrated, synergistic action is showing the lack of matching structures for problem solving and action.** Different domains are interconnected and can thus not be effectively resolved unless they are addressed intersectionally. Yet many legal and market structures, agreed targets and functional lines in organisations still remain sectoral in their basic outlook. This requires advanced analytical capabilities to enable governance and management risk assessment and management under information overload, complex interactions at the scale of systems and uncertainty. Moreover, we need to learn how to govern and manage equitably in nexus interdependencies.
- C. **New forms of research-to-action go well beyond diversity and inclusion box ticking,** or older forms of participatory research where inputs from non-scientific experts can be reduced to data, or light consultations. Transdisciplinary science, crowdsourcing, citizen science, data and science democratisation, Citizen Action Labs, Living Laboratories are all examples (overlapping to some degree) of new research-to-action modes that build upon foundations of deliberative and participatory research. These new modes are being facilitated by some interesting funding sources:
 - i. *Changing research pre-funding evaluation and post-implementation performance* assessments to prioritise research with policy / practice relevancy and a convincing pathway to impact built-in (e.g. UK Science Council, EU Horizon 2020).
 - ii. *Specific calls within traditional research funding channels for collaborative, impact research* (e.g. EU Biodiversa call).
 - iii. *Specific calls for collaborative action by intergovernmental, national governments and related agencies*, (e.g. [Power of Voices Framework](#) Subsidy, Netherlands, 2019)
 - iv. *New basket funding arrangements targeting collaboration and impact* (Belmont Forum)
 - v. *Science-motivated civil society organisations* (e.g. Oxfam, WWF)
 - vi. *Private Foundations* supporting innovation in research-to-action (e.g. Oak Foundation)
 - vii. *Private sector* (e.g. [Unilever Sustainable Living Lab 2013](#), [Sustainable Food Lab](#))

2. Keeping up with knowledge and data politics, data democracy and digital transformation trends

- A. **Addressing power imbalances and inequalities in international knowledge and data production and access.** [DIA \(January 2022\)](#): Advances have been made in creating research capacity to address societal issues in the Global South over the past 4 decades, but this progress has been put at risk by the various global shocks are experiencing (COVID effects on health research – Reidpath et al., 2020). Mechanisms “for financing joint projects between African and European or North American universities [poses a range of challenges](#). More often than not, these relationships are not a true partnerships of equals. Instead, they build on and sustain material inequalities in terms of resource allocation, employment stability and research benefits, [as well as inequalities around authorship and voice](#).”
- B. **Demand for real time, integrative, context-specific sustainability analyses and data visualizations under localization trends.** More traditional science actors are being outpaced by private enterprises in many domains of big data, machine learning, collective intelligence. Some examples: [Seeq](#) – private analytics firm, [new certificate in Sustainability](#) Analytics from Columbia University, New York; Big 4 and boutique consultancy firms offering insights on advanced analytics for sustainability – [Deloitte](#), [Quantis](#), [TASAM BGC](#), [ISS](#); Big data analysis in environmental monitoring and management and supply chain management in [fisheries management](#), [fisheries production](#), [agricultural supply chain management](#)...etc.
- C. **Indicators debates.** Where do we really stand on our environmental and social goals, especially given scepticism for SDGs targets and indicators in some quarters, concerns about development gains being wiped out [by COVID, geopolitical effects on food security from the war in Ukraine) and in new and

emerging spaces for sustainability assessment and reporting in the private sector (e.g. ESG metrics issues).

- D. **Open data standards** are not just critical for securing research quality but also enhancing equitable access to data and other research resources.
- E. **Issues with [vapourware](#)**, many software tools and related analysis go out of date quickly. This is an emerging issue in sustainability analysis communities.
- F. **Data and analysis services are increasingly provided and demanded by nontraditional actors.** Moreover, the lines between scientific and non-scientific experts are blurrier, and traditional hierarchies of knowledge are weakening. The general evidence credibility challenge in parts of the world (not in East and Southeast Asia) is also playing out in sustainability science. Changing data providers: growing presence of private players (e.g. [Dynamic Earth](#) by Google is making waves in the spatial analysis world currently).
- 3. **Engaging with the 'human factor'**, and how this influences real outcomes for enriched decision making and subsequent change in behaviour (as per behavioural economics, social psychology and policy sciences literature). This is currently quite poorly understood and utilised in sustainability science research-to-action. How scientific uncertainties are internalized and managed – or not – in various cultural and institutional capacity? How do the world views, mental models, lived experiences and empathy affect both how problems are framed and what evidence is deemed important, and what solutions are viable?
- 4. **Innovating new competencies in research-to-action to engage with politics, power and power dynamics.** Research-to-action processes must contend with “hierarchy, power play and institutional battle” in the ‘murky’ world of policy, and increasingly the worlds of financial markets, supply chains and other market institutions which also struggle with transparency and accountability. More systematic understanding of what research-to-action can do to intervene and address power dynamics for more just and equitable processes and outcomes is needed.
- 5. **Legitimate and data-driven case-making for the why and how of research-to-action**
 - A. **Consistent, effective research-to-action is genuine struggle** for many, more traditional ‘science-policy’ organisations. The community of scholars, practitioners, commissioners, funders, programme managers engaging in research-to-action are still not on the same page about the value-add. We are missing empirical evidence to support more robust design principles and performance assessment.
 - B. **Responding to poor utility of much sustainability research** for policy-makers or other target audiences (Pannel et al., 2018).
 - C. **Dealing with the mismatch between policy integration** (governance levels, institutions, people) **and science integration** (disciplines, research themes, methods) agendas in different places in the world, and at different levels.
 - D. **Research-to-action matches the increasing appetite for decentralisation** or bottom-up governance mechanisms – there are opportunities unexplored here, but these are likely tempered by the very short term funding models for many research-to-action activities.
 - E. **Research-to-action as an enabling factor for sustainability transitions is still poorly understood.** Previous evaluations have tried to explain difficulties and successes through the credibility-salience-legitimacy framework (Cash et al., 2003). This is valid but incomplete for institutional innovation in sustainability governance. Part of the problem is an older view of research influence still holds sway and empirical testing is more prevalent in Europe and US.

1.4. Trends identified by IIED staff

A list of 10 tentative trends for IIED’s landscape were presented to participating IIED staff during peer discussion sessions held from March-May2022, identified from preliminary work carried out by the External Review team. All were perceived to be relevant, and the working descriptions were refined through the discussions. The final 11 trends are listed here, in a (very) approximate ranking order for their perceived importance in global sustainability / sustainable development by IIED staff :

1. Justice, equity and paradigms of regenerative and circular economies
2. Practising decolonisation

3. Vertical and horizontal connections and scaling of impact in global sustainability governance, with localisation in mind
4. Global South research and development capacities: Working on funding flows, capability building, research infrastructure, facilitating influence by Global South sustainability science
5. Identity and power in sustainability politics
6. Gender equity and inclusion as a pathway to sustainable, resilient societies
7. Evolutions in data science, equity & politics, including trends towards data democratisation and data-driven decision making that is fit for purpose in sustainability governance
8. Youth / future generations - Bringing voices of the future into the present
9. Maturing SDG politics, power relations on rights and responsibilities
10. Threats to democracy and closing civic space
11. Post-truth, relativism and the role of science

1.5. What do these dynamics imply?

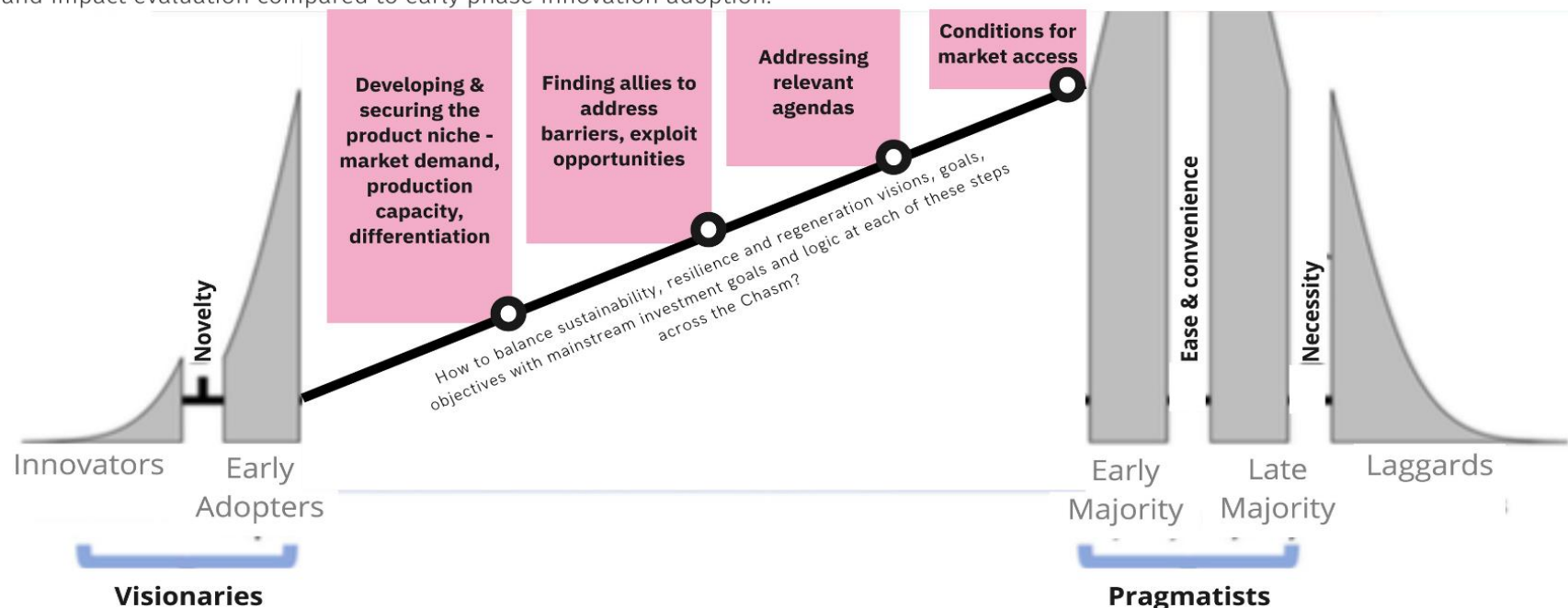
After worrying about geopolitical instability and global environmental change for many decades, it has arrived. While we can learn from history, we do not have language, let alone a roadmap, for what comes next. Never before have our national and regional economies been so interconnected; nor have we experienced such intense and successive shocks to globalisation. The increasing poverty and other social and political dynamics in 2020/2021 and yet to come in 2022 will reverberate for years to come. Many parts of society are now obliged to move from a predict and control worldview, to sensing and responding our way towards new system structures and guiding paradigms in amidst a series of potential shifts underway:

- Shift 1: From globalisation is here to stay to de-globalisation and fragmentation
- Shift 2: From pre- to post-2015 notions of 'Development'
- Shift 3: From 'Environment and Development' to 'Environment or Development'
- Shift 4: From global to decentralised centres of power in sustainability governance
- Shift 5: From talking about, to implementing sustainability transitions
- Shift 6: From traditional, conventional to innovative, unconventional sources of finance
- Shift 7: From pilots and transitions to 'crossing the chasm' for scaling and transformations
- Shift 8: From within-boundary to multiple boundary-spanning research-to-action engagement
- Shift 9: From linear and discipline-focussed sustainability analysis to systems and nexus thinking
- Shift 10. From traditional research-to-action practices to non-linear science influence in sustainability transitions and transformations

Giving hope and leading societies towards effective collective action in the Global North and South towards in the context of current global geopolitical trends. A just transition to low-carbon and regenerative economies is going to require increased recognition of how modern human society is reliant on the Earth's ecological systems and a renegotiation of already unequal rights between different global regions, income classes, societal groups, generations, human and nonhuman species. Infiltrating the mainstream and getting us past the 'pilot stage' of sustainable development by evidencing ambitious actions, brokering partnerships, and channelling financial flows towards structural change for and institutionalisation of new practices is the most critical focus. This is a form of 'crossing the chasm', a notion from innovation diffusion studies and strategy, which may prove to be a useful model to assist futures IIED strategy reflections (see Fig. 3 below). Crossing the chasm will necessarily include navigating increasingly multi-polar, multi-actor and tense local-national-global politics of sustainable development, including engaging with new narratives of what it means to develop both in the Global North and South. Intentional research-to-action interventions designed for sustainability governance outcomes have an important role to play as spaces where institution-altering solution-finding and social learning can take place.

Getting transition projects and practices across 'the chasm' to scaled adoption

Current transition projects appeal to the innovators and early adopters in sustainable development (by choice, by necessity). We now need projects that will appeal to the pragmatic majority in the mainstream private sector. That means meeting different conditions because early adopters and the majority are different target markets. Crossing the chasm will also require different steps to be taken in project development, promotion and impact evaluation compared to early phase innovation adoption.



Model design is based on the model of innovation diffusion (Rogers, 2010), and adapted with insights from Moore (2014) and Polhill et al. (2019) about what it takes to 'cross the chasm' between early innovation adoption and late innovation adoption phases. Rogers, E. M. (2010). Diffusion of Innovations (4th Edition). Simon and Schuster. Moore, G. A. (2014). Crossing the chasm: Marketing and selling disruptive products to mainstream customers (Third edition). HarperBusiness, an imprint of HarperCollins Publishers. Polhill, J. G., Ge, J., Hare, M. P., Matthews, K. B., Gimona, A., Salt, D., & Yeluripati, J. (2019). Crossing the chasm: A 'tube-map' for agent-based social simulation of policy scenarios in spatially-distributed systems. *Geoinformatica*, 23(2), 169-199. <https://doi.org/10.1007/s10707-018-00340-z>

Figure 3 Applying the innovation diffusion thinking to mainstreaming of sustainability practices at scale

Section 2: IIED's value proposition in landscape dynamics

Many governance models do not support the imaginative effort required to create inspirational and equitable futures for all in navigating the above dynamics. The same systems of economic development and governance that brought us the climate and other crises have persisted because the same narrow group of power-brokers are making choices for all. However, current conditions seem to be speeding up the timeframe for transformation in institutional structures around the world.

Sustainability agendas are part of disrupting existing regimes- bringing niche innovations into the mainstream – and are supposed to be opening up new pathways and futures. However, governance of sustainability actions is currently being decided through a uncoordinated combination of 1) local, national and regional policy, 2) global financing mechanisms, national government budget allocations some private financing and 3) the structure of global supply chains and markets, and private consumption. These mechanisms exclude many voices and fail to respond to the urgent issues we are facing in many cases. Inclusive, integrated and truly anticipatory planning and action at local levels, and from local to global levels, is a rarity in practice. Some powerful actors resist acknowledging for change in this direction. Or actions are all too often viewed through current balances of power which favour 'tried and tested' solutions that are not delivering. Sometimes, the biggest decisions are taken outside of public view.

More effective research-to-action activities have been clearly identified as part of the solution to this challenge (ISC, 2020). And many institutions are racing to answer this call, creating a competitive research to action environment. Since the 1980s the number of university-based boundary organisations has risen, including industry-linked institutes and funding programmes in Australia ([Sebastian et al., 2022](#)), Europe (Cvitanovic et al., 2018), US (Bednarek et al., 2018); and in thematic spaces like biodiversity conservation and development (Sarkki et al., 2013; Honeck et al. 2021), urban sustainability (Acuto et al., 2018). 11,175 think tanks are catalogued in TTCSP's Global Think Tank Database ([TTCSP, 2020](#)) from across all global regions, with 99 institutions featuring on TTCSP's listing of environmental thinktanks (T 18: 161).

2.1. Core elements of IIED's value proposition

What matters to competing in this space? Diverse financing, longevity, understanding and communicating the value-add. From IIED staff peer discussions and partner feedback, the following five **assumptions** are being used to explain IIED's current value proposition in sustainability governance:

1. Influence due to a well-established brand, a long track record, new 'clever' thinking, an ability to see issues on the ground and how they scale across the multi-level governance system for sustainable development
2. Ability to work across levels, from local to global, with partners in a collaborative research-to-action processes that while are not systematically designed, perform well in terms of producing conceptual influence and increasing partner influence.
3. Complementary skills to local partners, and willingness to work with research as a means to the end of institutional or social change not bound by academic performance criteria.
4. Fundraising (according to partners; internally, this is viewed as theme/group dependent).
5. IIED is clearly in the space of applied sustainability science and so it compares favourably to academic institutions for some.

From IIED staff peer discussions and partner feedback, the following five issues are posed as a **major threat** to IIED's current value proposition in sustainability governance :

1. Distribution and sharing of expertise and experiences within IIED, with poor codification of collaboration models that all understand and share
2. Accountabilities within the research groups
3. University faculty/department mentality, with an emphasis on individual researchers' agendas
4. The need to do many projects in order to stay afloat
5. Some reflect on the thematic structure of the research groups as being problematic for collaborative or nexus research-to-action processes – not all agree with this.

2.2. Selecting some comparison organisations operating in the same shifting landscape

Good comparison organisations for IIED who also operate with research-to-action practises in action arenas for local-to-global sustainability governance will have the following characteristics

- Europe-based organisations in the environment-development nexus working at local and global levels
- Social science dominant, or at least strongly mixed methods
- Research-to-action as an explicit part of the mission or of ways of working
- Autonomous and independent, or quasi-independent think-tanks ([as per 2020 Global Go to Think Tank Index report definitions:14](#)) who deliver services to similar audience targets

Which organisations are included in the comparison?

1. CGIAR (formerly the Consultative Group for International Agricultural Research).
2. Chatham House (United Kingdom)
3. E3G (UK)
4. Forum for the Future (UK, US, India, Singapore)
5. Global resilience partnership (GRP) at the Stockholm resilience centre (SRC) (Sweden)
6. Institute du développement durable et relations internationales (IDDRI) (France)
7. Institute of Development Studies (IDS) (hosted at the University of Sussex but independent from this institution both financially and in its governance structures).
8. International Institute for Applied Systems Analysis (IIASA) (Austria)
9. International Institute for Sustainable Development (IISD) (Switzerland, Canada)
10. Öko-Institut (Germany)
11. Overseas Development Institute (ODI)
12. Stockholm Environment Institute (SEI) (Stockholm, with regional centres)

Which organisations are excluded and why?

- Institutes, think tanks which are primarily nationally-focussed or based completely outside Europe (e.g. [Earth Institute](#) and World Resources Institute (US), Institute for Global Environmental Strategies (Japan).
- [Centre for Science and Earth](#), [The Energy and Resources Institute](#) (TERI) because they are primarily focused on having influence at national-level in India.
- [Future Earth](#), strong on encouraging cutting edge developments in collaborative and transdisciplinary research, they are a research network and not a dedicated organisation.
- IUCN, because it is an intergovernmental – business – civil society partnership/network
- Oxfam, WWF, Hivos: because they do not place knowledge production at the heart of their organisational theories of change.
- [Think2030](#), because it is Europe-focussed and a network. SEI and IISD are members.
- UNEP, UNDP, because intergovernmental bodies operate from a different position of power and influence.

2.3. Summary observations about the 12 comparison organisations

Table 1 below is a rapid comparison of IIED to other similar organisations in research-to-action in the sustainability field. This is a light analysis, depending on information found on the organisations' websites.

Table 1 Comparison organisations summary table

Organisation	Positioning	Strategy highlights: What do they do to 'make change happen'?	Financing structure	Primary locations	Longevity
CGIAR	CGIAR has a wealth of experience and knowledge spanning 50 years that builds on a track-record of innovation and world class research. Thanks to our funders, CGIAR research has transformed the lives of hundreds of millions of people through tangible research outcomes.	<p>> Research/Science and Innovation</p> <p>To deliver science and innovation that advance the transformation of food, land, and water systems in a climate crisis.</p> <p>Other key elements: >Integration / cross-cutting action areas / systems approach> partnership driven > systems research > towards the SDGs, transformations.</p> <p>Partnership / network structure uniting 16 CGIAR non-profit research centres into One CGIAR.</p>	<p>Has an annual research portfolio of just over US\$900 million with more than 9,000 staff working in 89 countries around the world.</p> <p>Trust Fund</p> <p>basket funding structure w/3 channels.</p>	<p>LAC</p> <p>CWANA</p> <p>WCA</p> <p>ESA</p> <p>SA</p> <p>SEA</p> <p>Research centres in US, France, Italy</p>	50 years
Chatham House	We are an independent policy institute and a trusted forum for debate and dialogue. Our research and ideas help people understand our changing world.	<p>Chatham House helps people, societies and governments understand and adapt to seismic change.</p> <p>We provided thought leadership on key issues that defined the 20th century[....] Our research influenced China's establishment of low-carbon economic zones. And the Chatham House Rule has helped foster open dialogue and ideas-sharing.</p> <p>We carry out independent and rigorous analysis through the lens of our second century goals.</p> <p>Our researchers develop positive solutions to global challenges, working with governments, charities, businesses and society to build a better future</p>	<p>Chatham House is a registered charity in England and Wales (charity number 208223) and a non-profit organization. The institute has been granted foreign 501(c)3 equivalency status with the United States Internal Revenue Service.</p> <p>Chatham House benefits from a wide range of philanthropic, research-related and membership support. This diversity of global support is critical to the independence of the institute.</p> <p>Highly rated by Transparify.</p>	<p>UK, London – though their events, discussions are strongly communicated through global regional lens.</p>	100 years.

Organisation	Positioning	Strategy highlights: What do they do to 'make change happen'?	Financing structure	Primary locations	Longevity
		The simulation centre offers immersive experiences in scenario planning and simulation exercises, to help participants build greater resilience and preparedness in an uncertain and interdependent global environment.			
E3G -	<p>We are world leading strategists on the political economy of climate change, dedicated to achieving a safe climate for all.</p> <p>As an independent think tank our aim is to steer the global transformation we need at the pace our planet requires.</p> <p>E3G stands for Third Generation Environmentalism: The first generation of environmentalists focused on the conservation of species and habitats. The second generation widened the scope to include pollution and natural resources. The third generation of environmentalists is building on this success, working on solutions rather than problems. As third generation environmentalists, we are turning arguments into answers.</p>	<p>Coalitions, strategy, insights.</p> <p>At E3G we are changing the world one conversation at a time.</p> <p>We work on the frontier of the climate landscape tackling the barriers and advancing the solutions to a safe climate.</p> <p>Our goal is to translate climate politics, economics and policies into action.</p> <p>Our work is global in outlook. Political economy and governance underpin our efforts across six interconnected areas. The scope of our work is unified in its ability to leverage the biggest impacts.</p> <p>Thematics:</p> <ul style="list-style-type: none"> • Political Economy and Governance • Fossil Fuel Transition • Clean Economy • Sustainable Finance • Geopolitics, Diplomacy and Security • Risk and Resilience 	<p>At E3G, we are grateful to our funders for allowing us to conduct our ground breaking work. They range from philanthropic foundations to governments and NGOs.</p> <ul style="list-style-type: none"> - Many partners and funders of IIED mentioned 	Brussels, Berlin, London and Washington, DC	Founded in 2004 – 18 years
Forum for the Future	<p>Forum for the Future is a leading international sustainability non-profit.</p> <p>The forum applies two core approaches: system change and futures.</p>	<p>We specialise in addressing critical global challenges by catalysing change in key systems.</p> <p>We do this by convening transformational collaborations to drive change, by partnering with organisations to help them lead by example, and by</p>	Forum for the Future is a registered charity (Charity No. 1040519), and our trustees are legally responsible for all of our activities. Like many other charities, we are also	offices in London, New York, Singapore and Mumbai	For over 25 years, we've been working in partnership

Organisation	Positioning	Strategy highlights: What do they do to 'make change happen'?	Financing structure	Primary locations	Longevity
	<p>We are a leading global sustainability non-profit with more than 20 years' experience in delivering systems change.</p> <p>We are able to effectively leverage funding from the private sector to match any contributions, helping to multiply the effect of your donation/support</p> <p>We work with a wide range of partners, including trusts and foundations, to deliver long-term, sustainable solutions that address key global challenges.</p> <p>We are sustainability pioneers.</p> <p>We are experts in systems change and in using futures tools to create shared visions of a more sustainable world.</p>	<p>building a global community of trailblazers and change makers.</p> <p>We create impact by convening innovative collaborations to drive change, by partnering with organisations to help them lead by example, and by building a global community of pioneers and change makers.</p> <p>Together we can reinvent the way the world works.</p> <p>What we do:</p> <ul style="list-style-type: none"> • Creating ambitious change strategies • Convening systemic collaborations • Equipping people to drive change 	incorporated as a registered limited company		with business, governments and civil society to accelerate the shift toward a sustainable future.
GRP- / SRC	The Global Resilience Partnership (GRP) is an inclusive and diverse Partnership of organisations joining forces towards a world where vulnerable people and places are able to thrive in the face of shocks, uncertainty and change	<p>The Global Resilience Partnership advances resilience through identifying and scaling on the ground innovation, generating and sharing knowledge, and shaping policy. Resilience underpins sustainable development in an increasingly unpredictable world. We envisage an inclusive world in harmony with nature, that is better prepared to cope with shocks, adapt to change, and transform – all within planetary boundaries.</p> <p>>What changes the world? >> Alliances</p> <p>GRP is made up of 60+ organisations that have joined forces to work together towards this vision.</p>	<p>GRP is funded by USAID, Irish AID, GEF, Sida, FCDO, and the Canadian government and is hosted by the Stockholm Resilience Centre.</p> <p>Funding structure is unclear</p>	Light structure, moving secretariat hosted by SRC and other organisations .	Set up in 2014, 8 years
IDDRI	IDDRI, a think tank to facilitate the transition towards sustainable development.	Governance is therefore the way in which sustainable development is built. IDDRI's goal is to describe the transformations of the sustainable	IDDRI's funding comes from long-term programmes (IDGM, IDGM+), companies, French ministries and	Paris, France with	2006? – first Annual report is

Organisation	Positioning	Strategy highlights: What do they do to 'make change happen'?	Financing structure	Primary locations	Longevity
	<p>IDDRI is an independent policy research institute and a multi-stakeholder dialogue platform that identifies the conditions and proposes tools to put sustainable development at the heart of international relations and public and private policies</p> <p>IDDRI is a foundation of public interest. Its programmes are determined by transparent decision-making processes subject to collective deliberation by IDDRI's governance bodies</p>	<p>development in its institutional and non-institutional components, and to organise the debate on its achievements with respect to the overall Agenda 2030 objectives.</p> <p>IDDRI's research and influence capacities are centred on alliances and networks of expertise in many countries in Europe and internationally.</p> <p>IDDRI has a multidisciplinary international team of around 40 people, the majority of whom are researchers.</p> <p>Programmes: Climate, Biodiversity and ecosystems, Oceans, Sustainable Development governance</p> <p>Initiatives :</p> <ul style="list-style-type: none"> • Deep Decarbonization Pathways • Renewing European food, agricultural and rural policies • Post-2020 International Biodiversity Governance • Strengthening regional oceans governance • Lifestyles in transition 	<p>public bodies, the European Commission, and international organisations and foundations</p> <p>IDDRI is labelled "Think tank and transparent" by the European Observatory of Think Tanks. It is second in the France 2017 ranking.</p>	<p>national and international research partners and influence networks that are largely European or International Organisations</p>	<p>issued in 2007 on their website.</p> <p>16 years?</p>
IDS	<p>Our interdisciplinary research explores how pathways to sustainability, green transformations and equitable access to resources such as land, water and food can be achieved and help us meet the environmental as well as human development-related goals of the UN Agenda 2030 for Sustainable Development.</p> <p>We are also ranked as the number one international development policy think-tank</p>	<p>Delivering world-class research, learning and teaching that transforms the knowledge, action and leadership needed for more equitable and sustainable development globally.</p> <p>We transform knowledge, action, and leadership to build more equitable and sustainable societies where everyone can live their lives free of poverty and injustice.</p> <p>Research clusters:</p>	<p>We are an independent charity and receive no core funding, relying on donations and on funding from project grants.</p>	UK	<p>56 years -</p> <p>IDS was founded in 1966 as a 'special institution', Britain's first national institute of</p>

Organisation	Positioning	Strategy highlights: What do they do to ‘make change happen’?	Financing structure	Primary locations	Longevity
	by the 2020 Global Go To Think Tank Index Report.	<ul style="list-style-type: none"> • Cities • Governance • Health and Nutrition • Knowledge-impact-policy • Digital and technology • Business, markets, and the state, • Participation, inclusion, and Social change • Power and Popular Politics • Resource politics and environmental change • Rural futures <p>The evolving network of IDS International Initiatives includes Brazil, China, Europe, Ghana, Pakistan.</p> <p>... moving beyond OECD country perspectives to include knowledge from multiple, diverse geographies to inform policy decision making and the generation of actionable solutions.</p>			development studies.
IIASA	<p>The International Institute for Applied Systems Analysis (IIASA) is an international research institute that advances systems analysis and applies its research methods to identify policy solutions to reduce human footprints, enhance the resilience of natural and socioeconomic systems, and help achieve the Sustainable Development Goals.</p> <p>IIASA is the primary science institute for solving world-wide problems in the areas of climate, environment and natural resources, energy, risk and resilience, population.</p>	<p>The results of IIASA research and the expertise of its researchers are made available to policymakers in countries around the world to help them produce effective, science-based policies that will enable them to face these challenges.</p> <p>IIASA research is focused on transformational changes towards sustainable social-economic-environmental systems. Research shows that transformations for sustainability are effected through drivers and pressures including profound reforms in institutions and governance, shifting mental maps and societal norms, changing patterns of human behavior, strong data innovations and</p>	<p>In 2020, IIASA’s total income was €22.4million of which 50% was from research funding agencies in member countries in Africa, the Americas, Asia, and Europe. The other 50% comes from contracts, grants, and donations from governments, international organizations, academia, businesses, and individuals. These diverse sources of income enable IIASA to perform research that is truly independent.</p> <p>In 2021, 434 researchers from 53 countries were affiliated with IIASA.</p>	Austria	50 years - IIASA was established in 1972 during the Cold War to build scientific bridges between East and West

Organisation	Positioning	Strategy highlights: What do they do to ‘make change happen’?	Financing structure	Primary locations	Longevity
		<p>systems analytic capabilities, as well as raising and mobilizing widespread societal awareness.</p> <p>Research is conducted by six programs whose expertise encompasses the following principles: systemic, policy relevant, state-of-the-art, inclusive, participative, collaborative, and open.</p>	Of the 434, 71% came from Member Organization countries.		
IISD	<p>The International Institute for Sustainable Development (IISD) is an award-winning independent think tank working to fulfil a bold commitment: to create a world where people and the planet thrive.</p> <p>IISD has always dedicated itself to "providing the knowledge to act." We still do this, and we do it exceptionally well—our experts have clear, actionable solutions to the world’s most pressing challenges. But more than ever before, IISD is focused on impact. We can’t afford not to be.</p>	<p>Our research and policy work focuses on areas we deem ripe for transformation, where shifts in policy have the potential to change the game and where we have a proven record of making significant gains.</p> <p>5 focus areas: Climate; Resources; Economies; Act Together, and Engage -> the last two are less significant in their activities and reporting it seems.</p> <p>There are a series of initiatives also that respond to particular opportunities or needs.</p> <p>Independent advice backed by evidence + communication – IISD keeps the global sustainability community informed and up to date on what’s happening in global sustainability governance through the Environmental News Bulletin.</p>	<p>IISD is a registered Canadian charity, highly rated by Transparify.</p> <p>IISD receives funding from a variety of public and private sources to finance specific projects relating to its strategic objectives</p> <p>It asks openly for donations from the public on its website.</p> <p>The Government of Canada and other governments make up close to half of their funding. UN, International orgs, Foundations and Private sector constitute the other half.</p> <p>IISD’s staff of more than 120 people, plus over 150 associates and consultants.</p>	Canada, Geneva	Founded in 1990 – 32 years
ODI	<p>A leading global affairs think tank</p> <p>We are a free thinking, inclusive and trusted think tank with a global footprint.</p> <p>Very topical, but maintains a focus on overarching global challenges and priorities</p> <ul style="list-style-type: none"> • Shaping the future of global cooperation 	<p>We inspire people to act on injustice and inequality. We focus on research, convening and influencing, to generate ideas that matter for people and planet.</p> <p>We lead thinking and agendas to deliver transformational change and bring about a global sense of resilient, just and equitable prosperity.</p>	<p>more than 220 staff, including researchers, communicators and specialist support staff.</p> <p>ODI operates through two separate legal entities, ODI and ODI Sales Limited.</p> <p>As a registered charity, ODI is supported by grants and donations</p>	London, UK	Founded 1960 – 62 years

Organisation	Positioning	Strategy highlights: What do they do to ‘make change happen’?	Financing structure	Primary locations	Longevity
	<ul style="list-style-type: none"> • Tackling the climate, environment and biodiversity crisis • Fostering a more equitable and sustainable global economic order • Advancing human rights, addressing conflict and promoting peace • Digitalisation 	We deliver high-quality, internationally recognised research that informs policy design and convenes leadership across the global challenges identified.	from foundations, non-governmental organisations, the private sector, governments, multilateral agencies and academia. The full list of funders can also be found on our funding page .		
Öko-Institut	<p>Independent, visionary, international</p> <p>The Oeko-Institut is one of Europe’s leading independent research and consultancy organisations working for a sustainable future</p> <p>In the Institute’s five divisions – Energy & Climate, Nuclear Engineering & Facility Safety, Sustainable Products & Material Flows, Resources & Transport, and Environmental Law & Governance – we are committed to enabling the sustainable transformation of our society</p>	<p>We use our ideas, our scientific expertise and our consulting skills to initiate the necessary changes in politics and society and to shape them in a solution-oriented manner. We are convinced that such change processes must be democratic and socially just - also internationally.</p> <p>>Strong emphasis on transdisciplinary research leadership: Networked research geared to sustainable development – Transdisciplinary research which acts as a motor for sustainable innovations in our society.</p>	<p>Oeko-Institut processes more than 300 projects funded by third parties every year. Among our most important clients are ministries, public institutions, companies, the European Union and non-governmental organizations. In many projects the institute cooperates with partners in Germany and abroad.</p> <p>Research and consultancy funding model.</p>	Germany	Established 1977 – 45 years
SEI	<p>Stockholm Environment Institute: bridging science and policy.</p> <p>We are an international non-profit research and policy organization that tackles environment and development challenges.</p> <p>A research institute devoted to providing knowledge and capacity to deal with the environmental dimensions of human development and well-being sprang</p>	<p>Our work supports the integration of Agenda 2030 and the Sustainable Development Goals (SDGs) into policy and action.</p> <p>We connect science and decision-making to develop solutions for a sustainable future for all.</p> <p>Our work spans climate, water, air and land-use issues, governance, the economy, gender and health. Stakeholder involvement is at the heart of our efforts to build capacity, strengthen institutions and equip partners for long-term change.</p>	<p>SEI is a foundation registered under Swedish law with offices in seven countries.</p> <p>The Sida is our largest single donor, but we also receive broad support from other development agencies, governments, NGOs, universities, businesses and financial institutions.</p> <p>Other top funders</p> <ol style="list-style-type: none"> 1. Swedish Ministry of the Environment via Formas 	SEI has seven centres in the UK, the US, Thailand, Kenya, Estonia and Colombia. Our headquarters is in Sweden.	33 years, though claims roots in UN Conference on the Human Environment, 1972

Organisation	Positioning	Strategy highlights: What do they do to 'make change happen'?	Financing structure	Primary locations	Longevity
			<ul style="list-style-type: none"> 2. NICFI at the Norwegian Ministry of Climate and Environment 3. Swedish Research Council Formas 4. Swedish Foundation for Strategic Environmental Research (Mistra) 		

Section 3: IIED relative strengths and weaknesses

This section offers a brief comment on IIED's relative strengths and weakness following the above familiarisation exercise with comparable organisations, IIED staff reflections in peer discussions, external review staff survey and partners survey returns to the external review team. It is intended as 'food for thought' to the preparation of the final report where it will be considered among other data sources produced and analysed by other members of the external review team.

Shift 1: Towards deglobalisation and fragmentation	IIED's signature strength on vertical and horizontal connections in global sustainability governance as low effort (Peer discussions). Partnership track record (peer discussions + partners survey). While it is unclear of how large a shift this will be, IIED is ready for a more decentralised world in many ways.
Shift 2: From pre- to post-2015 notions of 'Development'	IIED has a large footprint in the Global South, but as organisation that is based in the UK and now also with an office in Europe, it is also well positioned in the Global North. This also gives it a particular strength with regard to the coming shifts in the framing of 'development'. It relates very well and with great empathy to the perspective of the Global South, but it is located and rooted in the Global North – mostly part of the privileged classes for whom the questions of ²¹ degrowth and fact-values gaps are going to be a challenge. Thus it can do 'two-eyed seeing' – a unique benefit under these circumstances. Some of its organisational peers are also strongly connected to the Global South but IIED appears to have a uniquely strong respect for its partners.
Shift 3: From 'Environment and Development' to Environment or Development?	Positioning on poverty and marginalisation means that IIED can add value in the balancing act of environment and development so necessary to navigating this shift. <i>Justice, equity and getting to paradigms of regenerative and circular economies</i> : Rated as likely to be strongly influential in the post-2030 agenda and, of course, linked to many other issues on the board including decolonisation, global south research and development capacities. Justice and equity are underpinning, core values for IIED – and recognised by others for this also. So, the Institute is in a strong position from which to engage further on this theme. IIED has a foundation of thinking on alternative economic structures and development-environment trade-offs across its various groups, and has done some recent cross-group explorations thanks to support from the MacArthur Foundation in the past year. IIED staff did reflect on a missing capacity in economics – or perhaps an unevenly shared capacity across the groups. There is more work to be done on mainstreaming gender into programme and project design and understanding the return on investment of applying a gender lens. It is not consistently seen as a pathway to securing impact in IIED and is more often engaged with in response to donor requests – or neglected because it is perceived as unimportant for donors. However, this topic is core to the work of newer and younger staff, where it is part of their part of their mindset and observed as an enabling condition for sustainability progress. It is an area of potential growth for the organisation as a result.
Shift 4: From global to decentralised centres of power in sustainability governance	<p>Local level research-to-action dynamics are absolutely critical to sustainability action since, ultimately, all politics is local. Social cohesion crises, climatic system change, biocapacity and geopolitical disruptions are mounting and intertwining, but such global trends will be translated into local manifestations and mediated through local politics. In every nation, a majority of environmental and social challenges and responses are driven by local conditions, local agency, local people making local decisions that have local impacts. Action on sustainability ultimately has to be localised, connected to contextual history, cultures and social, political and economic institutions and dynamics. IIED has deep experience in working with decentralised and localised governance systems while still working towards the benefits of global scale learning, coordination and cooperation. It also sees engagement with power as part of the daily work, and have some successful examples already inside the organisation.</p> <p>Practising decolonisation is recognised as one of the single most important issues that will shape IIED's work in the coming months and years ahead because the wider environment-development sector has reached a political moment and a time of change on this issue, where IIED should be able to do more. IIED is quite well set up to engage on this topic</p>

	because of the work done on partnerships, however many staff recognised there is still a long way to fully embed the necessary practices, both externally and internally.
Shift 5: From talking about, to implementing sustainability transitions	Climate change impacts, pandemics, social and environmental injustices, all rooted in global environmental change; all linked to the interactions of humans and nature. The 'how' of sustainability is IIED's core business at a time when this is being seen as strategic by some powerful non or new-sustainability actors. IIED should not be considered an implementer in sustainability necessarily. Its skills are complementary to that of its partners, and it is willing and very capable in work with research as a means to the end of institutional or social change without being bound by academic performance criteria.
Shift 6: From traditional, conventional to innovative, unconventional sources of finance	<p>IIED, according to its staff, does not seem ready to navigate this shift yet. It currently is struggling to focus on really critical focus areas of work and research staff are continuously seeking project funding. However, the recent investments in the development team mean an enthusiastic and experienced team are on board. More effective collaboration and jump starting more regular and active exchanges in the wake of COVID impacts on work patterns seem in order.</p> <p>Supporting Global South research and development funding, infrastructure and influence is a topic that IIED is very well positioned to address though it perhaps is not doing enough on it today and engaging further would mean contending with complex historical and social factors that shape this realm: elitism, knowledge hierarchies, prestige factors, western education models and institutions influence, funding flows. Any work to support the influence of Global South research (opposite to extractive research models) would go hand in hand with work on practicing decolonisation. This is less a thematic interest and more a central to a way IIED works across all activities. Increasingly, research / research-to-policy funding is anticipated to flow to IIED's local research partners and IIED can hope to become their partner of choice/service providers to them – even if this is insufficient funding in the near to medium term.</p>
Shift 7: From pilots and transitions to 'crossing the chasm' for scaling and transformations	Vertical and horizontal connections and scaling of impact in global sustainability governance, with localisation in mind is something that IIED knows. It is the main strength of IIED to the eyes of IIED staff and some partners. However, the role here for IIED could be further shifted towards supporting Global South partners to scale efforts in their own contexts (IIED as conveners, collaborators); IIED would then focus on Global-scale (including Global North activities) networking, becoming more visible and communicating better, and critically, making connections across place-based explorations. As one example: one IIED staff member shared how they have observed two groups at IIED currently working on very similar issues of energy poverty, access and transitions to renewable energy – one in urban areas and the other in rural. Having a linking dialogue on experiences and learning within IIED and with the partners could benefit everyone. Clever identification and good investigation of thorny problems that are observed and felt at ground level is an IIED strength. Their connection to the ground allows them to "see" the issues that are, or will become, really important in the global environment-development dynamics in time. What could be interesting would be to analyse across their deep place-based work in many locations in the world to more quickly identify common, repeating emerging issues, agency gaps, structural barriers to change – and what has worked in pathway finding – to say something about about the new horizons in sustainability? What seems old news to IIED could be really new news to other organisations. What they observe to be key and common thorny issues that impede or accelerate sustainability action in many places could be elevated beyond the place-based scale. The end result would be IIED advancing the global conversation on structural problems to systems change for resilience and sustainability outcomes, with strong roots in ground-level experiences (IIED example that seems to be already doing this: work debt swaps for nature). This speaks to the necessity and value of collaboration across groups in IIED to identify core problems.
Shift 8: From within-boundary to multiple boundary-spanning research-	Internally, a culture of challenging each other at IIED was deliberately embedded in the organisation through the creation of separate research group structures. The intention was to help the organisation and staff grow intellectually, and avoid falling into complacency and innovate new approaches to complex sustainability challenges by all staff being able to explore, question and challenge the work of any other group. It is supposed to be balanced out by values and principles like fairness, respect, collaboration, equity, inclusion

to-action engagement	<p>– but some imbalances may have crept in because of hierarchies – of expertise, of experiences, of seniority.</p> <p>Externally, the changing landscape in research effectiveness and impact in the UK which favours IIED's model of research-to-action. However, it is important to recognise the difficulty in claiming impact in the boundary space between research, policy and practice in sustainability. It is a real space but also a fuzzy one when we try to explain how the enabling conditions for institutional innovation and transformation are affected and impacted by research processes, the relationships and influence built around research activities, and research outputs and their communication, sharing.</p>
Shift 9: From linear and discipline-focussed sustainability analysis to systems and nexus thinking	<p>From the outside, and only with the light touch analysis, it appears that IIED may not be as strong as other peer organisations in systems or nexus analysis approaches, methods and initiatives (e.g. CGIAR, SEI, IIASA). This is an area worth evaluating more deeply than is possible here.</p>
Shift 10. From traditional research-to-action practices to non-linear science influencing sustainability transitions and transformations	<p>Organisations who succeed in engaging with these trends will likely be ready with its own credible understanding and competencies. Some preliminary thinking about these are laid out in Table 3 below for IIED's own internal reflections. IIED is extraordinarily well positioned for innovation in research methods and approaches for in local communities in some research groups (according to the relatively limited knowledge gained from the peer discussions). A stronger understanding of what is influence and what it means to create and have influence in the world based on knowledge production processes is needed at IIED. Transdisciplinary knowledge production, cocreation and synthesis in formal and informal spaces – for institutional change/innovation. What is quality research in this area now? When does individual research performance deliver; when do more mission-driven, collective research deliver?</p>

Table 3. What are the competencies of an effective research-to-action organisation engaging with local-to-global sustainability governance?

Research-to-action trends	Organisational competence	How these might be evaluated
1. Practises of research-to-action intervention design to engage with new desired governance modes are needed	<p>>Proven ability to engage sensitively and productively with identity and values in sustainability science production for sustainability governance.</p> <p>>Clear organisational approach to research-to-action design connected to governance outcomes.</p> <p>>Monitoring, evaluation and learning systems to develop, reinforce organisational resources and procedures.</p> <p>> Operates with flexibility and in a timely fashion under tight decision making cycles outside the research world, and over the longer periods for social change.</p> <p>> Strong partnerships, partnership policies / codes, including commitments to transparency and accountability.</p>	<p>>>Existence of mandates, budgets, codes of conduct, training, staff manuals, publications documenting the following characteristics that discern boundary spanning and transdisciplinary practices from other approaches (distilled from Lang et al. 2012, Brandt et al. 2013, Brown 2015, Polk 2015, Brennan and Rondón-Sulbarán 2019, Nagy et al. 2020, Schäfer et al. 2020):</p> <p>>Aiming to address socially-relevant problems in place-based and practice situations, situating the work in political, historical, social, economic and ecological context with context analyses (political economy, stakeholder mapping and analysis, power analysis) informing theories of change/action.</p> <p>>Harnessing collective intelligence and enhance deliberative processes in issue analysis, solution-finding and agenda setting; citizen self-efficacy, network effects towards collective action, including often unheard voices in identifying risks, problems and effective individual and collective actions.</p> <p>>Explicit multiple functions and multiple accountabilities to public, research, policy, private sector and/or practice communities and with intended research, policy, and social change outcomes deliberately designed into the process.</p> <p>>Processes have defined phases that allow for iteration and nonlinear progress that fosters genuine collaboration/partnership between researchers and non-scientific experts, with equal respect for all domains of knowledge and experience facilitated by explicit forms of co-creation, co-production or co-design, co-decision and co-evaluation, with an acknowledged motivation of mutual learning.</p> <p>> Evidence of transparency and accountability.</p> <p>>Processes, explicit mandates, funding that allows for flexibility, agility in an acceptance of uncertainty and complexity.</p>
2. Keeping up with data politics, democracy and digital transformation trends across natural and social sciences	<p>>Open data policy and procedures, including for interoperability and avoidance of vapourware issues</p> <p>>Secure data management systems</p>	<p>>>Existence of relevant documents, data products</p> <p>>>Evidenced use of policies and procedures by staff</p> <p>>>Evidenced use of data products by target audiences</p>

	<ul style="list-style-type: none"> >Digital transformation strategy, including consideration of digital access issues for different populations >Data visualisation capacities, or working with partners with similar – has to be as good as private sector offerings 	
3. Engaging with 'human factor', and how this influences real outcomes for enriched decision making and subsequent change in behaviour	<ul style="list-style-type: none"> > Expert capacities in this area on staff or in partnerships > Inclusion of behaviour change-related theory in the formulation of organisational, individual intervention theories of change/action 	>>Staff profiles, ideal data would include access to staff competencies review
4. Knowledge, skills and competencies in research-to-action to engage with politics, power and power dynamics.	<ul style="list-style-type: none"> > Acknowledging power imbalances openly > Strategy to engage with this productively – not where power is lessened, but showing how 'power-over' is transmuted into 'power-together' or other forms of generative power > Evidence of attempting to disrupt power dynamics deliberately in signature processes 	<ul style="list-style-type: none"> >>Existence of relevant documents, data products >>Evidenced use of policies and procedures by staff
5. Legitimate and data-driven case-making for the why and how of research-to-action as part of catalysing and guiding sustainability transitions and transformations	<ul style="list-style-type: none"> >Ability to harvest data to test assumptions supporting theories of change >Compelling narratives built around tested theories of change/action > Can make a case for contributions to sustainability transitions and transformations contributions at an organisational level (not just programme or project) 	<ul style="list-style-type: none"> >>Demonstrated testing and updating of theories of change/action informing research-to-action activities across the organisation on an ongoing basis >>Evidence of discarding research-to-action processes that do not function for the ambitions >> Evidence of powerful communications >>Evidence base for claims is supported by voices outside the organisation

References

- Bennett, N. J., & Satterfield, T. (2018). Environmental governance: A practical framework to guide design, evaluation, and analysis. *Conservation Letters*, 11(6), e12600. <https://doi.org/10.1111/conl.12600>
- Biermann, F., Hickmann, T., S  nit, C.-A., Beisheim, M., Bernstein, S., Chasek, P., Grob, L., Kim, R. E., Kotz  , L. J., Nilsson, M., Ord   ez Llanos, A., Okereke, C., Pradhan, P., Raven, R., Sun, Y., Vijge, M. J., van Vuuren, D., & Wicke, B. (2022). Scientific evidence on the political impact of the Sustainable Development Goals. *Nature Sustainability*. <https://doi.org/10.1038/s41893-022-00909-5>
- Cairney, P. (2019). Understanding public policy: Theories and issues. Red Globe Press.
- Cash, D. W., Adger, N. W., Berkes, F., Garden, P., Lebel, L., Olsson, P., Pritchard, L., & Young, O. (2006). Scale and Cross-Scale Dynamics: Governance and Information in a Multilevel World. *Ecology and Society*, 11(2), 8.
- Chaigneau, T., Coulthard, S., Daw, T.M. et al. Reconciling well-being and resilience for sustainable development. *Nat Sustain* 5, 287–293 (2022). <https://doi.org/10.1038/s41893-021-00790-8>.
- Cvitanovic C, L  f MF, Norstr  m AV, Reed MS (2018) Building university-based boundary organisations that facilitate impacts on environmental policy and practice. *PLoS ONE* 13(9): e0203752. <https://doi.org/10.1371/journal.pone.0203752>
- East, M. (2020). The transition from sustainable to regenerative development. *Ecocycles*, 6(1), 106–109. <https://doi.org/10.19040/ecocycles.v6i1.168>
- Bednarek, A. T., Wyborn, C., Cvitanovic, C., Meyer, R., Colvin, R. M., Addison, P. F. E., Close, S. L., Curran, K., Farooque, M., Goldman, E., Hart, D., Mannix, H., McGreavy, B., Parris, A., Posner, S., Robinson, C., Ryan, M., & Leith, P. (2018). Boundary spanning at the science–policy interface: The practitioners’ perspectives. *Sustainability Science*, 13(4), 1175–1183. <https://doi.org/10.1007/s11625-018-0550-9>
- Gallop  n, G. C. (2006). Linkages between vulnerability, resilience, and adaptive capacity. *Global Environmental Change*, 16(3), 293–303. <https://doi.org/10.1016/j.gloenvcha.2006.02.004>
- Heikkil  , T., Villamayor-Tomas, S., & Garrick, D. (2018). Bringing polycentric systems into focus for environmental governance. *Environmental Policy and Governance*, 28(4), 207–211. <https://doi.org/10.1002/eet.1809>
- Honeck, E., Gallagher, L., von Arx, B., Lehmann, A., Wyler, N., Villarrubia, O., Guinaudeau, B., & Schlaepfer, M. A. (2021). Integrating ecosystem services into policymaking – A case study on the use of boundary organizations. *Ecosystem Services*, 49, 101286. <https://doi.org/10.1016/j.ecoser.2021.101286>
- ISC. (2021). *Science and society in transition: ISC Action Plan: 2022–2024*. International Science Council.
- Kellner, E. (2022). Identifying leverage points for shifting Water-Energy-Food nexus cases towards sustainability through the Networks of Action Situations approach combined with systems thinking. *Sustainability Science*. <https://doi.org/10.1007/s11625-022-01170-7>
- Kimmich, C., Gallagher, L., Kopainsky, B., Dubois, M., Sovann, C., Buth, C., & Br  thaut, C. (2019). Participatory modeling updates expectations for individuals and groups, catalyzing behavior change and collective action in water-energy-food nexus governance. *Earth’s Future*, 2019EF001311. <https://doi.org/10.1029/2019EF001311>
- Lange, P., Driessen, P. P. J., Sauer, A., Bornemann, B., & Burger, P. (2013). Governing Towards Sustainability—Conceptualizing Modes of Governance. *Journal of Environmental Policy & Planning*, 15(3), 403–425. <https://doi.org/10.1080/1523908X.2013.769414>
- Latulippe, N., & Klenk, N. (2020). Making room and moving over: Knowledge co-production, Indigenous knowledge sovereignty and the politics of global environmental change decision-making. *Current Opinion in Environmental Sustainability*, 42, 7–14. <https://doi.org/10.1016/j.cosust.2019.10.010>
- Lemons, J., Brown, D.A. (1995). The Role of Science in Sustainable Development and Environmental Protection Decisionmaking. In: Lemons, J., Brown, D.A. (eds) *Sustainable Development: Science, Ethics, and Public Policy*. Environmental Science and Technology Library, vol 3. Springer, Dordrecht. https://doi.org/10.1007/978-94-015-8492-0_2
- McGann, J. G.(2021). 2020 Global Go To Think Tank Index Report. TTCSP Global Go To Think Tank Index Reports. 18. https://repository.upenn.edu/think_tanks/18
- Ostrom, E. (2010). Beyond Markets and States: Polycentric Governance of Complex Economic Systems. *The American Economic Review*, 100(3), 641–672.
- Pannell, D. J., Alston, J. M., Jeffrey, S., Buckley, Y. M., Vesk, P., Rhodes, J. R., McDonald-Madden, E., Nally, S., Goucher, G., & Thamo, T. (2018). Policy-oriented environmental research: What is it worth? *Environmental Science & Policy*, 86, 64–71. <https://doi.org/10.1016/j.envsci.2018.05.005>
- Pascual, U., McElwee, P. D., Diamond, S. E., Ngo, H. T., Bai, X., Cheung, W. W. L., Lim, M., Steiner, N., Agard, J., Donatti, C. I., Duarte, C. M., Leemans, R., Managi, S., Pires, A. P. F., Reyes-Garc  a, V., Trisos, C., Scholes, R. J., & P  rtner, H.-O. (2022). Governing for Transformative Change across the Biodiversity–Climate–Society Nexus. *BioScience*, biac031. <https://doi.org/10.1093/biosci/biac031>
- Raffaelli, R., & Glynn, M. A. (2015). Institutional Innovation: Novel, Useful, and Legitimate. In *Shalley et al. 2015*, 35.
- Sarkki, S., Heikkinen, H. I., & Puhakka, R. (2013). Boundary organisations between conservation and development: Insights from Oulanka National Park, Finland. *World Review of Entrepreneurship, Management and Sustainable Development*, 9(1), 37. <https://doi.org/10.1504/WREMSD.2013.050935>
- Sebastian, I., Fam, D., & Prior, J. (2022). The rise of transdisciplinary “boundary organisations” within the Australian tertiary education sector: Beyond the disciplined university. In *Institutionalizing Interdisciplinarity and Transdisciplinarity* (pp. 89–106). Routledge.
- Witt, M. A. (2019). De-globalization: Theories, predictions, and opportunities for international business research. *Journal of International Business Studies*, 50(7), 1053–1077. <https://doi.org/10.1057/s41267-019-00219-7>

ANNEX - Bibliography on research-to-action evolutions literature .

The following bibliography is a list of documents upon which the discussions of research-to-action in the landscape analysis is founded. It was prepared in 2020 and so is out of date by 2 years. It was prepared for an application to science policy analysis in the biodiversity and ecosystems science field and so the selection of some literature is biased towards that global challenge.

- Aarons, G.A., Hurlburt, M. and McCue Horwitz, S. (2011). Advancing a Conceptual Model of Evidence-Based Practice Implementation in Public Service Sectors. *Administration and Policy in Mental Health and Mental Health Services Research* 38 (1): 4–23. <https://doi.org/10.1007/s10488-010-0327-7>.
- Allouche, J., Middleton, C., and Gyawali, D. (2015). Technical veil, hidden politics: Interrogating the power linkages behind the nexus. *Water Alternatives*, 8(1).
- Anderson, J.R. (2002). Spanning seven orders of magnitude: A challenge for cognitive modeling. *Cognitive Science* 26(1): 85–112. [https://doi.org/10.1016/S0364-0213\(01\)00062-3](https://doi.org/10.1016/S0364-0213(01)00062-3)
- Ansell, C., and Geyer, R. (2017). ‘Pragmatic Complexity’ a New Foundation for Moving beyond “Evidence-Based Policy Making? *Policy Studies* 38 (2): 149–167. <https://doi.org/10.1080/01442872.2016.1219033>.
- Armitage, D.R., Plummer, R., Berkes, F., I Arthur, R.I., Charles, A.T., Davidson-Hunt, I.J., Diduck, A.P. et al. (2009). Adaptive co-management for social–ecological complexity. *Frontiers in Ecology and the Environment* 7(2): 95–102. <https://doi.org/10.1890/070089>.
- Arnott, J.C., Moser, S.C. and Goodrich, K.A. (2016). Evaluation That Counts: A Review of Climate Change Adaptation Indicators & Metrics Using Lessons from Effective Evaluation and Science-Practice Interaction. *Environmental Science & Policy* 66: 383–92. <https://doi.org/10.1016/j.envsci.2016.06.017>.
- Avelino, F. (2017). Power in Sustainability Transitions: Analysing Power and (Dis) Empowerment in Transformative Change towards Sustainability. *Environmental Policy and Governance* 27 (6): 505–520. <https://doi.org/10.1002/eet.1777>
- Bäckstrand, K. (2003). Civic Science for Sustainability: Reframing the Role of Experts, Policy-Makers and Citizens in Environmental Governance. *Global Environmental Politics*, 3(4), 24–41. <https://doi.org/10.1162/152638003322757916>
- Baird, J., Schultz, L., Plummer, R., Armitage, D. and Bodin. Ö. (2019). Emergence of Collaborative Environmental Governance: What Are the Causal Mechanisms? *Environmental Management* 63 (1):16–31. <https://doi.org/10.1007/s00267-018-1105-7>.
- Balconi, M., Brusoni, S., Orsenigo, L. (2010). In defence of the linear model: An essay. *Research Policy* 39: 1–13. <https://doi.org/10.1016/j.respol.2009.09.013>.
- Ban, N.C., Mills, M., Tam, J., Hicks, C.J., Klain, S., Stoeckl, N. Bottrill, M.C. et al. (2013). A social–ecological approach to conservation planning: Embedding social considerations. *Frontiers in Ecology and the Environment* 11(4):194–202. <https://doi.org/10.1890/110205>.
- Barbier, E. (2011). Transaction costs and the transition to environmentally sustainable development. *Environmental Innovation and Societal Transitions*, 58–69. <https://doi.org/10.1016/j.eist.2011.02.001>
- Barton, T. M., Beaven, S. J., Cradock-Henry, N. A., & Wilson, T. M. (2020). Knowledge sharing in interdisciplinary disaster risk management initiatives: Cocreation insights and experience from New Zealand. *Ecology and Society*, 25(4), art25. <https://doi.org/10.5751/ES-11928-250425>
- Bassi, A.M. and Gallagher, L. (2016) ‘Integrated Economic and Spatial Planning for the Food-Energy-Water Nexus’, Chapter 5 in Goswami, A., and Arabinda M. [Economic Modeling, Analysis, and Policy for Sustainability](https://doi.org/10.4018/978-1-5225-0094-0). IGI Global: 1-323. <https://doi.org/10.4018/978-1-5225-0094-0>.
- Bassi. A.M., Gallagher, L.A. and Helsing, H. (2016) Green Economy Modelling of Ecosystem Services along the “Road to Dawei”. *Environments* 2016 (3)19.
- Beck, S. (2010). Moving beyond the linear model of expertise? IPCC and the test of adaptation. *Regional Environmental Change* 11: 297–306. <https://doi.org/10.1007/s10113-010-0136-2>.
- Beck, S., Borie, M., Chilvers, J., and Esguerra, A. (2014). Towards a Reflexive Turn in the Governance of Global Environmental Expertise. *Gaia* 23(2): 80–87. <http://doi.org/10.14512/gaia.23.2.4>.
- Bednarek, A., Wyborn, C., Meyer, R., Parris, A., Leith, P., McGreavey, B., and Ryan, M. (2016). *Practice at the Boundaries: Summary of a workshop of practitioners working at the interfaces science, policy and society for environmental outcomes*. Pew Charitable Trusts, Washington D.C. [online] URL: <http://ecite.utas.edu.au/128003>.
- Bednarek, A.T., Wyborn, C., Cvitanovic, C., Meyer, R., Colvin, R.M., Addison, P.F.E., Close, S. L. et al. (2018) Boundary Spanning at the Science–Policy Interface: The Practitioners’ Perspectives. *Sustainability Science* 13(4): 1175–83. <https://doi.org/10.1007/s11625-018-0550-9>.
- Bennett, N.J., Roth, R., Klain, S.C., Chan, K.M.A., Christie, P., Clark, D.A., Cullman, G. et al. (2017b) Conservation Social Science: Understanding and Integrating Human Dimensions to Improve Conservation. *Biological Conservation* 205: 93–108. <https://doi.org/10.1016/j.biocon.2016.10.006>.
- Bennett, N.J., Roth, R., Klain, S.C., Chan, K.M.A., Clark, D.A., Cullman, G., Epstein, G. (2017a). Mainstreaming the Social Sciences in Conservation: Mainstreaming the Social Sciences. *Conservation Biology* 31(1): 56–66. <https://doi.org/10.1111/cobi.12788>.
- Berdahl J.L., Martorana, P. (2006). Effects of power on emotion and expression during a controversial group discussion. *European Journal of Social Psychology* 36(4):497–509. <https://doi.org/10.1002/ejsp.354>.

- Bergendahl, A., Sarkis, J., and Timko, M. T. (2018). Transdisciplinarity and the food energy and water nexus: Ecological modernization and supply chain sustainability perspectives. *Resources, Conservation and Recycling* 133: 309-319. <https://doi.org/10.1016/j.resconrec.2018.01.001>
- Bergner, C., Desmarais, B. A. and Hird, J. (2019). Speaking Truth in Power: Scientific Evidence as Motivation for Policy Activism. *Journal of Behavioral Public Administration* 2(1). <https://doi.org/10.30636/jbpa.21.27>.
- Berkes, F. (2009). Community-Based Conservation in a Globalized World. *Proceedings of the National Academy of Sciences* 104 (39): 15188–93. <https://doi.org/10.1073/pnas.0702098104>.
- Berman, R., Quinn, C. and Paavola, J. (2012). The Role of Institutions in the Transformation of Coping Capacity to Sustainable Adaptive Capacity. *Environmental Development* 2: 86–100. <https://doi.org/10.1016/j.envdev.2012.03.017>.
- Biermann, F., Abbott, K., Andresen, S., Bäckstrand, K., Bernstein, S., Betsill, M.M., Bulkeley, H. et al. (2012). Transforming Governance and Institutions for Global Sustainability: Key Insights from the Earth System Governance Project. *Current Opinion in Environmental Sustainability* 4(1): 51–60. <https://doi.org/10.1016/j.cosust.2012.01.014>.
- Biesbroek, G.R., Termeer, C.J.A.M., Klostermann, J.E.M., and Kabat, P. (2014). Rethinking barriers to adaptation: Mechanism-based explanation of impasses in the governance of an innovative adaptation measure. *Global Environmental Change* 26:108–118. <https://doi.org/10.1016/j.gloenvcha.2014.04.004>.
- Boaz, A., Locock, L. and Ward, V. (2015). 'Whose Evidence Is It Anyway?' *Evidence & Policy: A Journal of Research, Debate and Practice* 11 (2): 145–48.
- Boyd E., Nykvist, B., Borgström, S. and Stacewicz, I.A. (2015). Anticipatory governance for social-ecological resilience. *Ambio* 44(1):149–61. <https://doi.org/10.1007/s13280-014-0604-x>.
- Bradshaw, G.A. and Borchers, G. (2000). Uncertainty as Information: Narrowing the Science-policy Gap. *Ecology and Society* 4, 7. [online] URL: <http://www.consecol.org/vol4/iss1/art7/>.
- Bréthaut, C., Gallagher, L., Allouche, J. and Dalton, J. (2019) Recognising power in integration dynamics when creating actionable knowledge for water, energy and food nexus governance. *Environmental Science & Policy* 94: 153-162. <https://doi.org/10.1016/j.envsci.2019.01.010>.
- Brown, R.R. and Farrelly, M.A. (2009). Delivering sustainable urban water management: a review of the hurdles we face. *Water Science and Technology* 59, 839-846. <https://doi.org/10.2166/wst.2009.028>.
- Bryson, J. M., Crosby, B.C., and Seo, D. (2019). Using a Design Approach to Create Collaborative Governance. *Policy & Politics*, 2019. <https://doi.org/10.1332/030557319X15613696433190>.
- Buckley, J., Archibald, T., Hargraves, M. and Trochim, W.M. (2015). Defining and Teaching Evaluative Thinking: Insights from Research on Critical Thinking. *American Journal of Evaluation* 36(3):375-388. <https://doi.org/10.1177/1098214015581706>.
- Cabello, V. (n.d.). *How to use knowledge co-production for transformative purposes*. <https://vimeo.com/541606159>
- Cairney, P. (2016). *The Politics of Evidence-Based Policy Making*. Palgrave Macmillan, London.
- Cairney, P. (2018). Three Habits of Successful Policy Entrepreneurs. *Policy & Politics* 46 (2): 199–215. <https://doi.org/10.1332/030557318X15230056771696>
- Cash, D.W., Clark, W.C., Alcock, F., Dickson, N.M., Eckley, N., Guston, D.H., Jager, J., Mitchell, R.B., 2003. Knowledge systems for sustainable development. *Proceedings of the National Academy of Sciences of the United States of America* 100, 8086–8091. <https://doi.org/10.1073/pnas.1231332100>
- Cash, D.W., W.N. Adger, F. Berkes, P. Garden, L. Lebel, P. Olsson, L. Pritchard, and O. Young. (2006). Scale and cross-scale dynamics: governance and information in a multilevel world. *Ecology and Society* 11(2):8.
- Chaffin, B. C., H. Gosnell, and Cosens, B. A. (2014). A decade of adaptive governance scholarship: synthesis and future directions. *Ecology and Society* 19(3):56. [online] URL: <https://www.ecologyandsociety.org/vol19/iss3/art56/>.
- Chalmers, A. (1976). *What is This Thing Called Science?* Queensland University Press.
- Chandler, M., See, L., Copas, K., Bonde, A.M.Z., Claramunt López, B., Danielsen, F., Kristoffer Legind, J. et al. (2017). contribution of citizen science towards international biodiversity monitoring. *Biological Conservation* 213: 280–94. <https://doi.org/10.1016/j.biocon.2016.09.004>.
- Charmaz, K., and Belgrave, L.L. (2015). "Grounded Theory." In Ritzer, G. *The Blackwell Encyclopedia of Sociology*, John Wiley & Sons, Ltd, Oxford, UK. <https://doi.org/10.1002/9781405165518.wbeosg070.pub2>.
- Clark, W. C., van Kerkhoff, L., Lebel, L., Gallopin, G. C. (2016). Crafting useable knowledge for sustainable development. *Proceedings of the National Academy of Sciences of the United States of America* 113(7), 4570–4578. <https://doi.org/10.1073/pnas.1601266113>.
- Clark, W.C., Mitchell, R.B., Cash, D.W. (2006). Evaluating the influence of global environmental assessments, in: Mitchell, R.B., Clark, W.C., Cash, D.W., Dickson, N.M. (Eds.), *Global Environmental Assessments*. MIT Press, Cambridge, Massachusetts, pp. 1–28.
- Cleaver, F., and Whaley, L. (2018). Understanding Process, Power, and Meaning in Adaptive Governance: A Critical Institutional Reading. *Ecology and Society* 23(2): art49. <https://doi.org/10.5751/ES-10212-230249>.
- Clement, F. (2013). For critical social-ecological system studies: integrating power and discourses to move beyond the right institutional fit. *Environmental Conservation* 40(1): 1–4. <https://doi.org/10.1017/S0376892912000276>.

- Colloff, M.J., Lavorel, S., van Kerkhoff, L.E., Wyborn, C.A., Fazey, I., Gorddard, R., Mace, G.M. et al. Transforming conservation science and practice for a postnormal world: conservation for a postnormal world. *Conservation Biology* 31(5): 1008–17. <https://doi.org/10.1111/cobi.12912>.
- Conrad, C.C., Hilchey, K.G. (2010). A review of citizen science and community-based environmental monitoring: issues and opportunities. *Environmental Monitoring and Assessment* 176, 273–291. <https://doi.org/10.1007/s10661-010-1582-5>.
- Cook, S.D.N. and Wagenaar, H. (2012). Navigating the Eternally Unfolding Present: Toward an Epistemology of Practice. *The American Review of Public Administration* 42(1): 3–38. <https://doi.org/10.1177/0275074011407404>.
- Corbin, J. M., and Strauss, A.L. (2015). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Fourth edition. SAGE publications, Los Angeles.
- Cornell, S., Berkhout, F., Tuinstra, W., Tàbara, J.D., Jäger, J., Chabay, I. de Wit, B. et al. (2013). Opening up knowledge systems for better responses to global environmental change. *Environmental Science & Policy* 28: 60–70. <https://doi.org/10.1016/j.envsci.2012.11.008>.
- Cox, M., G. Arnold, and Villamayor Tomás, S. (2010). A review of design principles for community-based natural resource management. *Ecology and Society* 15(4): 38. [online] URL: <http://www.ecologyandsociety.org/vol15/iss4/art38/>.
- Creswell, J. W., and Creswell, J.D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Fifth edition. SAGE, Los Angeles.
- Cumming, G.S., Allen, C.R., Ban, N.C., Biggs, D., Biggs, H.C., Cumming, D.H.M., De Vos, A. et al. (2015). Understanding Protected Area Resilience: A Multi-Scale, Social-Ecological Approach. *Ecological Applications* 25 (2): 299–319. <https://doi.org/10.1890/13-2113.1>.
- Cvitanovic, C., Hobday, A.J., van Kerkhoff, L., Wilson, S.K., Dobbs, K., Marshall, N.A. (2015). Improving knowledge exchange among scientists and decision-makers to facilitate the adaptive governance of marine resources: a review of knowledge and research needs. *Ocean & Coastal Management* 112: 25–35. <https://doi.org/10.1016/j.ocecoaman.2015.05.002>.
- Cvitanovic, C., McDonald, J., Hobday, A.J (2016). From science to action: Principles for undertaking environmental research that enables knowledge exchange and evidence-based decision- making. *Journal of Environmental Management*. 183(3): 864–874. <https://doi.org/10.1016/j.jenvman.2016.09.038>.
- Daily, G.C., Polasky, S., Goldstein, J., Kareiva, P.M., Mooney, H.A., Pejchar, L., Ricketts, T.H., Salzman, J. and Shallenberger, R. (2009). Ecosystem Services in Decision Making: Time to Deliver. *Frontiers in Ecology and Environment* 7(2009): 21–28. <https://doi.org/doi:10.1890/080025>.
- de Groot, R., Alkemade, R., Braat, L., Hein, L., & Willemsen, L. (2010). Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making. *Ecological Complexity* 7:260–272. <https://doi.org/10.1016/j.ecocom.2009.10.006>.
- Deaton, A., and Cartwright, N. (2018). Understanding and misunderstanding randomized controlled trials. *Social Science & Medicine* 210: 2–21. <https://doi.org/10.1016/j.socscimed.2017.12.005>
- Delavande, A., Giné, X., & McKenzie, D. (2011b). Measuring subjective expectations in developing countries: A critical review and new evidence. *Journal of Development Economics*, 94(2): 151–163. <https://doi.org/10.1016/j.jdevco.2010.01.008>
- Delavande, A., Giné, X., and McKenzie, D. (2011a). Eliciting probabilistic expectations with visual aids in developing countries: how sensitive are answers to variations in elicitation design? *Journal of Applied Econometrics*, 26(3): 479–497. <https://doi.org/10.1002/jae.1233>.
- Denzau, A. T. and North, D. C. (1994). Shared mental models: Ideologies and Institutions. *Kyklos*, 47(1), 3–31. <https://doi.org/10.1111/j.1467-6435.1994.tb02246.x>
- Desmarais, B., Hird, J.A. and Bergner, C. (2018). Replication Data for: Speaking Truth in Power: Scientific Evidence as Motivation for Policy Activism. Dataset. <https://doi.org/10.7910/DVN/KNKRNP>, Harvard Dataverse, V1
- Díaz, S., Demissew, S., Carabias, J., Joly, C., Lonsdale, M., Ash, N., Larigauderie, A. et al. (2015). The IPBES Conceptual Framework — Connecting Nature and People. *Current Opinion in Environmental Sustainability* 14: 1–16. <https://doi.org/10.1016/j.cosust.2014.11.002>.
- Diener, E. and Biswas-Diener, R. (2005). Psychological empowerment and subjective well-being. In In: Narayan, D. (ed.). *Measuring empowerment: Cross-disciplinary perspectives*. :125–140, World Bank Publications, Washington DC.
- Doubleday, R., and Wilsdon, J. (2013). *Future directions for scientific advice in Whitehall* [WWW Document]. [online] URL: <http://www.csap.cam.ac.uk/media/uploads/files/1/fdsaw.pdf>
- Duncan, R. (2008). Problematic practice in integrated impact assessment: the role of consultants and predictive computer models in burying uncertainty. *Impact Assessment and Project Appraisal* 26, 53–66. <http://doi.org/10.3152/146155108X303931>.
- Dunn, G., and Laing, M. (2017). Policy-makers perspectives on credibility, relevance and legitimacy (CRELE). *Environmental Science & Policy* 76 (October): 146–52. <https://doi.org/10.1016/j.envsci.2017.07.005>.
- Earl, S., Carden, F. and Smutylo, T. (2001). *Outcome Mapping: Building Learning and Reflection into Development Programs*. International Development Research Centre, Ottawa. [online] URL: <https://www.idrc.ca/en/book/outcome-mapping-building-learning-and-reflection-development-programs>.
- Eriksen, S. H., Nightingale, A. J., and Eakin, H. (2015). Reframing adaptation: The political nature of climate change adaptation. *Global Environmental Change* 35: 523–533. <http://doi.org/10.1016/j.gloenvcha.2015.09.014>.

- Ernest-Jones, M., Nettle, D. and Bateson, M. (2011). Effects of eye images on everyday cooperative behavior: a field experiment. *Evolution and Human Behavior* 32(3): 172–78. <https://doi.org/10.1016/j.evolhumbehav.2010.10.006>.
- Ervine, K. (2010). Participation Denied: the Global Environment Facility, its universal blueprint, and the Mexico–Mesoamerican Biological Corridor in Chiapas. *Third World Quarterly* 31(5): 773–790. <https://doi.org/10.1080/01436597.2010.502694>.
- Evans, C., Abrams, E., Reitsma, R., Roux, K., Salmonsens, L., Marra, P.P. (2005). The neighborhood nestwatch program: Participant outcomes of a citizen-science ecological research project. *Conservation Biology* 19: 589–594. <https://doi.org/10.1111/j.1523-1739.2005.00s01.x>.
- Evans, J. P. (2007). Wildlife Corridors: An Urban Political Ecology. *Local Environment* 12(2): 129–152. <https://doi.org/10.1080/13549830601133169>
- Feger, C., Mermet, L., Vira, B., Addison, P., Birkin, F., Burns, J., Cooper, S., Couvet, D., Cuckston, T., Dey, C., Gallagher, L., Hails, R., Jollands, S., Mace, G., McKenzie, E., Milne, M., Quattrone, P., Russell, S. (2018) Five priorities for new links between conservation science and accounting research *Conservation Biology* <https://doi.org/10.1111/cobi.13254>.
- Feger, C., Mermet, L., Vira, B., Addison, P., Birkin, F., Burns, J., Cooper, S., Couvet, D., Cuckston, T., Dey, C., Gallagher, L., Hails, R., Jollands, S., Mace, G., McKenzie, E., Milne, M., Quattrone, P., Russell, S. (2018) Five priorities for new links between conservation science and accounting research *Conservation Biology* <https://doi.org/10.1111/cobi.13254>.
- Ferreira, S. and Gallagher, L. (2010). Protest responses and community attitudes toward accepting compensation to host waste disposal infrastructure (April 2010). *Land Use Policy* 27(2): 638–652. <https://doi.org/10.1016/j.landusepol.2009.08.020>.
- Fischer, F., and Miller, G.J.. (2017) *Handbook of public policy analysis: theory, politics, and methods*, Routledge, New York. <https://doi.org/10.4324/9781315093192>.
- Fligstein, N., and McAdam, D. (2011). Toward a general theory of strategic action fields. *Sociological Theory* 29 (1):1–26. <https://doi.org/10.1111/j.1467-9558.2010.01385.x>.
- Folke, C., T. Hahn, P. Olsson, and J. Norberg. (2005). Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources* 30(1):441–473. <http://dx.doi.org/10.1146/annurev.energy.30.050504.144511>
- Förster, J.J., Downsborough, L. and Chomba, M.J. (2017). When Policy Hits Practice: Structure, Agency, and Power in South African Water Governance. *Society & Natural Resources* 30(4): 521–36. <https://doi.org/10.1080/08941920.2016.1268658>.
- Fraser, D. J., Coon, T., Prince, M. R., Dion, R., and Bernatchez, L. (2006). Integrating traditional and evolutionary knowledge in biodiversity conservation: A population level case study. *Ecology and Society* 11(2), 20. <http://doi.org/10.1016/j.tre.2007.01.003>.
- Fraser, E. D.G., Dougill, A.J., Mabee, W.J., Reed, M. and McAlpine, P. (2006). Bottom up and top down: analysis of participatory processes for sustainability indicator identification as a pathway to community empowerment and sustainable environmental management. *Journal of Environmental Management* 78(2): 114–27. <https://doi.org/10.1016/j.jenvman.2005.04.009>.
- Fung, A. (2006) Varieties of participation in complex governance. *Public Administration Review* 66 (1), 66–75. <https://doi.org/10.1111/j.1540-6210.2006.00667.x>.
- Funtowicz, S. and Ravetz, J. (1990). *Uncertainty and Quality in Science for Policy*. Kluwer Academic Publishers, the Netherlands.
- Funtowicz, S. and Ravetz, J. (1993). Science for the post-normal age. *Futures* 25(7): 735–755. [https://doi.org/10.1016/0016-3287\(93\)90022-L](https://doi.org/10.1016/0016-3287(93)90022-L)
- Funtowicz, S. and Ravetz, J. (1994). The Worth of a Songbird: Ecological Economics as a Post-normal Science *Ecological Economics* 10 (3)197–207. [https://doi.org/10.1016/0921-8009\(94\)90108-2](https://doi.org/10.1016/0921-8009(94)90108-2)
- Funtowicz, S. and Ravetz, J. (2003). Post-Normal Science *Internet Encyclopaedia of Ecological Economics*, International Society for Ecological Economics. [online] URL: <http://www.isecoeco.org/pdf/pstnormsc.pdf>
- Gallagher, L., Dalton, J. Bréthaut, C., Allan, T., Bellfield H., Crilly, D., Cross, K. Gyawali, D., Lainé, S., LeFlaive, X., Li, L., Lipponen, A., Matthews, N., Orr, S., Pittock, J., Ringler, C., Smith, M., Tickner, D., von Schlippenbach, U., Vuille, F. (2017). The role of risk in setting directions for water, food and energy research. *Current opinion in Environmental Sustainability* 23:12–16.
- Gallagher, L., Ferreira, S. and Convery, F.J. (2008). Host community attitudes towards solid waste landfill infrastructure: comprehension before compensation. *Journal of Environmental Planning and Management*, 51(2): 233–257. <https://doi.org/10.1080/09640560701864878>.
- Gallagher, L., Kopainsky, B., Bassi, A.M., Watkins, K., Horm, C., Rin, N., Bun, M., Freeman, S., Costanzo, S., Sereyrotha, K., Sok, K., Sovann, C., Betancourt, A. and Bréthaut, C. (Accepted) Supporting stakeholders to anticipate and respond to risks in a Mekong River water-energy-food nexus, *Ecology and Society*.
- Gallagher, L., LeFlaive, X., Zaeske, A., Brown, C., Lange, G.M, Ahlroth, S., Castaneda, J.P., Fanaian, S., Joyce, J., Kamar, E., Bahri, A., Miralles-Wilhelm, F.R. (2016) [Embracing risk, uncertainty and water allocation reform when planning for Green Growth](https://doi.org/10.1016/j.aqpro.2016.06.004). *Aquatic Procedia*, 6 (2016): 23–29, <https://doi.org/10.1016/j.aqpro.2016.06.004>.
- Game, E. T., Schwartz, M. W., and Knight, A. T. (2015). Policy relevant conservation science. *Conservation Letters* 8(5): 309–311. <http://doi.org/10.1111/conl.12207>.
- Gerritsen, A. L., Stuiver, M., and Termeer, C. J. A. M. (2013). Knowledge governance: An exploration of principles, impact, and barriers. *Science and Public Policy* 40(5): 604–615. <https://doi.org/10.1093/scipol/sct012>.

- Gigerenzer, G., and Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology* 62: 451–482. <https://doi.org/10.1146/annurev-psych-120709-145346>
- Gluckman, P. (2016). The Science–Policy Interface. *Science* 353 (6303): 969–969. <https://doi.org/10.1126/science.aai8837>.
- Glynn, P.D., Voinov, A.A., Shapiro, C.D. and White, P.A. (2017). From Data to decisions: Processing information, biases, and beliefs for improved management of natural resources and environments: From Data to Decisions. *Earth's Future* 5(4): 356–78. <https://doi.org/10.1002/2016EF000487>.
- Godin, B. (2006). The Linear Model of Innovation: The Historical construction of an analytical framework. *Science Technology Human Values* 31: 639–667. <https://doi.org/10.1177/0162243906291865>.
- Goldman, M. (2009). Constructing Connectivity: Conservation Corridors and Conservation Politics in East African Rangelands. *Annals of the Association of American Geographers* 99(2): 335–359. <https://doi.org/10.1080/00045600802708325>.
- Gore, M. L., J Ratsimbazafy, J. and Lute, M.L. (2013). Rethinking corruption in conservation crime: Insights from Madagascar. *Conservation Letters* 6(6): 430–38. <https://doi.org/10.1111/conl.12032>.
- Grimmelikhuisen, S., Jilke, S., Olsen, A.L. and Tummers, L. (2017). Behavioral Public Administration: Combining insights from public administration and psychology: PUBLIC ADMINISTRATION AND THE DISCIPLINES. *Public Administration Review* 77(1): 45–56. <https://doi.org/10.1111/puar.12609>.
- Groothuis, P.A., and Miller, G. (1997). The role of social distrust in risk-benefit analysis: a study of the siting of a hazardous waste disposal facility. *Journal of Risk and Uncertainty* 15:241–257. <https://doi.org/10.1023/A:1007757326382>.
- Guijt, I. (2008). *Seeking Surprise: rethinking monitoring for collective learning in rural resource management*. Published PhD thesis, Wageningen University, Wageningen, The Netherlands. [online] URL: <https://edepot.wur.nl/139860>.
- Guston D (2001) Boundary organizations in environmental policy and science: an introduction. *Sci Tech Hum Values* 16:399–408
- Guston D (2004) Forget politicizing science. Let's democratize science! *Issues Sci Technol* Fall 21(1): 25–28
- Guston D. H. (2014). Understanding “anticipatory governance.” *Social Studies of Science* 44(2):218–42. <https://doi.org/10.1177/0306312713508669>.
- Guston, D.H. (2000). *Between politics and science: assuring the integrity and productivity of research*. University of Chicago Press, Chicago.
- Haasnoot, M., Kwakkel, J.H. Walker, W.E. and ter Maat, J. (2013). Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world. *Global Environmental Change* 23 (2): 485–498. <https://doi.org/10.1016/j.gloenvcha.2012.12.006>.
- Hamstead, Z. A., Iwaniec, D. M., McPhearson, T., Berbé-Blázquez, M., Cook, E. M., & Muñoz-Erickson, T. A. (Eds.). (2021). *Resilient Urban Futures*. Springer International Publishing. <https://doi.org/10.1007/978-3-030-63131-4>
- He, S., Gallagher, L., Su, Y. and Wang, L. (2018) Identification and assessment of ecosystem services for protected area planning: a case in rural communities of Wuyishan national park pilot. *Ecosystem Services* 31(Part A):169-180. <https://doi.org/10.1016/j.ecoser.2018.04.001>.
- Head, B.W., and Alford, J. (2015). ‘Wicked Problems: Implications for public policy and management’. *Administration & Society* 47 (6): 711–39. <https://doi.org/10.1177/0095399713481601>
- Hoppe, R. (2011). *The Governance of Problems: puzzling, powering and participation*. The Policy Press, Bristol, UK.
- Hove, S. van den (2007). A Rationale for Science–Policy Interfaces. *Futures* 39 (7): 807–26. <https://doi.org/10.1016/j.futures.2006.12.004>.
- Howarth, C. and Monasterolo, I. (2017). Opportunities for knowledge co-production across the energy-food-water nexus: Making interdisciplinary approaches work for better climate decision making. *Environmental Science & Policy* 75: 103-110. <https://doi.org/10.1016/j.envsci.2017.05.019>.
- Howarth, C., and Brooks, K. (2017). Decision-making and building resilience to nexus shocks locally: Exploring Flooding and Heatwaves in the UK. *Sustainability* 9 (5): 838. <https://doi.org/10.3390/su9050838>.
- Hsieh, H.F. and Shannon, S.E. (2005). Three approaches to qualitative content analysis. *Qualitative. Health Research*. 15:1277–1288. <https://doi.org/10.1016/j.ecolmodel.2017.08.010>
- Huntjens, P., Lebel, L., Pahl-Wostl, C. Camkin, J., Schulze, R. and Kranz, N. (2012). Institutional design propositions for the governance of adaptation to climate change in the water sector. *Global Environmental Change* 22(1): 67–81. <https://doi.org/10.1016/j.gloenvcha.2011.09.015>.
- Hurlbert, M., and Gupta, J. (2015). The split ladder of participation: a diagnostic, strategic, and evaluation tool to assess when participation is necessary. *Environmental Science & Policy*, 50: 100–113
- Hurlbert, M.A. (2018). Adaptive governance (Management, Co-Management and Anticipatory). Chapter 2 in *Adaptive Governance of Disaster*. Water governance - concepts, methods, and practice. Springer International Publishing. <https://doi.org/10.1007/978-3-319-57801-9>.
- ISSC/UNESCO (2013). *World Social Science Report 2013: Changing Global Environments*. OECD Publishing and UNESCO Publishing, Paris. [online] URL: <http://www.worldsocialscience.org/activities/world-social-science-report/the-2013-report/>
- ISSC/UNESCO (2016). *World Social Science Report 2013: Challenging Inequalities: Pathways to a just world*. OECD Publishing and UNESCO Publishing, Paris. [online] URL: <http://www.worldsocialscience.org/activities/world-social-science-report/the-2013-report/>

- Jasanoff, S. and Wynne, B. (1998). Science and decision making in Rayner, S., Malone, E.L. (Eds.), *Human Choice and Climate Change*. Battelle Press, Columbus, Ohio: 1–87.
- Johnson, O.W. and Karlberg, L. (2017). Co-exploring the water-energy-food nexus: facilitating dialogue through participatory scenario building. *Frontiers in Environmental Science* 5:24 <https://doi.org/10.3389/fenvs.2017.00024>.
- Jones, N.A., Ross, H., Lynam, T., Perez, P., Leitch, A. (2011). Mental models: An interdisciplinary synthesis of theory and methods. *Ecology and Society*. 16(1): 1-13. [online] URL: <http://www.ecologyandsociety.org/vol16/iss1/art46/>.
- Jordan, A.J, Turnpenny, J.R., and Rayner, T. (2015) The tools of policy formulation. In Jordan, A.J, Turnpenny, J.R. (2015). *The Tools of Policy Formulation Actors, Capacities, Venues and Effects*, *New Horizons in Public Policy series*, Edward Elgar Publishing.
- Jordan, R., Gray, S., Zellner, M., Glynn, P. D., Voinov, A., Hedelin, B., et al. (2018). Twelve questions for the participatory modeling community. *Earth's Future*, 6(8): 046–1057. <https://doi.org/10.1029/2018EF000841>
- Jost, J.T., Banaji, M.R. and Nosek, B.A. (2004). A Decade of System Justification Theory: Accumulated Evidence of Conscious and Unconscious Bolstering of the Status Quo. *Political Psychology* 25: 881–919. <https://doi.org/10.1111/j.1467-9221.2004.00402.x>.
- Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist*, 58(9): 697-720. <http://dx.doi.org/10.1037/0003-066X.58.9.697>
- Kahneman, D. (2011). *Thinking, fast and slow*. Allen Lane, London.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47: 263-291.
- Kania, J. and Kramer, M. (2013). Embracing Emergence: How Collective Impact Addresses Complexity. *Stanford Social Innovation Review*. Stanford University, CA. [online] URL: https://ssir.org/articles/entry/social_progress_through_collective_impact
- Kimmich, C., Gallagher, L., Kopainsky, B., Dubois, M., Sovann, C., Bun, M. and Bréthaut, C. (Accepted) Behavior change and participatory system dynamics modelling for the water-energy-food nexus, *Earth's Future*.
- King, A. (2008). In Vivo Coding In Given, L.M. (Ed). *The SAGE Encyclopedia of Qualitative Research Methods* SAGE Publications, Thousand Oaks. <https://doi.org/10.4135/9781412963909.n240>.
- Kirchhoff, C.J., Lemos, M.C., and Dessai, S. (2013). Actionable knowledge for environmental decision making: Broadening the usability of climate science. *Annual Review of Environment and Resources* 38:393-414. <https://doi.org/10.1146/annurev-environ-022112-112828>.
- Knight, A.T., Cowling, R.M. and Campbell, B.M. (2006). An Operational Model for Implementing Conservation Action. *Conservation Biology* 20: 408–419. <https://doi.org/10.1111/j.1523-1739.2006.00305.x>.
- Knight, A.T., Cowling, R.M., Rouget, M., Balmford, A., Lombard, A.T. and Campbell, B.M. (2008). Knowing but not doing: selecting priority conservation areas and the research–implementation gap. *Conservation Biology* 22: 610–617. <https://doi.org/10.1111/j.1523-1739.2008.00914.x>.
- Koetz, T., Farrell, K.N. and Bridgewater, P. (2011). Building better science-policy interfaces for international environmental governance: assessing potential within the intergovernmental platform for biodiversity and ecosystem services. *International Environmental Agreements* 12: 1–21. <https://doi.org/10.1007/s10784-011-9152-z>.
- Koetz, T., Farrell, K.N. and Bridgewater, P. (2012) Building Better Science-Policy Interfaces for International Environmental Governance: Assessing Potential within the Intergovernmental Platform for Biodiversity and Ecosystem Services. *International Environmental Agreements: Politics, Law and Economics* 12(1): 1–21. <https://doi.org/10.1007/s10784-011-9152-z>.
- Köhler, J., Geels, F.W., Kern, F., Markard, J., Onsongo, E., Wiecek, A. Alkemade, F., Avelino, F., Berge, A., Boons, F., Fünfschilling, L., Hess, D., Holtz, G., Hyysalo, S., Jenkins, K., Kivimaa, P., Martiskainen, M., McMeekin, A., Mühlemeier, M.S., Nykvist, B., Pel, B., Raven, R., Rohrer, R., Sandén, B., Schot, J., Sovacool, B., Turnheim, B., Welch, D., and Wells, P. (2019). An agenda for sustainability transitions research: state of the art and future directions. *Environmental Innovation and Societal Transitions* 31: 1–32. <https://doi.org/10.1016/j.eist.2019.01.004>.
- Kok, K. P. W., Gjefsen, M. D., Regeer, B. J., & Broerse, J. E. W. (2021). Unraveling the politics of ‘doing inclusion’ in transdisciplinarity for sustainable transformation. *Sustainability Science*. <https://doi.org/10.1007/s11625-021-01033-7>
- Koontz, T.M., Gupta, D., Mudliar, P. and Ranjan, P. (2015). Adaptive institutions in social-ecological systems governance: a synthesis framework. *Environmental Science & Policy* 53: 139–51. <https://doi.org/10.1016/j.envsci.2015.01.003>.
- Korytárová, J., & Hromádka, V. (2014). The economic evaluation of megaprojects – social and economic impacts. *Procedia - Social and Behavioral Sciences*, 119:495-502. <https://doi.org/10.1016/j.sbspro.2014.03.055>.
- Kristjanson, P., Reid, R.S., Dickson, N., Clark, W.C., Romney, D., Puskur, R., ... and Grace, D. (2009). Linking international agricultural research knowledge with action for sustainable development. *Proceedings of the National Academy of Sciences of the United States of America* 106(13): 5047–52. <http://doi.org/10.1073/pnas.0807414106>.
- Kuhn, T.S. (1970). *The Structure of Scientific Revolutions*, 2nd ed. University of Chicago Press, Chicago.
- Labovitz, S. and Hagedorn, R. (1971). *Introduction to Social Research*. McGraw-Hill, UK. online] URL:<https://books.google.ch/books?id=Y4pIAAAMAAJ>.
- Lackey, R.T. (2007). Science, Scientists, and Policy Advocacy. *Conservation Biology* 21:12–17. <https://doi.org/10.1111/j.1523-1739.2006.00639.x>.
- Langer, E.J. (1997). *The Power of Mindful Learning*. Perseus Books, Cambridge, MA.

- Larigauderie, A. and Mooney, H.A. (2010). The Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services: Moving a step closer to an IPCC-like mechanism for biodiversity. *Current Opinion in Environmental Sustainability* 2(1–2): 9–14. <http://doi.org/10.1016/j.cosust.2010.02.006>.
- Lasswell, H. (1958). *Politics: Who Gets What, When, How?* P. Smith, New York.
- Latulippe, N., & Klenk, N. (2020). Making room and moving over: Knowledge co-production, Indigenous knowledge sovereignty and the politics of global environmental change decision-making. *Current Opinion in Environmental Sustainability*, 42, 7–14. <https://doi.org/10.1016/j.cosust.2019.10.010>
- Le Blanc, D. (2015). Towards integration at last? the sustainable development goals as a network of targets. *Sustainable Development* 23 (3): 176–87. <https://doi.org/10.1002/sd.1582>.
- Lederach, J.P., Neufeldt, R. and Culbertson, H. (2007). *Reflective Peacebuilding. A Planning, Monitoring, and Learning Toolkit*. Joan B. Kroc Institute for International Peace Studies, University of Notre Dame, South Bend, IN, and Catholic Relief Services, Baltimore, MD. [online] URL: https://ndigd.nd.edu/assets/172927/reflective_peacebuilding_a_planning_monitoring_and_learning_toolkit.pdf.
- Leith, P. and Vanclay, F. (2016). Placing science for natural resource management and climate variability: Lessons from narratives of risk, place and identity. *Sociologia Ruralis*. <https://doi.org/10.1111/soru.12124>.
- Leith, P., O'Toole, K., Haward, M., Coffey, B., Rees, C. and Ogier, E. (2014). Analysis of operating environments: A diagnostic model for linking science, society and policy for sustainability. *Environmental Science & Policy* 39:162–171. <http://doi.org/10.1016/j.envsci.2014.01.001>.
- Linkov, I., Anklam, E., Collier, Z.A., DiMase, D. and Renn, O. (2014). Risk-based standards: integrating top-down and bottom-up approaches. *Environment Systems and Decisions* 34(1): 134–37. <https://doi.org/10.1007/s10669-014-9488-3>.
- Linstone, H.A. and Turoff, M. (1975). *The Delphi Method: Techniques and Applications*, Addison-Wesley Publishing, Reading, Massachusetts.
- Litton-Monnet, A.. (2017). *The Politics of Expertise in International Organizations: How International Bureaucracies Produce and Mobilize Knowledge*. Taylor & Francis.
- Loeffler, E., & Bovaird, A. G. (2021). *The Palgrave handbook of co-production of public services and outcomes*. <https://doi.org/10.1007/978-3-030-53705-0>
- Lopes, R., and Videira, N. (2015). Conceptualizing stakeholders' perceptions of ecosystem services: a participatory systems mapping approach. *Environmental and Climate Technologies* 16(1). <https://doi.org/10.1515/rtuect-2015-0011>.
- Loreau M., Oteng-Yeboah A., Arroyo M., Babin D., Barbault R., Donoghue M., Gadgil M., Häuser C., Heip C., and Larigauderie A., Ma, K., Mace, G., Mooney, H. A., Perrings, C., Raven, P., Sarukhan, J., Schei, P., Scholes, R. J. and Watson, R. T. (2006). Diversity without representation. *Nature* 442: 245–246. [online] URL: <https://www.nature.com/articles/442245a>
- Lowndes, V., and Roberts, M. (2010). *Why Institutions Matter: The New Institutionalism in Political Science*. Palgrave, Basingstoke, UK.
- Mair, D., Smillie, L., La Placa, G., Schwendinger, F., Raykovska, M., Pásztor, Z., van Bavel, R. *Understanding our political nature: how to put knowledge and reason at the heart of political decision-making*. European Commission, and Joint Research Centre. <https://data.europa.eu/doi/10.2760/374191>.
- Martin, V., Smith, L., Bowling, A., Christidis, L., Lloyd, D., and Pecl, G. (2016). Citizens as scientists what influences public contributions to marine research? *Science Communication* 38, 495–522. <https://doi.org/10.1177/1075547016656191>.
- Mausser, W., Klepper, G., Rice, M., Schmalzbauer, B. S., Hackmann, H., Leemans, R., and Moore, H. (2013). Transdisciplinary global change research: the co-creation of knowledge for sustainability. *Current Opinion in Environmental Sustainability* 5:420–431. <http://doi.org/10.1016/j.cosust.2013.07.001>.
- McCright, A.M. and Dunlap, R.E. (2011). The Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001–2010. *Sociological Quarterly* 52: 155–194. <https://doi.org/10.1111/j.1533-8525.2011.01198.x>.
- McGinnis, M. D. and Ostrom, E. (2014). Social-ecological system framework: initial changes and continuing challenges. *Ecology and Society* 19(2): 30. <http://dx.doi.org/10.5751/ES-06387-190230>
- Miller, B. P., Sinclair, E.A., Menz, M.H.M., Elliott, C.P., Bunn, E., Commander, L.E., Dalziel, E. et al. (2017). A framework for the practical science necessary to restore sustainable, resilient, and biodiverse ecosystems: a framework for practical restoration science. *Restoration Ecology* 25(4): 605–17. <https://doi.org/10.1111/rec.12475>.
- Miller, C. A. and Wyborn, C. (2018). Co-production in global sustainability: histories and theories. *Environmental Science & Policy* <https://doi.org/10.1016/j.envsci.2018.01.016>.
- Miller, C.A. (2004). Climate science and the making of a global political order, in: Jasanoff, S. (Ed.), *States of Knowledge: The Co-Production of Science and Social Order*. Routledge, London and New York, pp. 46–66.
- Miller, Clark. "Hybrid Management: Boundary Organizations, Science Policy, and Environmental Governance in the Climate Regime." *Science, Technology, & Human Values* 26, no. 4 (October 2001): 478–500. <https://doi.org/10.1177/016224390102600405>.
- Miller, T.R., Wiek, A., Sarewitz, D., Robinson, J., Olsson, L., Kriebel, D. and Loorbach, D. (2014). The future of sustainability science: a solutions-oriented research agenda. *Sustainability Science* 9(2): 239–46. <https://doi.org/10.1007/s11625-013-0224-6>.
- Mintrom, M. and Norman, P. (2009). Policy entrepreneurship and policy change. *Policy Studies Journal* 37 (4): 649–667. <https://doi.org/10.1111/j.1541-0072.2009.00329.x>

- Mupepele, A.-C., Walsh, J.C., Sutherland, W.J., and Dormann, C.F. (2016). An evidence assessment tool for ecosystem services and conservation studies. *Ecological Applications* 26(5): 1295–1301. <https://doi.org/10.1890/15-0595>.
- Nahrath, S., and Guerrin, J. (2019). Enriching the Institutional Resource Regime Framework with the Politics of Scale Approach. *Environmental Science & Policy* 102): 18–25. <https://doi.org/10.1016/j.envsci.2019.08.009>.
- Nel, J.L., Roux, D.J., Driver, A., Hill, L., Maherry, A.C., Snaddon, K., Petersen, C.R., Smith-Adao, L.B., Van Deventer, H., and Reyers, B. (2016). Knowledge co-production and boundary work to promote implementation of conservation plans. *Conservation Biology* 30: 176–188. <https://doi.org/10.1111/cobi.12560>.
- Nickerson, R.S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology* 2: 175–220. <http://dx.doi.org/10.1037/1089-2680.2.2.175>.
- Nowotny, H., Scott, P. and Gibbons, M. (2001). *Re-thinking Science: Knowledge and the public in an age of uncertainty*. Polity, Cambridge, UK.
- O'Connor, R. A., Nel, J.L., Roux, D.J., Lim-Camacho, L., van Kerkhoff, L. and Leach, J. (2019). principles for evaluating knowledge co-production in natural resource management: incorporating decision-maker values. *Journal of Environmental Management* 249): 109392. <https://doi.org/10.1016/j.jenvman.2019.109392>.
- Oliver, K., Innvar, S., Lorenc, T., Woodman, J., & Thomas, J. (2014). A systematic review of barriers to and facilitators of the use of evidence by policymakers. *BMC Health Services Research*, 14(1). <https://doi.org/10.1186/1472-6963-14-2>
- Ostrom, E. (2007a). A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences* 104(39):15181–15187. <http://dx.doi.org/10.1073/pnas.0702288104>
- Ostrom, E. (2007b). *Governing the Commons: the evolution of institutions for collective actions*. 20th printing (first published 1990), Cambridge University Press, New York.
- Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. *Science* 325:419–422. <http://dx.doi.org/10.1126/science.1172133>
- Ostrom, E. (2010) Institutional Analysis and Development: Elements of The Framework in Historical Perspective. Chapter 11 in Crothers, C. (2010). *Historical Developments and Theoretical Approaches in Sociology*. Ramsey: Eolss Publishers.
- Ostrom, E. (2010). Beyond markets and states: polycentric governance of complex economic systems. *American Economic Review* 100(3):641–672. <http://dx.doi.org/10.1257/aer.100.3.641>
- Ostrom, E. (2011). Background on the institutional analysis and development framework. *Policy Studies Journal* 39(1):7–27. <http://dx.doi.org/10.1111/j.1541-0072.2010.00394.x>
- Ostrom, E., and Cox, M. (2010). Moving beyond panaceas: a multi-tiered diagnostic approach for social-ecological analysis. *Environmental Conservation* 37(4):451–463. <http://dx.doi.org/10.1017/S0376892910000834>
- Pannell, D.J., Alston, J.M., Jeffrey, S., Buckley, Y.M., Vesk, P., Rhodes, J.R., McDonald-Madden, E., Nally, S. Goucher, G. and Thamo. T. (2018). Policy-oriented environmental research: What Is It worth? *Environmental Science & Policy* 86: 64–71. <https://doi.org/10.1016/j.envsci.2018.05.005>.
- Parkhurst, Justin O. (2016). Appeals to Evidence for the Resolution of Wicked Problems: The Origins and Mechanisms of Evidentiary Bias. *Policy Sciences* 49 (4): 373–93.
- Parsons, E. C. M., D. A. DellaSala, and Wright, A. J. (2015). Is Marine Conservation Science Becoming Irrelevant to Policy Makers? *Frontiers in Marine Science* 2. <https://doi.org/10.3389/fmars.2015.00102>.
- Patton, M.Q. (2011) *Developmental Evaluation: Applying Complexity Concepts to Enhance Innovation and Use*. Guilford Press, New York.
- Patton, M.Q. (2019). *Blue Marble Evaluation: Premises and Principles*. The Guilford Press, New York:
- Perrings, C., Duraipapp, A., Larigauderie, A. and Mooney, H. (2011). The Biodiversity and Ecosystem Services Science-Policy Interface. *Science* 331(6021): 1139–40. <https://doi.org/10.1126/science.1202400>.
- Peters, O., and Gell-Mann, M. (2016). Evaluating Gambles Using Dynamics. *Chaos: An Interdisciplinary Journal of Nonlinear Science* 26(2): 023103. <https://doi.org/10.1063/1.4940236>.
- Peterson, M.J. (2019) *Contesting global environmental knowledge, norms and governance*, Routledge, London and New York.
- Pielke, J., R.A. (2007). *The Honest Broker: Making sense of science in policy and politics*. Cambridge University Press, New York.
- Pindyck, R.S. (2013). Climate Change Policy: What Do the Models Tell Us? *Journal of Economic Literature* 51: 860–72.
- Pitt, R., Wyborn, C., Page, G., Hutton, J., Virah Sawmy, M., Ryan, M. and Gallagher, L. (2018) Wrestling with the complexity of evaluation for organisations at the boundary of science, policy and practice. *Conservation Biology* Apr 16 <https://doi.org/10.1111/cobi.13118>.
- Plummer, R., Dzyundzyak, A., Baird, J. and Bodin, O., Armitage, D., Schultz, L. (2017). How do environmental governance processes shape evaluation of outcomes by stakeholders? A causal pathways approach. *PLoS ONE* 12(9): e0185375. <https://doi.org/10.1371/journal.pone.0185375>.
- Pogrebin, M, Ed. (2003) *Qualitative Approaches to Criminal Justice: Perspectives from the Field*, SAGE Publications, Thousand Oaks.

- Poteete, A.R., Janssen, M.A., Ostrom, E. (2010). *Working Together: collective action, the commons, and multiple methods in practice*. Princeton University Press, Princeton, New Jersey.
- Pregernig, M. (2014). Framings of science-policy interactions and their discursive and institutional effects: examples from conservation and environmental policy. *Biodiversity Conservation* 23: 3615–3639. <https://doi.org/10.1007/s10531-014-0806-3>.
- Raffaelli, R. and Glynn, M.A. (2015). Institutional innovation: novel, useful, and legitimate. Chapter 2 in Shalley, C.E., Hitt, M.A. and Zhou, J. (Eds). *The Oxford Handbook of Creativity, Innovation, and Entrepreneurship*. Oxford Library of Psychology. Oxford ; New York: Oxford University Press, 2015.
- Reed, M.S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C.H. and Stringer, L.C. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management* 90:1933–1949. <https://doi.org/10.1016/j.jenvman.2009.01.001>.
- Reid, R. S., Nkedianye, D., Said, M. Y., Kaelo, D., Neselle, M., Makui, O. and Clark, W.C. (2009). Evolution of models to support community and policy action with science: Balancing pastoral livelihoods and wildlife conservation in savannas of East Africa. *Proceedings of the National Academy of Sciences of the United States of America*. 113 (17): 4579-4584. <https://doi.org/10.1073/pnas.0900313106>
- Reyers, B., Roux, D.J., Cowling, R.M., Ginsburg, A.E., Nel, J.L., and O'Farrell, P. (2010). conservation planning as a transdisciplinary Process. *Conservation Biology* 24: 957–965. <https://doi.org/10.1111/j.1523-1739.2010.01497.x>
- Richards, G.W. (2019) The Science–Policy Relationship Hierarchy (SPRHi) Model of co-production: How climate science organizations have influenced the policy process in Canadian case studies. *Policy Sciences*. 52(1): 67–95. <https://doi.org/10.1007/s11077-018-9328-2>.
- Rietig, K. (2014). “Neutral” experts? How input of scientific expertise matters in international environmental negotiations. *Policy Sciences* 47: 141–160. <http://dx.doi.org/10.1007/s11077-013-9188-8>.
- Rittel, H.W. J. and Webber, W.M. (1973) Dilemmas in a General Theory of Planning. *Policy Sciences* 4(1973):155-169
- Robinne, F. N., Schlaepfer, M.A. Gallagher, L., and Bréthaut, C. (2019) A novel tool for measuring the penetration of the ecosystem service concept into public policy *Ecosystem Services*. 36:100914. <https://doi.org/10.1016/j.ecoser.2019.100914>.
- Rodela, R., Reinecke, S., Bregt, A., Kilham, E. and Lapeyre, R. (2015). Challenges to and Opportunities for Biodiversity Science–Policy Interfaces. *Environmental Science & Policy* 54: 483–86. <https://doi.org/10.1016/j.envsci.2015.08.010>.
- Runge, C. F. (1978) Common property and collective action in economic development. *World Development* 14 (5): 623–35. [https://doi.org/10.1016/0305-750X\(86\)90128-2](https://doi.org/10.1016/0305-750X(86)90128-2).
- Saldaña, J. (2013). *The coding manual for qualitative researchers*. Second edition. SAGE Publications, London.
- Sarewitz, D. (2004). How science makes environmental controversies worse. *Environmental Science & Policy* 7: 385–403. <https://doi.org/10.1016/j.envsci.2004.06.001>.
- Sarkki, S., Tinch, R., Niemelä, J., Heink, U., Waylen, K., Timaeus, J., Young, J., Watt, A., Neßhöver, C., van den Hove, S. (2015). Adding ‘iterativity’ to the credibility, relevance, legitimacy: A novel scheme to highlight dynamic aspects of science–policy interfaces. *Environmental Science & Policy* 54: 505-512. <https://doi.org/10.1016/j.envsci.2015.02.016>.
- Sayer, J., Margules, C., Bohnet, I., Boedhihartono, A., Pierce, R., Dale, A. and Andrews, K. (2015). The role of citizen science in landscape and seascape approaches to integrating conservation and development *Land* 4(4): 1200–1212. <https://doi.org/10.3390/land4041200>.
- Schut, M., van Paassen, A., and Leeuwis, C. (2013). Beyond the research–policy interface. Boundary arrangements at research–stakeholder interfaces in the policy debate on biofuel sustainability in Mozambique. *Environmental Science & Policy* 27: 91–102. <https://doi.org/10.1016/j.envsci.2012.10.007>.
- Scott, A., Carter, C., Hardman, M., Grayson, N. and Slaney, T. (2018). Mainstreaming ecosystem science in spatial planning practice: Exploiting a hybrid opportunity space. *Land Use Policy* 702: 232–46. <https://doi.org/10.1016/j.landusepol.2017.10.002>.
- Scott, R. J., Cavana, R. Y., and Cameron, D. (2016). Mechanisms for understanding mental model change in group model building. *Systems Research and Behavioral Science*, 33(1): 100–118. <https://doi.org/10.1002/sres.2303>
- Shapiro, I. (2006). Extending the framework of inquiry: Theories of change in conflict interventions. *Berghof Research Center for Constructive Conflict Management* 206 (5): 1–9. [online] URL: https://www.berghof-foundation.org/fileadmin/redaktion/Publications/Handbook/Dialogue_Chapters/dialogue5_shapiro_comm.pdf. Last accessed 31 October 2019.
- Sinclair, T.A.P. (2006). Previewing Policy Sciences: Multiple Lenses and Segmented Visions. *Politics Policy* 34 (3): 481–504. <https://doi.org/10.1111/j.1747-1346.2006.00025.x>.
- Smaijl, A., J. R. Ward, T. Foran, J. Dore, and S. Larson. (2015). Visions, beliefs, and transformation: exploring cross-sector and transboundary dynamics in the wider Mekong region. *Ecology and Society* 20(2): 15. <http://dx.doi.org/10.5751/ES-07421-200215>.
- Smith, P.K., and Hofmann, W.. (2016) Power in everyday life. *Proceedings of the National Academy of Sciences* 113 (36): 10043–48. <https://doi.org/10.1073/pnas.1604820113>.
- Smith, R., J. Kasprzyk, and Dilling, L. (2017). Participatory Framework for Assessment and Improvement of Tools (ParFAIT): Increasing the impact and relevance of water management decision support research, *Environmental Modelling & Software* 95: 432-446. <https://doi.org/10.1016/j.envsoft.2017.05.004>.

- Stein, A.A. (1982). Coordination and Collaboration: Regimes in an Anarchic World. *International Organization* 36(2): 299–324. <https://doi.org/10.1017/S0020818300018968>.
- Stein, D., and Valters, C. (2012) *Understanding Theory of Change in International Development*. The Justice and Security Research Programme/The Asia Foundation. [online] URL: http://eprints.lse.ac.uk/56359/1/JSRP_Paper1_Understanding_theory_of_change_in_international_development_Stein_Valters_2012.pdf
- Stirling, A. (2012). Opening Up the Politics of Knowledge and Power in Bioscience. *PLoS Biology* 10:e1001233. <https://doi.org/10.1371/journal.pbio.1001233>.
- Stirling, A. (2014). Transforming power: Social science and the politics of energy choices. *Energy Research & Social Science* 1:83–95. <https://doi.org/10.1016/j.erss.2014.02.001/>
- Stufflebeam, D. (2001). Evaluation Models. *New Directions for Evaluation* 89 (2001): 7. <https://doi.org/10.1002/ev.3>.
- Sulistyawan, B., Feger, C., McKenzie, E., Gallagher, L., Verweij, P. and Boot, R. (2019). Effective governance for sustainable landscapes: The case of RIMBA Corridor, Central Sumatra. *Sustainability Science*. <https://doi.org/10.1007/s11625-019-00662-3>.
- Sutherland, W.J., Bellingan, L. Bellingham, J.R., Blackstock, J.J., Bloomfield, R.M., Bravo, M., Cadman, V.M. et al. (2012). A collaboratively-derived science-policy research agenda. Edited by Erik von Elm. *PLoS ONE* 7(3): e31824. <https://doi.org/10.1371/journal.pone.0031824>.
- Szafrański, M. (2022, February 27). Book Review: Politics and Expertise: How to Use Science in a Democratic Society by Zeynep Pamuk. *LES Phelan US Centre*. <https://blogs.lse.ac.uk/usappblog/2022/02/27/book-review-politics-and-expertise-how-to-use-science-in-a-democratic-society-by-zeynep-pamuk/>
- Tashakkori, A. and Teddlie, C. (2003). *Handbook of Mixed Methods in Social & Behavioral Research*. SAGE, Thousand Oaks.
- Tinch, R., Balian, E., Carss, D., Blas, D.E. de, Geamana, N.A., Heink, U., Keune, H., Nesshöver, C., Niemelä, J., Sarkki, S., Thibon, M., Timaeus, J., Vadineanu, A., Hove, S. van den, Watt, A., Waylen, K.A., Wittmer, H., Young, J.C. (2016). Science-policy interfaces for biodiversity: dynamic learning environments for successful impact. *Biodiversity Conservation* 1–24. <https://doi.org/10.1007/s10531-016-1155-1>.
- Toomey, A. H., Knight, A. T., and Barlow, J. (2016). Navigating the Space Between Research and Implementation in Conservation. *Conservation Letters* 1–19. <http://doi.org/10.1111/conl.12315>.
- Turner, J.M., 2006. Conservation Science and Forest Service Policy for Roadless Areas. *Conservation Biology* 20, 713–722. doi:10.1111/j.1523-1739.2006.00365.x
- Turnhout, E., Bloomfield, B., Hulme, M., Vogel, J. and Wynne, B. (2012). Conservation policy: Listen to the voices of experience. *Nature* 488:454–455. <https://doi.org/10.1038/488454a>.
- Turnhout, E., Hisschemöller, M. and Eijssackers, H. (2007). Ecological indicators: Between the two fires of science and policy. *Ecological Indicators* 7, 215–228. <https://doi.org/10.1016/j.ecolind.2005.12.003>.
- Turnhout, E., Stuiver, M., Klostermann, J., Harms, B. and Leeuwis, C. (2013). New roles of science in society: Different repertoires of knowledge brokering. *Science and Public Policy* 40: 354–365. <https://doi.org/10.1093/scipol/scs114>.
- UNDESA (2015). *United Nations Global Sustainable Development Report*, United Nations, New York. [online] URL: https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2015.pdf.
- UNDESA (2019). *United Nations Global Sustainable Development Report*, United Nations, New York. [online] URL: https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf.
- UNEP (2012). *United Nations Foresight Report*, United Nations, Nairobi. [online] URL: http://www.unep.org/pdf/Foresight_Report-21_Issues_for_the_21st_Century.pdf.
- UNEP (2017). *Strengthening the Science-Policy Interface: A Gap Analysis*, UN Environment Programme, Nairobi. [online] URL: https://wedocs.unep.org/bitstream/handle/20.500.11822/22261/Gap_Analysis_2017.pdf?sequence=1&isAllowed=y.
- van Enst, W.I., Driessen, P.P.J. and Runhaar, H.A.C. (2014). Towards productive science-policy interfaces: a research agenda. *Journal of Environmental Assessment Policy and Management* 16(01):1450007. <https://doi.org/10.1142/S1464333214500070>.
- Van Kerkhoff, L. (2014). Knowledge governance for sustainable development: a review. *Challenges in Sustainability* 1(2). <https://doi.org/10.12924/cis2013.01020082>.
- van Kerkhoff, L., and Lebel, L. (2006). Linking knowledge and action for sustainable development. *Annual Review of Environment and Resources* 31:445–477. <https://doi.org/10.1146/annurev.energy.31.102405.170850>.
- van Kerkhoff* L. and Pilbeam, V. (2017). Understanding socio-cultural dimensions of environmental decision-making: a knowledge governance approach. *Environmental Science and Policy* 73: 29–37. <http://dx.doi.org/10.1016/j.envsci.2017.03.011>.
- Waddock, S. (2020). Thinking Transformational System Change. *Journal of Change Management*, 1–13. <https://doi.org/10.1080/14697017.2020.1737179>
- Watson, R.T. (2005). Turning science into policy: challenges and experiences from the science–policy interface. *Philosophical Transactions of the Royal Society B Biological Sciences* 360 (1454): 471–77. <https://doi.org/10.1098/rstb.2004.1601>.

- Waylen, K.A., Fischer, A., McGowan, P.J.K., Thirgood, S.J., and Milner-Gulland, E.J. (2010). Effect of Local Cultural Context on the Success of Community-Based Conservation Interventions. *Conservation Biology* 24: 1119–1129. <https://doi.org/10.1111/j.1523-1739.2010.01446.x>.
- Weible, C.M., Heikkilä, T., DeLeon, P., and Sabatier, P.A. (2012). Understanding and influencing the policy process. *Policy Sciences* 45, 1–21. <https://dx.doi.org/10.1007/s11077-011-9143-5>.
- Weichselgartner, J., and Kaspersen R. (2010). Barriers in the Science-Policy-Practice Interface: Toward a Knowledge-Action-System in Global Environmental Change Research. *Global Environmental Change* 20 (2): 266–77. <https://doi.org/10.1016/j.gloenvcha.2009.11.006>.
- Weiss, C.H (1995). Nothing as Practical as Good Theory: Exploring Theory-Based Evaluation for Comprehensive Community Initiatives for Children and Families. In Connell, J., Kubisch, A., Schorr, L. B. and Weiss, C. H. (Eds.), *New approaches to evaluating community initiatives*. Aspen Institute, New York: 65–92.
- Wesselink, A., Buchanan, K. S., Georgiadou, Y. and Turnhout, E. (2013). Technical Knowledge, Discursive Spaces and Politics at the Science–Policy Interface. *Environmental Science & Policy* 30: 1–9. <https://doi.org/10.1016/j.envsci.2012.12.008>.
- West, S., Beilin, R. and Wagenaar, H. (2019). Introducing a practice perspective on adaptive management. *People and Nature*, <https://doi.org/10.1002/pan3.10033>
- Willets, J. and Crawford, P. (2007). The Most Significant Lessons about the Most Significant Change Technique. *Development in Practice* 17(3): 367–79. <https://doi.org/10.1080/09614520701336907>.
- Woods, M. and Gardner, G. (2011). Applied policy research and critical human geography: Some reflections on swimming in murky waters. *Dialogues in Human Geography*, 1(2):198–214. <https://doi.org/10.1177/2043820611404488>.
- Wuppuluri, S., and Antonio Doria, F. (2018). *The Map and the Territory: Exploring the Foundations of Science, Thought and Reality*. Springer.
- Wyborn, C. (2015). Connectivity conservation: Boundary objects, science narratives and the co- production of science and practice. *Environmental Science and Policy*, 51: 292–303. <http://doi.org/10.1016/j.envsci.2015.04.019>.
- Wyborn, C., Datta, A., Montana, J., Ryan, M., Leith, P., Chaffin, B., Miller, C. and van Kerkhoff, L. (2019). Co-Producing Sustainability: Reordering the Governance of Science, Policy, and Practice. *Annual Review of Environment and Resources* 44(1): annurev-environ-101718-033103. <https://doi.org/10.1146/annurev-environ-101718-033103>.
- Wyborn, C., van Kerkhoff, L., Dunlop, M., Dudley, N., & Guevara, O. (2016). Future oriented conservation: knowledge governance, uncertainty and learning. *Biodiversity and Conservation*. <http://doi.org/10.1007/s10531-016-1130-x>.
- Young, J.C., Jordan, A., R. Searle, K., Butler, A., S. Chapman, D., Simmons, P., Watt, A.D. (2013). Does stakeholder involvement really benefit biodiversity conservation? *Biological Conservation* 158, 359–370. <http://doi.org/10.1016/j.biocon.2012.08.018>.
- Young, K., Ashby, D., Boaz, A. and Grayson, L. (2002). Social Science and the Evidence-Based Policy Movement. *Social Policy and Society* 1(03). <https://doi.org/10.1017/S1474746402003068>.
- Yung, L., Louder, E., Gallagher, L.A., Jones, K., and Wyborn, C. (2019). How Methods for Navigating Uncertainty Connect Science and Policy at the Water-Energy-Food Nexus. *Frontiers in Environmental Science* 7: 37. <https://doi.org/10.3389/fenvs.2019.00037>.
- Zimmerman, R., Zhu, Q. and Dimitri, C. (2016). Promoting resilience for food, energy, and water interdependencies. *Journal of Environmental Studies and Sciences* 6: 50–61. <http://doi.org/10.1007/s13412-016-0362-0>.
- Zohlnhöfer, R., and Rüb, F. (2016). *Decision-Making under Ambiguity and Time Constraints*. ECPR Press, Colchester, UK.